CHRISTIAN EMINENT COLLEGE, INDORE
(Academy of Management, Professional Education & Research)
An Autonomous Institution Established in 1996
NAAC (UGC) Accredited WITH GRADE "A"
F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011

2022-23

Scheme of Examination (Revised under NEP - As per Ordinance 14-A)

CBCS System

Scheme of Examination
&
Syllabus
For
Bachelor of Science
(B.Sc.)
Part I – Semester I & II
SESSION 2022-23

CHRISTIAN EMINENT COLLEGE, INDORE
ACADEMY OF MANAGEMENT, PROFESSIONAL EDUCATION & RESEARCH
An Autonomous Institution Established in 1996
AFFILIATED TO DEVI AHILYA VISHWAVIDYALAYA, INDORE
F-SECTOR, R.S.S. NAGAR, H.I.G. MAIN ROAD, INDORE

CHRISTIAN EMINENT COLLEGE, INDORE

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2022-23

Scheme of Examination (Revised under NEP - As per Ordinance 14-A)
B.Sc. Part I – Semester I

COURSE TYPE	COURSE NAME	COURSE CODE	COURSE TITLE	CREDITS	TOTAL HOURS	LECTURE HOURS PER WEEK	MIN. GRADE POINT OUT OF 10
MAJOR ANY ONE	**BSC – T/P 101**						
	Biotechnology	BSC – T 101A	Cell Biology and Biochemistry	04	60	04	04
		BSC – P 101A	Practical on CB&B	02	60	08	04
	Chemistry	BSC – T 101B	Fundamentals of chemistry	04	60	04	04
		BSC – P 101B	Practical On Qual. and Quantitative Chem. analysis	02	60	08	04
	Computer Science	BSC – T 101C	Comp. System Architecture	04	60	04	04
		BSC – P 101C	Practical on CSA	02	60	08	04
	Physics	BSC – T 101D	Thermodynamics and Statistical Physic	04	60	04	04
		BSC – P 101D	Practical on Thermodynamics & Sta. Physic	02	60	08	04
	Pharma. Chemistry	BSC – T 101E	Pharmaceutical Inorganic Chemistry	04	60	04	04
		BSC – P 101E	Practical on PIC	02	60	08	04
	Mathematics	BSC – T 101F	Algebra Vector analysis and Geometry	06	90	06	04
MINOR ANY ONE	**BSC – T/P 102**						
	Biotechnology	BSC – T 102A	Microbiology and Immunology-I	04	60	04	04
		BSC – P 102A	Practical on Microbiology and Immunology-I	02	60	08	04
	Chemistry	BSC – T 102B	Analytical Chemistry-I	04	60	04	04
		BSC – P 102B	Practical on Analytical Process and Techniques -I	02	60	08	04
	Computer Science	BSC – T 102C	Programming Methodologies & Data Structures-I	04	60	04	04
		BSC – P 102C	Practical on CSA-I	02	60	08	04
	Physics	BSC – T 102D	Mechanics and General Properties of Matter-I	04	60	04	04
		BSC – P 102D	Practical on Mechanics and General Properties of Matter-I	02	60	08	04
	Pharma. Chemistry	BSC – T 102E	Pharmaceutical Organic Chemistry-I	04	60	04	04
		BSC – P 102E	Practical on Pharmaceutical Organic Chemistry	02	60	08	04
	Mathematics	BSC – T 102F	Calculus and Differential Equations-I	06	90	06	04
GENRIC ELECTIVE ANY ONE	**BSC – T/P 103**						
	Pharmaceutical Chemistry	NPGE-T106	Pharmaceutical Organic Chemistry -I	03	45	03	04
		NPGE-P106	Practical on Pharmaceutical Organic Chemistry -I	01	30	02	04
	Computer Application	NPGE-T111	Programming Methodologies & Data Structures-I	03	45	03	04
		NPGE-P111	Practical on Programming Methodologies & Data Structures-I	01	30	02	04
	Mathematics	NPGE-T110	Matrices, Geometry and Vector Algebra-I	04	60	04	04
	Physics	NPGE-T112	Mechanics and General Properties of Matter-I	03	45	03	04
		NPGE-P112	Practical on MGPM-I	01	30	02	04
ABILITY ENHANCEMENT	**BSC – T 105**						
		NPAE-T101	Bhasha aur Snaskrati	02	30	02	04
		NPAE-T102	Environmental Education	02	30	02	04
TOTAL				**20**			

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2022-23

Scheme of Examination (Revised under NEP - As per Ordinance 14-A)
B.Sc. Part I – Semester I

Course Name	Course Code	Max. Marks					Min. Marks			
		Theory Examination		Practical Examination		TOTAL MARKS	Theory Exam.		Practical Marks	
		External	Internal	External	Internal		External	Internal	External	Internal
MAJOR COURSES (ANY ONE) TYPE 1 - CREDIT 06 (06+00)										
Mathematics	BSC – T 101F	60	40	-	-		21	14	-	-
MAJOR COURSES (ANY ONE) TYPE 2 - CREDIT 06 (04+02)										
Computer Science	BSC – T 101A	60	40	-	-		21	14	-	-
Practical on C.S.	BSC – P 101A	-	-	60	40		-	-	21	14
Biotechnology	BSC – T 101B	60	40	-	-		21	14	-	-
Practical on BT	BSC – P 101B	-	-	60	40		-	-	21	14
Chemistry	BSC – T 101C	60	40	-	-		21	14	-	-
Practical on CHE	BSC – P 101C	-	-	60	40		-	-	21	14
Physics	BSC – T 101D	60	40	-	-		21	14	-	-
Practical on PHY	BSC – P 101D	-	-	60	40		-	-	21	14
Pharma. Chemistry	BSC – T 101E	60	40	-	-		21	14	-	-
Practical on PH. CHE.	BSC – P 101E	-	-	60	40		-	-	21	14
MINOR COURSES (ANY ONE) TYPE 1 - CREDIT 06 (06+00)										
Mathematics	BSC – T 102F	60	40	-	-		21	14	-	-
MINOR COURSES (ANY ONE) TYPE 2 - CREDIT 06 (04+02)										
Computer Science	BSC – T 102A	60	40	-	-		21	14	-	-
Practical on C.S.	BSC – P 102A	-	-	60	40		-	-	21	14
Biotechnology	BSC – T 102B	60	40	-	-		21	14	-	-
Practical on BT	BSC – P 102B	-	-	60	40		-	-	21	14
Chemistry	BSC – T 102C	60	40	-	-		21	14	-	-
Practical on CHE	BSC – P 102C	-	-	60	40		-	-	21	14
Physics	BSC – T 102D	60	40	-	-		21	14	-	-
Practical on PHY	BSC – P 102D	-	-	60	40		-	-	21	14
Pharma. Chemistry	BSC – T 102E	60	40	-	-		21	14	-	-
Practical on PH. CHE.	BSC – P 102E	-	-	60	40		-	-	21	14
GENRIC ELECTIVE COURSES (ANY ONE) TYPE 1 - CREDIT 04 (04+00)										
Mathematics	NPGE-T110	60	40	-	-		21	14	-	-
GENRIC ELECTIVE COURSES (ANY ONE) TYPE 2 - CREDIT 04 (03+01)										
Computer Science	NPGE-T111	60	40	-	-		21	14	-	-
Practical on C.S.	NPGE-P111	-	-	100	-		-	-	35	-
Pharma. Chemistry	NPGE-T106	60	40	-	-		21	14	-	-
Practical on PCHE	NPGE-P106	-	-	100	-		-	-	35	-
Physics	NPGE-T112	60	40	-	-		21	14	-	-
Practical on PHY	NPGE-P112	-	-	100	-		-	-	35	-
ABILITY ENHANCEMENT - CREDIT 04 (04+00)										
Hindi Language – Bhasha aur Snaskrati	NPAE-T101	30	20	-	-		11	7	-	-
Environmental Education	NPAE-T102	30	20	-	-		11	7	-	-
TYPE 1 - 03 Theory										
TOTAL MARKS		400		-			200		-	
TYPE 2 - 02 Theory + 01 Theory + Practical										
TOTAL MARKS		500		-			250		-	
TYPE 3 - 01 Theory + 02 Theory + Practical										
TOTAL MARKS		600		-			300		-	
TYPE 4 - 03 Theory + Practical										
TOTAL MARKS		700		-			350		-	

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2022-23

Scheme of Examination (Revised under NEP - As per Ordinance 14-A)
B.Sc. Part I – Semester II

COURSE TYPE	COURSE NAME	COURSE CODE	COURSE TITLE	CREDITS	TOTAL HOURS	LECTURE HOURS PER WEEK	MIN. GRADE POINT OUT OF 10
MAJOR ANY ONE		**BSC – T/P 201**					
	Biotechnology	BSC – T 201A	Microbiology And Immunology	04	60	04	04
		BSC – P 201A	Practical on Mic & Imm.	02	60	08	04
	Chemistry	BSC – T 201B	Fundamentals of chemistry	04	60	04	04
		BSC – P 201B	Practical On Qual. and Quantitative Chem. analysis	02	60	08	04
	Computer Science	BSC – T 201C	Programming Methodologies & Data Structures	04	60	04	04
		BSC – P 201C	Practical on Office Tools & Programming Methodology Lab	02	60	08	04
	Physics	BSC – T 201D	Thermodynamics and Statistical Physic	04	60	04	04
		BSC – P 201D	Practical on Thermodynamics & Sta. Physic	02	60	08	04
	Pharma. Chemistry	BSC – T 201E	Pharmaceutical Inorganic Chemistry	04	60	04	04
		BSC – P 201E	Practical on PIC	02	60	08	04
	Mathematics	BSC – T 201F	Algebra Vector analysis and Geometry	06	90	06	04
MINOR ANY ONE		**BSC – T/P 202**					
	Biotechnology	BSC – T 202A	Microbiology and Immunology-II	04	60	04	04
		BSC – P 202A	Practical on Microbiology and Immunology	02	60	08	04
	Chemistry	BSC – T 202B	Analytical Chemistry-II	04	60	04	04
		BSC – P 202B	Practical on Analytical Process and Techniques	02	60	08	04
	Computer Science	BSC – T 202C	Programming Methodologies & Data Structures-II	04	60	04	04
		BSC – P 202C	Practical on CSA	02	60	08	04
	Physics	BSC – T 202D	Mechanics and General Properties of Matter-II	04	60	04	04
		BSC – P 202D	Practical on Mechanics and General Properties of Matter	02	60	08	04
	Pharma. Chemistry	BSC – T 202E	Pharmaceutical Organic Chemistry-II	04	60	04	04
		BSC – P 202E	Practical on Pharmaceutical Organic Chemistry	02	60	08	04
	Mathematics	BSC – T 202F	Calculus and Differential Equations-II	06	90	06	04
GENRIC ELECTIVE ANY ONE		**BSC – T/P 203**					
	Pharmaceutical Chemistry	NPGE-T206	Pharmaceutical Organic Chemistry –II	03	45	03	04
		NPGE-P206	Practical on Pharmaceutical Organic Chemistry –II	01	30	02	04
	Computer Application	NPGE-T211	Programming Methodologies & Data Structures-II	03	45	03	04
		NPGE-P211	Practical on Programming Methodologies & Data Structures-II	01	30	02	04
	Mathematics	NPGE-T210	Matrices, Geometry and Vector Algebra-II	04	60	04	04
	Physics	NPGE-T212	Mechanics and General Properties of Matter-II	03	45	03	04
		NPGE-P212	Practical on MGPM-II	01	30	02	04
ABILITY ENHANCEMENT		**BSC – T 205**					
		NPAE-T201	English Language and Indian Culture	02	30	02	04
		NPAE-T202	Yoga and Meditation	02	30	02	04
TOTAL				**20**			

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2022-23

Scheme of Examination (Revised under NEP - As per Ordinance 14-A)
B.Sc. Part I – Semester II

Course Name	Course Code	Max. Marks					Min. Marks			
		Theory Examination		Practical Examination		TOTAL MARKS	Theory Exam.		Practical Marks	
		External	Internal	External	Internal		External	Internal	External	Internal
MAJOR COURSES (ANY ONE) TYPE 1 - CREDIT 06 (06+00)										
Mathematics	BSC – T 201F	60	40	-	-		21	14	-	-
MAJOR COURSES (ANY ONE) TYPE 2 - CREDIT 06 (04+02)										
Computer Science	BSC – T 201A	60	40	-	-		21	14	-	-
Practical on C.S.	BSC – P 201A	-	-	60	40		-	-	21	14
Biotechnology	BSC – T 201B	60	40	-	-		21	14	-	-
Practical on BT	BSC – P 201B	-	-	60	40		-	-	21	14
Chemistry	BSC – T 201C	60	40	-	-		21	14	-	-
Practical on CHE	BSC – P 201C	-	-	60	40		-	-	21	14
Physics	BSC – T 201D	60	40	-	-		21	14	-	-
Practical on PHY	BSC – P 201C	-	-	60	40		-	-	21	14
Pharma. Chemistry	BSC – T 201E	60	40	-	-		21	14	-	-
Practical on PH. CHE.	BSC – P 201E	-	-	60	40		-	-	21	14
MINOR COURSES (ANY ONE) TYPE 1 - CREDIT 06 (06+00)										
Mathematics	BSC – T 202F	60	40	-	-		21	14	-	-
MINOR COURSES (ANY ONE) TYPE 2 - CREDIT 06 (04+02)										
Computer Science	BSC – T 202A	60	40	-	-		21	14	-	-
Practical on C.S.	BSC – P 202A	-	-	60	40		-	-	21	14
Biotechnology	BSC – T 202B	60	40	-	-		21	14	-	-
Practical on BT	BSC – P 202B	-	-	60	40		-	-	21	14
Chemistry	BSC – T 202B	60	40	-	-		21	14	-	-
Practical on CHE	BSC – P 202B	-	-	60	40		-	-	21	14
Physics	BSC – T 202B	60	40	-	-		21	14	-	-
Practical on PHY	BSC – P 202B	-	-	60	40		-	-	21	14
Pharma. Chemistry	BSC – T 202B	60	40	-	-		21	14	-	-
Practical on PH. CHE.	BSC – P 202B	-	-	60	40		-	-	21	14
GENRIC ELECTIVE COURSES (ANY ONE) TYPE 1 - CREDIT 04 (04+00)										
Mathematics	NPGE-T210	60	40	-	-		21	14	-	-
GENRIC ELECTIVE COURSES (ANY ONE) TYPE 2 - CREDIT 04 (03+01)										
Computer Science	NPGE-T211	60	40	-	-		21	14	-	-
Practical on C.S.	NPGE-P211	-	-	100	-		-	-	35	-
Phrama. Chemistry	NPGE-T206	60	40	-	-		21	14	-	-
Practical on PCHE	NPGE-P206	-	-	100	-		-	-	35	-
Physics	NPGE-T212	60	40	-	-		21	14	-	-
Practical on PHY	NPGE-P212	-	-	100	-		-	-	35	-
ABILITY ENHANCEMENT - CREDIT 04 (04+00)										
English Language and Indian Culture	NPAE-T201	30	20	-	-		11	7	-	-
Yoga and Meditation	NPAE-T202	30	20	-	-		11	7	-	-
TYPE 1 - 03 Theory										
TOTAL MARKS		400		-			200		-	
TYPE 2 - 02 Theory + 01 Theory + Practical										
TOTAL MARKS		500		-			250		-	
TYPE 3 - 01 Theory + 02 Theory + Practical										
TOTAL MARKS		600		-			300		-	
TYPE 4 - 03 Theory + Practical										
TOTAL MARKS		700		-			350		-	

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC- T101A - CELL BIOLOGY AND BIOCHEMISTRY

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**
The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning Out comes:
Course Objectives:
The Main Objective of the course will be to build the basic foundation for studying Biotechnology. The Demand for Trained workforce in Biotechnology is ever growing in Fundamental Research and Industry Sector. Academic and Research Sectors also Require Interdisciplinary trained manpower to foster the Biotechnology Revolution. The restructured syllabus combines basic principles of Chemical and Biological sciences in light of advancements in technology. The curriculum aims to impart basic knowledge with emphasis on its applications to make the students ready for industries and research work in concerned field.

Learning Outcome: -At the end of the paper, a student should be able to:

1. Understand basics of cell biology.
2. Appreciate the importance of bonding and spatial arrangements of molecules for proper functioning and stability.
3. Understand both the physical as well as chemical properties of biomolecules.
4. The Student Could Pursue a career in biochemical testing. The decrease of increase in the amount of some of the biomolecules can have clinical significance.
5. Students can also go in for medical Laboratory Technique Courses. opening opportunities in hospitals and pathological laboratories.

Unit-I	12 Lectures

Cell as a Basic Unit:
1.   Historical background of the Cell
    1.1. History of Cell Biology.
    1.2. Cell Structure.
    1.3. Cell Theory.
2.   Prokaryotic Cell and Cell Organells:
    1.1 Ultrastructure of Prokaryotic Cell.
    1.2 Structure and function of cell organelles: Flagella. Pili, Cell wall, Cytoplasmic membrane, Nuclear region. Ribosomes, Vacuoles. Metachromatic. Microfilaments, Centriole, granules, Spores and Cysts, Microtubules
    1.3 Difference between Prokaryotic and Eukaryotic cells.
Key Words:- Cell theory, Prokaryotic Cell

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC- T101A - CELL BIOLOGY AND BIOCHEMISTRY

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-II	14 Lectures

Cell Organelles and Cell Cycle:

1. Eukaryotic Cell and Cell Organells:
   1.1 Ultrastructure of Eukaryotic cell (Plant and Animal cells).
   1.2 Structure and function of cell organelles: Cell membrane, Mitochondria. Chloroplast, Endoplasmic reticulum, Golgi bodies. Lysosomes. Peroxisomes, Nucleus.
2. Cell Cycle:
   2.1 Cell cycle and Cell division.
   2.2 Apoptosis or Cell death

Key Words: Eukaryotic cell, Cell organelles, Cell cycle. Apoptosis

Unit-III	14 Lectures

Molecular Structure of Water:

1. Water structure and Buffer:
   1.1. Properties of Water.
   1.2. Interaction of Water.
   1.3. Role of Water in Bio molecular Structure.
   1.4. Acid and Bases, Buffer solutions.
2. Chemical Bonds:
   2.1.Chemical Bonds (Ionic Bond, Covalent Bond, Coordinate Bond, Non-Covalent Bonds, Hydrogen Bond)

Key Words: - Water, Buffer, Chemical bonds.

Unit-IV	10 Lectures

Biomolecules:
Sources, Nomenclature. Classification. Structures, Characteristics, and Functions:
1. Carbohydrates.
2. Lipids,
3. Proteins and Nucleic Acids.

Key Words: - Carbohydrates, Proteins, Lipids, Nucleic Acids.

Unit-V	10 Lectures

Tools and Techniques
Principle and Applications of Light Microscopy. Centrifugation. Chromatography (Paper. Thin layer and Column). Colorimeter and Spectrophotometer.

Key Words: - Carbohydrates, Proteins, Lipids, Nucleic Acids

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC- T101A - CORE COURSE - CELL BIOLOGY AND BIOCHEMISTRY

MAX. MARKS:60+40 **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Textbooks, Reference Books, Other Resources:
Suggested Readings:

1. कोशिका विज्ञान एवं आनुवांशिकी. पी॰ के॰ गुप्ता रस्तोगी प्रकाशक
2. कोशिका जीवविज्ञान डॉ॰ मनीषकुमार शर्मा निखिल प्रकाशक
3. जैवरसायन भाटिया एवं कोहली आर॰डी॰बी॰ प्रकाशक
4. कोशिका जैविकीए आनुवंशिकीए जैवप्रौद्योगिकी शर्माए त्रिवेदी॰ आर॰ बी॰ डी प्रकाशक
5. जीवरसायन विज्ञान. डॉ॰ विजय कुमारए महेन्द्रप्रसाद जेॠ पी॰ बी॰ प्रकाशक
6. प्रायोगिक जैव रसायन भाटिया एवं कोहली आर॰ डी॰ बी॰ प्रकाशक
7. Industrial Biotechnology - B.D. Singh
8. Textbook of Biochemistry - S.P. Singh
9. Cell and Molecular Biology - P.K. Gupta
10. Cell Biology - P.S. Verma and Agrawal
11. Cell and Molecular Biology. - S.C.Rastogy
12. Cell Biology. - P.S. Verma and Agrawal

Suggested equivalent online courses:

1. https://pubs.acs.org/loi/bichaw (for Biochemistry),
2. https://pubs.acs.org/loi/bipret, https://guides.lib.uh.edu/biotech (for biotechnology)
3. http://www.freebookcentre.net/Biology/BioTechnology-Books.html e books on biotechnology
4. https://www.phindia.com/Books/Showe Books/MTExNA/Biotechnologye books on biotechnology
5. https://bookauthority.org/books/best-biotechnology-ebooks e books on biotechnology

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC- P101A – PRACTICAL ON CELL BIOLOGY AND BIOCHEMISTRY

MAX. MARKS: 60+40   **MIN. PASS MARKS: 21+14**
No. of Lectures per Week: 08 Hours   **Total Lectures: 60**

Course Objective: -
The Main Objective of the course will be to give hands-on practical knowledge in Biotechnology.

The Demand for Trained workforce in Biotechnology is ever growing in Fundamental Research and Interdisciplinary trained manpower to foster the Biotechnology. The curriculum aims to impart basic knowledge with research work in concerned field Industry Sector. Academic and Research Sectors also require interdisciplinary trained manpower to foster the Biotechnology revolution. The curriculum aim to impart the basic knowledge with emphasis on its applications to make the students ready for industries and research work in concerned field.

Learning Outcome:

At the end of the paper, a student will be able to:
1. Understand basic techniques of cell biology.
2. Know the physical as well as chemical properties of bio-molecules.
3. Pursue a career in biochemical testing. The decrease of increase in the amount of some of the biomolecules can have clinical significance.
4. Take medical Laboratory Technique Courses, opening opportunities in hospitals and pathological laboratories.

List of Experiment Exercise

1. To study the plant cell structure using various plant materials.

2. To study the animal cell structure using cheek cells.

3. To Prepare Onion root tip for the stages of Mitosis.

4. To Prepare and study the different stages of Mitosis and Meiosis.

5. To analyze Carbohydrates Quantitatively

6. To analyze proteins Quantitatively

7. To analyze lipids quantitatively

8. To prepare buffers

9. To separate plant pigments by paper chromatography

10. To separate amino acid by TLC

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC- T101C-COMPUTER SYSTEM ARCHITECTURE

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**
The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions

Course Learning Outcomes:

On Completion of this course, learners will be able to:
1. Understand the basic structure, operation and characteristics of digital computer.
2. Be able to design simple combination digital circuits based on given parameters.
3. Familiarity with working of arithmetic and logic unit as well as the concept of pipelining.
4. Know about hierarchical memory system including cache memories and virtual memory.
5. Understand concept and advantages of parallelism, threading, multiprocessors and multicore processors.

Unit-I	**12 Lectures**
Fundamentals of Digital Electronics: Data Types, Complements. Fixed-Point Representation, Floating-Point Representation, Binary and other Codes, Error Detection Codes. Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuits, Sequential Circuits, simple combination circuit design problems. **Circuits**- Adder- Subtractor, Multiplexer, Demultiplexer, Decoders, Encoders Flip – Flops, Registers, Counters. Basic Computer Organization: Instructive codes, Computer Registers, Computer Instruction, Timing & Control Instruction Cycle, Memory Reference Instruction, Input – Output & Interrupts, Complete Computer Description & Design of Basic Computer.	

Unit-II	**14 Lectures**
Instructions – Instructions formats, Addressing modes, Instructions Codes, Machine language, Assembly language. **Register Transfer and Micro operations –** Register Transfer Language, Register Transfer, Bus & Memory Transfer, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations. **Processor and Control Unit –** Hardwired vs Micro Programmed Control Unit, General Register Organization, Stack Organization, Instruction Format, Data Transfer & Manipulation, Program Control, Introductory concept of RISC, CISC, advantages and disadvantages of both. **Pipelining –** concept of pipelining, introduction to Pipelined data path and control – Handling Data hazards & Control hazards.	

Unit-III	**12 Lectures**
Memory and I/O Systems – Peripheral Devices, I/O Interface, Data Transfer Schemes – Program Control, Interrupt, DMA Transfer. I/O Processor. Memory Hierarchy, Processor vs. Memory Speed, High-Speed Memories, Main memory, Auxiliary Memory, cache Memory, Associative Memory, Interleaving, Virtual Memory, Memory Management.	

Unit-IV	**10 Lectures**
Parallelism – meaning, types of parallelism, introduction to Instruction-level-parallelism, Parallel processing challenges, Applications. **Flynn's classification** – Introduction to SISD, SIMD, MISD, MIMD **Hardware multithreading** – Introduction, types, advantages and applications. **Multicore processors** – Introduction, advantages, difference from multiprocessor.	

