Karmaveer Bhaurao Patil University, Satara

Syllabus for

B. Sc. I (Forensic Science)

Under

Faculty of Science and Technology

(As per NEP 2020)

With effect from Academic Year 2024-2025

Syllabus for Bachelor of Science (B. Sc.) Part – I Forensic Science

PREAMBLE:

This syllabus is framed to give sound knowledge with understanding of Forensic Science to undergraduate students. The goal of the syllabus is to make the study of Forensic Science popular, interesting and encouraging to the students for higher studies including research. Forensic science, an intricate and indispensable field, stands as the intersection of science, law, and justice. With its roots dating back centuries, forensic science has evolved into a multidisciplinary domain dedicated to uncovering the truth, elucidating mysteries, and ensuring fairness in the judicial system. In the pursuit of truth, forensic scientists employ a wide range of specialized tools and technologies, from microscopes and chromatography instruments to DNA profiling and digital forensics. They delve into the intricate details of crime scenes, scrutinize patterns, reconstruct events, and untangle complex puzzles to piece together an accurate and comprehensive picture of events.

The contributions of forensic science extend beyond the confines of the laboratory and crime scenes. Forensic experts may testify in court, offering their scientific expertise to help the legal system understand the significance of evidence and the implications it holds for the case at hand. They bridge the gap between science and the law, translating technical jargon into accessible language, and shedding light on the intricacies of complex scientific concepts for judges, juries, and legal professionals. The importance of forensic science cannot be overstated. It plays a vital role in promoting justice, safeguarding innocent lives, and ensuring the guilty are held accountable. It seeks to provide answers to the unresolved questions, to bring closure to grieving families, and to uphold the principles of truth, integrity, and fairness within society.

The syllabus is prepared after discussion at length with a number of faculty members of the subject and experts from Government and private sectors and research fields. The units of the syllabus are well defined, taking into consideration the level and capacity of students.

GENERAL OBJECTIVES:

1) Apply scientific knowledge and methodologies to investigate and analyze evidence in order to uncover the truth, establish facts, and assist in the administration of justice.
2) Provide accurate, reliable, and unbiased scientific information that can be used in legal proceedings.
3) To expose the students to various emerging areas of Forensic Science.
4) To prepare students for further studies, helping in their bright career.

PROGRAM OUTCOMES:

1) The student will graduate with proficiency in forensic Science.
2) The students will be eligible to continue higher studies in the subject.
3) The students will be eligible to pursue higher education abroad.
4) The students will be eligible to appear for the examination for a job in the government sector.
5) The students will be eligible to appear for jobs with minimum requirement for B.Sc. program.

PROGRAM SPECIFIC OBJECTIVES

1) The students are expected to understand the fundamentals, principles, concepts and recent developments in Forensic Science.
2) The practical course is framed in relevance with theory courses to improve understanding of various concepts in Forensic Science.
3) It is expected to inspire and boost interest of students in Forensic Science.

PROGRAM SPECIFIC OUTCOMES

1) Understand basics of Forensic Science.
2) Learn, design and perform experiments in the labs to demonstrate the concepts, principles and theories learnt in the classroom.
3) Develop the ability to apply the knowledge acquired in the classroom and laboratories to specific problems in theoretical and experimental Forensic Science.
4) Identify the area of interest in academic research and development.

5) Perform jobs in various fields like banking, private investigative agencies, and research labs and in the field of Government sectors, cyber security, Insurance frauds, and pharmaceuticals.
6) Be an entrepreneur with precision, analytical mind, innovative thinking, and clarity of thought, expression and systematic approach.