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC- T101C-COMPUTER SYSTEM ARCHITECTURE

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions

Unit-V	12 Lectures
Indian contribution to the field – Contribution of reputed scientists of Indian origin – like – Dr. Vinod Dham – Father of Intel Pentium Processor, Dr. Ajay Bhat – Co-Inventor of USB Technology, Dr. Vinod Khosla – Co-Founder of Sun Microsystems, Dr. Vijay P Bhatkar – Architect of India's national initiative in supercomputing, and many others. Parallel Computing projects of India – PARAM, ANUPAM, FLOSOLVER, CHIPPS etc. Other relevant contributors and contributions.	

TEXTBOOK:

Suggested Readings:
- M. Morris mano, "Computer System Architecture", PHI.
- Heuring Jordan, "Computer System Design & Architecture" (A.W.L.)
- William Stalling, "Computer Organization & Architecture", Pearson Education Asia.
- V. Carl Hamacher, "Computer Organization", TMH
- Tannenbaum, "Structured Computer Organization", PHI.

Suggestive digital platform web links:
https://www.youtube.com/watch?v=4TzMyXmzL8M
https://nptel.ac.in/courses/106/106/106106166/
https://nptel.ac.in/courses/106/106/106106134/
Suggested equivalent online courses
https://nptel.ac.in/courses/106/105/106105163/

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC- P101C – PRACTICAL ON COMPUTER ARCHITECTURE

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**
No. of Laboratory per Week: 08 Hours   **Total Lectures: 60**

Course Learning Outcomes

On completion of this course, learners will be able to:
1. Realization of the basic logic and universal gates.
2. Verify the behavior of logic gates using truth tables.
3. Implement Binary-to-Gray, Gray-to-Binary code conversions.
4. Design half and full adder circuit using basic gates.
5. Design and construct flip flops and verify the excitation tables.

Suggested Practicals:
1. To study basic gates (AND, OR, NOT) and verify their truth tables.
2. To convert a given binary number to Gray code using IC 7486.
3. To study and verify NND as Universal gate using IC 7400.
4. To study half adder using basic gates and verify its truth table.
5. To study Full Adder using basic gates and verify its truth table.
6. To realize basic gates (AND, OR, NOT) from Universal gates (NAND and NOR).
7. To verify truth table of 4-bit adder using IC7483.
8. To design and construct RS flip flop using gates and verify the truth table.
9. To design and construct KJ flip flop using gates and verify the truth table.
10. To verify DeMorgan's Theorem.

Suggested Readings:
- M. Morris mano, "Computer System Architecture", PHI.
- Heuring Jordan, "Computer System Design & Architecture" (A.W.L.)
- William Stalling, "Computer Organization & Architecture", Pearson Education Asia.
- V. Carl Hamacher, "Computer Organization", TMH
- Tannenbaum, "Structured Computer Organization", PHI.

Suggestive digital platform web links:
https://www.youtube.com/watch?v=4TzMyXmzL8M
https://nptel.ac.in/courses/106/106/106106166/
https://nptel.ac.in/courses/106/106/106106134/
Suggested equivalent online courses
https://nptel.ac.in/courses/106/105/106105163/

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC- T102B - ANALYTICAL CHEMISTRY-I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning Outcomes (CLO):
By the end of this course students will learn the following aspects of Chemistry:
I.   Basic concepts of Mathematics for Chemists.
2.   Fundamentals of analytical chemistry and steps involved in analysis.
3.   Basic knowledge of Computer for chemists.
4.   Basic Concepts of Chemical equilibrium.
5.   Principles of Chromatography and chromatographic techniques.
Various techniques of Spectroscopic Analysis.

Unit-I	12 Lectures
Mathematics for Chemists Straight line equation, Logarithmic relations. curve sketching, li near graphs & calculation of slopes. Differentiate ion, differentiation of functions like kx. e^x, x^n • $\sin x$. $\log x$, maxima & minimum, partial differentiation. Integration of some useful relevant functions. **Keywords/Tags:** linear graphs, Logarithmic Relation, Differentiation, integration	
Unit-II	12 Lectures
Basic Analytical Chemistry: Introduction to Analytic al Chemistry and its interdisciplinary nature. Concept of sampling. Importance of Accuracy. Precision and sources of error in analytical measurements. Presentation of experimental data and result s. from the point of view of significant figures. Statistical terms: mean, mean deviation, median, standard deviationn. Numerical Problems. **Keywords/Tags:** Accuracy, Precision,	
Unit-III	14 Lectures
Calculations used in Analytical Chemistry **Some Important units of measurements-** SI Units, distinction between mass and weight, mole, milli mole and Numerical Problems. **Solution and their concentrations-Concept** of Molarity, Molality and Normality. Expressing the concentration in parts per million (ppm), parts per billion (ppb), numerical Problems. **Chemical Stoichiometry-** Empirical and Molecular Formulas, Stoichiometric Calculations. Numerical Problems. **Keywords/Tags:** SI units, Units of Concentration, Chemical stoichiometry	
Unit-IV	10 Lectures
Computer for Chemists Introduction to computer, Introduction to operating systems like -DOS,Windows, Linux and Ubuntu . **Keywords/Tags:** DOS,Windows, Linux and Ubuntu	
Unit-V	12 Lectures
Use of computer programs Running of standard programs & packages such as MS- word, MS-excel.PowerPoint, Execution of linear regression x-y Plot. Use of softwares for drawing structures and molecular formulae. **Keywords/Tags:** Operating Systems, MS-word, MS-excel, PowerPoint.	

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC- T102B - ANALYTICAL CHEMISTRY-I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Learning resources

Text Books, Reference Books, Other Resources

 Text Books
1. Gaur, S.. Computer for Chemists, Neel Kama l Prakashan, 201 7
2. Khopka r, S.M. Basic Concepts of Analytical C hem istry. New Age, International Publisher, 2009
3. Kaur H, Analytical Chemistry , Pragati P rakashan (2008)
4. Gupta, Alka L. Analytical Chemistry, Pragati Prakas han (2020)
5. Bahl, A. & Bahl, B.S. Advanced Organic Che mis try, S. Chand, 2010

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC- P102B – PRACTICAL ON ANALYTICAL PROCESSES AND TECHNIQUES-I

 MAX. MARKS: 60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per Week: 08 Hours   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning Outcomes (CLO):

 By the end of this course students will learn the following aspects of Laboratory exercises in Chemistry:

1. Concepts and analytical methods in Chemistry.
2. Determination of melting point.
3. Determination of boiling point .
4. Preparation of solutions of different concentrations.
5. Standardization of the solution.
6. Identification of Organic compounds by chromatographic techniques.
7. Analysis by Spectral Techniques.

Experiments to be performed in laboratory

1. Basic analytical exercises

- Calibration of different weights and glassapparatus (measuring cylinder, burette, pipette, volumetric flasks).
- Preparation of solutions of different molarity/normality by weighing and dilution.

References:
1. Skoog, D.A. and Leary, J.J.: Instrumental Methods of Analysis, Saunders College Publications, New York, 1992
2. Vogel's textbook of quantitative chemical analysis, 7th edition.
3. Goswami A.K., Mehta Anita, Khanam Rehana, ORS., UGC Practical Chemistry VOL. I, PragatiPrakashan, 2015.
4. Goyal Sudha, B.Sc. Chemistry Practical, Krishna Publication, 2017.
5. Tandon, M.N., Unified RasayanVigyan, Shivlal Agarwal & Company. 2018

Suggestive digital platforms web links:
1. https://www.youtube.com/watch?v--0A1mRDzuTh8
2. http://amrita.olabs.eduinnsub=738thrch=88,sim=1338,cnt =1
3. http://chemcollective.orgivlabs
4. http://mas-iiith.vlabs.ac.in/exp6/Quiz.html
5. https://chem.libretexts.org/Ancillary_Materials/Laboratory_Ex periments/Wet Lab Experiments/General Chemistry Labs/On line Chemistry Lab Manual/Chem 9 Experiments/02%3A_P aper Chromatography of Gel Ink Pens jExperiment)
6. https://edu.rsc.org/experimen ts/leaf-chromatography/389.artic le
7. https://ed u. rsc.org/experi men ts/chromatography-of-sweets/455 .article

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC- T102F- CALCULUS AND DIFFERENTIAL EQUATIONS-I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 06 per Hour   **Total Lectures: 90**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning outcome:
The course will enable the students to:
1. Sketch curves in a plane using its Mathematical properties in the different coordinate systems of reference.
2. Using the derivatives in Optimization, Social sciences, Physics and Life sciences etc.

Unit-I	**18 Lectures**
Historical Background	
Development of Indian Mathematics:	
Ancient and early classical period (till 500 CE)	
A brief biography of Bhaskaracharya (with special reference to Leelawati) and Madhva	
Successive Differentiation	
Leibnitz theorem	

Unit-II	**16 Lectures**
Maclaurin series expansions	
Taylor series expansions	
Partial Differentiation	
Partial derivatives of higher order	
Euler's theorem on homogeneous functions	

Unit-III	**20 Lectures**
Asymptotes	
Asymptotes of algebraic curves	
Condition for Existence of Asymptotes	
Parallel Asymptotes	
Asymptotes of Polar curves	
Integration of transcendental functions	
Reduction formulae	

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC- T102F- CALCULUS AND DIFFERENTIAL EQUATIONS-I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 06 per Hour   **Total Lectures: 90**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning outcome:

The course will enable the students to:

1. Sketch curves in a plane using its Mathematical properties in the different coordinate systems of reference.
2. Using the derivatives in Optimization, Social sciences, Physics and Life sciences etc.
3. Formulate the Differential equations for various Mathematical models.
4. Using techniques to solve and analyze various Mathematical models

Unit-IV	**20 Lectures**
Curvature	
Formula for radius of curvature	
Curvature at origin	
Centre of curvature	
concavity and convexity	
concavity and convexity of curves	
Points of inflexion	
Singular Point	
Multiple points	
Tracing of curves	
Curves represented by Cartesian equation	
Curves represented by Polar equation	

Unit-V	**16Lectures**
Introduction to Double & Triple Integrals	
Quadrature	
For Cartesian Coordinates	
For Polar Coordinates	
Rectification	
For Cartesian Coordinates	
For Polar Coordinates	

Books:

1.Gorakh Prasad: Differential Calculus, Pothishala Pvt. Prayagraj 2016

2. Gorakh Prasad: Integral Calculus, Pothishala Pvt. Prayagraj 2015

.3. Gerard G. Emch. R. Sridharan and M.D.Srinivas : Conrtibution to the history of Indian Mathematics, Hindustan Book Agencies Vol.3, 2005

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC– T 103 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-T106 - PHARMACEUTICAL ORGANIC CHEMISTRY -I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 03 per Hour   **Total Lectures: 45**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.
Course Learning outcome:
The course would enable the students to develop the concept of pharmaceutical organic compounds and their application in daily life. This will provide a foundation for various applied fields in pharmaceutical chemists.

Unit-I	**08 Lectures**
Historical background & Pharmaceutical Organic Chemistry	
Historical background: A brief historical background of pharmaceutical chemistry in the context of India and Indian culture, A brief biography of Prof. Bishnupada Mukherjee, Important aspects of Pharmaceutical chemistry.	
Unit-II	**09 Lectures**
Pharmaceutical Organic Chemistry:	
Atomic and molecular orbitals, Covalent bond, hybrid orbitals, intra- and inter-molecular forces, bond length and bond dissociation energy, Dipole moment, polarity of the bond, polarity of the molecule, electronegativity, Inductive effect, resonance, hyperconjugation, hydrogen bonding and conjugation in cyclic and acyclic organic compounds.	
Unit-III	**10 Lectures**
Stereochemistry	

A) Optical isomerism:
Optical activity and chirality, enantiomers, diastereoisomers, meso compound, RS configuration, Absolute configuration, methods of determining configuration, molecules with more than one chiral centre, Reaction of one Chiral molecules, Racemic modification and resolution of racemic mixture.

B) Geometrical Isomerism:
Nomenclature and methods of determination.

Unit-IV	**10 Lectures**
Synthesis and structure of Organic Compounds	
Nomenclature, preparation and structure of: Alkanes, Alkenes, Alkynes, Cycloalkanes, Dienes, Benzene, Polyaromatic Compounds, Arenes, Alcohols, Ethers, Epoxides, Phenol.	
Unit-V	**08 Lectures**
Reaction Mechanism	

Reactive Intermediates: Carbocation, Carbanions, Carbenes, Free Radicals, Benzyne, Nitrenes and Nitronium ions- their generation, fate and application.

Suggested Books

1. Organic Chemistry by I.L. Finar, Volume 1,n 6th edition, pearson educationIndia 2002.
2. Organic Chemistry Volume 2: Stereochemistry and the Chemistry of natural product, 5th edition by I.L. Finar, Pearson Education India, 2002.
3. Organic Chemistry by R.T. Morrison and R.N. Boyd, 6th edition, Pearson Education India, 2018.
4. Organic chemistry by J. Clayden , n. Greeves , S.Warren and P. Wothers , Oxford university Press,2001.

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC– T 103 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-T106 - PHARMACEUTICAL ORGANIC CHEMISTRY -I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 03 per Hour   **Total Lectures: 45**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

5. Wilson & Gisvolds textbook of organic medicinal and pharmaceutical chemistry by Beal, W olters Kluwer India Pvt. Ltd. 2010.
6. Bentley and Driver Textbook of Pharmaceutical Chemistry by L. M. Atherden , Eighth edition, Oxford university Press,2020.
7. A Guide book to Mechanism in Organic Chemistry by Peter Sykes ,6th edition ,Pearson Education India , 2003 .
8. Reaction mechanism in organic chemistry by S.P. Mukherjee, S.P. singh and Rajeev beri, Mecmillan India limited, New Delhi.

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC– T 103 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-P106 –PRACTICAL ON PHARMACEUTICAL ORGANIC CHEMISTRY -I

MAX. MARKS:100   **MIN. PASS MARKS: 35**

No. of Lectures per week: 08 per Hour   **Total Lectures: 60**

Course Learning Outcomes

After   completing   this   practical   course,   studentsare expected to

- Describe about laboratory practices, hazards and calibration of glass wares.
- Demonstrate synthesis, structure and identification of organic compounds.

Design experimental set up of various name reactions.

1. Introduction of good laboratory practices.
2. Study of possible hazards in the laboratory.
3. Study of various glass wares used in the laboratory.
4. Preparation, structure and identification of organic compounds and their derivatives: Phenols, amides, carbohydrates, amines, carboxylic acids.
5. Purification of organic compounds by crystallization using the following solvents:
    - Water
    - Alcohol

Determination of boiling point of liquid compounds. (Boiling point lower than and more than 100°C by distillation and capillary method).

Suggested Books

1. Mann, F.G. & Saunders, B.C. practical organic chemistry, Pearson Education (2009).
2. Furniss, B.S; Hannaford: A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)
3. Arora, V., Arora P., Shah, S. K., Umarkar, A. R., Pharmaceutical Organic Chemistry -I (Theory and Practical), S. Vikas and Company (PV), 2017.

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC– T 103 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-T111 - PROGRAMMING METHODOLOGIES & DATA STRUCTURES-I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per Week: 03 Hours   **Total Lectures: 45**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning Outcomes:

Unit-I	**09 Lectures**
Introduction of Programming –Algorithms, , Flowcharts, Types of Programming Methodologies. Introduction to C++ Programming – Basic Program Structure In C++, Data Types, Variables, Constants, Operators Basic I/O. Variables – Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Casting of	
Unit-II	**10 Lectures**
Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putchar etc.), Formatted and Console I/O (printf(), scanf(), cin cout), Using Basic Header Files (stdio.h, iostream.h, conio.h etc.) Operators and Operators Precedence . **Conditional Statements** if construct, switch-case construct.	
Unit-III	**08 Lectures**
Iterative Statements while, do-while, and for loops, Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative) **Functions** Pre-defined Functions, Programmer-defined Functions, Local Variables and Global variables, Functions with Default Arguments, Call-By-Value and Call-By-Reference Parameters, Recursion.	
Unit-IV	**10 Lectures**
Introduction to Arrays – Declaration and Referring Arrays, Arrays in Memory, Initializing Arrays. Arrays in Functions, one-dimensional arrays, two-dimensional arrays, Multi-Dimensional Arrays. **Pointer:** Introduction, Pointer to Pointer, Arithmetic operation **Structures** – Member Accessing, Pointers to Structures, Structures and Functions, Arrays of Structures.	
Unit-V	**08 Lectures**
Unions – Declaration and Initialization. **Strings** – Reading and writing Strings, Arrays of Strings, String and Function, Strings and Structure, Standard String Library Functions. **Searching Algorithms** – Linear Search, Binary Search.	

TEXTBOOK:
Suggested Readings:

- Lipdchutz: Schaum's Outline series Data structures, Tata Mcgraw-Hill.
- Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Pearson, 2015.
- E. Balguruswamy, "C++" TMH Publication ISBN O-07-462038-X.
- Herbertz Shiels, "C++ The Complete Reference" TMH Publication ISBN 0-07-463880-7.
- R. Lafore, "Object Oriented Programming C++"
- N. Dale and C. Weems, Programming and problem solving with C++: brief edition, Jones & Barlett Learning.
- Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning.
- Sartaj Sahani, Data Structures, Algorithms and Applications with C++, McGraw Hill.
- Robert L. Kruse, "Data Structures and Program Design in C++", Pearson.

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC– T/P 103 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-P111 – PRACTICAL ON PROGRAMMING METHODOLOGIES & DATA STRUCTURES-I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per Week: 02 Hours   **Total Lectures: 30**

1. Write a program to swap the contents of two variables.
2. Write a program for finding the roots of a Quadratic Equation.
3. Write a program to find area of a circle, rectangle, square using switch case.
4. Write a program to check whether a given number is even or odd.
5. Write a program to print table of any number.
6. Write program to print Fibonacci series.
7. Write program to find factorial of a given number.
8. Write program to convert decimal (integer) number into equivalent binary number.
9. Write a program to check given string in palindrome or not
10. Write program to perform multiplications of two matrices.
11. Write program to print digits of entered number in reverse order.
12. Write program to print sum of two matrices.
13. Write program to print multiplication of two matrices.
14. Write program to generate even/odd series from 1 to 100.
15. Write program whether a given number is prime or not.
16. Write a program for call by value and call by reference.
17. Write program to generate a series 1+1/1+2/2+3/3+_____+n/n
18. Write program to create a pyramid structure

    *
    **
    ***
    ****

19. Write program to create a pyramid structure

    1
    12
    123
    1234

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC– T/P 103 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-T112 -MECHANICS AND GENERAL PROPERTIES OF MATTER-I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per Week: 03 Hours   **Total Lectures: 45**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	09 Lectures

Historical Background :
A brief historical background of mathematics and mechanics in the context of India and Indian culture. A brief biography of Varahamihira and Vikram Sarabhai with their major contribution to science and society.

Mathematical Physics-I:

Scalar and vector fields, Gradient of a scalar field and its physical significance.
Vector integral: line integral, surface integral and volume integral. Divergence of a vector field   and its physical significance.

Unit-II	09 Lectures

Mathematical Physics-II:

Gauss divergence theorem, Curl of a vector field and its physical significance, Stokes and Green's theorem, Numerical problems based on the above topics.

Unit-III	09 Lectures

Rigid body mechanics:
System of particles and concept of rigid body, Torque, Centre of mass, Position of the Centre of mass, Motion of the Centre of mass, Conservation of linear and angular momentum with examples, Single stage and multistage rocket. Rotatory motion and concept of moment of inertia, Theorems of moment of inertia, Theorem of   addition, Theorem of perpendicular axis, Theorem of parallel axis, Calculation of moment of   inertia of rectangular lamina, Disc, Solid cylinder, Solid sphere.

Unit-IV	09 Lectures

Mechanics of deformable bodies-I:
Hook's law, Young's modulus, Bulk modulus, Modulus of rigidity and Poisson's ratio, Relationship   between various elastic moduli. Possible values of Poisson's ratio, Finding Poisson's ratio of rubber in the laboratory , Torsion of a cylinder, Strain energy of twisted cylinder.

Unit-V	09 Lectures

Mechanics of deformable bodies-II:
Finding the modulus of rigidity of the material of a wire by Barton's method, Torsional pendulum   and Maxwell needle, Searl's method to find Y, η and σ of the material of a wire, Bending of   beam, Cantilever, Beam supported at its ends and loaded in the middle.

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F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011

2022-23

Syllabus
B.Sc. Part I– Semester I

BSC– T/P 103 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-T112- MECHANICS AND GENERAL PROPERTIES OF MATTER-I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per Week: 03 Hours   **Total Lectures: 45**

Textbooks, Reference Books, Other resources
Suggested Readings:
- University Physics: Sears, Zeemansky & Young, Pearson Education
- Properties of Matter: D.S. Mathur, Shamlal Chritable Trust, New Delhi
- Unified Physics by R.P.Goyal, Shiva Lal Agrawala & Company
- Concepts of Physics: H.C. Varma, Bharati Bhavan Publishers
- Fundamentals of Physics; Halliday, Resnick & Walker, John Wiley & Sons
- Mechanics: D.S. Mathur, S Chand and Company, New Delhi

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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC– T/P 103 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-P112 – PRACTICAL ON MECHANICS AND GENERAL PROPERTIES OF MATTER-I

MAX. MARKS:100   **MIN. PASS MARKS: 35**

No. of Lectures per Week: 02 Hours   **Total Lectures: 30**

1. To determine acceleration due to gravity using bar pendulum.
2. To determine Modulus of a rigidity of wire by torsional pendulum.
3. Study of Oscillations under a bifilar suspension.
4. To determine moment of inertia of a fly wheel about its own axis of rotation.
5. Poisson's ratio using Searle's apparatus.
6. η by Maxwell Needle.
7. Moment of inertia of disc.

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(Academy of Management, Professional Education & Research)
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2022-23

Syllabus
B.Sc. Part I– Semester I

BSC - T105 (NPAE) – SKILL ENHANCEMENT / VOCATIONAL COURSE - ANY ONE (SEC) –
NPAE- T101 – HINDI AND SANSKRIT
भाषा और संस्कृत

MAX. MARKS:30+20   **MIN. PASS MARKS: 11+7**

No. of Lectures per Week: 2 Hours   **Total Lectures:30**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

कोर्स अधिगम उपलब्धि (लर्निंग आउटकम)(CLO):

1. उत्कृष्ट साहित्यिक पाठो के अध्ययन से रूचि का विकास करना ।
2. सांस्कृतिक चेतना और राष्ट्रीय भावना का विकास करना।
3. भाषा–ज्ञान।
4. सामान्य शब्दावली और विशेष शब्दावली के अध्ययन द्वारा भाषा एवं संस्कृति बोध का विकास करना
5. विशिष्ट शब्दावली (बीज शब्द / की वर्ड)से परिचित करवाते हुए बोध के स्तर का विकसित करना।
6. प्रतियोगी परीक्षाओं हेंतु तैयार करना।

Unit-I	**06 Lectures**
हिन्दी भाषा	

1. मैथिलीशरण गुप्त परिचय पाठः मातृभूमि(कविता)
2. प्रेमचन्द परिचय पाठःशतरंज के खिलाडी (कहानी)
3. पर्यायवाची शब्द विलोम भाब्दः अनेक शब्द के लिए एक शब्द (हिन्दीव्याकरण)

Unit-II	**06 Lectures**

1. व्यग्य शरद जोशी–जीप पर सवार इल्लियाॅ
2. वैचारिक–भारतीय भाषाओं में राम
3. संधि और उसके प्रकार (हिन्दीव्याकरण)

Unit-III	**06 Lectures**
हिन्दी भाषा	

1. आचार्य रामचन्द्र शुक्ल परिचय पाठः उत्साह (भावमूलक निबन्ध)
2. रामधारी सिंह दिनकर परिचय पाठःभारत एक है (संस्कृत)
3. समास और उसके प्रकार (हिन्दीव्याकरण)

Unit-IV	**06 Lectures**
हिन्दी भाषा	

1. आदिशंकराचार्य– जीवन व दर्शन
2. बीज शब्द–धर्म अद्वैत भाषा,अवधारणा उदारीकरण ।
4. अफसर (निबंध) शरद जोशी

Unit-V	**06 Lectures**

1. आचरण की सभ्यता (निबंध) सरदार पूरनसिंह
2. नैतिक मूल्य –परिचय और वर्णीकरण (आलेख)
3. अन्तर्ज्ञान एवं नैतिक जीवन

CHRISTIAN EMINENT COLLEGE, INDORE
(Academy of Management, Professional Education & Research)
An Autonomous Institution Established in 1996
NAAC (UGC) Accredited WITH GRADE "A"
F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011

2022-23

Syllabus
B.Sc. Part I– Semester I

BSC - T105 (NPAE) – SKILL ENHANCEMENT / VOCATIONAL COURSE - ANY ONE (SEC) – NPAE- T101 – HINDI AND SANSKRIT
भाषा और संस्कृत

MAX. MARKS:60+40   **MIN. PASS MARKS:**

No. of Lectures per Week: 2 Hours   **Total Lectures: 30**
The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

सारबिन्दु (की वर्ड):
सर्च करे
मैथिलीशरणगुप्त   : मैथिलीशरणगुप्त की कविता मातृभूमि
प्रेमचंद   : प्रेमचंद शंतरज के खिलाडी
रामधारी सिंह दिनकर   : भारत एक है रामधारी सिंह दिनकर
आचार्य रामचन्द शुक   : उत्साह निबन्ध रामचन्द शुक्ल
ज्ञान चतुर्वेदी   : सूर्यग्रहण और चूहे व्यंग्य
स्वामी विवेकानन्द   : शिकागो व्याख्यान
धर्म क्या है
मिथक का अर्थ
भाषा विकास
भाषा परिभाषा
अवधारणा का अर्थ एवं परिभाषा
उदारीकरण की विशेषता
पर्यार्यवाची शब्द
विलोम शब्द
अनेक शब्द के लिए एक शब्द
सन्धि

BOOKS :
पाठ्य पुस्तके सन्दर्भ पुस्तकें,अन्य संसाधन
1   प्रेमचन्द–मानसरोवर खण्ड
2   आचार्य रामचन्द्र शुक्ल चिंतामणि भाग 1
3   डॉ वासुदेव नन्दन प्रसाद : आधुनिक हिन्दी व्याकरण और रचना, भारती भवन ,ठाकुर बाडी रोड पटना बिहार
4   डॉ राजेश्वर चतुर्वेदी, हिन्दी व्याकरण–उपकार प्रकाशन आगरा उ. प्र.
5   ज्ञान चतुवेदीः इक्यावन व्यंग्य रचनाएं
6   हिन्दी ज्ञान कोश
7   इन्टर नेट सामग्री–टैग में उल्लेखित

CHRISTIAN EMINENT COLLEGE, INDORE
(Academy of Management, Professional Education & Research)
An Autonomous Institution Established in 1996
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F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011

2022-23

Syllabus
B.Sc. Part I– Semester I

BSC - T105 (NPAE) – SKILL ENHANCEMENT / VOCATIONAL COURSE - ANY ONE (SEC) – NPAE- T102 – ENVIRONMENTAL EDUCATION

MAX. MARKS: 30+20   **MIN. PASS MARKS:11+7**

No. of Lectures per Week: 02 Hours   **Total Lectures:30**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning Outcomes (CLO):

1. To understand the various aspects of life forms, ecological processes, and the impacts on them by the human during Anthropogenic era.
2. To build capabilities to identify relevant environmental issues, analyze the various underlying causes, evaluate the practices and policies, and develop framework to make inform decisions.
3. To develop empathy for all life forms, awareness, and responsibility towards environmental protection and nature preservation.
4. To develop the critical thinking for shaping strategies such as; scientific, social, economic, administrative & legal, environmental protection, conservation of biodiversity, environmental equity and sustainable development.

Unit-I	**06 Lectures**
Environment and its Components • Multidisciplinary nature, Scope and Importance of Environment • Components of environment: Atmosphere, hydrosphere, Lithosphere. And Biosphere.	
Keywords: Environment	
Unit-II	**06 Lectures**
Natural Resources • Brief account of natural Resources and associated problems: Land Resources, Water Resource, Energy Resource • Concept of Sustainability and Sustainable Development	
Keywords: Forest, Mineral, Food, Land, Water, Energy, Sustainable Development	
Unit-III	**06 Lectures**
Biome, Ecosystem and Biodiversity: • Major Biomes: Tropical, Temperate, Forest, Grassland, Desert, Tundra, Wetland, Estuarine and Marine • Ecosystem: Structure function and types their Preservation& Restoration • Biodiversity and its conservation practices.	
Keywords: Biome, Ecosystem, Biodiversity	
Unit-IV	**06 Lectures**
Environmental Pollution: • Pollution: Types, Control measures, Management and associated problems. • Environmental Law and Legislation: Protection and conservation Acts. • International Agreement & Program.	

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An Autonomous Institution Established in 1996
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F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011

2022-23

Syllabus
B.Sc. Part I– Semester I

BSC - T105 (NPAE) – SKILL ENHANCEMENT / VOCATIONAL COURSE - ANY ONE (SEC) –
NPAE- T102 – ENVIRONMENTAL EDUCATION

MAX. MARKS: 30+20   **MIN. PASS MARKS:11+7**

No. of Lectures per Week: 02 Hours   **Total Lectures:30**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-V	06 Lectures

Pollution Management and social Issues:
- Environmental Movements, Communication and public awareness programme.
- National and International organisations related to environment conservation and monitoring.
- Role of information Technology in environment and human health.

Key words: Pollution, Environmental Legislation, Environmental Movement, Environmental programme and organisation.

Suggested Activities: (at least one)
1. Visit to an area to document environmental assets: rivers /forest /flora/ fauna
2. Visit to a local polluted site Urban/ Rural/ Industrial/ Agricultural
3. Study of simple ecosystem

Textbooks, Reference Books, Other Resources

1. Singh; J S., Singh S P. And Gupta, S R; " Ecology; Environment Science and Conservation", S Chand Publishing, New Delhi, (2018)
2. Divan, S. And Rosencranz, A, "Environmental Law and Policy in India: Cases, Material & Status" Oxford University Press, India,(20020 2ND Edition.
3. Odum, E. P. , 'Fundamental of Ecology'. Philadelphia Saundres, (1971)
4. Bharucha, Erach, "Environmental Studies" University Press India Pvt Ltd. Hyderbad (2014) (Hindi edition also available).
5. Kaushik , Anubha, Kaushik, C. P. "Perspective in Environmental Studies" New Age International Publishers, (2018), 6th Edition.
6. Asthana, D. K.. Asthana Meera, " Atextbook of Environmental Studies" S Chand Publishing New Delhi, (2007)
7. National Digital Library(https://ndl.iitkgp.ac.in/homestudy/science)
8. Epg.pathshala (https://epgp.inflibnet.ac.in/home/Download)
9. NPTEL(https//nptel.ac.in/course.html)
10. Coursera(https://www.coursera.org/search?query =environmental+science&page=1)

Suggested equivalent online course-
i.   The health Effects of Climatic Change (edx)
ii.   Climate Change: Financial risks and Opportunities (edx)
iii. Introduction to Environmental Law and Policy (coursera)
iv.   Women in Environmental biology(coursera)
v.   Our Earth: It's Climate, History, and Processes(coursera)

CHRISTIAN EMINENT COLLEGE, INDORE
(Academy of Management, Professional Education & Research)
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NAAC (UGC) Accredited WITH GRADE "A"
F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011

2022-23

Syllabus
B.Sc. Part I– Semester II

BSC- T201A - MICROBIOLOGY AND IMMUNOLOGY

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

Unit-I	12 Lectures

1. History, Basic concepts of Microbiology:
    1.1. Fundamental, History and evolution of microbiology. Development of microbiology, Application of microbiology in human welfare.
    1.2. Classification, General characteristic, and structure of Bacteria, Fungi and Viruses.
2. Media Preparation:
2.1   Methods and Types: Culture, Minimal, Selective, differential, Transport media
2.2   Synchronous, Batch and Continuous culture.

Key Words: Classification of Microorganisms, Media Preparation.

Unit-II	13 Lectures

Microbial Growth and Growth measurement:

1. Microbial Growth:
1.1. Definition of growth, Mathematical expression of growth Growth Curve, Generation time. Growth yield. Effect of nutrients on growth.
1.2. Factor affecting growth: Nutrient, Temperature, Oxygen, pH,Osmotic pressure.

2. **Growth measurement:**
2.1. Measurement of Growth (Direct and Indirect methods) : cell number, Cell Mass and Cell Activity.
2.2. Cell Count: Turbidometric method, Plate count method. Membrane count method, Dry weight and Wet method by measurement of cellular activity.

Key Words: Growth, Measurement.

Unit-III	10 Lectures

Basics of Immunology:

1. Basics of Immunology:
1.1. Concept of Innate and Acquired immunity. Phagocytosis complements and Inflammatory responses.
1.2. Immune cells and organs: Structure, Function and Properties of immune cells - Stem cell, T-cell, B-cell, NK-cell. Macrophagus, Neutrophil, Eosinophil, Basophil, Mastcell, Dentric cell.
1.3. Immune organ: Bone marrow, Thymus, Lymph Node, Spleen. Lymphatic System.

Key Words: Immunity, Immune cells.

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An Autonomous Institution Established in 1996
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F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011

2022-23

Syllabus
B.Sc. Part I– Semester II

BSC- T201A -MICROBIOLOGY AND IMMUNOLOGY

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

Unit-IV	15 Lectures

Immunoglobulins and Immune response:

1. Immunoglobulins
   1.1. Antigens: Characteristics of an antigen: Foreignness. Molecular size, Chemical composition and Heterogeneity. Antigen Adjuvants, Epitopes, Haptens.

   1.2. Antibodies: Structure, Types, Functions and Properties of antibodies Antigenic determinant on antibodies(Isotypic, Allotypic, Idiotypic). Monoclonal, Polyclonal and Chimeric antibody.

2. **Immune response:**
1.1 Generation of immune response: Primary and Secondary immune response, generation of Humoral response (Plasma and Memory cell),
Generation of cell mediated immune response (self MHC restriction, T-cell activation, Co-stimulatory signals), Killing Mechanisms by CTL and NK cells, Introduction to tolerance
Key Words: Antigens, Antibody.

Unit-V	10 Lectures

Microbial, Immunological Techniques and Vaccination:

1. Microbial Techniques:
1.1. Principle, Working and applications of instruments -Laminar airflow, Autoclave, Hot air oven.
 2. Immunological techniques:
1.2 RIA, ELISA, Western blotting. Principles of Precipitation. Agglutination, Immunodiffsion, Immunoelectophorosis.
3. Vaccination:
1.1 Vaccines and vaccination: Rubella, Varicella (Chickenpox). Polio, Diptheria, Hepatitis vaccine.
Key Words: RIA, ELISA, Laminar air flow, Autoclave, Vaccine.

Textbooks, Reference Books, Other resources
Suggested Readings -

1. Fundamentals of microbiology and immunology; A.K.Banerjee and Nirmalaya Banerjee, New Central Book Agency, New Delhi
2. Modern concepts of microbiology; H.D. Kumar and Swati Kumar., Vikas Publishing House Pvt Ltd., 2nd Edition.
3. Microbiology ;M.J. Pelczar, E.C.S. Chan and N.R.Krieg, McGraw Hill Book company. 1993, 5th edition
4. A text book of microbiology :R.C.Dubey and D.K.Maheshwari . S Chand and Company Ltd 2004, 1st edition.
5. Microbiology ;P.D.Sharma, Rastogi Publication,Meerut.
6. General Microbiology Vol and II; C.B. Powar and H.F.Dagniwala. HimalayaPublication.
7. Microbiology Fundamental and Applications: S.S.Purohit, Agrobias, 7th Edition.
8. Immunology :K.R. Joshi, Agrobios, 5th edition.

CHRISTIAN EMINENT COLLEGE, INDORE

(Academy of Management, Professional Education & Research)

An Autonomous Institution Established in 1996

NAAC (UGC) Accredited WITH GRADE "A"

F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011

2022-23

Syllabus
B.Sc. Part I– Semester II

BSC- T201A - MICROBIOLOGY AND IMMUNOLOGY

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

9. प्रतिरक्षाविज्ञान, सूक्ष्मजैविकी एवं जैवप्रोद्योगिकी; अरविंदलाल भाटिया, नरेंद्र जैन, महासिंह, RBD Publication, New Delhi.

10. पर्यावरण एवंप्रोद्योगिकी, प्रवीणचन्द्र त्रिवेदी - हिंदीpdf पुस्तक.

11. सूक्ष्मजीवविज्ञान इम्तियाज वानी, मनीषशर्मा, पुष्पेन्द्र चौधरी, S. Vikas and company. Jalandhar..

12. आण्विक जैविकी एवंजैवप्रोद्योगिकी; पी. के. गुप्ता, Rastogi Publication Meerut.

Suggested digital platforms web links

1. http://www.freebookcentre.net >...free microbiology books download Ebooks online   Textbooks
2. http://open.oregonstate.education>...General Microbiology- Open Textbook-Open Textbooks
3. http://www.freebookcentre.net>...Immune System and Immunology (PDF63P) download book
4. http://hmmcollege.ac.in>3...PDF Introduction to Immunology
5. http://www.malecentrum.sk>...PDF IMMUNOLOGY &MICROBIOLOGY

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(Academy of Management, Professional Education & Research)

An Autonomous Institution Established in 1996

NAAC (UGC) Accredited WITH GRADE "A"

F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011

2022-23

Syllabus
B.Sc. Part I– Semester II

BSC- P201A – MICROBIOLOGY & IMMUNOLOGY

MAX. MARKS: 60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per Week: 08 Hours   **Total Lectures: 60**

Course Learning objective outcome

Course Objectives: The objective of the course is to prepare students competent in subject through in-depth lecture and laboratory practices

1   The students will be able to identify microbes using modern techniques.
2   The students will acquire skill and competence in microbiological and immunological laboratory practices applicable to microbiological research or clinical methods of immunology, including accurately reporting observations and analysis.

Course Learning Outcomes:

1   On completion of this course, learners will be able to have sufficient scientific understanding of microbiology and immunology
2   Students apply concept, Principle and types of sterilization methods viz performing microbiological experiments.
3   Students apply the concept and characteristics of antiseptic. disinfected and their mode of action in day to day life.
4   Students will apply principle, working and applications of instruments -Laminar airflow, Autoclave, Hot air oven etc

List of Practicals

1   To perform Aseptic technique, Cleaning of glassware's, preparation of Cotton
2   Plugging and Sterilization.
3   To prepare Bacterial and Fungal media,
4   To isolate microbes from Air, Water and Soil.
5   To Study dilution and plating by Pour Plate, Spread Plate methods.
6   To Study microorganisms by Staining method - Simple staining. Gram staining. Endospore staining, Fungal staining. Negative staining
7   To identify bacteria based on staining. Shape and Size.
8   To enumerate microorganism - Total and Viable count.
9   To study Antibiotic sensitivity of microbes by the use of antibiotic discs.
10 To isolate and identify pathogenic bacteria from sewage and waste water.
11 To identify of human blood groups .sample by hemocytometer. E. coli.
12 To Determine growth curve and generation time of
13 To enumerate total WBC of the given blood
14 To enumerate differential Leukocyte of the given blood sample.
15 To enumerate total RBC of the given blood sample by hemocytometer.
16 To isolate and Identify aquatic Fungi from Local water body.

CHRISTIAN EMINENT COLLEGE, INDORE
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NAAC (UGC) Accredited WITH GRADE "A"
F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011

2022-23

Syllabus
B.Sc. Part I– Semester II

B.Sc.- P201A – MICROBIOLOGY & IMMUNOLOGY

MAX. MARKS: 60+40   **MIN. PASS MARKS: 21+14**
No. of Lectures per Week: 08 Hours   **Total Lectures: 60**
Text Books, Reference Books ,Other Resources

Suggested Readings

1   Laboratory Techniques in Modern Biology :N.Swarup, S.C. Pathak, S. Arora, Kalyani Publication, New delhi,
2   Integrated Methodologies in Biology :Shashi Shrivatava .P. Banerjee, Arun Prakashan, Gwalior.
3   Experiment in Microbiology Plant Pathology and Biotechnology:K.R.Anejaa, New Age International New Delhi, 2007.
4   Laboratory Manual of Biotechnology: P.N.Swamy, Rastogi Publication .Meerut.
5   Practical Microbiology: R.C.Dubey, D.K.Maheshwari S Chand & Company, Delhi.
6   Manual of Experiments in Biotechnology :Leena Lakhani, Sheeba Khan, Kailash Pustak Sadan. ,Bhopal.

Suggested digital platforms web links

1.   http://lipguides.uphsc.edu>...ebooks Microbiology Immunology & Biochemistry

Suggested equivalent online courses:

1.   http://bookauthority.org>...Microbiology eBook

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2022-23

Syllabus
B.Sc. Part I– Semester II

BSC- T201C- PROGRAMMING METHODOLOGIES & DATA STRUCTURES

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions

Course Learning Outcomes:
On Completion of this course, learners will be able to:

1. Develop simple algorithms and flow charts to solve a problem with programming using top down design principles.
2. Writing efficient and well-structures computer algorithms/programs.
3. Learn to formulate iterative solutions and array processing algorithms for problem.
4. Use recursive techniques, pointers and searching methods in programming.
5. Will be familiar with fundamental data structures, their implementation; become accustomed to the description of algorithms in both functional and procedural styles.
6. Have knowledge of complexity of basic operations like insert, delete, search on these data structures.
7. Possess ability to choose a data structure to suitably model any data used in computer applications.
8. Design programs using various data structures including hash tables, Binary and general search trees, heaps, graphs etc.
9. Assess efficiency tradeoffs among different data structure implementations.
10. Implement and know the applications of algorithms for searching and sorting etc.
11. Know the contributions of Indians in the field of programming and data structures.

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	12 Lectures
Introduction of Programming –Algorithms, , Flowcharts, Types of Programming Methodologies. Introduction to C++ Programming – Basic Program Structure In C++, Data Types, Variables, Constants, Operators Basic I/O. Variables – Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putchar etc.), Formatted and Console I/O (printf(), scanf(), cin cout), Using Basic Header Files (stdio.h, iostream.h, conio.h etc.) Operators and Operators Precedence . **Conditional Statements** if construct, switch-case construct.	
Unit-II	**12 Lectures**
Iterative Statements while, do-while, and for loops, Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative) **Functions**: Pre-defined Functions, Programmer-defined Functions, Local Variables and Global variables, Functions with Default Arguments, Call-By-Value and Call-By-Reference Parameters, Recursion. **Introduction to Arrays** – Declaration and Referring Arrays, Arrays in Memory, Initializing Arrays. Arrays in Functions, one-dimensional arrays, two-dimensional arrays ,Multi-Dimensional Arrays.	

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2022-23

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B.Sc. Part I– Semester II

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MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

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Unit-III	12 Lectures

Pointer: Introduction , Pointer to Pointer , Arithmetic operation
Structures – Member Accessing, Pointers to Structures, Structures and Functions, Arrays of Structures.
Unions – Declaration and Initialization.
Strings – Reading and writing Strings, Arrays of Strings, String and Function, Strings and Structure, Standard String Library Functions.
Searching Algorithms – Linear Search, Binary Search.

Unit-IV	14 Lectures

Data Structure - Basic concepts, Linear and Non-Linear data Structures.
Linked List – Singly Linked Lists, Operations, Concatenating, circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists – Operations.
Stack – Operations, Array and Linked Implementations, Application-Infix to Postfix Conversion, Postfix Expression Evaluation, Recursion Implementation.
Queue – Definition, Operations, Array and Linked Implementations. Circular Queue-Insertion and Deletion Operations, Dequeue (Double Ended Queue), Priority Queue-Implementation

Unit-V	10 Lectures

Trees – Representation of Trees, Binary tree, Properties of Binary Trees, Binary Tree Representations- Array and Linked Representations, Binary Tree Traversals, Threaded Binary Trees.
Search Trees – Binary Search Trees, AVL Trees- Definition and Examples.
Heap – Definition, Insertion, Deletion.
Graphs – Graph ADT, Graph Representations, Graph Traversals, Searching.
Indian Contribution to the field: Innovations in India, origin of Julia Programming Language, Indian Engineers who designed new programming languages, open-source languages, Dr. Sartaj Sahni- computer scientist – pioneer of data structures, Other relevant contributors and contributions.

Suggested Readings:
- Lipdchutz: Schaum's Outline series Data structures, Tata Mcgraw-Hill.
- Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Pearson, 2015.
- E. Balguruswamy, "C++" TMH Publication ISBN O-07-462038-X.
- Herbertz Shiels, "C++ The Complete Reference" TMH Publication ISBN 0-07-463880-7.
- R. Lafore, "Object Oriented Programming C++"
- N. Dale and C. Weems, Programming and problem solving with C++: brief edition, Jones & Barlett Learning.
- Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning.
- Sartaj Sahani, Data Structures, Algorithms and Applications with C++, McGraw Hill.
- Robert L. Kruse, "Data Structures and Program Design in C++", Pearson.
- D.S. Malik, Data Structures using C++, Second edition, Cengage Learning.
- M.A. Weiss, Data Structures and Algorithms Analysis in C, 2nd edition, Pearson.

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2022-23

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No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

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Suggestive digital platform web links:
https://www.youtube.com/watch?v=BCIS40yzssA
https://www.youtube.com/watch?v=vLnPwxZdW4Y&vl=en
https://www.youtube.com/watch?v=Umn1ZQ51tZw
https://www.youtube.com/watch?v=AT141CXuMKI&list=PLdo5W4Nhv31bbKJzrsKfMpo_grxuL18LU
Suggested equivalent online courses:
https://nptel.ac.in/courses/106/105/106106151/
https://nptel.ac.in/courses/106/105/106106133/

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2022-23

Syllabus
B.Sc. Part I– Semester II

BSC- P201C-- PRACTICAL ON OFFICE TOOLS & PROGRAMMING METHODOLOGY LAB

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**
No. of Laboratory per Week: 08 Hours   **Total Lectures: 60**

Course Learning Outcomes (CLO)
On completion of this course, learners will be able to:

1. Develop simple algorithms and flow charts to solve a problem with programming using top down design principles.
2. Writing efficient and well-structures computer algorithms/programs.
3. Learn to formulate iterative solutions and array processing algorithms for problems.
4. Use recursive techniques, pointers and searching methods in programming.
5. Possess ability to choose a data structure to suitably model any data used in computer applications
6. Implementation of algorithms for searching and sorting.

Suggestive list of Practical's
I.   Office Tools
A.   Using a Text Editor Tool
1. Create a document and apply different Editing options.
2. Create Banner for Your College.
3. Design a Greeting Card using Word Art for different festivals.
4. Design your Bio data and use page borders and shading.
5. Create a document and insert header and footer, page title, date, time, apply various page formatting features etc.
6. Implement Mail Merge.
7. Insert a table into a document and try different formatting options for the table.

B.   Using a Spreadsheet Tool
1. Design your class Time Table.
2. Prepare a Mark Sheet of your class result.
3. Prepare a Salary Slip of an employee of an organization.
4. Prepare a bar chart & pie chart for analysis of Election Results.
5. Prepare a generic Bill of a Super Market.
6. Work on the following exercises on a Workbook:
   a.   Copy an existing Sheet
   b.   Rename the old Sheet
   c.   Insert a new Sheet into an existing Workbook
   d.   Delete the renamed Sheet.
7. Prepare an Attendance sheet of 10 students for any 6 subjects of your syllabus. Calculate their total attendance, total percentage of attendance of each student & average of attendance.
8. Create a worksheet of Students list of any 4 faculties and perform following database functions on it.
   a.   Sort data by Name
   b.   Filter data by Class
   c.   Subtotal of no. of students by Class.

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No. of Laboratory per Week: 08 Hours **Total Lectures: 60**

C. Using a Presentation Tool
1. Design a Presentation of your institute using auto content wizard, design template and blank presentation.
2. Design a presentation illustrating insertion of pictures, Word Art and ClipArt.
3. Design a presentation, learn how to save it in different formats, copying and opening an existing presentation.
4. Design a presentation illustrating insertion of movie, animation and sound.
5. Illustrate use of custom animation and slide transition (using different effects).
6. Design a presentation using charts and tables of the marks obtained in class.

II. Given the problem statement, students are required to formulate problem, develop flowchart/algorithms, write code in C++, execute and test it. Students should be given assignments on following:
1. a. To learn elementary techniques involving arithmetic operators and mathematical expressions, appropriate use of selection (if, switch, conditional operators) and control structures.
   b. Learn how to use functions and parameter passing in functions, writing recursive programs.
2. Write a program to swap the contents of two variables.
3. Write a program for finding the roots of a Quadratic Equation.
4. Write a program to find area of a circle, rectangle, square using switch case.
5. Write a program to check whether a given number is even or odd.
6. Write a program to print table of any number.
7. Write program to print Fibonacci series.
8. Write program to find factorial of a given number.
9. Write program to convert decimal (integer) number into equivalent binary number.
10. Write a program to check given string in palindrome or not
11. Write program to perform multiplications of two matrices.
12. Write program to print digits of entered number in reverse order.
13. Write program to print sum of two matrices.
14. Write program to print multiplication of two matrices.
15. Write program to generate even/odd series from 1 to 100.
16. Write program whether a given number is prime or not.
17. Write a program for call by value and call by reference.
18. Write program to generate a series 1+1/1+2/2+3/3+_____+n/n
19. Write program to create a pyramid structure
    *
    **
    ***
    ****

20. Write program to create a pyramid structure
    1
    12
    123
    1234

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Syllabus
B.Sc. Part I– Semester II

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No. of Laboratory per Week: 08 Hours   **Total Lectures: 60**

21. Write program to check entered number is Armstrong or not.
22. Write program for traversing an Array.
23. Write program to input N numbers, add them and find average.
24. Write program to find largest element from an array.
25. Write program for Linear search.
26. Write program for Binary search.
27. Write program for Bubble sort.
28. Write program for selection sort.