1. **TITLE:** Forensic Science
2. **YEAR OF IMPLEMENTATION:** 2024-2025
3. **DURATION:** 01 year
4. **PATTERN:** Semester examination
5. **MEDIUM OF INSTRUCTION:** English
6. **Eligibility of the Students:**

   Higher Secondary Certificate (HSC/10+2) examination or an equivalent examination from a recognized Board with the Science stream

7. **Eligibility of the Core Faculty:**

   As per the rule and regulation of the UGC and Government of Maharashtra

8. STRUCTURE OF COURSE:

Level	Semester	Course	DSC	OE	AEC/VEC/IKS	Total	Degree/Cum. Cr. MEME
4.5	I	I	DSC-I (2) DSC-II (2) DSC P-I (2)	2	IKS I (2) (Generic)	22	UG Certificate 44
		II	DSC-I (2) DSC-II (2) DSC P-I (2)				
		III	DSC-I (2) DSC-II (2) DSCP-I (2)				
4.5	II	I	DSC-I (2) DSC-II (2) DSC P-I (2)	2	VEC I (2) DEGG and IIC	22	
		II	DSC-I (2) DSC-II (2) DSC P-I (2)				
		III	DSC-I (2) DSC-II (2) DSC P-I (2)				

9.COURSE TITLE:

1) FIRST SEMESTER

Sr. No.	Subject Title	Theory				Practical		
		Course No. & Course Code	Title of Paper	No. of lectures per week	Credits		No. of Practical Per week	Credits
1	Forensic Science	Course -I BFST111	Basics of Forensic science I	4	4	Practical Course–I BFSP 113	1	2
		Course –I BFST 112	Basics of Computer and Digital Forensics I					
		Course-II BFST 114	Basics of Forensic Chemistry I and Forensic Physics I	4	4	Practical Course–II BFSP 116	1	2
		Course-II BFST 115	Basics of Forensic Biology I and Forensic Psychology I					
		Course III-BFST 117	Criminology I	4	4	Practical Course–III BFSP 119	1	2
		Course III-BFST 118	Law I					
2	OE	BFSTOE 1	Artificial intelligence	2	2			
3	IKS	BFSTIKS 1	Indian Knowledge System	2	2			

2)SECOND SEMESTER

Sr. No.	Subject Title	Theory				Practical		
		Course No. & Course Code	Title of Paper	No. of lectures per week	Credits		No. of Practical Per week	Credits
1	Forensic Science	Course -I BFST 121	Basics of Forensic science II	4	4	Practical Course–I BFSP 123	1	2
		Course –I BFST 122	Basics of computer and digital Forensics II					
		Course-II BFST 124	Basics of Forensic Chemistry II and Forensic Physics II	4	4	Practical Course–II BFSP 126	1	2
		Course-II BFST 125	Basics of Forensic Biology II and Forensic Psychology II					

		Course III-BFST 127	Criminology II	4	4	Practical Course–III BFSP 129	1	2
		Course III-BFST 128	Law II					
2	OE	BFSTOE II	Defense Studies	2	2			
3	VEC	BFSTVEC I	Democracy, Election and Indian Constitution	2	2			

10. EVALUATION STRUCTURE:

Theory

Assessment Category	**Internal Evaluation** (Best of two CCE Marks will be considered)				**ESE**	**Total Marks**	**Credits**
	CCE-I	**CCE-II**	**CCE-III**	**Total**			
Theory of 2 Credits	10	10	10	20	30	50	02

Practical

Assessment Category	**Internal Evaluation**	**ESE**	**Total Marks**	**Credits**
	Journal / Viva/Activity			
Practical of 2 Credits	20	30	50	02

14. OTHER FEATURES:

(A) LIBRARY: Reference Books – Latest Editions, Journals and Periodicals.

(B) SPECIFIC EQUIPMENTS NECESSARY TO RUN THE COURSE: OHP, Computer, L.C.D. Projector.

(C) INTERNET

(D) LIST OF THE LABORATORY EQUIPMENTS:

INSTRUMENTS	**INSTRUMENTS**	**INSTRUMENTS**
Colorimeter	Glassware	Soxhlet extraction apparatus.
Spectrophotometer	Chromatographic jar	Micropipettes
pH meter	Chromatography column	LASER
Electrophoresis apparatus	CSI Kit	Sonometer
Computer with printer & internet	CSI Management Kit	Electromagnetic device
Water bath	Fingerprint development kit	Travelling Microscope
Incubator	Fingerprint collection kit	Polarimeter
Oven	Blood detection Kit	Logic gate Kit

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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Biotechnology

Programme: B.Sc. I	**Semester-** I
Type: Major I	**Marks:**50
Credits: 2	**From: A.Y.2024-25**

Name of the Course: Basics of Forensic Science I (BFST 111)

Course Objectives: Students should be able to…

1) understand the basic concepts in Forensic Science.
2) recognize the major contributors to the development of forensic science.
3) study the Organization of a Crime Laboratory.
4) learn about the scope of forensic science.

Course Outcomes: Students will be able to...

1) differentiate laws of forensic science.
2) utilize the history and development of Forensic science.
3) differentiate the branches of forensic Science.
4) describe about the agencies involved in crime scene investigation.

Module	Course I: BFST 111 Basics of Forensic Science I	Hrs.
Module-1:	**INTRODUCTION TO FORENSIC SCIENCE** 1.1 Definition and Scope of Forensic Science 1.2 History and Development of Forensic Science 1.3 Principles of forensic science 1.4 Terminologies in forensic science: First responder 1.5 chain of custody 1.6 Duties of First Responding officers.	7
Module-2:	**BRANCHES OF FORENSIC SCIENCE LABORATORIES I** 2.1 Forensic Biology 2.2 Forensic Chemistry 2.3 Forensic Toxicology 2.4 Forensic Physics 2.5 Forensic Ballistics 2.6 Forensic Psychology.	7
Module-3:	**BRANCHES OF FORENSIC SCIENCE LABORATORIES II** 3.1 Computer Forensics 3.2 DNA and serology 3.3 Narcotics Unit 3.4 Forensic Anthropology 3.5 Fingerprints analysis 3.6 Questioned Document examination 3.7 Forensic Audio Analysis.	8

Module-4:	**ORGANIZATION OF FORENSIC SCIENCE LABORATORY** 4.1 Forensic Science Laboratories in India: history, development and hierarchical set up 4.2 Directorate of Forensic Science Services 4.3 Central Forensic Science Laboratories 4.4 State Forensic Science Laboratories 4.5 Regional Forensic Science Laboratories 4.6 Mobile Crime Laboratories 4.7 Introduction to Various Institutions: IITR, CCMB, CDFD, NCRB, CDTS.	8

Reference Books: -

1. Saferstein, Richard. *Criminalistics: An Introduction to Forensic Science*. 13th ed. Pearson Education, 2020.
2. Sharma, B. R. *Forensic Science in Criminal Investigation and Trial*. 5th ed. Universal Law Publishing, an imprint of LexisNexis, 2014.
3. Wecht, Cyril H., and John T. Rago. *Forensic Science and Law: Investigative Applications in Criminal, Civil, and Family Justice*. Boca Raton, FL: CRC Press, 2014.
4. Fisher, Barry A. *Techniques of Crime Scene Investigation*. 9th ed. Boca Raton, FL: CRC Press, 2013.
5. James, Stuart H., J. J. Nordby, and Suzanne B. Forensic Science: An Introduction to Scientific and Investigative Techniques. USA: Taylor & Francis, 2005.
6. James, Stuart H. *Forensic Science: An Introduction to Scientific and Investigative Techniques*. 3rd ed. London: CRC Press, 2009.

Evaluation Pattern: 60:40

Total Marks:50

Continuous Comprehensive Evaluation (20 Marks):	**End Semester Examination (30Marks):**
• CCE-I: Compulsory home assignment (10 Marks) • CCE-II: Short & long answer question Test/seminar/open book test/ quiz/case study/book review/field work/industrial visit (10 Marks each) • CCE-III: Compulsory MCQ test (Each question for 1Mark) 10 Marks Note: -Best two scores of CCE will be considered out of three.	• Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M Note: Conversion of 50 marks of ESE to 30 marks

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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Biotechnology

Programme: B.Sc. I	**Semester**- I
Type: Major II	**Marks:**50
Credits: 2	**From: A.Y.2024-25**

Name of the Course: Basics of Computer and Digital Forensics I (BFST 112)

Course Objectives: Students should be able to…

1) gain knowledge of the overview of Digital & Cyber Forensic and its applications.
2) learn basics of operating system, networking, file system.
3) categorize the types of digital crimes and vulnerability.
4) comprehend the basic tools and Software required for analysis of Cybercrimes.