Suggested Readings:
- Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Pearson, 2015.
- E. Balguruswamy, "C++" TMH Publication ISBN O-07-462038-X.
- Herbertz Shiels, "C++ The Complete Reference" TMH Publication ISBN 0-07-463880-7.
- R. Lafore, "Object Oriented Programming C++"
- N. Dale and C. Weems, Programming and problem solving with C++: brief edition, Jones & Barlett Learning.
- Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning.
- Sartaj Sahani, Data Structures, Algorithms and Applications with C++, McGraw Hill.
- Robert L. Kruse, "Data Structures and Program Design in C++", Pearson.
- D.S. Malik, Data Structures using C++, Second edition, Cengage Learning.
- M.A. Weiss, Data Structures and Algorithms Analysis in C, 2nd edition, Pearson.
- Lipdchutz: Schaum's Outline series Data structures, Tata Mcgraw-Hill.

Suggestive digital platform web links:
https://www.youtube.com/watch?v=BCIS40yzssA
https://www.youtube.com/watch?v=vLnPwxZdW4Y&vl=en
https://www.youtube.com/watch?v=Umn1ZQ51tZw
https://www.youtube.com/watch?v=AT141CXuMKI&list=PLdo5W4Nhv31bbKJzrsKfMpo_grxuL18LU
Suggested equivalent online courses:
https://nptel.ac.in/courses/106/105/106106151/
https://nptel.ac.in/courses/106/105/106106133/

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2022-23

Syllabus
B.Sc. Part I– Semester II

BSC- T 202B ANALYTICAL CHEMISTRY-II

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning Outcomes (CLO):
By the end of this course students will learn the following aspects of Chemistry:
1. Basic concepts of Mathematics for Chemists.
2. Fundamentals of analytical chemistry and steps involved in analysis.
3. Basic knowledge of Computer for chemists.
4. Basic Concepts of Chemical equilibrium.
5. Principles of Chromatography and chromatographic techniques.

Various techniques of Spectroscopic Analysis.

Unit-I	10 Lectures
Chemical Equilibrium: Equilibrium constant and free energy, concept of chemical potential, Thermodynamic derivation of law of chemical equilibrium. Temperature dependence of equilibrium constant; Van' t Hoff reaction isochore, Van't Hoff reaction isotherm. Le-Chatelier's principle and its applications. **Keywords/Tags:** Chemical Equilibrium, Equilibrium constant, Free Energy and Chemical Potential	
Unit-II	**14 Lectures**
Chromatography Introduction, Principle and Classification. Mechanism of separation: adsorption, partition & ion-ex change. Development of chromatograms : frontal. elution and displacement Method Paper Chromatography. (ascending, descending and circular). Thin Layer Chromatography (TLC) and Column Chromatography (CC), Gas Chromatography (GC) and High Pressure Liquid Chromatography (HPLC), types of column and column selection, applications, limitations. **Keywords** -Chromatogram, Ion Exchange, Column Selection, Adsorption Chromatography.	
Unit-III	**12 Lectures**
Principle and Applications of: • Flash chromatography, • Ion-exchange chromatograph y and • Chiral chromatography. **Basics of absorption spectroscopy**: Electromagnetic radiation, Spectral range. Absorbance Absorptivity, Molar Absorptivity, Fundamental Laws or Absorption, Lambert-Beer Law and its limitations.Constitution & working of photometer, spectrometer, colorimeter.	
Unit-III	**12 Lectures**
Ultraviolet (UV) absorption spectroscopy- Presentation and analysis of UV spectra, Types of electronic transitions. Effect of conjugation. Concept of chromophore and auxochrome. Bathochromic . hypsoc hromic , Hyperchromic and hypochromic shifts. UV spectra of conjugated polyenes and enones.	

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2022-23

Syllabus
B.Sc. Part I– Semester II

BSC- T 202B ANALYTICAL CHEMISTRY-II

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-V	**12 Lectures**

Infra-red (IR) absorption spectroscopy-

Molecular vibrations, Hooke's law. selection rules, intensity and position of IR bands, Measurement or IR spectrum, finger print region, characteristic absorption of various functional groups and interpretation of IR spectra of simple organic compound s.

Keywords_/T_a,gs_: _Hyp.sochrom ic,, Hypochromic, Absorption Spectra

Learning resources
Text Books, Reference Books, Other Resources

Text Books
1. Kaur H, Instrumental Method s of Chemical Analysis, Pragati Prakashan, 2018
2. Sharma B.K. Chromatography. Krishna Prakashan.2019.

3. Sharma Y.R., Elementary Organic Spectroscopy. S Chand. 2013
4. Singh, DR, Saxe na. G., Sin gh, B., In o rgan ic Chemicals, Shivlal Aggarwal & Company, Agra
5. Srivastava, S. S., Gehlot, A. S., Chemistry, Ratan Prakashan Temple, Indore
6. Soni, PL, Organic Chemistry, Sultan Chand and Sons, Delhi

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2022-23

Syllabus
B.Sc. Part I– Semester II

BSC- P202B – PRACTICAL ON ANALYTICAL PROCESSES AND TECHNIQUES-II

MAX. MARKS: 60+40   **MIN. PASS MARKS: 21+14**
No. of Lectures per Week: 08 Hours   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning Outcomes (CLO):

By the end of this course students will learn the following aspects of Laboratory exercises in Chemistry:
1. Concepts and analytical methods in Chemistry.
2. Determination of melting point.
3. Determination of boiling point .
4. Preparation of solutions of different concentrations.
5. Standardization of the solution.
6. Identification of Organic compounds by chromatographic techniques.
7. Analysis by Spectral Techniques.

Quantitative Analysis
- Titrimetric Analysis
    - Standardization of NaOH with Oxalic acid.
    - Determination of carbonate and hydroxide present in mixture.
    - Determination of carbonate and bicarbonate present in a mixture.
    - Determination of free alkali present in different soaps/detergents.

Quantitative Analysis by Colorimetry
- Verification of Lambert-Beer Law,
- Determination of concentration of coloured compounds (e.g., CuSO KMnO4)

Qualitative Analysis
- Systematic identification of organic compound by qualitative analysis.
- chromatography:

Identification by determination of the R_f values of the given organic/ inorganic compounds by paper / thin layer chromatography.

References:
1. Skoog, D.A. and Leary, J.J.: Instrumental Methods of Analysis, Saunders College Publications, New York, 1992
2. Vogel's textbook of quantitative chemical analysis, 7th edition.
3. Goswami A.K., Mehta Anita, Khanam Rehana, ORS., UGC Practical Chemistry VOL. I, PragatiPrakashan, 2015.
4. Goyal Sudha, B.Sc. Chemistry Practical, Krishna Publication, 2017.
5. Tandon, M.N., Unified RasayanVigyan, Shivlal Agarwal & Company. 2018

Suggestive digital platforms web links:
1. https://www.youtube.com/watch?v--0A1mRDzuTh8
2. http://amrita.olabs.eduinnsub=738thrch=88,sim=1338,cnt =1
3. http://chemcollective.orgivlabs
4. http://mas-iiith.vlabs.ac.in/exp6/Quiz.html
5. https://chem.libretexts.org/Ancillary_Materials/Laboratory_Ex periments/Wet Lab Experiments/General Chemistry Labs/On line Chemistry Lab Manual/Chem 9 Experiments/02%3A_P aper Chromatography of Gel Ink Pens jExperiment)
6. https://edu.rsc.org/experimen ts/leaf-chromatography/389.artic le
7. https://ed u. rsc.org/experi men ts/chromatography-of-sweets/455 .article

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2022-23

Syllabus
B.Sc. Part I– Semester II

BSC- T202F- CALCULUS AND DIFFERENTIAL EQUATIONS-II

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 06 per Hour   **Total Lectures: 90**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning outcome:
The course will enable the students to:
1. Sketch curves in a plane using its Mathematical properties in the different coordinate systems of reference.
2. Using the derivatives in Optimization, Social sciences, Physics and Life sciences etc.
3. Formulate the Differential equations for various Mathematical models.
4. Using techniques to solve and analyze various Mathematical models

Unit-I	**18 Lectures**

Linear Differential Equations
    Linear equation
    Equations reducible to the linear form
    Change of Variables
Exact differential equation	

Unit-II	**16 Lectures**

First order and higher degree differential equations
        Equations Solvable for x, y and p
        Equations homogeneous in x and y	

Unit-III	**20 Lectures**
Clairaut's Equation Singular Solutions Geometrical Meaning of a Differential Equation Orthogonal Trajectories	
Unit-IV	**18 Lectures**
Linear differential equations with constant coefficients Homogenous linear ordinary differential equations	
Unit-V	**18 Lectures**
linear differential equations of second order Transformation of the equation by changing the dependent/independent variable Method of variation of parameters.	

Books:
1. M.D.Raisinghania : Ordinary and Partial Differential Equations S Chand and Company Ltd.
2. N.M. Kapoor , A Text Book of Differential Equation, Pitambar Publishing Company
3. G. Paria, Ordinary Differential Equation, Scholars Publishing House

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2022-23

Syllabus
B.Sc. Part I– Semester II

BSC– T/P 203 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-T212 -MECHANICS AND GENERAL PROPERTIES OF MATTER-II

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per Week: 03 Hours   **Total Lectures: 45**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	09Lectures

Surface tension: Intermolecular forces and potential energy curve, Force of cohesion and adhesion. Surface tension, Explanation of surface tension on the basis of intermolecular forces, Surface energy, Effect of temperature and impurities on surface tension, Daily life application of surface tension. Angle of contact, The pressure difference between the two sides of a curved liquid surface, Excess pressure inside a soap bubble, Capillarity, Determination of surface tension of a liquid- capillary rise method, Jaeger's method.

Unit-II	10 Lectures

Viscosity: Ideal and viscous fluid, Streamline and turbulent flow, Equation of continuity, Rotational and irrotational flow, Energy of a flowing fluid, Euler's equation of motion of a non- viscous fluid and its physical significance. Bernoulli's theorem and its applications (velocity of efflux, shapes of wings of airplane , Magnus effect, Filter pump, Bunsen's burner. Viscous flow of a fluid, Flow of liquid through a capillary tube, Derivation of Poiseuille's formula and limitations, Stokes formula, Motion of a spherical body falling in a viscous fluid.

Unit-III	08 Lectures

Conservative and non conservative force field, Conservation of energy in motion under the conservative and non-conservative forces, Potential energy.
Conservative force, conservation of energy, Gravitational potential and gravitational potential energy, Gravitational potential and intensity of gravitational field due to a uniform spherical shell and a uniform solid sphere.
Gravitational self- energy, gravitational self- energy of a uniform spherical shell and a uniform solid sphere.

Unit-IV	10 Lectures

Motion under central forces, Conservative characteristics of central forces. The motion of a two particle system in a central force, Concept of reduced mass, Reduced mass of positronium and hydrogen. Motion of particles in an inverse-square central force, Motion of celestial bodies and derivation of Kepler's laws. Elastic and inelastic scattering (elementary idea).

Unit-V	08 Lectures

Relativistic Mechanics:
Frame of references, Galilean transformation, Michelson- Morley experiment. Postulates of special theory of relativity, Lorentz transformation, Simultaneity and order of events, Length contraction, Time dilation, Relativistic transformation of velocities, Variation of mass with velocity. Mass-energy equivalence and its experimental verification.

Astrophysics:
Introduction to the universe, Properties of the sun, Concept of astronomical distance. Life cycle of a stars, Chandrasekhar limit, H-R diagram, Red giant star, White dwarf star, Neutron star, Black hole. Big Bang theory (elementary idea).

BOOKS:

- University Physics: Sears, Zeemansky & Young, Pearson Education
- Properties of Matter: D.S. Mathur, Shamlal Chritable Trust, New Delhi
- Unified Physics by R.P.Goyal, Shiva Lal Agrawala & Company
- Concepts of Physics: H.C. Varma, Bharati Bhavan Publishers
- Fundamentals of Physics; Halliday, Resnick & Walker, John Wiley & Sons
- Mechanics: D.S. Mathur, S Chand and Company, New Delhi

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2022-23

Syllabus
B.Sc. Part I– Semester II

BSC– T/P 203 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-P212 -MECHANICS AND GENERAL PROPERTIES OF MATTER-II

MAX. MARKS:100   **MIN. PASS MARKS: 35**

No. of Lectures per Week: 02 Hours   **Total Lectures: 30**

Suggested Practicals:
1. To determine Surface Tension by Jaegar's method.
2. To determine Viscosity of fluid using Stokes method.
3. Poisson's ratio of Rubber
4. To determine Young's Modulus by bending of beam method.
5. Force constant of spring (Series and parallel Combination).
6. To determine Young's Modulus of a material of a rod using Cantilever method.
7. Verification of laws of the parallel/perpendicular axes of moment of inertia.

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2022-23

Syllabus
B.Sc. Part I– Semester II

BSC– T/P 203 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-T206 - PHARMACEUTICAL ORGANIC CHEMISTRY -II

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 03 per Hour   **Total Lectures: 45**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning outcome:

The course would enable the students to develop the concept of pharmaceutical organic compounds and their application in daily life. This will provide a foundation for various applied fields in pharmaceutical chemists.

Unit-I	**08 Lectures**
Substitution Reactions in Organic Aliphatic Compounds: A) Nucleophilic substitution reactions: SN^1 and SN^2 reactions, mechanism, kinetics, order of reactivity and stereochemistry. B) Electrophilic Substitution reaction: Types and mechanism. Free Radical Mechanism.	
Unit-II	**10 Lectures**
Substitution Reactions in Organic Aromatic Compounds: C) Nucleophilic substitution reactions: SN^1 and SN^2 reactions and Benzyne mechanism, kinetics, order of reactivity and stereochemistry. D) Electrophilic Substitution reaction: Types and mechanism of Aromatic electrophilic sunstitution reaction.	
Unit-III	**10 Lectures**
Synthesis and Structure of Organic Compounds: Nomenclature, preparation and structure of: Amino-Nitro-Compounds, Aldehydes, Ketones, Carboxylic acids and their functional derivatives and their reaction profile.	
Unit-IV	**09 Lectures**
Synthesis and application of Organic Condensation reaction- Aldol Condensation, Claisen-Schmidt condensation, Cannizzaro reaction, Crossed and aldol and Crossed Aldol and Crossed Cannizzaro Reaction, Benzoin Condensation and Perkin Condensation.	
Unit-V	**08 Lectures**
Synthesis and application of Organic reaction- Witting reaction, Reformatsky reaction, Michael addition, Sandmeyer's reaction, Hoffmann rearrangement, Kolbe and Riemer- Tieman reactions.	

Suggested Books

1. Organic Chemistry by I.L. Finar, Volume 1,n 6th edition, pearson educationIndia 2002.
2. Organic Chemistry Volume 2: Stereochemistry and the Chemistry of natural product, 5th edition by I.L. Finar, Pearson Education India, 2002.
3. Organic Chemistry by R.T. Morrison and R.N. Boyd, 6th edition, Pearson Education India, 2018.
4. Organic chemistry by J. Clayden , n. Greeves , S.Warren and P. Wothers , Oxford university Press,2001.
5. Wilson & Gisvolds textbook of organic medicinal and pharmaceutical chemistry by Beal,
W olters Kluwer India Pvt. Ltd. 2010.
6. Bentley and Driver Textbook of Pharmaceutical Chemistry by L. M. Atherden , Eighth edition, Oxford university Press,2020.
7. A Guide book to Mechanism in Organic Chemistry by Peter Sykes ,6th edition ,Pearson Education India , 2003 .
8. Reaction mechanism in organic chemistry by S.P. Mukherjee, S.P. singh and Rajeev beri, Mecmillan India limited , New Delhi.

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An Autonomous Institution Established in 1996
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2022-23

Syllabus
B.Sc. Part I– Semester II

BSC– T/P 203 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-P206 – PRACTICAL ON PHARMACEUTICAL ORGANIC CHEMISTRY -II

MAX. MARKS:100   **MIN. PASS MARKS: 35**

No. of Lectures per week: 08 per Hour   **Total Lectures: 60**

Course Learning Outcomes

After completing this practical course, studentsare expected to

- Describe about laboratory practices, hazards and calibration of glass wares.
- Demonstrate synthesis, structure and identification of organic compounds.
    1. Study of possible hazards in the laboratory.
    2. Study of various glass apparatus used in the laboratory.
    3. Preparation, structure and identification of organic compounds and their derivatives: aldehydes and ketones, alcohols, esters, hydrocarbons, anilids, nitro compounds.
    4. Synthesis of Organic dug Molecules:
        - Aspirin
        - Thalimide
    5. Purification of organic compounds by crystallization using the Mixture of solvents:
        - Alcohol-Water
    6. Determination of the melting points of the above compounds and unknown organic compounds (Kjeldahl method and electrically heated melting point apparatus.
    7. Effect of impurities on the melting point- mixed melting point of two unknown organic compounds.

Suggested Books
    1. Mann, F.G. & Saunders, B.C. practical organic chemistry, Pearson Education(2009).
    2. Furniss, B.S; Hannaford: A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)
    3. Arora, V., Arora P., Shah, S. K., Umarkar , A. R., Pharmaceutical Organic Chemistry -I (Theory and Practical), S. Vikas and Company (PV), 2017.

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2022-23

Syllabus
B.Sc. Part I– Semester II

BSC– T 203 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-T211 - PROGRAMMING METHODOLOGIES & DATA STRUCTURES-II

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per Week: 03 Hours   **Total Lectures: 45**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning Outcomes:

Unit-I	10 Lectures

Data Structure - Basic concepts, Linear and Non-Linear data Structures.
 Stack – Operations, Array and Linked Implementations, Application-Infix to Postfix Conversion, Postfix Expression Evaluation, Recursion Implementation.

Unit-II	08 Lectures

Queue – Definition, Operations, Array and Linked Implementations. Circular Queue-Insertion and Deletion Operations, Dequeue (Double Ended Queue), Priority Queue-Implementation

Unit-III	08 Lectures

Linked List – Singly Linked Lists, Operations, Concatenating, circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists – Operations.

Unit-IV	10 Lectures

Trees – Representation of Trees, Binary tree, Properties of Binary Trees, Binary Tree Representations- Array and Linked Representations, Binary Tree Traversals, Threaded Binary Trees.
Search Trees – Binary Search Trees, AVL Trees- Definition and Examples.

Unit-V	08 Lectures

Heap – Definition, Insertion, Deletion.
Graphs – Graph ADT, Graph Representations, Graph Traversals, Searching.
Indian Contribution to the field: Innovations in India, origin of Julia Programming Language, Indian Engineers who designed new programming languages, open-source languages, Dr. Sartaj Sahni- computer scientist – pioneer of data structures, Other relevant contributors and contributions.

TEXTBOOK:
Suggested Readings:
TEXT BOOKS:
1. Data Structure: By Lipschultz (Schaums Outline Series)
2. Data Structures through C (A Practical Approach) by G.S. Baluja Data Structure: By Trembley & Sorrenson

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2022-23

Syllabus
B.Sc. Part I– Semester II

BSC– T 203 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-P211 - PROGRAMMING METHODOLOGIES & DATA STRUCTURES-II

MAX. MARKS:100   **MIN. PASS MARKS: 35**

No. of Lectures per week: 08 per Hour   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning Outcomes:

1. Write a program to perform insertion and deletion operation in the stack.
2. Write a program to perform insertion and deletion operation in the queue using static
3. implementation.
4. Write a program to perform insertion and deletion operation in queue using dynamic
5. implementation.
6. Write a program to insert a node at the beginning in singly linked list.
7. Write a program to insert a node at the middle in singly linked list.
8. Write a program to insert a node at the last in singly linked list.
9. Write a program to delete a node from the beginning in singly linked list.
10. Write a program to delete a node from the middle in the singly linked list.
11. Write a program to delete a node from the last in the singly linked list.
12. Write a program to traverse all the nodes in singly linked list.
13. Write a program to insert a node in the beginning in the circular linked list.
14. Write a program to insert a node at the last circular linked list.
15. Write a program to perform all the insertion operations in the singly linked list using switch case.
16. Write a program to perform all the deletion operations in the singly linked list using switch case.
17. Write a program to count the number of nodes in binary tree.
18. Write a program to evaluate postfix operation.
19. Write a program to convert infix operation to postfix operation.

CHRISTIAN EMINENT COLLEGE, INDORE

(Academy of Management, Professional Education & Research)
An Autonomous Institution Established in 1996
NAAC (UGC) Accredited WITH GRADE "A"
F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011

2022-23

Syllabus
B.Sc. Part I– Semester II

BSC – T205 (NPAE) – SKILL ENHANCEMENT / VOCATIONAL COURSE - ANYONE (SEC) –
NPAE-T201-ENGLISH LANGUAGE AND INDIAN CULTURE

MAX. MARKS:30+20   **MIN. PASS MARKS: 11+7**
No. of Lectures per Week: 2 Hours   **Total Lectures:30**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning outcomes (CLO)
Through this course the students will be able to:

1. Prepare for various competitive exams by developing their English language competence.
2. Promote their comprehension skills by being exposed to a variety of texts and their interpretations.
3. Build and enhance their Vocabulary.
4. Develop their Communication Skills by strengthening grammar and usages.
5. Inculcate values which make them aware of national heritage and environmental issues, making them responsible citizens.

Unit-I	**08 Lectures**

Reading, Writing and Interpretation Skills:
1. Where The Mind is Without Fear – Rabindranath Tagore **(Key Word: Patriotism)**
2. National Education – M.K. Gandhi **(Key Word: Edification)**
3. The Axe – R.K Narayan **(Key Word: Environment)**
4. The Wonder That Was India–A.L Basham (an excerpt) **(Key Word: Indian Mythology)**
5. Preface to the Mahabharata – C. Rajagopalachari **(Key Word: Indian Mythology)**

Unit-II	**06 Lectures**

Basic Language Skills:
Vocabulary Building: Suffix, Prefix, Synonyms, Antonyms, Homophones, Homonyms and One-word substitution

Unit-III	**05 Lectures**

Basic Language Skills
Basic Grammar: Noun, Pronoun, Adjective, Verb, Adverb, Prepositions, Articles, Time and Tenses

Unit-IV	**05 Lectures**

Comprehension Skills:
Unseen Passage followed by multiple choice questions, Dialogue Writing: Definition, How to write a good dialogue, Dialogue writing on Urban and Rural Life, Indoor and Outdoor Games, Print and Electronic Media etc.

Unit-V	**06 Lectures**

Composition:
Paragraph Writing-All that glitters is not gold, A friend in need is a friend indeed, Where there is will there is way, Work is worship, God help those who help themselves etc.
Application for leave, Scholarship, Duplicate Mark sheet etc.

Textbooks, Reference Books, Other Resources

- Essential English Grammar – Raymond Murphy, Cambridge University Press.
- Practical English Grammar Exercises 1 – A.J Thomson & A.V. Martinet, Oxford India.
- Practical English Usage – Michael Swan, Oxford
- English Grammar in Use – Raymond Murphy, Cambridge University Press.

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(Academy of Management, Professional Education & Research)
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2022-23

Syllabus
B.Sc. Part I– Semester II

CHRISTIAN EMINENT COLLEGE, INDORE
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An Autonomous Institution Established in 1996
NAAC (UGC) Accredited WITH GRADE "A"
F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011

2022-23

Syllabus
B.Sc. Part I– Semester II

BSC – T205 (NPAE) – SKILL ENHANCEMENT / VOCATIONAL COURSE
NPAE-T202-YOGA AND MEDITATION

MAX. MARKS:30+20   **MIN. PASS MARKS: 11+7**

No. of Lectures per Week: 2 Hours   **Total Lectures:30**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning outcomes (CLO) :
              After studying this course, students will be able to:
Take care of their own physical, mental, emotional, social and spiritual health.

Unit-I	06 Lectures

Introduction to Yoga and Yogic Practices:
- Yoga: Etymology, definitions, aim, objectives and misconceptions
- Yoga: Its Origin, history and development
- Rules and regulations to be followed by Yoga Practitioners
- Yoga in Modern Times: Yogic Traditions of Swami Vivekananda, Shri Aurobindo; Maharshi Ramana and Maharshi Dayanand Saraswati

Key words: History and Development of Yoga

Unit-II	06 Lectures

Yogic Practices in Life
- Introduction to Yoga Practices
- Shatkarma: Meaning, purpose and their significance in "Yoga Sadhana"
- Introduction to Yogic Loosening practices and Surya Namaskar

KeyWords: Shatkarma, Common Yogic Practices.

Unit-III	06 Lectures

Breathing Practices and Pranayama
- Sectional Breathing (Abdominal, Thoracic and Clavicular)
- Yogic Deep Breathing
- Concept of Puraka, Rechaka and Kumbhaka
- Concept of Bandha and Mudra

Key Words: Yogic Deep breathing, Puraka, Bandha, Mudra.

Unit-IV	06 Lectures

Breathing Practices and Pranayama
- AnulomaViloma/ NadiShodhana
- Shitali
- Bhramari

Key Words: Sectional Breathing, Deep Breathing, Bandha & Mudra, Shitali, Bhramari.

CHRISTIAN EMINENT COLLEGE, INDORE
(Academy of Management, Professional Education & Research)
An Autonomous Institution Established in 1996
NAAC (UGC) Accredited WITH GRADE "A"
F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011

2022-23

Syllabus
B.Sc. Part I– Semester II

BSC – T205 (NPAE) – SKILL ENHANCEMENT / VOCATIONAL COURSE
NPAE-T202-YOGA AND MEDITATION

MAX. MARKS:30+20   **MIN. PASS MARKS: 11+7**

No. of Lectures per Week: 2 Hours   **Total Lectures:30**

Unit-V	06 Lectures
Practices leading to Meditation: • Recitation of Pranava Mantra • Recitation of Hymns, in vocations and prayers • Anter Maun • Breath Meditation • Om Dhyana **Key Words:** Pranav Mantra, Antermaun, Breath Meditation, Om Dhyan	

Textbooks, Reference Books, Other Resources:
Suggested Readings:

- Singh S.P & Yogi Mukesh: Foundationof Yoga, Standard Publication, New Delhi, 2010
- Swami Dhirendra Brahmchari: Yogasana Vijnana, Dhirendra Yoga Publication, New Delhi, 1966
- Saraswati, Swami Satyanand: Asana, Pranayama, Mudra, Bandha (APMB), Yoga Publication Trust, Munger, 2013
- H.R. Nagendra: Asana, Pranayama, Mudra, Bandha, Swami Vivekananda Yog Prakashan, Bangalore, 2002
- Ishwar Bhardwaj: Saral Yogasana, Satyam Publishing House, New Delhi, 2018
- Shri Rai Singh Chouhan: Mudra Rahasya, Bhartiya Yog Sansthan, New Delhi, 2014
- Dr. Vishwanath Prasad Sanha: Dhyan Yoga, Bhartiya Yog Sansthan, New Delhi, 1987
- Shri Deshraj: Dhyan Sadhana, Dhyan Sadhana, Bhartiya Yog Sansthan, New Delhi, 2015

Suggestive digital platforms web links:
1. www.rishikeshnathyogshala.com

Suggested equivalent online courses:
1. https://shayji.com/hathayoga-course
2. https://theyogainstitute.org

CHRISTIAN EMINENT COLLEGE, INDORE
(Academy of Management, Professional Education & Research)
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F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011

2022-23

Scheme of Examination (Revised under NEP - As per Ordinance 14-A)

CBCS System
Scheme of Examination
&
Syllabus
For
Bachelor of Science
(B.Sc.)
Part II – Semester III & IV
SESSION 2022-23

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CHRISTIAN EMINENT COLLEGE, INDORE
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An Autonomous Institution Established in 1996
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2022-23

Scheme of Examination (Revised under NEP - As per Ordinance 14-A)
B.Sc. Part II – Semester III

COURSE TYPE	COURSE NAME	COURSE CODE	COURSE TITLE	CREDITS	TOTAL HOURS	LECTURE HOURS PER WEEK	MIN. GRADE POINT OUT OF 10
MAJOR ANY ONE	BSC – T/P 301						
	Biotechnology	BSC – T 301A	**Basic Molecular Biology**	04	60	04	04
		BSC – P 301A	**Practical on BMB**	02	60	08	04
	Chemistry	BSC – T 301B	Reactions, Reagents and Mechanism in Organic Chemistry	04	60	04	04
		BSC – P 301B	Practical On Organic Qualitative Analysis, reactions and synthesis	02	60	08	04
	Computer Science	BSC – T 301C	Computer Networks & Information Security System Architecture	04	60	04	04
		BSC – P 301C	Practical on CNA	02	60	08	04
	Physics	BSC – T 301D	Waves and Optics	04	60	04	04
		BSC – P 301D	Practical on Waves and Optics	02	60	08	04
	Pharma. Chemistry	BSC – T 301E	Pharmaceutical organic Chemistry-II	04	60	04	04
		BSC – P 301E	Practical on PIC-II	02	60	08	04
	Mathematics	BSC – T 301F	Abstract Algebra and Linear Algebra	06	90	06	04
MINOR ANY ONE	BSC – T/P 302						
	Biotechnology	BSC – T 302A	Recombinant DNA Technology	04	60	04	04
		BSC – P 302A	Practical on Recombinant DNA Technology	02	60	08	04
	Chemistry	BSC – T 302B	**Transition, Elements, Chemi-Energetics, Phase Equilibria-I**	04	60	04	04
		BSC – P 302B	**Practical on Transition, Elements, Chemi-Energetics, Phase Equilibria-I**	02	60	08	04
	Computer Science	BSC – T 302C	Object Oriented Programming with Java	04	60	04	04
		BSC – P 302C	Practical on OOPJ-I	02	60	08	04
	Physics	BSC – T 302D	Electricity, Magnetism And Electromagnetic Theory-I	04	60	04	04
		BSC – P 302D	Practical on Electricity, Magnetism And Electromagnetic Theory-I	02	60	08	04
	Pharma. Chemistry	BSC – T 302E	**Pharmaceutical Analytical Chemistry-I**	04	60	04	04
		BSC – P 302E	**Practical on Pharmaceutical Analytical Chemistry-I**	02	60	08	04
	Mathematics	BSC – T 302F	**Advanced Calculus and Partial Differential Equations-I**	06	90	06	04
GENRIC ELECTIVE ANY ONE	BSC – T/P 303						
	Chemistry	NPGE-T306	**Transition, Elements, Chemi-Energetics, Phase Equilibria-I**	03	45	03	04
		NPGE-P306	**Practical on Transition, Elements, Chemi-Energetics, Phase Equilibria-I**	01	30	02	04
	Computer Application	NPGE-T307	**Object Oriented Programming With Java-I**	03	45	03	04
		NPGE-P307	**Practical on Object Oriented Programming With Java-I**	01	30	02	04
	Physics	NPGE-T312	**Electricity, Magnetism And Electromagnetic Theory-I**	03	45	03	04
		NPGE-P312	**Practical on Electricity, Magnetism And Electromagnetic Theory-I**	01	30	02	04
VOCATION AL COURSE	BSC – T 304						
		NPVO-T301	Karyatmak Hindi Avam Naitik Mulya	02	30	02	04
		NPVO-T302B	Web designing-I	02	30	02	04
		NPVO-T302D	Organic Farming-I	02	30	02	04
TOTAL				**20**			

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(Academy of Management, Professional Education & Research)
An Autonomous Institution Established in 1996
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F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011

2022-23

Scheme of Examination (Revised under NEP - As per Ordinance 14-A)
B.Sc. Part II – Semester III

Course Name	Course Code	Max. Marks					Min. Marks			
		Theory Examination		Practical Examination		TOTAL MARKS	Theory Exam.		Practical Marks	
		External	Internal	External	Internal		External	Internal	External	Internal
MAJOR COURSES (ANY ONE) TYPE 1 - CREDIT 06 (06+00)										
Mathematics	BSC – T 301F	60	40	-	-		21	14	-	-
MAJOR COURSES (ANY ONE) TYPE 2 - CREDIT 06 (04+02)										
Biotechnology	BSC – T 301A	60	40	-	-		21	14	-	-
Practical on BT	BSC – P 301A	-	-	60	40		-	-	21	14
Chemistry	BSC – T 301B	60	40	-	-		21	14	-	-
Practical on CHE	BSC – P 301B	-	-	60	40		-	-	21	14
Computer Science	BSC – T 301C	60	40	-	-		21	14	-	-
Practical on C.S.	BSC – P 301C	-	-	60	40		-	-	21	14
Physics	BSC – T 301D	60	40	-	-		21	14	-	-
Practical on PHY	BSC – P 301D	-	-	60	40		-	-	21	14
Pharma. Chemistry	BSC – T 301E	60	40	-	-		21	14	-	-
Practical on PH. CHE.	BSC – P 301E	-	-	60	40		-	-	21	14
MINOR COURSES (ANY ONE) TYPE 1 - CREDIT 06 (06+00)										
Mathematics	BSC – T 302F	60	40	-	-		21	14	-	-
MINOR COURSES (ANY ONE) TYPE 2 - CREDIT 06 (04+02)										
Biotechnology	BSC – T 302A	60	40	-	-		21	14	-	-
Practical on BT	BSC – P 302A	-	-	60	40		-	-	21	14
Chemistry	BSC – T 302B	60	40	-	-		21	14	-	-
Practical on CHE	BSC – P 302B	-	-	60	40		-	-	21	14
Computer Science	BSC – T 302C	60	40	-	-		21	14	-	-
Practical on C.S.	BSC – P 302C	-	-	60	40		-	-	21	14
Physics	BSC – T 302D	60	40	-	-		21	14	-	-
Practical on PHY	BSC – P 302D	-	-	60	40		-	-	21	14
Pharma. Chemistry	BSC – T 302E	60	40	-	-		21	14	-	-
Practical on PH. CHE.	BSC – P 302E	-	-	60	40		-	-	21	14
GENRIC ELECTIVE COURSES (ANY ONE) TYPE 1 - CREDIT 04 (04+00)										
Mathematics	NPGE-T310	60	40	-	-		21	14	-	-
GENRIC ELECTIVE COURSES (ANY ONE) TYPE 2 - CREDIT 04 (03+01)										
Computer Science	NPGE-T311	60	40	-	-		21	14	-	-
Practical on C.S.	NPGE-P311	-	-	100	-		-	-	35	-
Chemistry	NPGE-T306	60	40	-	-		21	14	-	-
Practical on CHE	NPGE-P306	-	-	100	-		-	-	35	-
Physics	NPGE-T312	60	40	-	-		21	14	-	-
Practical on PHY	NPGE-P312	-	-	100	-		-	-	35	-
ABILITY ENHANCEMENT - CREDIT 04 (04+00)										
Karyatmak Hindi Avam Naitik Mulya	NPVO-T301	30	20	-	-		11	7	-	-
Web designing-I	NPVO-T302B	30	20	-	-		11	7	-	-
Organic Farming	NPVO-T302D	30	20	-	-		11	7	-	-
TYPE 1 - 03 Theory										
TOTAL MARKS		400		-			200		-	
TYPE 2 - 02 Theory + 01 Theory + Practical										
TOTAL MARKS		500		-			250		-	
TYPE 3 - 01 Theory + 02 Theory + Practical										
TOTAL MARKS		600		-			300		-	
TYPE 4 - 03 Theory + Practical										
TOTAL MARKS		700		-			350		-	

CHRISTIAN EMINENT COLLEGE, INDORE
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F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011

2022-23

Scheme of Examination (Revised under NEP - As per Ordinance 14-A)
B.Sc. Part II – Semester IV

COURSE TYPE	COURSE NAME	COURSE CODE	COURSE TITLE	CREDITS	TOTAL HOURS	LECTURE HOURS PER WEEK	MIN. GRADE POINT OUT OF 10
MAJOR ANY ONE	BSC – T/P 401						
	Biotechnology	BSC – T 401A	**Recombinant DNA Technology**	04	60	04	04
		BSC – P 401A	**Practical on Recombinant DNA Technology**	02	60	08	04
	Chemistry	BSC – T 401B	Transition, Elements, Chemi-Energetics, Phase Equilibria	04	60	04	04
		BSC – P 401B	Practical on Transition, Elements, Chemi-Energetics, Phase Equilibria	02	60	08	04
	Computer Science	BSC – T 401C	**Object Oriented Programming With Java**	04	60	04	04
		BSC – P 401C	**Practical on Object Oriented Programming With Java**	02	60	08	04
	Physics	BSC – T 401D	Electricity, Magnetism And Electromagnetic Theory	04	60	04	04
		BSC – P 401D	Practical on Electricity, Magnetism And Electromagnetic Theory	02	60	08	04
	Pharma. Chemistry	BSC – T 401E	Pharmaceutical Analytical Chemistry	04	60	04	04
		BSC – P 401E	Practical on Pharmaceutical Analytical Chemistry	02	60	08	04
	Mathematics	BSC – T 401F	Advanced Calculus and Partial Differential Equations	06	90	06	04
MINOR ANY ONE	BSC – T/P 402						
	Biotechnology	BSC – T 402A	Recombinant DNA Technology-II	04	60	04	04
		BSC – P 402A	Practical on Recombinant DNA Technology-II	02	60	08	04
	Chemistry	BSC – T 402B	**Transition, Elements, Chemi-Energetics, Phase Equilibria-II**	04	60	04	04
		BSC – P 402B	**Practical on Transition, Elements, Chemi-Energetics, Phase Equilibria-II**	02	60	08	04
	Computer Science	BSC – T 402C	Object Oriented Programming With Java-II	04	60	04	04
		BSC – P 402C	Practical on Object Oriented Programming With Java-II	02	60	08	04
	Physics	BSC – T 402D	Electricity, Magnetism And Electromagnetic Theory-II	04	60	04	04
		BSC – P 402D	Practical on Electricity, Magnetism And Electromagnetic Theory-II	02	60	08	04
	Pharma. Chemistry	BSC – T 402E	**Pharmaceutical Analytical Chemistry-II**	04	60	04	04
		BSC – P 402E	**Practical on Pharmaceutical Analytical Chemistry-II**	02	60	08	04
	Mathematics	BSC – T 402F	**Advanced Calculus and Partial Differential Equations-II**	06	90	06	04
GENRIC ELECTIVE ANY ONE]	BSC – T/P 403						
	Chemistry	NPGE-T406	**Transition, Elements, Chemi-Energetics, Phase Equilibria-II**	03	45	03	04
		NPGE-P406	**Practical on Transition, Elements, Chemi-Energetics, Phase Equilibria-II**	01	30	02	04
	Computer Application	NPGE-T411	**Object Oriented Programming With Java-II**	03	45	03	04
		NPGE-P411	**Practical on Object Oriented Programming With Java-II**	01	30	02	04
	Mathematics	NPGE-T410	Electricity, Magnetism And Electromagnetic Theory-I	04	60	04	04
	Physics	NPGE-T412	**Electricity, Magnetism And Electromagnetic Theory-II**	03	45	03	04
		NPGE-P412	**Practical on Electricity, Magnetism And Electromagnetic Theory-II**	01	30	02	04
ABILITY ENHANCEMENT	BSC – T 405						
		NPAE-T401	Advance English & Entrepreneurship Practices	02	30	02	04
		NPVO-T402B	Web designing-II	02	30	02	04
		NPVO-T402D	Organic Farming-II	02	30	02	04
TOTAL				**20**			

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An Autonomous Institution Established in 1996
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2022-23

Scheme of Examination (Revised under NEP - As per Ordinance 14-A)
B.Sc. Part II – Semester IV

Course Name	Course Code	Max. Marks					Min. Marks			
		Theory Examination		Practical Examination		TOTAL MARKS	Theory Exam.		Practical Marks	
		External	Internal	External	Internal		External	Internal	External	Internal
MAJOR COURSES (ANY ONE) TYPE 1 - CREDIT 06 (06+00)										
Mathematics	BSC – T 401F	60	40	-	-		21	14	-	-
MAJOR COURSES (ANY ONE) TYPE 2 - CREDIT 06 (04+02)										
Biotechnology	BSC – T 401A	60	40	-	-		21	14	-	-
Practical on BT	BSC – P 401A	-	-	60	40		-	-	21	14
Chemistry	BSC – T 401B	60	40	-	-		21	14	-	-
Practical on CHE	BSC – P 401B	-	-	60	40		-	-	21	14
Computer Science	BSC – T 401C	60	40	-	-		21	14	-	-
Practical on C.S.	BSC – P 401C	-	-	60	40		-	-	21	14
Physics	BSC – T 401D	60	40	-	-		21	14	-	-
Practical on PHY	BSC – P 401D	-	-	60	40		-	-	21	14
Pharma. Chemistry	BSC – T 401E	60	40	-	-		21	14	-	-
Practical on PH. CHE.	BSC – P 401E	-	-	60	40		-	-	21	14
MINOR COURSES (ANY ONE) TYPE 1 - CREDIT 06 (06+00)										
Mathematics	BSC – T 402F	60	40	-	-		21	14	-	-
MINOR COURSES (ANY ONE) TYPE 2 - CREDIT 06 (04+02)										
Biotechnology	BSC – T 402A	60	40	-	-		21	14	-	-
Practical on BT	BSC – P 402A	-	-	60	40		-	-	21	14
Chemistry	BSC – T 402B	60	40	-	-		21	14	-	-
Practical on CHE	BSC – P 402B	-	-	60	40		-	-	21	14
Computer Science	BSC – T 402C	60	40	-	-		21	14	-	-
Practical on C.S.	BSC – P 402C	-	-	60	40		-	-	21	14
Physics	BSC – T 402D	60	40	-	-		21	14	-	-
Practical on PHY	BSC – P 402D	-	-	60	40		-	-	21	14
Pharma. Chemistry	BSC – T 402E	60	40	-	-		21	14	-	-
Practical on PH. CHE.	BSC – P 402E	-	-	60	40		-	-	21	14
GENRIC ELECTIVE COURSES (ANY ONE) TYPE 1 - CREDIT 04 (04+00)										
Mathematics	NPGE-T410	60	40	-	-		21	14	-	-
GENRIC ELECTIVE COURSES (ANY ONE) TYPE 2 - CREDIT 04 (03+01)										
Computer Science	NPGE-T411	60	40	-	-		21	14	-	-
Practical on C.S.	NPGE-P411	-	-	100	-		-	-	35	-
Chemistry	NPGE-T406	60	40	-	-		21	14	-	-
Practical on CHE	NPGE-P406	-	-	100	-		-	-	35	-
Physics	NPGE-T412	60	40	-	-		21	14	-	-
Practical on PHY	NPGE-P412	-	-	100	-		-	-	35	-
ABILITY ENHANCEMENT - CREDIT 04 (04+00)										
Advance English & Entrepreneurship Practices	NPVO-T401	30	20	-	-		11	7	-	-
Web designing-I	NPVO-T402B	30	20	-	-		11	7	-	-
Organic Farming	NPVO-T402D	30	20	-	-		11	7	-	-
TYPE 1 - 03 Theory										
TOTAL MARKS		400		-			200		-	
TYPE 2 - 02 Theory + 01 Theory + Practical										
TOTAL MARKS		500		-			250		-	
TYPE 3 - 01 Theory + 02 Theory + Practical										
TOTAL MARKS		600		-			300		-	
TYPE 4 - 03 Theory + Practical										
TOTAL MARKS		700		-			350		-	

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(Academy of Management, Professional Education & Research)
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F-Sector, H.I.G., Ravi Shankar Shukla Nagar Main Road, Indore (M.P.) – 452011
2022-23

Syllabus
B.Sc. Part II– Semester III

BSC- T301A - BASIC MOLECULAR BIOLOGY

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning Out comes:
1. Students will be able to explain role of different protein/ enzymes involved incell signalling.
2. They will be able to understand mechanism of genetic damage caused by mutation and role of various repair system in neglecting the effect of thesemutation.

Students will be able to explain mechanism of DNA replication, transcription,translation and other related processes

Unit-I	**12 Lectures**
Anatomy of gene, gene structure of prokaryotes and eukaryotes.Flow of genetic information. **Cell signalling:** Hormones and their receptors, secondmessengers, signalling through G protein coupled receptors **Cancer:** Oncogenes, Tumor suppressor genes, Cancer and thecell cycle; Apoptosis, Necrosis.	
Unit-II	**12 Lectures**
Replication: Prokaryotic and Eukaryotic replication: models for replication, Unit of replication, replication initiation, elongation and termination, replication inhibitors **DNA repair:** Direct reversal, Excision repair -nucleotide and base excision, Mismatch repair Trans lesion DNA synthesis, Recombination repair, SOS Response DNA recombination: Models for recombination, Enzymes and proteins involved in recombination, Site-specific recombination	
Unit-III	**12 Lectures**
Transcription: Prokaryotic and Eukaryotic transcription: RNA polymerases, General and specific transcription factors, Promoters, insulator, repressor, enhancer.	
Unit-IV	**12 Lectures**
Translation: Prokaryotic and eukaryotic translation: Translation machinery, initiation, elongation and termination factors, translational inhibitors. Regulation of translation	
Unit-V	**12 Lectures**
Control of gene expression in Prokaryotes: DNA binding proteins, posttranscriptional control of gene expression. Generegulation in Bacteria**,** Gene silencing, Overview of ribozymetechnology **Control of gene expression in Eukaryotes:** enhancers,chromatin remodeling, **Mutation:** Types and causes, mutant types – lethal, conditional, biochemical, loss of function, gain of function	

Suggested Readings:

1. Molecular Biotechnology, Channarayappa.
2. Lewin's Gene XII -J. E. Kerb's, Jones and Barlett.
3. Molecular Cell Biology -H. Lodish, et.al., W H Freeman & Co (Sd), 2016, 8th edition
4. Cell Biology -G. Karp, Wiley, 2013, 7th edition
5. Molecular Biology of Cell-B. Alberts and A, Johnson, Garland Sciences, 2014
6. Molecular Biology, P. K. Gutpa.
7. Biotechnology-B.D. Singh
8. Biotechnology-U. Satyanaraynan

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC- P301A – PRACTICAL ON BASIC MOLECULAR BIOLOGY

MAX. MARKS: 60+40	**MIN. PASS MARKS: 21+14**
No. of Lectures per Week: 08 Hours	**Total Lectures: 60**

Learning Outcome:

1. Students will be able to explain role of different protein/ enzymes involved incell signalling.
2. They will be able to understand mechanism of genetic damage caused bymutation and role of various repair system in neglecting the effect of these mutation.

Students will be able to explain mechanism of DNA replication,transcription, translation and other related processes

List of Experiments/Exercise/Practicals:

1. Isolation of genomic DNA.
2. Isolation of Plasmid DNA.
3. Visualization of DNA using EtBr
4. Electrophoresis of DNA-linear, circular and super coiled plasmid.
5. Isolation of DNA from Tissue/Blood/Microorganism
6. Plasmid restriction map.
7. Quantification of DNA using UV/VIS spectrophotometer
8. Effect of UV on microbial/plant cell.

Text Books, Reference Books, Other Resources

1. Laboratory manual of Biotechnology by P.N. Swamy, Rastogi Publication, Merrut.
2. Manual of Experiment in Biotechnology by Leera Lakhaw, Sheeba Khan, Kailash Pustak Sadan Bhopal.
3. Biotechnology –A lab project in molecular biology by Thiel, Bissen, Lyone. TATA Mc GrowHill.
4. Molecular Biology Principles and practices by Siwach and Singh.
5. Books published by M.P. Hindi Granth Academy, Bhopal
     http://www.mphindigranthacademy.org/

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC- T301C- COMPUTER NETWORKS & INFORMATION SECURITY
SYSTEM ARCHITECTURE

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**
The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions

Course Learning Outcomes:

1. Build an understanding of the fundamental concepts of computer networking.
2. Demonstrate the Basic Concepts of Networking, Networking Principles and working of Networking Devices.
3. Demonstrate the Significance, Purpose and application of Networking protocols and Standards.
4. Describe, compare and contrast LAN, MAN, WAN.
5. Explain the working of Layers and apply the various protocols of OSI & TCP/IP model.

Unit-I	12 Lectures
Introduction to Computer Network: **Use of computer network:** Access to information, person to person communication, electronic commerce, internet of things; **Types of computer network:** Broadband access network, Mobile and wireless network, content delivery network, transit network, Enterprise network. **Network Technology:** Personal Area Network, Local Area Network, MAN, WAN. **Reference Model:** OSI, TCP/IP, Critique of the OSI and TCP/IP reference models, Transmission Media.	
Unit-II	**14 Lectures**
Data Link Layer: **Service Provided to Network Layer:** Data Link Control: Framing, Flow and Error Control; Error detecting codes, Error correcting codes; **Data Link Protocols:** Basic transmission and receipt, simplex link layer protocol, Full duplex, Sliding window protocol, Point-to-Point Protocol. **Switching Techniques:** Packet Switching, Circuit Switching, Datagram Networks, Virtual-Circuit Networks, and Structure of a Switch. **Network Devices & Drivers:** Router, Modem, Repeater, Hub, Switch, Bridge and Gateways (fundamental concepts).	
Unit-III	**12 Lectures**
Network Layer: Network Layer Issues, Routing Algorithm: Optimality, principle of shortest path algorithm, Flooding, Distance Vector Routing, Broadcast Routing, congestion in network, traffic management approaches; IP Addresses, IPv4 Addresses IPV6 Addresses. **Transport Layer:** Process-Process Delivery: UDP, TCP. **Application layers:** DNS, SMTP, POP, ftp, http and https. Basics of Wi-Fi (Fundamental concepts only).	

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2022-23

Syllabus
B.Sc. Part II – Semester III

BSC- T301C- COMPUTER NETWORKS & INFORMATION SECURITY
SYSTEM ARCHITECTURE

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions

Unit-IV	10 Lectures

Network Security and Information Security: Fundamentals of network and information security: principles of security and attack. Security Goals (Confidentiality, Integrity, and Availability), Non-Repudiation.
Overview of Security Threats and Vulnerability: Types of attacks on Confidentiality, Integrity and Availability.
Vulnerability and Threats: Phishing Attacks, E-mail threats, Web-threats, Intruders and Hackers, Insider threats, SQL injection Attacks, Ransomware. **Malware:** Worms, Virus, Spams, Adware Spyware, Trojans.
Security Technology: Firewalls, Intrusion detection and prevention systems, Scanning and Analysis Tools: Biometric access controls, Cipher methods, Cryptographic algorithms, Cryptographic tools, Protocols for secure communication.

Unit-V	12 Lectures

Computer and Cyber-crimes: Cyber-crimes and related concepts, distinction between cyber-crimes and conventional crimes, Cyber criminals and their objectives. Kinds of cyber-crimes, cyber stalking, cyber terrorism, Ransom ware attacks, computer vandalism. **Cyber Laws-** Introduction to IT laws & Cyber Crimes Internet, Hacking, Cracking, Viruses, Virus Attacks, Software Piracy, Intellectual property, Legal System of Information Technology, Social Engineering, Mail Bombs, Bug Exploits. Scope of cyber laws: e-commerce, online contracts, e-taxation; e-governance and cyber-crimes, Cyber law in India, with special reference to Information Technology Act, 2000 and Recent amendments.

Text Books:
1. Tannanbaum, A.S.: Computer Networks, Prentice Hall
2. Fourauzan B., "Data Communication and Networks", 3rd Edition, TMH.

Reference Books:
1. Comer D., "Computer Networks and Internet", 2nd Edition, Pearson Education.
2. William Stallings, "data and Computer Communications".

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC- T301C- PRACTICAL ON COMPUTER NETWORKS & INFORMATION SECURITY
SYSTEM ARCHITECTURE

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**
No. of Laboratory per Week: 08 Hours   **Total Lectures: 60**

1. Study of UTP network cable   Study the color code of UTP cable   Categories of UTP n/w cable   Shielding of n/w cable   Electricity interference with n/w cable   Maximum length for which data cable can be used   Crimping of RJ45 connector and Punching of data n/w cable   Penta scanning of cabling work   Rules of UTP laying
2. Knowledge of Structured Cabling and its components   Information outlet with box   Network Rack (4U, 6U, 9U, 12U, 24U, 32U, 42U)   Patch Panel   Rack Management
3. Study of Optical Fiber cable   Different cores of OFC (6 core, 12, 24 core)   Multimode & Single mode OFC cable   Shielding of OFC   Splicing/Termination of OFC.   OTDR Testing   LIU fixing   LIU management (pigtail/fiberpatchcord)   Media Convertor   SFP module   Rules of OFC laying
4. Use of tools   Crimping Tool   Punching Tool   Nose plier   Wire Stripping and Cable Cutter   Multimeter   RJ45 RJ11 RJ12 Cat5 Cat6 Network Cable Tester   In-Line Coupler (RJ45 F/F)   RJ45 NETWORK SPLITTER ADAPTER 2-way.

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC- T301C- PRACTICAL ON COMPUTER NETWORKS & INFORMATION SECURITY
SYSTEM ARCHITECTURE

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**
No. of Laboratory per Week: 08 Hours   **Total Lectures: 60**

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5. Configuration/ Management of Local Area Network
Implementation of file and printer sharing.
Installation of ftp server and client.
Connect the computers in Local Area Network.

Configuring Class A IP Address on LAN Connection in Computer LAB and then use following tools: ping, ipconfig, getmac, hostname, nslookup, tracert,
arp, pathping, systeminfo.
Configure static routing using packet tracer software
Configure Dynamic routing using packet tracer
Configure VLAN using Managed switch Device / Packet tracer
Implementation of Subnetting in Class A, B and C
Ping between 2 systems using IPv6
Configuration of NAT for incoming packet request
Configuration of Software / Hardware firewall to block
outgoing requests to facebook.com

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC- T302B -TRANSITION, ELEMENTS, CHEMI-ENERGETICS, PHASE EQUILIBRIA-I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**
No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning Outcomes (CLO):
   By the end of this course students will learn the following aspects of Chemistry:
   I.   Basic concepts of Indian Traditional Chemistry
   2.   About transition Elements and applications
   3.   Thermodynamical behavior of the Substances

Unit-I	10 Lectures

Knowledge Tradition of Indian Chemistry

Ancient Indian chemists and their works: Nagarjuna, Vagbhata,Govindacharya, Yashodhara, Ramchandra, Soimadeva, etc.

Introductory idea about rasas

Main rasa: Maharas, Uparas, Common ras, Ratna, dhatu, poison, alkali,acid, salt, lauhabhasma.

Maharas : Abram, Vaikrant, Bhasik, Vimala, Sliilajatu, Sasak, Cliapala, Rasak.

Uparas: Gandhak, Garik, Kashish, Suvari, Lalak, Manah, Shila, Anjana,Kankushtha.

Common   Rasa: Koyla,   Gauripashan,   Navasara,   Varataka,   Agnijar,

Lajavarta, Giri Sindoor, Hingul, Murdad Shrangakam, Chemistry of d- & f-block elements

Keywords/Tags: *Knowledge Tradition of Indian Chemistry. Transition* elements, *Spectral Properties, Magnetic Properties, Catalytic Properties, Lanthanide Contraction.*

Unit-II	10 Lectures

Coordination Chemistry

Structures, Stereochemistry and Transition Metal Complexes Werner's Theory for complexes, Electronic Interpretation by Sidwik.

Valence Bond Theory (VBT): Postulates and applications for Tetrahedral and Square planar and Octahedral complexes. Limitations of VBT.

Crystal Field Theory (CEFT)- Postulates and application of Crystal Field splitting of d-orbitals. Crystal field stabilization energy (CFSE) in Tetrahedral,   Octahedral complexes, CFSE of weak and strong fields. Factors affecting the crystal field parameters.

Measurement of 10 Dq and $\triangle_o$ and factors affecting its magnitude. Comparison of octahedral and tetrahedral coordination. Tetragonal distortions from octahedral geometry. Jahn-Teller theorem. Square planar geometry Limitations of CFT. {Qualitative aspect of Ligand field and Molecular Orbital (MO) Theory.'Spectrochemical and Nephelauxetic series.

Coordination number, coordination geometries of metal ions, types of ligands

Keywords/Tags: Stereochemistry of complexes, VBT, *CFT, CFSE.*

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC- T302B -TRANSITION, ELEMENTS, CHEMI-ENERGETICS, PHASE EQUILIBRIA-I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**
No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

Unit-III	10 Lectures

Thermodynamics

First law of Thermodynamics Concept of heat (Q), work (W), internal energy (U), Statement of first law, Enthalpy (H), Relation between heat capacities.

Calculations of Q, W, $\triangle$ U and $\triangle$ H under isothermal and adiabatic conditions for Reversible, Irreversible and Free (ideal and van der Waals) expansions of gases. Joule Thomson effect and its theory, Inversion temperature.

Unit-IV	10 Lectures

1. Electrochemistry: Conduction in metals and in electroolyte solutions. Specific, equivalent, and Molar conductivity. Measurement of equivalent conductance. Effect of dilution on conductivity. Migration of ions. Kohlrausch law and its applications.

2. Weak and strong electrolytes: Theory of strong electrolytes, Debye- Huckel-Onsagar (DHO) theory and equation.
Transport numbers: Determination of transport numbers by Hittorf method and Moving boundary method.

Unit-V	20 Lectures

Phase equilibrium

1. Concept of phases. Components and degrees of freedom. Thermodynamic derivation of Gibbs Phase Rule for reactive and nonreactive systems.
2. Clausius-Clapeyron equation and its applications to Solid-Liquid, Liquid-Vapour and Solid-Vapour equilibria.

Learning resources
Text Books, Reference Books, Other Resources

Text Books

1. Gaur, S.. Computer for Chemists, Neel Kamal Prakashan, 2017
2. Khopkar, S.M. Basic Concepts of Analytical Chemistry. New Age, InternationalPublisher, 2009
3. Kaur H, Analytical Chemistry, Pragati Prakashan (2008)
4. Gupta, Alka L. Analytical Chemistry, Pragati Prakashan (2020)
5. **Bahl, A. & Bahl, B.S.** Advanced Organic Chemistry, S. Chand, 2010

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC- T302B -TRANSITION, ELEMENTS, CHEMI-ENERGETICS, PHASE EQUILIBRIA-I

MAX. MARKS:60+40	**MIN. PASS MARKS: 21+14**
No. of Lectures per week: 04 per Hour	**Total Lectures: 60**

References:

1. Skoog, D.A. and Leary, J.J. Instrumental Methods of Analysis, Saunders College Publications, New York, 1992.
2. Vogel's textbook of quantitative chemical analysis, 7th edition.
3. Goswami A.K., Mehta Anita, Khanam Rehana, ORS., UGC Practical Chemistry VOL. I, PragatiPrakashan, 2015.
4. Goyal Sudha, B.Sc. Chemistry Practical, Krishna Publication, 2017.
5. Tandon, M.N., Unified RasayanVigyan, Shivlal Agarwal & Company. 2018

Suggestive digital platforms web links:
1. https://www.youtube.com/watch?v--0A1mRDzuTh8
2. http://amrita.olabs.eduinnsub=738thrch=88,sim=1338,cnt =1
3. http://chemcollective.orgivlabs
4. http://mas-iiith.vlabs.ac.in/exp6/Quiz.html
5. https://chem.libretexts.org/Ancillary_Materials/Laboratory_Ex periments/Wet Lab Experiments/General
6. Chemistry Labs/On line Chemistry Lab Manual/Chem 9 Experiments/02%3A_P aper Chromatography of Gel
7. Ink Pens jExperiment)
6. https://edu.rsc.org/experimen ts/leaf-chromatography/389.artic le
7. https://ed u. rsc.org/experi men ts/chromatography-of-sweets/455 .article

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC- P302B – PRACTICAL ON TRANSITION, ELEMENTS, CHEMI-ENERGETICS, PHASE EQUILIBRIA-I

MAX. MARKS: 60+40   **MIN. PASS MARKS: 21+14**
No. of Lectures per Week: 08 Hours   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning Outcomes (CLO):

Section –A
Preparation of Inorganic Complexes:
   Tetra amine Copper(II) Sulphate
   Copper(II) Acetyle Acetone Complex
   Iron (III)Acetyle Acetone Complex

Section – B Thermochemistry
  a. Determination of Heat Capacity of a Calorimeter using Following experiments

Change of enthalpy data of known system 9method of back calculation of heat capacity of calorimeter from known enthalpy of solution of sulphuric acid or enthalpy of neutralisation.
  b. Determination of enthalpy of Following

i) Neutralisation of Hydrochloric acid with Sodium Hydroxide

  c. Determination of Enthalpy(endothermic exothermic) of aquous solution of salts KNO_3, NH_4Cl
  d. Determination of basicity of biprotic acid by thrmochemical method
   Calculation of the enthalpy of neutralisation of the first step in terms of changes of
   temperatures in the graph of temperature versus time for different additions of base.

C. Phase Equilibria:
   a. Determination of Critical Solution Temperature (CST), Composition of the Phenol –Water system at CST and to study the impurities of sodium chloride and Succinic acid on it.
   b. Construction of the phase diagram using cooling curve of ignition tube method.
  e. Purification and separation of compounds by fractional distillation

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC- T302E- CORE COURSE - PHARMACEUTICAL ANALYTICAL CHEMISTRY-I

MAX. MARKS:60+40　　　　　　　　　　　　　　　　　**MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour　　　　　　　　　**Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning outcome:

The course would enable the students to develop the concept of pharmaceutical Analytical chemistry and their application in daily life. This will provide a foundation for various applied fields in pharmaceutical chemists.

Unit-I	10 Lectures

Historical background & Foundation of Analytical Chemistry

Historical background: A brief historical background of analytical chemistry in the context of India and Indian culture,

A brief biography of Eminent Analytical Chemist, Important aspects of Analytical chemistry, Relation of analytical chemistry with pharmaceutical chemistry.

Unit-II	12 Lectures

Introduction to Analytical Pharmaceutical Chemistry:

Introduction, definition, manufacturing of pharmaceuticals, uses of pharmaceuticals, history of pharmacopoeia, Acids, Bases, Ph and pKa, Buffers, Acid-base properties of drug substances.

Active Pharmaceutical Ingredients (API): Fluoxetine, Atenolol, Morphine, Ibuprofen, Paracetamol, Hydrocortisone. Stability of drug substances.

Unit-III	12 Lectures

Fundamentals of Pharmaceutical Analytical Chemistry: Specification of quantities, concentration and composition of mixtures, Significant figures.

Laboratory equipment- Analytical balance, Pipettes, Volumetric flasks, Burettes, Preparation of solution and dilution, Calibration of Glass wares.

Unit-IV	12 Lectures

Errors, Accuracy and Precision. Statistical Tests- Mean value and standard deviation, Confidence intervals, Comparison of mean with t-Test, Comparison of standard deviation with F-Test, Rejection of outliners by Q-Test, Linear regression analysis.

Unit-V	14 Lectures

Impurities:

Sources of impurities, methods to purify organic and inorganic substances, Test of Purity, Limit test- Chloride, Iron, Sulphate, Arsenic and Lead.

Suggested Books

1. Introduction to pharmaceutical analytical chemistry by S. Pedersen-Bjergaard, B. Gammelgaard, T. G. Halvorsen, Wiley, 2nd edition, 2019.
2. Analytical Chemistry by G. D. Christian, Wiley Student Edition 6th Edition, 2003.
3. Quantitative Pharmaceutical Chemistry by G. L. Jenkins, J. E . Christian and G.P. Hager, MeGraw Hill.
4. Vogel's Quantitative Chemical Analysis by J. Mendham, R. C. Denney, J. B. Bames, M. Thomas and B. Shivashankar, Pearson Education, 6th Edition, 2009.
5. A Text book of Pharmaceutical Analysis by K. A. Connors, 3rd Edition, Wiley, 2007.
6. Textbook from M. p. Hindi Granth Academy, Bhopal.
7. G.R. Chatwal Pharmaceutical Chemistry Inorganic, Vol. 1, Himalaya publication house.

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC- P302E- CORE COURSE – PRACTICAL ON PHARMACEUTICAL ANALYTICAL CHEMISTRY-I

MAX. MARKS:60+40   MIN. PASS MARKS: 21+14

No. of Lectures per week: 08 per Hour   Total Lectures: 60

Topics
1. Limit Test
- Limit test of Chloride.
- Limit Test of sulphates
- Limit test of Iron
- Limit Test of Arsenic
- Limit test of heavy metals

2. Assay of the following drugs
- Ammonium chloride by acid-base titration
- Copper sulphate by Iodometry
- Hydrogen peroxide by Redox titration
- Sodium Chloride by Volhards method

3. Chromatographic estimation of drug molecules and ions
- Separation and identification of plant pigments by TLC
- Separation and identification of inorganic ions by paper-chromatography

Books Suggested
1. Practical Pharmaceutical Analytical Chemistry by M. M. Alam, M. Akhtar, A. hUSSain M. Shaquiquzzaman, Elsevier Health –INR,1st addition, 2010.
2. Pharmaceutical analysis by Dr. KR Mahadik and Dr. L. Satyanarayan, Nirale prakashan.
3. Vogel's textbook of quantitative chemical analysis.
4. Complex analysis, Kayalal Cachaiyappa, S. Chand Prakashan.

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC- T302F- CORE COURSE – ADVANCED CALCULUS AND PARTIAL DIFFERENTIAL EQUATIONS-I

MAX. MARKS: 60+40   MIN. PASS MARKS: 21+14

No. of Lectures per week: 06 per Hour   Total Lectures: 90

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning outcome:

The course will enable the students to :

1. Understand many properties of the real line R and sequences.
2. Calculate the limit superior, the limit inferior, and the limit of a bounded sequence.
3. Apply the mean value theorems and Taylor's theorem.
4. Apply the various tests to determine convergence and absolute convergence of an infinite series of real numbers.

Unit-I	18 Lectures

Historical background:

    A brief historical background of Calculus and partial differential equations in the context of India and Indian heritage and culture

    A brief biography of Bodhayana

Field structure and ordered structure of R, Intervals, bounded and unbounded sets, supremum and infimum, completeness in R , absolute value of real numbers.

Unit-II	16 Lectures

Sequence of real numbers

  Limit of a sequence

  Bounded and monotonic sequences

  Cuchy's general principal of convergence

  Algebra of sequence and some important theorems.

Unit-III	20 Lectures

Series of non-negative terms

  Convergence of positive term series

  Alternating series and Lebnitz's test

  Absolute and conditional convergence of Series of real terms

  Uniform continuity

Unit-IV	20 Lectures

Chain rule of differentiability

  Mean value theorems and their geometrical interpretations

Limit and continuity of functions of two variables

Unit-V	16 Lectures

Change of variables

  Euler's theorem on homogeneous functions

  Taylor's theorem for functions of two variables

Books:

1. Devi Prasad: Advanced Calculus, Prentice Hall India Learning Private Limited, 2009.
2. S C Malik and Savita Arora: Mathematical Analysis, New Age International Private Limited, 1st edition, 2017.
3. M. D. Raysinghania: Ordinary and Partial Differential Equations, S. Chand & Company,New Delhi, 2017.
4. Gerard G. Emch, R. Sridharan and M. D. Srinivas: Contributions to the History of Indian Mathematics. Hindustan Book Agency, Vol. 3, 2005.
5. मध्य प्रदेश हिन्दी ग्रंथ अकादमी की पुस्तकें।

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC– T 303 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-T306-TRANSITION, ELEMENTS, CHEMI-ENERGETICS, PHASE EQUILIBRIA-I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per Week: 03 Hours   **Total Lectures: 45**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning Outcomes (CLO):
By the end of this course students will learn the following aspects of Chemistry:
  I.   Basic concepts of Indian Traditional Chemistry
  4.   About transition Elements and applications
  5.   Thermodynamical behavior of the Substances

Unit-I	**08 Lectures**
Knowledge Tradition of Indian Chemistry Ancient Indian chemists and their works: Nagarjuna, Vagbhata,Govindacharya, Yashodhara, Ramchandra, Soimadeva, etc. Introductory idea about rasas Main rasa: Maharas, Uparas, Common ras, Ratna, dhatu, poison, alkali,acid, salt, lauhabhasma. Maharas : Abram, Vaikrant, Bhasik, Vimala, Sliilajatu, Sasak, Cliapala, Rasak. Uparas: Gandhak, Garik, Kashish, Suvari, Lalak, Manah, Shila, Anjana,Kankushtha. Common Rasa: Koyla, Gauripashan, Navasara, Varataka, Agnijar, Lajavarta, Giri Sindoor, Hingul, Murdad Shrangakam, Chemistry of d- & f-block elements	
Keywords/Tags: *Knowledge Tradition of Indian Chemistry. Transition* elements, *Spectral Properties, Magnetic Properties, Catalytic Properties, Lanthanide Contraction.*	
Unit-II	**10 Lectures**
Coordination Chemistry Structures, Stereochemistry and Transition Metal Complexes Werner's Theory for complexes, Electronic Interpretation by Sidwik. Valence Bond Theory (VBT): Postulates and applications for Tetrahedral and Square planar and Octahedral complexes. Limitations of VBT. Crystal Field Theory (CEFT)- Postulates and application of Crystal Field splitting of d-orbitals. Crystal field stabilization energy (CFSE) in Tetrahedral, Octahedral complexes, CFSE of weak and strong fields. Factors affecting the crystal field parameters. Measurement of 10 Dq and $\triangle_o$ and factors affecting its magnitude. Comparison of octahedral and tetrahedral coordination. Tetragonal distortions from octahedral geometry. Jahn-Teller theorem. Square planar geometry Limitations of CFT. {Qualitative aspect of Ligand field and Molecular Orbital (MO) Theory.'Spectrochemical and Nephelauxetic series. Coordination number, coordination geometries of metal ions, types of ligands	
Keywords/Tags: Stereochemistry of complexes, VBT, *CFT, CFSE.*	

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC– T 303 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-T306-TRANSITION, ELEMENTS, CHEMI-ENERGETICS, PHASE EQUILIBRIA-I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per Week: 03 Hours   **Total Lectures: 45**

Unit-III	08 Lectures
Thermodynamics	

First law of Thermodynamics Concept of heat (Q), work (W), internal energy (U), Statement of first law, Enthalpy (H), Relation between heat capacities.

Calculations of Q, W, $\triangle$ U and $\triangle$ H under isothermal and adiabatic conditions for Reversible, Irreversible and Free (ideal and van der Waals) expansions of gases. Joule Thomson effect and its theory, Inversion temperature.

Unit-IV	10 Lectures

1. Electrochemistry: Conduction in metals and in electroolyte solutions. Specific, equivalent, and Molar conductivity. Measurement of equivalent conductance. Effect of dilution on conductivity. Migration of ions. Kohlrausch law and its applications.

2. Weak and strong electrolytes: Theory of strong electrolytes, Debye- Huckel-Onsagar (DHO) theory and equation.

Transport numbers: Determination of transport numbers by Hittorf method and Moving boundary method.

Unit-V	08 Lectures

Phase equilibrium

1. Concept of phases. Components and degrees of freedom. Thermodynamic derivation of Gibbs Phase Rule for reactive and nonreactive systems.

2. Clausius-Clapeyron equation and its applications to Solid-Liquid, Liquid-Vapour and Solid-Vapour equilibria.

Learning resources
Text Books, Reference Books, Other Resources

Text Books
1. Gaur, S.. Computer for Chemists, Neel Kama l Prakashan, 201 7
2. Khopka r, S.M. Basic Concepts of Analytical C hem istry. New Age, InternationalPublisher, 2009
3. Kaur H, Analytical Chemistry , Pragati P rakashan (2008)
4. Gupta, Alka L. Analytical Chemistry, Pragati Prakashan (2020)
5. Bahl, A. & Bahl, B.S. Advanced Organic Che mistry, S. Chand, 2010

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC– T 303 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-T306-TRANSITION, ELEMENTS, CHEMI-ENERGETICS, PHASE EQUILIBRIA-I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per Week: 03 Hours   **Total Lectures: 45**

8. Skoog, D.A. and Leary, J.J. Instrumental Methods of Analysis, Saunders College Publications, New York, 1992.
9. Vogel's textbook of quantitative chemical analysis, 7th edition.
10. Goswami A.K., Mehta Anita, Khanam Rehana, ORS., UGC Practical Chemistry VOL. I, PragatiPrakashan, 2015.
11. Goyal Sudha, B.Sc. Chemistry Practical, Krishna Publication, 2017.
12. Tandon, M.N., Unified RasayanVigyan, Shivlal Agarwal & Company. 2018

Suggestive digital platforms web links:
8. https://www.youtube.com/watch?v--0A1mRDzuTh8
9. http://amrita.olabs.eduinnsub=738thrch=88,sim=1338,cnt =1
10. http://chemcollective.orgivlabs
11. http://mas-iiith.vlabs.ac.in/exp6/Quiz.html
12. https://chem.libretexts.org/Ancillary_Materials/Laboratory_Ex periments/Wet Lab Experiments/General
6. Chemistry Labs/On line Chemistry Lab Manual/Chem 9 Experiments/02%3A_P aper Chromatography of Gel
7. Ink Pens jExperiment)
13. https://edu.rsc.org/experimen ts/leaf-chromatography/389.artic le
14. https://ed u. rsc.org/experi men ts/chromatography-of-sweets/455 .article

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC– T 303 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-T306-PRACTICAL ON TRANSITION, ELEMENTS, CHEMI-ENERGETICS, PHASE EQUILIBRIA-I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**
No. of Lectures per Week: 02 Hours   **Total Lectures: 30**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning Outcomes (CLO):

Section –A
Preparation of Inorganic Complexes:
          Tetra amine Copper(II) Sulphate
          Copper(II) Acetyle Acetone Complex
          Iron (III)Acetyle Acetone Complex

Section – B Thermochemistry
          e.   Determination of Heat Capacity of a Calorimeter using Following experiments

Change of enthalpy data of known system 9method of back calculation of heat capacity of calorimeter from known enthalpy of solution of sulphuric acid or enthalpy of neutralisation.
          f.   Determination of enthalpy of Following

ii)   Neutralisation of Hydrochloric acid with Sodium Hydroxide

          g.   Determination of Enthalpy(endothermic exothermic) of aquous solution of salts KNO_3, NH_4Cl
          h.   Determination of basicity of biprotic acid by thrmochemical method
          Calculation of the enthalpy of neutralisation of the first step in terms of changes of
          temperatures in the graph of temperature versus time for different additions of base.

C. Phase Equilibria:
          a. Determination of Critical Solution Temperature   (CST), Composition of the Phenol –Water system at CST and to study the impurities of sodium chloride and Succinic acid on it.
          b.   Construction of the phase diagram using cooling curve of ignition tube method.
      f.   Purification and separation of compounds by fractional distillation

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC– T 303 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-T307- OBJECT ORIENTED PROGRAMMING WITH JAVA-I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 03 per Hour   **Total Lectures: 45**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions

Course Learning Outcomes:
On Completion of this course, learners will be able to:

1. Use an integrated development environment to write, compile, run and test simple object oriented java programs.
2. Use object oriented programming concepts to solve real world problems.
3. Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
4. Develop software in the Java programming language, (application)
5. Design and use basic applet for web page.

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	08 Lectures
OOPS-Object Oriented Paradigm, Benefits of OOP, Applications of OOP. **Java-** History, Java Features, How Java Differs from C and C++, Java and internet, Java and World Wide Web, Web Browsers, Hardware and Software Requirements, Java Supports Systems, Java Environment. **Java Program Structure-** Java Tokens, Java Statements, Implementing Java Program, Java Virtual Machine, Command Line Arguments, and Programming Style.	

Unit-II	10 Lectures
Java Basics - Constants, Variables, Data Types, Declaration of Variables, Giving Values to Variables, Scope of Variable, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values. **Operators -** Arithmetic Operator, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators	

Unit-III	10 Lectures
Arithmetic Expressions - Evaluation of Expressions, Precedence of Arithmetic Operators, Type Conversions in Expressions, Operator Precedence and Associativity Mathematical Functions. **Decision Making** with if Statement, Simple if Statement, if.......Else Statement, Nesting of if ...else Statement if else Ladder, The Switch Statement, The?: Operator. **Loops-** While Statement, Do Statement, For Statement, Jump in Loops, Labeled Loops.	

Unit-IV	08 Lectures
Class- Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, **Constructors -** definition and types, Methods Overloading, Static Members, Nesting of Methods.	

Unit-V	09 Lectures
Inheritance - Extending a Class, Overloading Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract Methods and Classes, Visibility Control Arrays, One Dimensional Array, Strings, Vectors, Wrapper Classes. Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables.	

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC– T 303 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-T307- OBJECT ORIENTED PROGRAMMING WITH JAVA-I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 03 per Hour   **Total Lectures: 45**
The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions

Textbooks:
   1. E Balguruswami, Programming with java, TMH
   2. Herber Schild, Java: The Complete Reference.

Reference Books:
   1. Bruce Eckel, Thinking in java
   2. Dr.S.S. Kandare, Programming in Java, S Chand Publication.

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC– T/P 303 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-P307- PRACTICAL ON OBJECT ORIENTED PROGRAMMING WITH JAVA-I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per Week: 02 Hours   **Total Lectures: 30**

List of Practicals

(Using any Text editor: Notepad/Eclipse/Netbeans/Sublime etc.)

1. Find greater number between two numbers-using conditional operator.
2. Find the factorial of number if number is given by user using command line argument.
3. Write a program to check if a number is prime or not.
4. Write a program to display tables from 2 to 10.
5. Write a program to print Fibonacci series.
6. Enter a no. and check whether it is even or odd.
7. Write a Program to find sum & average of 10 no. using arrays. cation
8. Write a program to display reverse of a digit no. using array.
9. Write a program to demonstrate function overloading.
10. Write a program to display grade according to the marks obtained by the student.

11. Write a program to calculate the salary of an employee if salary is greater than or equal to 20000 and year of service is greater than or equal to 5 years then bonus will be 2000 otherwise 1000 and print grass salary of employee.

12. Write a program to convert the given no. of days into months & days using with classes, objects and method.

13. Write a program to convert given string into Uppercase and lowercase and get the length of string using array.

14. Create a package called "Arithmetic" that contains methods to deal all arithmetic operations. Also write a program to use the package.

15. Write a program to demonstrate use of constructor and destructor.

16. Define an exception called "Marks out of Bound" exception that is thrown if the entered marks are greater than 100.

17. Write a program using application of single inheritance. Find the area of rectangle & volume of cube.

19. Write a program using multiple inheritance to calculate area and perimeter of a circle using interface.

20. Write an applet program to draw a Rectangle (color= orange) and a right aligned oval.

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC– T/P 303 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-T312 - ELECTRICITY, MAGNETISM AND ELECTROMAGNETIC THEORY-I

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MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per Week: 03 Hours   **Total Lectures: 45**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	**09 Lectures**
Electrostatics-I	
An overview of thermal and hydroelectric power plants in Madhya Pradesh, Electrostatic field, Electric flux, Gauss's theorem of electrostatics, Applications of Gauss theorem, Electric field due to infinite long charged wire, Uniformly charged spherical shell and solid sphere.	
Unit-II	**09 Lectures**
Electrostatics-II	
Charged plate, Conservative nature of electrostatic field, Laplace and Poisson's equations, Uniqueness theorem, Dielectrics, Polar and non polar molecules, Parallel plate capacitor with dielectric, Electrical susceptibility and dielectric constant, Polarisation and polarisation vector, Displacement vector, Intensity of electric field, Relation between **D**, **E** and **P**.	
Unit-III	**09 Lectures**
Electrostatics-III	
Gauss's law in dielectrics, Clausius-Mossotti relation, Langevin- Debye formula, Ferroelectric and Para electric materials, Hysteresis loop for ferroelectrics.	
Unit-IV	**09 Lectures**
Magnetostatics-I	
Lorentz force equation and magnetic field **B**, Bio-Savart's law, Calculation of magnetic Intensity H for solenoid and anchoring, Ampere's circuital law and its applications for solenoid and toroid, Basic law of magnetostatics in differential form.	
Unit-V	**09 Lectures**
Magnetostatics-II	
Free and bound currents , Magnetization and magnetization vector **M**, Magnetic permeability and susceptibility, Derivation of $\nabla \times M = J_b$ for a non- uniformly magnetized substance, Relation between **B**, **H** and **M**, Diamagnetic, Paramagnetic and Ferromagnetic substances, B-H curve and Hysteresis loss, General idea about AC and DC motors, Motor winding.	

Text and Reference Books:

1. Principles of Electronics by V.K. Mehta.
2. Schaums outline of Beginning Physics II: Electricity & Magnetism
3. Electricity & Magnetism : S. S. Atwood Dover.
4. Electricity, Magnetism & Electromagnetic Theory: S. Mahajan and Choudhary, Tata McGraw.
5. Electromagnetic field theory: R.S. Kshetrimayun, Cengage learning.
6. Unified Physics by R.P.Goyal

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC– T/P 303 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-P312 - ELECTRICITY, MAGNETISM AND ELECTROMAGNETIC THEORY-I

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per Week: 02 Hours   **Total Lectures: 30**

List of Practical

1. Hysteresis curve a transformer core.
2. Use of a vibration magnetometer to study a field.
3. Study of B field due to a current.
4. Sensitivity of a cathode- ray oscilloscope.
5. Study of motor winding.
6. Study of AC motor.
7. Study of DC motor.

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2022-23

Syllabus

B.Sc. Part II– Semester III

BSC – T 304 (NEVO) – VOCATIONAL COURSE

NPVO-T301 – KARYATMAK HINDI AVAM NAITIK MULYA

MAX. MARKS:30+20   **MIN. PASS MARKS: 11+7**

No. of Lectures per Week: 2 Hours   **Total Lectures:30**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

उपयुक्त पाठ्यक्रम द्वारा छात्र:

1. कार्यात्मक हिंदी एवं उसके क्षेत्र के बारे में जान पाएंगे

2. छात्र भारतीय संविधान हिंदी भाषा संबंधित प्रावधानों एवं भाषा के विविध रूप जान पाएंगे एवं छात्र हिंदी
   भाषा की अशुद्धियां जानकर उन्हें संशोधित करने में सक्षम हो पाएंगे

3. छात्र कार्यालयी हिंदी के प्रयोग में सक्षम हो पाएंगे

4. छात्र नैतिक मूल्यों को जानकर नैतिक आचरण व्यवहार में लाने में सक्षम हो पाएंगे

छात्र व्यवसायिक जगत के नैतिक मूल्यों को आत्मसात कर अपना व्यवसायिक विकास कर पाएंगे

Unit-I	**06 Lectures**
कार्यात्मक हिंदी 1. परिभाषा और स्वरुप 2.कार्यात्मक हिंदी के क्षेत्र	
Unit-II	**06 Lectures**
हिन्दी भाषा और संवैधानिक प्रावधान 1.राज भाषा नीति 2.हिंदी भाषा के विविध रूप 3. (राजभाषा, राष्ट्रभाषा, माध्यम भाषा, संचार भाषा) नागरी लिपि का मानक रूप 4. हिंदी भाषा की अशुद्धियाँ एवं प्रकार	
Unit-III	**06 Lectures**
हिन्दी भाषा और संवैधानिक प्रावधान 1.राज भाषा नीति 2.हिंदी भाषा के विविध रूप 3. (राजभाषा, राष्ट्रभाषा, माध्यम भाषा, संचार भाषा) नागरी लिपि का मानक रूप 4. हिंदी भाषा की अशुद्धियाँ एवं प्रकार	
Unit-IV	**06 Lectures**

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2022-23

Syllabus
B.Sc. Part II– Semester III

नैतिक मूल्य

1 नैतिक मूल्य परिभाषा एवं परिचय

2 मूल्यों की विशिष्टताएं

3 नैतिक मूल्य एवं नैतिकता में अंतर

4 मूल्यों का वर्गीकरण

१ सैद्धांतिक

२ आर्थिक

३ सामाजिक

४ राजनीतिक

५ धार्मिक

६ सौन्दर्यात्मक मूल्य

Unit-V	**06 Lectures**

व्यवसायिक नैतिकता ∕ कॉर्पोरेट एथिक्स

1 परिचय

2 अर्थ एवं परिभाषाएं

3 विशेषताएँ एवं उदाहरण

1   4 तत्व एवं सिद्धांत

सन्दर्भः—

❖ १ शब्दावली आयोग नई दिल्ली द्वारा निर्मित व प्रकाशित प्रशासनिक शब्दावली का वृहद कोष

❖ २ हिंदी प्रयोग की दिशाएं ः डॉ हरीश चंद्र

❖ ३ प्रारूपण टिप्पणी और प्रूफ पठन ः डॉ विजय कुलश्रेष्ठ

❖ ४ प्रयोजनमूलक हिंदी ः डॉ राकेश कुमार पाराशर

❖ ५ हिंदी में अशुद्धियां ः डॉ रमेश चंद्र मेहरोत्रा

❖ ६ राजभाषा हिंदी ः डॉ भोलानाथ तिवारी

❖ हिंदी भाषा और नैतिक मूल्य वैज्ञानिक तथा तकनीकी शब्दावली आयोग मध्यप्रदेश हिंदी ग्रंथ अकादमी
अनुशंसित डिजिटल प्लेटफॉर्म वेब लिंकः—
  ➢ www.wikipidiya.org
  ➢ www.egyankosh.ac.in
  ➢ www.youtube.com
  ➢ https://epgp.inflibnet.ac.in
  ➢ hindiwi.org

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC – T 304 (NEVO) – VOCATIONAL COURSE - ANY ONE (VO) –
NPVO-T302B – WEB DESIGNING-I

MAX. MARKS:30+20 **MIN. PASS MARKS: 11+7**

No. of Lectures per Week: 2 Hours **Total Lectures:30**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning Outcomes:

1. Code a handful of useful HTML & CSS examples
2. Build semantic, HTML & CSS web page
3. Write basic scripts
4. Use Names, Objects, and Methods

Unit-I	**06 Lectures**
Introduction to Internet- World Wide Web, Internet Addressing, Browser, URL, Web server, website, homepage, Domain Name. Basic concepts. **Softwares for Web Designing -** Notepad/Notepad++, Dreamweaver, Blue Griffon, Net beans, Sea Monkey, Word press, Sublime. **Introduction to HTML:** HTML Tags and Attributes, HTML Basic Tags, Formatting Tags, HTML Color Coding, Div and Span Tags for Grouping. Lists: Unordered Lists, Ordered Lists, Definition list. Images: Image and Image Mapping.	
Unit-II	**06 Lectures**
Hyperlink: URL- Uniform Resource Locator, URL Encoding. Table: <table> <th>, <tr>, <td>, <caption>, <thead>, <tbody>, <tfoot>, <colgroup>, <col>. Attributes Using Iframe as the Target **Form:** <input>, <textarea>, <button>, <select>, <label> **Headers:** Title, Base, Link, Styles, Script HTML Meta Tag, XHTML, HTML Deprecated Tags & Attributes	
Unit-III	**06 Lectures**
CSS: Introduction, Features and benefits of CSS, CSS Syntax, External Style Sheet using <link>, Multiple Style Sheets, Value Lengths and Percentages. **Selectors:** ID Selectors, Class Selectors, Grouping Selectors, Universal Selector, Descendant/Child Selectors, Attribute Selectors, CSS - Pseudo Classes. **Color Background Cursor:** background-image, background-repeat, background position, CSS Cursor	
Unit-IV	**06 Lectures**
Text Fonts: color, background-color, text-decoration, text-align, vertical-align, text-indent, text-transform, white-space, letter-spacing, word-spacing, line-height, font-family, font-size, font-style, font-variant, font-weight. **Lists Tables:** list-style-type, list-style-position, list-style-image, list-style, CSS Tables (border, width & height, text-align, vertical-align, padding, color) **Box Model:** Borders & Outline, Margin & Padding, Height and width, CSS Dimensions.	
Unit-V	**06 Lectures**
Display Positioning: CSS Visibility, CSS Display, CSS Scrollbars, CSS Positioning (Static Positioning, Fixed Positioning, Relative Positioning, Absolute Positioning), CSS Layers with Z-Index. **Floats:** The float Property, The clear Property, The clearfix Hack.	

BOOKS:

1. John Duckett ,HTML and CSS: Design an build websites , wiley
2. Steven M. Schafer, HTML, XHTML and CSS Bible , wiley

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2022-23

Syllabus
B.Sc. Part II– Semester III

BSC – T 304 (NEVO) – VOCATIONAL COURSE - ANY ONE (VO) –
NPVO-T302D – ORGANICFARMING-I

MAX. MARKS:30+20　　　　　　　　　　　　　　　　　**MIN. PASS MARKS: 11+7**

No. of Lectures per Week: 2 Hours　　　　　　　　　　**Total Lectures:30**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.
Course Learning outcome:
The course would enable the students to develop the concept of

- Prepare media for protected cultivation.
- Demonstrate irrigation and fustigation, green house operations, irrigation and fustigation, care and maintenance of protected structure.
- Demonstrate special horticulture practices in protected cultivation
- Identify and control of insect pest and diseases, harvest and post-harvest practice

Unit-I	06 Lectures
Introduction and Principles, Developing Organic farm ,conversion of soil to organic Soil Cultivation and Tillage, Creating good growing conditions, soil compaction, Types of soil cultivation.	
Unit-II	**06 Lectures**
Crop planning and management, Croprotation, intercropping, covercrops, crop-animal association.	
Unit-III	**06 Lectures**
Organically manage the field, Live fencing, Water and nutrient management, Weed management, Pest and disease management.: Establishment of Organic Nutrient Production Unit(Manures, Compost and Bio fertilizer)	
Unit-IV	**06 Lectures**
Plant propagation, Criteria for seed evaluation, characterization and multiplication, Importance of traditional varieties, Seed conservation.	
Unit-V	**06 Lectures**
Other forms of organic management, Biodynamic agriculture, RishiKrishi, natural farming, panchgavya krishi, Natueco farming, Home farming.	

Suggested Books

1. Introduction to pharmaceutical analytical chemistry by S. Pedersen-Bjergaard, B. Gammelgaard, T. G. Halvorsen, Wiley, 2nd edition, 2019.
2. Analytical Chemistry by G. D. Christian, Wiley Student Edition 6th Edition, 2003.
3. Quantitative Pharmaceutical Chemistry by G. L. Jenkins, J. E . Christian and G.P. Hager, MeGraw Hill.
4. Vogel's Quantitative Chemical Analysis by J. Mendham, R. C. Denney, J. B. Bames, M. Thomas and B. Shivashankar, Pearson Education, 6th Edition, 2009.
5. A Text book of Pharmaceutical Analysis by K. A. Connors, 3rd Edition, Wiley, 2007.
6. Textbook from M. p. Hindi Granth Academy, Bhopal.
7. G.R. Chatwal Pharmaceutical Chemistry Inorganic, Vol. 1, Himalaya publication house.

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2022-23

Syllabus
B.Sc. Part II– Semester IV

BSC- T401A - RECOMBINANT DNA TECHNOLOGY

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

Course Learning Out comes

1. The objectives of this course are to teach students with various approaches to conduct genetic engineering and their applications inbiological research as well as in biotechnology industries.
2. Genetic engineering is a technology that has been developed based on our fundamental understanding of the principles of molecular biology and this is reflected in the contents of this course.
3. Given the impact of genetic engineering in modern society, the students should be endowed with strong theoretical knowledge of thistechnology.
4. In conjunction with the practicals in molecular biology and geneticengineering, the students should be able to take up biological research as well as placement in the relevant biotech industry

Unit-I	12 Lectures
The Basic Principles of Gene Cloning and DNA Analysis:-	
Introduction, History, The advent and importance of gene cloning and the polymerase chain reaction, Purification of DNA from LivingCells, Manipulation of Purified DNA, Introduction of DNA into Living Cells, Plasmids,	
Unit-II	**12 Lectures**
Vectors for Cloning:-	
Cloning Vectors: PBR 322, Bacteriophage, Cosmid, Phagemid,Shuttle vectors Cloning Vectors for E. coli, λ and other high capacity vectors, Cloning Vectors for Eukaryotes, Genomics & cDNA Libraries	
Unit-III	**12 Lectures**
Enzymology of genetic manipulation:-	
Enzymes useful in molecular cloning: Restriction endonuclease, DNA ligases, polynucleotide kinase, klenow enzyme, DNA Polymerase- I, reverse transcriptase, alkaline phosphatase, terminalnucleotidyltransferase	
Unit-IV	**12 Lectures**
Gene editing:-	
Gene Recombination and Gene transfer : Bacterial Conjugation,Transformation, Transduction, Gene transfer techniques: Approaches, gene silencing, Mutagenesis:random, site directed, Knock-in, Knock-out	
Unit-V	**12 Lectures**
Applications and Techniques of Gene Cloning :-	
Polymerase Chain Reaction and qPCR, Labeling nucleic acids and blotting techniques (Southern, Northern, Western, Zooblot), DNA Sequencing, DNA Fingerprinting, Applications of recombinant DNAtechnologies- Agriculture, Medicine,health	

Suggested Readings:

1. Text Book of Biotechnology - By H.K. Das (Wiley Publications)
2. Test Book of Molecular Biology - By K.S. Sastry, G. Padmanabhan& C. Subramanyan, Publ:Macmillan India
3. Genes - By B. Lewin - Oxford Univ. Press
4. Molecular Biology &Biotechnol. - By H.D. Kumar, Publ: Vikas
5. Molecular Biology - By D. Freifelder, Publ: Narosa
6. Gene, Genomics and Genetic Engineering - By Irfan Ali Khan and Atiya Khanum (UkaazPublications)
7. Advanced Biotechnology- R. C.DubeyBooks published by M.P. Hindi Granth Academy,Bhopal

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2022-23

Syllabus
B.Sc. Part II– Semester IV

BSC- P401A – MICROBIOLOGY & IMMUNOLOGY

MAX. MARKS: 60+40   **MIN. PASS MARKS: 21+14**
No. of Lectures per Week: 08 Hours   **Total Lectures: 60**

Course Learning objective outcome
1. The objectives of this course are to teach students with various approaches to conduct genetic engineering and their applications inbiological research as well as in biotechnology industries.
2. Genetic engineering is a technology that has been developed based on our fundamental understanding of the principles of molecular biology and this is reflected in the contents of this course.
3. Given the impact of genetic engineering in modern society, the students should be endowed with strong theoretical knowledge of thistechnology.
4. In conjunction with the practicals in molecular biology and geneticengineering, the students should be able to take up biological research as well as placement in the relevant biotech industry

List of Experiments/Exercise/Practicals:

1. Isolation of DNA from bacterial/plant/animal cells
2. Demonstration of Polymerase Chain Reaction
3. Bacterial Transformation (Selection of transformants with blue white selection).
4. Demonstration of southern blotting.
5. Demonstration of Restriction digestion of DNA
6. Demonstration of conjugation.
   Demonstration of Transduction.

Text Books, Reference Books, Other Resources

1. Molecular Biology and Biotechnology-   By   H.D. Kumar, Vikas Publication.
2. Gene, Genomics and Genetic Engineering-   By Irfan Khan and Atiya Khanum, UkaazPublication.
3. Advanced Biotechnology-   By   R. C. Dubey
4. Introductory Practical Biochemistry -   By Sawheny and Singh, Narosa Publication.
5. Biochemistry A lab manual- By Farrell and Taylor, Cenage Learning.
6. Laboratory manual on Biotechnology- By Swamy, Rastogi Publication.
7. Practical Microbiology-   By   Dubey and Maheshwari, S. Chand and Co.
8. Trends in Molecular Biology and Biotechnology, - By Srivastava, Srivastava and Tiwari, CBSPublication, Dehradun.
   Books published by M.P. Hindi Granth Academy, Bhopalhttp://www.mphindigranthacademy.org/

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2022-23

Syllabus
B.Sc. Part II– Semester IV

BSC- T401C OBJECT ORIENTED PROGRAMMING WITH JAVA

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions

Course Learning Outcomes:
On Completion of this course, learners will be able to:

1. Use an integrated development environment to write, compile, run and test simple object oriented java programs.
2. Use object oriented programming concepts to solve real world problems.
3. Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
4. Develop software in the Java programming language, (application)
5. Design and use basic applet for web page.

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	12 Lectures

OOPS-Object Oriented Paradigm, Benefits of OOP, Applications of OOP.
Java- History, Java Features, How Java Differs from C and C++, Java and internet, Java and World Wide Web, Web Browsers, Hardware and Software Requirements, Java Supports Systems, Java Environment.
Java Program Structure- Java Tokens, Java Statements, Implementing Java Program, Java Virtual Machine, Command Line Arguments, and Programming Style.

Unit-II	12 Lectures

Java Basics - Constants, Variables, Data Types, Declaration of Variables, Giving Values to Variables, Scope of Variable, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values.
Operators - Arithmetic Operator, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators;
Arithmetic Expressions - Evaluation of Expressions, Precedence of Arithmetic Operators, Type Conversions in Expressions, Operator Precedence and Associativity Mathematical Functions. **Decision Making** with if Statement, Simple if Statement, if.......Else Statement, Nesting of if ...else Statement if else Ladder, The Switch Statement,   The?   Operator.
Loops- While Statement, Do Statement, For Statement, Jump in Loops, Labeled Loops.

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2022-23

Syllabus
B.Sc. Part II– Semester IV

BSC- T401C OBJECT ORIENTED PROGRAMMING WITH JAVA

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions

Unit-III	12 Lectures

Class- Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, **Constructors -** definition and types, Methods Overloading, Static Members, Nesting of Methods.
Inheritance - Extending a Class, Overloading Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract Methods and Classes, Visibility Control Arrays, One Dimensional Array, Strings, Vectors, Wrapper Classes. Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables.

Unit-IV	14 Lectures

Java API Packages - Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, and Hiding Classes. Creating Threads, Extending the Thread Class, Stopping and Blocking a Threads, Life Cycle of a Thread, Using Threads Methods, Threads Exceptions, Threads Priority, Synchronization, Implementing the 'Runnable' interface.
Types of Errors - Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using Finally Statements, Throwing Our Own Exceptions, Using Exceptions for Debugging.
Preparing to Write Applets - Building Applet Code, Applet Life Cycle, Creating an Executable Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet.

Unit-V	10 Lectures

More About the Applet tag - Passing Parameters to Applets, Aligning the Display, More About HTML Tags, Displaying Numbering Values, Getting Input from the user.
The Graphics Class - Lines and Rectangles Circles and Ellipses, Drawing Arcs, Drawing Polygons, Line Graphs, Using Control Loops in Applets, Drawing Bar Charts.
Concept of Stream -Stream Classes, Byte Stream Classes, Character Stream Classes, Using Streams, **Other Useful I/O Classes -** Using the File Class, Input/Output Exceptions, Creation of Files, Reading Writing Characters, Reading / Writing Bytes, Handing Primitive Data Types, Concatenating and Buffering Files, Random Access, Files, Interactive Input and Output, other Stream Classes.

Textbooks:
1. E Balguruswami, Programming with java, TMH
2. Herber Schild, Java: The Complete Reference.

Reference Books:
1. Bruce Eckel, Thinking in java
2. Dr.S.S. Kandare, Programming in Java, S Chand Publication.

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2022-23

Syllabus
B.Sc. Part II– Semester IV

BSC- P401C-- PRACTICAL ON OBJECT ORIENTED PROGRAMMING WITH JAVA

MAX. MARKS:60+40	**MIN. PASS MARKS: 21+14**
No. of Laboratory per Week: 08 Hours	**Total Lectures: 60**

List of Practicals

(Using any Text editor: Notepad/Eclipse/Netbeans/Sublime etc.)

1. Find greater number between two numbers-using conditional operator.
2. Find the factorial of number if number is given by user using command line argument.
3. Write a program to check if a number is prime or not.
4. Write a program to display tables from 2 to 10.
5. Write a program to print Fibonacci series.
6. Enter a no. and check whether it is even or odd.
7. Write a Program to find sum & average of 10 no. using arrays. cation
8. Write a program to display reverse of a digit no. using array.
9. Write a program to demonstrate function overloading.
10. Write a program to display grade according to the marks obtained by the student.
11. Write a program to calculate the salary of an employee if salary is greater than or equal to 20000 and year of service is greater than or equal to 5 years then bonus will be 2000 otherwise 1000 and print grass salary of employee.
12. Write a program to convert the given no. of days into months & days using with classes, objects and method.
13. Write a program to convert given string into Uppercase and lowercase and get the length of string using array.
14. Create a package called "Arithmetic" that contains methods to deal all arithmetic operations. Also write a program to use the package.
15. Write a program to demonstrate use of constructor and destructor.
16. Define an exception called "Marks out of Bound" exception that is thrown if the entered marks are greater than 100.
17. Write a program using application of single inheritance. Find the area of rectangle & volume of cube.
18. Develop a simple real life application to illustrate the use of multithreading.
19. Write a program using multiple inheritance to calculate area and perimeter of a circle using interface.
20. Write an applet program to draw a Rectangle (color= orange) and a right aligned oval.
21. Develop an applet that receives 3 numeric values as inputs from the user and then displays the largest no. on the screen.
22. Write a Java Program to read data from the inputted text file name, and print its content on the console.
23. Write a Java Program to merge two files into third file
24. Write a Java program to delete duplicate lines in text file
25. Write a Java Program to implement FileInputStream class to read binary data from any image file.

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2022-23

Syllabus
B.Sc. Part II– Semester IV

BSC- T 402B TRANSITION, ELEMENTS, CHEMI-ENERGETICS, PHASE EQUILIBRIA-II

MAX. MARKS:60+40   MIN. PASS MARKS: 21+14

No. of Lectures per week: 04 per Hour   Total Lectures: 60

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning Outcomes (CLO):
By the end of this course students will learn the following aspects of Chemistry:
1. Basic concepts of Mathematics for Chemists.
2. Fundamentals of analytical chemistry and steps involved in analysis.
3. Basic knowledge of Computer for chemists.
4. Basic Concepts of Chemical equilibrium.
5. Principles of Chromatography and chromatographic techniques.

Various techniques of Spectroscopic Analysis.

Unit-I	10 Lectures

1. **Chemistry of Transition elements:** First, Second and Third Transition series
General group trends with special reference to- Electronic Configuration, Coordination Geometry, Colour, Variable Valency, Spectral, Magnetic and Catalytic Properties, Ability to form Complexes.
2. Chemistry of Inner Transition elements: Lanthanides and Actinides General group trends with special reference to Electronic Configuration, Oxidation States, Colour, Spectral and Magnetic Properties. Lanthanide Contraction.
Separation of Lanthanides (Ion-exchange method only).
Transuranic elements: General Introduction,

Unit-II	10 Lectures

Isomerism in coordination compounds:
Structural isomerism- Ionization, Linkage, Coordination-LigandIsomerism.
Stereoisomerism
Geometrical Isimerism : Square planar metal complexes of type-[MA2B2), [MA2BC], [M(AB)2], (MABCD].
Octalhedral metal complexes of type- [M A_4B 2]. [M(AA)$_2$B$_2$, [M A_3B_3]
Optical isomerism: Tetrahedral complexes of type- [MABCD]. Octahedral
complexes of type- [M(AA)$_2$B$_2$] [M(AA)$_3$]

Unit-III	10 Lectures

Second Law of Thermodynamics
Carnot cycle, Statement of the second law of thermodynamics.
Concept of Entropy, Calculation of entropy change for Reversible and irreversible processes, Concept of residual entropy,;
Free Energy Functions: Gibbs and Helmholtz energy. Variation of entropy (S), Gibbs free energy (G), work function (A) with temperature (T), volume (V) & pressure (P). Free energy change and spontaneity, Gibbs-Helmholtz equation.
Third Law of Thermodynamics: Nernst heat theorem and its 'significance, Statement of third law, Calculation of absolute entropy

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2022-23

Syllabus
B.Sc. Part II– Semester IV

BSC- T 402B TRANSITION, ELEMENTS, CHEMI-ENERGETICS, PHASE EQUILIBRIA-II

MAX. MARKS:60+40   MIN. PASS MARKS: 21+14

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-IV	10 Lectures

Electrochemical Reactions: Nernst equation, Derivation of equation for single electrode potential.

Electrodes: Reference electrodes, Standard hydrogen electrode, Quinhydrone electrode, Glass electrode, Calomel electrode.

Standard electrode potential, Electrochemical series and its applications.

Electrochemical cells: Nernst equation, calculation of e.m.f. of cell.

Unit-V	20 Lectures

1. Phase diagram for one component systems with applications-Water and Sulphur. Phase diagram for systems of solid-liquid equilibria involving-Eutectic, Congruent and Incongruent melting points. Water and Sulfur system, Ag-Pb and Mg-Zn system, NaCl- H_2O system.

2. Binary solutions: Raoult's Law, Ideal and Non-ideal or Azeotropic mixtures, Immiscible liquids, Steam distillation.

Learning resources

Text Books, Reference Books, Other Resources

Text Books

1. Kaur H, Instrumental Methods of Chemical Analysis, Pragati Prakashan, 2018
2. Sharma B.K. Chromatography. Krishna Prakashan.2019.
3. Sharma Y.R., Elementary Organic Spectroscopy. S Chand. 2013
4. Singh, DR, Saxena. G., Singh, B., Inorganic Chemicals, Shivlal Aggarwal & Company, Agra
5. Srivastava, S. S., Gehlot, A. S., Chemistry, Ratan Prakashan Temple, Indore
6. Soni, PL, Organic Chemistry, Sultan Chand and Sons, Delhi

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2022-23

Syllabus
B.Sc. Part II– Semester IV

BSC- P402B – PRACTICAL ON TRANSITION, ELEMENTS, CHEMI-ENERGETICS, PHASE EQUILIBRIA-II

MAX. MARKS: 60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per Week: 08 Hours   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Section –A

Preparation of Inorganic Complexes:

          Potassium Tri(oxalate) Ferrate (III)

          Nickel(II) Di methyl Glyoximate

Section – B Thermochemistry

      a. Determination of Heat Capacity of a Calorimeter using Following experiments

      Heat gained by cold water is equal to heat lost by hot water

      b. Determination of enthalpy of Following

  i)   Ionisation of Ethanoic acid

  ii)   Hydration of Salt

      c. Determination of basicity of biprotic acid by thrmochemical method
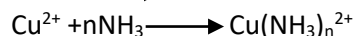
          Calculation of the enthalpy of neutralisation of the first step in terms of changes of temperatures in the graph of temperature versus time for different additions of base.

      d. Study of solubility of benzoic acid in water and determination of enthalpy change ($\triangle$H)

Section C. Phase Equilibria:

      a. Distribution acetic /benzoic acid between water and cyclohexane.

      b. Study of the equilibrium of the following reaction by the distribution method

        $I^+ + I^- \longrightarrow I^-$

      $Cu^{2+} + nNH_3 \longrightarrow Cu(NH_3)_n^{2+}$

      c. Purification and separation of compounds by steam distillation.

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2022-23

Syllabus
B.Sc. Part II– Semester IV

BSC- T402E- CORE COURSE - PHARMACEUTICAL ANALYTICAL CHEMISTRY-II

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 04 per Hour   **Total Lectures: 60**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning outcome:

The course would enable the students to develop the concept of pharmaceutical Analytical chemistry and their application in daily life. This will provide a foundation for various applied fields in pharmaceutical chemists.

Unit-I	**14 Lectures**

Acid-Base and Redox Titration

Acid base titration: theories of acid-base indicators, titrations of strong, weak and very weak acids and bases. Application of acid base titration.

Redox titrations: Concept of oxidation and reduction, principles of cerimetry, Iodimetry, Iodometry titrations with potassium iodate.

Unit-II	**12 Lectures**

Complexometric Titration

Complexometric titrations, theory of metal ion indicators, masking and demasking, reagents, application of complexometric titration, estimation of magnesium sulphate and calcium gluconate.

Unit-III	**10 Lectures**

Precipitation Titration

Precipitation titrations, theory of adsorption indicators, Mohr's, Volhard's and Fajan's titration, estimation of chloride. Kjaldahl method of nitrogen estimation.

Unit-IV	**10 Lectures**

Non-Aqueous Titration

Titration in non-aqueous solvents, acidic and basic drugs, solvents used, indicators. Estimation of sodium benzoate and ephedrine HCl, Potentiometric titration and electrodes, basic principle and applications.

Unit-V	**14 Lectures**

Gravimetric Analysis

Principle and steps involved in gravimetric analysis. Purity of precipitate theory of super saturation, co-precipitation and post-precipitation, method of analysis of barium sulphate.

Suggested Books

1. Introduction to pharmaceutical analytical chemistry by S. Pedersen-Bjergaard, B. Gammelgaard, T. G. Halvorsen, Wiley, 2nd edition, 2019.
2. Analytical Chemistry by G. D. Christian, Wiley Student Edition 6th Edition, 2003.
3. Quantitative Pharmaceutical Chemistry by G. L. Jenkins, J. E . Christian and G.P. Hager, MeGraw Hill.
4. Vogel's Quantitative Chemical Analysis by J. Mendham, R. C. Denney, J. B. Bames, M. Thomas and B. Shivashankar, Pearson Education, 6th Edition, 2009.
5. A Text book of Pharmaceutical Analysis by K. A. Connors, 3rd Edition, Wiley, 2007.
6. Textbook from M. p. Hindi Granth Academy, Bhopal

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2022-23

Syllabus
B.Sc. Part II– Semester IV

BSC- P402E- CORE COURSE - PHARMACEUTICAL ANALYTICAL CHEMISTRY-II

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 08 per Hour   **Total Lectures: 60**

1. Assay of the following drugs
   - Milk of magnesia
   - Sodium bicarbonate and carbonate
   - Sodium benzoate
2. Standardization of EDTA solution and determination of calcium by standard EDTA solution.
3. Estimation of hardness of water by complexometrically.
4. Gravimetric estimation of Barium as Barium Sulphate.
5. Conductometric titration and comparison of end point in following cases
   - Conductometric titration and end point determination of strong acid Vs strong base
   - Conductometric titration and end point determination of Weak acid and strong base
   - Conductometric titration and end point determination of strong acid and Weak base
   - Conductometric titration and end point determination of weak acid and Weak base

Books Suggested
1. Practical Pharmaceutical Analytical Chemistry by M. M. Alam, M. Akhtar, A. hUSSain M. Shaquiquzzaman, Elsevier Health –INR,1st addition, 2010.
2. Pharmaceutical analysis by Dr. KR Mahadik and Dr. L. Satyanarayan, Nirale prakashan
3. Vogel's textbook of quantitative chemical analysis.
4. Complex analysis, Kayalal Cachaiyappa, S. Chand Prakashan

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2022-23

Syllabus
B.Sc. Part II– Semester IV

BSC- T402F- CORE COURSE - ADVANCED CALCULUS AND PARTIAL DIFFERENTIAL EQUATIONS-2

MAX. MARKS: 60+40 **MIN. PASS MARKS: 21+14**

No. of Lectures per week: 06 per Hour **Total Lectures: 90**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning outcome:
The course will enable the students to:
1. Sketch curves in a plane using its Mathematical properties in the different coordinate systems of reference.
2. Using the derivatives in Optimization, Social sciences, Physics and Life sciences etc.
3. Formulate the Differential equations for various Mathematical models.
4. Using techniques to solve and analyze various Mathematical models

Unit-I	**18 Lectures**
Jacobians Maxima and Minima of functions of two variables	
Unit-II	**16 Lectures**
Lagrange's multiplier method , Beta and Gamma Functions	
Unit-III	**20 Lectures**
Partial differential equations of the first order Lagrange's multiplier method Some special types of equations which can be solved easily by methods other than the general method	
Unit-IV	**18 Lectures**
Charpit's general method Partial differential equations of second and higher orders	
Unit-V	**18 Lectures**
Classification of partial differential equations of second order Homogeneous and non-homogeneous partial differential equations of constant coefficients Partial differential equations reducible to equations with constant coefficients	

Books:

1. Devi Prasad: Advanced Calculus, Prentice Hall India Learning Private Limited, 2009.
2. S C Malik and Savita Arora: Mathematical Analysis, New Age International Private Limited, 1st edition, 2017.
3. M. D. Raysinghania: Ordinary and Partial Differential Equations, S. Chand & Company,New Delhi, 2017.
4. Gerard G. Emch, R. Sridharan and M. D. Srinivas: Contributions to the History of Indian Mathematics. Hindustan Book Agency, Vol. 3, 2005.
5. मध्य प्रदेश हिन्दी ग्रंथ अकादमी की पुस्तकें।

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2022-23

Syllabus
B.Sc. Part II– Semester IV

BSC– T/P 403 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-T412 - ELECTRICITY, MAGNETISM AND ELECTROMAGNETIC THEORY-II

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per Week: 03 Hours   **Total Lectures: 45**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Unit-I	**10 Lectures**
Current Electricity-I Network theorems: Concept of ideal current and voltage sources, Thevenin's theorem, Norton's theorem, Millman's theorem, Maximum power transfer theorem.	
Unit-II	**08 Lectures**
Current Electricity-II Transient current, Growth and decay of current in LR circuit, Charging &discharging of a capacitor through resistor, Measurement of high resistance by leakage, Charging and discharging of a condenser through an inductance and resistance, Alternating current, Complex number and their applications in alternating current circuits (RL, RC and LC), Series LCR(acceptor) and parallel LCR (rejector) circuits, Power factor. AC bridges: Maxwells bridge, Owen's bridge, Anderson's bridge, Kelvin's bridge.	
Unit-III	**08 Lectures**
Motion of charge particles in electric and magnetic field-I Motion of charge particles in electric and magnetic field, Construction and working principle of cyclotron and betatron, Thomson's method for the determination of specific charge (e/m) of electron, Ballistic galvanometer, Torque on a current loop, Current and charge sensitivity, Electromagnetic damping, Logarithmic damping, CDR.	
Unit-IV	**09 Lectures**
Motion of charge particles in electric and magnetic field-II Introduction to CRO , Block diagram of CRO, Applications of CRO: (1) Study of wave form , (2) Measurement of voltage, current ,frequency and phase difference. Electromagnetic induction, Faraday's law, Lenz's law, Self and mutual inductance, Reciprocity theorem , Self- mutual of oil, Mutual inductance of two coils, Energy stored in magnetic field.	
Unit-V	**10 Lectures**
Electrodynamics Equation of continuity for current, Maxwell's displacement current, Derivation of Maxwell's equations, Poynting theorem, Electromagnetic wave equations, Plane electromagnetic wave in vacuum and dielectric media, Reflection and refraction at a plane boundary of dielectric, Polarization by reflection and Fresnel's equation, Brewster's law, Electromagnetic waves in conducting medium, Reflection and reflection of electromagnetic wave by the ionosphere, Secant law, Skip distance and maximum usable frequency.	

Text Books, Reference Books, Other resources

1. Principles of Electronics by V.K. Mehta.
2. Schaums outline of Beginning Physics II: Electricity & Magnetism
3. Electricity & Magnetism : S. S. Atwood Dover.
4. Electricity, Magnetism & Electromagnetic Theory: S. Mahajan and Choudhary, Tata McGraw.
5. Electromagnetic field theory: R.S. Kshetrimayun, Cengage learning.
6. Unified Physics by R.P.Goyal

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Syllabus
B.Sc. Part II– Semester IV

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2022-23

Syllabus
B.Sc. Part II– Semester IV

BSC– T/P 403 (NEGE) – GENERIC ELECTIVE - ANY ONE (GE) –
NEGE-P412 -PRACTICAL ON ELECTRICITY, MAGNETISM AND ELECTROMAGNETIC THEORY-II

MAX. MARKS:60+40   **MIN. PASS MARKS: 21+14**

No. of Lectures per Week: 02 Hours   **Total Lectures: 30**

1. Response curve for LCR circuits and response frequencies.
2. Verification of the maximum power transfer theorem.
3. Determination of e/m of an electron using Thomson's method,
4. To study charging and discharging of a condenser through a resistance.
5. Determination of voltage, frequency and phase difference using CRO.
6. Verification of the Thevenin's theorem.

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	2022-23

Syllabus
B.Sc. Part II– Semester IV

BSC – T 404 (NEVO) – VOCATIONAL COURSE – ANY ONE (VO) –
NPVO-T401 – ADVANCE ENGLISH & ENTREPRENEURSHIP PRACTICES

MAX. MARKS:30+20   **MIN. PASS MARKS: 11+7**

No. of Lectures per Week: 2 Hours   **Total Lectures:30**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Through this course the students will be able to:

1. Strengthen their grammar and vocabulary.
2. Acquire and develop LSRW (Listening, Speaking, Reading and Writing) skills.
3. Learn to think creatively and critically. After the completion of the course, students are expected to gain competency and proficiency in English language to perform at professional and personal level as well as to face competitive examinations at State and National level.
4. Introduces the students to the basics of entrepreneurship and small business management. It Helps in building the skills, framework and knowledge of entrepreneurship and new venture creation. Helps in achieving competency and proficiency in language for entrepreneurship related correspondence and presentations.
5. Helps the students in understand the importance of the planning process and learn how to develop, write and present an effective business plan for a new venture.

Unit-I	**07 Lectures**
Advance English: Grammar Components- Tense, Parts of Speech, Vocabulary, Idioms, Phrases, Punctuations, Mis-spelt and Inappropriate words, Re-organizing Jumbled sentences, Spotting the errors.	
Unit-II	**04 Lectures**
Comprehension Skills: Multiple choice questions based on unseen passages.	
Unit-III	**06 Lectures**
Language Skills and Writing Skills Advertisement and Notice-writing, Letter Writing (Formal & Informal), Brochures, social media, Email writing. Practice sessions for Conversational English.	
Unit-IV	**06 Lectures**
Entrepreneurship Practices Basic Concept of entrepreneurship, types, Importance and needs of entrepreneurs and significance of entrepreneurship in economic development, Start-up Process, Generation of start-up ideas. Marketing and Advertising, Planning a marketing strategy. Role of English language in entrepreneurship. Speaking Skills and entrepreneurship related correspondence: Oral presentation, delivering group presentations, Presenting a business plan.	
Unit-V	**07 Lectures**
Corporate Ethics and responsibilities, Innovation, and creativity, Writing the business plan/project proposal, writing a report: Outlining a meeting, Minutes of the meeting, Project submission/presentation and appraisal.	
Key Words: Comprehension, Advertisement, Language Skills, Writing Skills Notice-writing ,entrepreneurship, Corporate Ethics, business plan	

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2022-23

Syllabus
B.Sc. Part II– Semester IV

BSC – T 404 (NEVO) – VOCATIONAL COURSE – ANY ONE (VO) –
NPVO-T401 – ADVANCE ENGLISH & ENTREPRENEURSHIP PRACTICES

MAX. MARKS:30+20   **MIN. PASS MARKS: 11+7**

1. **No. of Lectures per Week: 2 Hours**   **Total Lectures:30**
2. Brush up Your English by S.T. Imam.BhartiBhawan Publishers &Distributors,2017
3. S.P.Dhanvel. English and Soft Skills. Orient Black Swan,2010.
4. Dr.M.Farook. English for Communication, Emerald Publishers,2015.
5. Kuratko and Rao,Entrepreneurship:A South Asian Perspective,Cengage Learning.
6. Robert Hisrich,Michel Peters,Dean Shepherd. Entrepreneurship,McGraw-Hill Education
7. Desai,Vasant.Dynamics of Entrpreneurial Development and Management.Mumbai,Himalaya Publishing House
8. Singh Nagendra P.Emerging trends in Entrepreneurship Development.New Delhi:ASEED.
9. SS Khanka,Entrepreneurial Development,S.Chand and Co.,Delhi.

Web Sources:
www.englishclub.com
https://nptel.ac.in
https://www.myenglishpages.com
Online or Web Resources:
http://slbcmadhyapradesh.in/frontmarqee/57le2722-f3ec-4b82-8591-5b4721dff44e-atmanirbhar%20Bharat%@20full%20presentation_compressed.pdf

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2022-23

Syllabus
B.Sc. Part II– Semester IV

BSC – T 404 (NEVO) – VOCATIONAL COURSE - ANY ONE (VO) –
NPVO-T402B – WEBDESIGNING-II

MAX. MARKS:30+20   **MIN. PASS MARKS: 11+7**

No. of Lectures per Week: 2 Hours   **Total Lectures:30**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.

Course Learning Outcomes:

1. Code a handful of useful HTML & CSS examples
2. Build semantic, HTML & CSS web page
3. Write basic scripts
4. Use Names, Objects, and Methods
5. Add Interactivity to a Web Page
6. Create Dynamic Web Pages using Java Script in HTML forms.

Unit-I	**06 Lectures**
The JavaScript: Nature of JavaScript, Script Writing Basics, Enhancing HTML Documents with JavaScript, The Building Blocks. Introduction to JavaScript, JavaScript Engines, Values, Variables and Operators, Variable Mutation, Basic Operators, Operator Precedence, JavaScript Types, Types Definition, Types in JavaScript, Objects, Type Conversion and Coercion, Static vs Dynamic Type Checking.	
Unit-II	**06 Lectures**
JavaScript Conditionals: Introduction to Conditionals, Conditionals in JavaScript, Ternary Operators and Conditionals. Conditional Ladder & Switch statement. **JavaScript Arrays:** Introduction to Arrays, Declaring and Mutating Arrays, Array Methods and Properties, Replication with Array Methods, Multi-dimensional Arrays.	
Unit-III	**06 Lectures**
JavaScript Loops: Introduction to Loops, Loops in JavaScript, While and Do/While Loops, For Loops, Break and Continue in Loops, Iterating Arrays, Iterating Objects.	
Unit-IV	**06 Lectures**
JavaScript Functions: Introduction to Functions, Functions in JavaScript, Nested Functions in JavaScript, Arrow Functions in JavaScript, Function as an Argument, Function as the Returned Object, **JavaScript Scope:** Scope Introduction, Scope in JavaScript, Lexical Scope, Module Scope.	
Unit-V	**06 Lectures**
Method of Adding Interactivity to a Web Page, Creating Dynamic Web Pages; Concept of Java Scripting the Forms. Java Scripting the Forms, Basic Script Construction, Talking to the Form Objects, Organizing the Objects and Scripts, Field-Level Validation, Check Required Fields like Validating Zip Code, Automated Formatting, Format Phone, Format Money, Automatic Calculation, Calculate Expiration Date, Calculate Amount etc	

BOOKS:

1. Lee Anner Philips , Using , HTML , PHI

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2022-23

Syllabus
B.Sc. Part II– Semester IV

BSC – T 404 (NEVO) – VOCATIONAL COURSE - ANY ONE (VO) –
NPVO-T402D – ORGANICFARMING-II

MAX. MARKS:30+20   **MIN. PASS MARKS: 11+7**

No. of Lectures per Week: 2 Hours   **Total Lectures:30**

The Question Paper will contain questions equally distributed in all Units. The Internal Choice will be given in all Questions.
Course Learning outcome:
The course would enable the students to develop the concept of

- Prepare media for protected cultivation.
- Demonstrate irrigation and fustigation, green house operations, irrigation and fustigation, care and maintenance of protected structure.
- Demonstrate special horticulture practices in protected cultivation
- Identify and control of insect pest and diseases, harvest and post-harvest practice

Unit-I	06 Lectures
Introduction and Principles Soil Sampling, Weed Management & Irrigation Management, Soil Nutrient Management Choice of Varieties, crop notation multiple and cropping systems,intercropping in relation to maintained of soil productivity by.	
Unit-II	**06 Lectures**
Crop Package of Practices for organic Farming: Selection of Crop, Seed selection and Treatment, Mulching: Definition, Uses, Selection of mulchmaterials, source of mulching materials, Application ofmulch.	
Unit-III	**06 Lectures**
Integrated Pest and Disease Management under Organic Skill component Theory/ Practical/ OJT/ 04 32 Farming including Integrated Pest Management: Bio pesticides and their Multiplication, Production of Bio and Herbal Pesticides at household/ Farm Level.	
Unit-IV	**06 Lectures**
Propagation-seed, planting materials and seed treatments. Water management , Green manuring, Composting-principles, stages, types and factors, Composting methods,	
Unit-V	**06 Lectures**
Requirements for organic farming, Farm components for an organic farm, Organic crop production methods- mango, banana, tuber crops, spices- pepper, spices- ginger, turmeric, spices-cardamom, medicinal and aromatics, ornamental crops	

Suggested Books

1. Introduction to pharmaceutical analytical chemistry by S. Pedersen-Bjergaard, B. Gammelgaard, T. G. Halvorsen, Wiley, 2nd edition, 2019.
2. Analytical Chemistry by G. D. Christian, Wiley Student Edition 6th Edition, 2003.
3. Quantitative Pharmaceutical Chemistry by G. L. Jenkins, J. E . Christian and G.P. Hager, MeGraw Hill.
4. Vogel's Quantitative Chemical Analysis by J. Mendham, R. C. Denney, J. B. Bames, M. Thomas and B. Shivashankar, Pearson Education, 6th Edition, 2009.
5. A Text book of Pharmaceutical Analysis by K. A. Connors, 3rd Edition, Wiley, 2007.
6. Textbook from M. p. Hindi Granth Academy, Bhopal.
7. G.R. Chatwal Pharmaceutical Chemistry Inorganic, Vol. 1, Himalaya publication house.