Course Outcomes: Students will be able to...

1) define the basic concepts related to Networking.
2) explain the Networking & Its types.
3) describe the types of Internet Connections.
4) discuss technology related Networking.

Module	Course I: BFST 112 Basics Of Computer and Digital Forensics I	Hrs.
Module-1:	**FUNDAMENTALS OF COMPUTERS** 1.1 Basics of Computers: Computer organization, 1.2 Input and Output devices, 1.3 Central Processing Unit, 1.4 Types of Memory – RAM, ROM etc. 1.5 Understanding working of internal and external Storage devices 1.6 Memory units, memory structure and management	7
Module-2:	**BASICS OF OPERATING SYSTEM** 2.1 Introduction to Operating System 2.2 Process management 2.3 Concurrency 2.4 Scheduling 2.5 Synchronization, 2.6 Examples of operating Systems – Windows and Dos, Linux. 2.7 Types of Computers, Internal and external parts of computers - connectors, sockets etc.	7
Module-3:	**BASICS OF NETWORKING** 3.1 Basics of Networking-Types of topologies, 3.2 LAN, MAN, WAN, SAN, CAN etc. 3.3 Types of internet connections (Dialup, DSL, Cable, broadband, leased line, satellite, Wi-Fi, 3G-4G) 3.4 ISP, IP grouping.	8

Module-4:	**BASICS OF INTERNET** 4.1 Introduction to Internet web and cloud-based application 4.2 World Wide Web 4.3 E-mails 4.4 Chat 4.5 Search Engines 4.6 Types of portals 4.7 Networking Protocols.	8

Reference Books: -

1. Singh, P. K. *Introduction to Computer Networks*. 2020th ed. VK Global Publications Pvt. Ltd., 2020.
2. Miller, Michael. *Computer Basics: Absolute Beginner's Guide*. 9th ed. Pearson Publication, 2020.
3. Singh, P. K. *Basics of Computer*. VK Global Publication, 2015.
4. Thareja, Reema. *Fundamentals of Computer*. Oxford Publication, 2014.
5. Sammons, John. *The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics*. Waltham, MA: Syngress, 2014.
6. Morley, Deborah. *Understanding Computers Today and Tomorrow*. 14th ed. Cengage Learning, 2012.

Evaluation Pattern: 60:40

Total Marks: 50

Continuous Comprehensive Evaluation (20 Marks):	**End Semester Examination (30Marks):**
• CCE-I: Compulsory home assignment (10 Marks) • CCE-II: Short & long answer question Test/seminar/open book test/ quiz/case study/book review/field work/industrial visit (10 Marks each) • CCE-III: Compulsory MCQ test (Each question for 1Mark) 10 Marks Note: -Best two scores of CCE will be considered out of three.	• Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M Note: Conversion of 50 marks of ESE to 30 marks

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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Biotechnology

Programme: B.Sc. I	**Semester**- I
Type: Major I	**Marks:**50
Credits: 2	**From: A.Y.2024-25**

Name of the Course: Practical Course I (BFSP 113)

Course Objectives: Students should be able to…

1) study the principles of forensic science.
2) understand the development and hierarchical set up of Laboratories.
3) learn about Creation & Sending about email.
4) learn & Understand use of Microsoft Office suite.

Course Outcomes: Students will be able to...

1) analyze principles of forensic science.
2) describe the development and hierarchical set up of laboratories.
3) operate the creation & sending about email.
4) perform the networking Commands.

Practical No.	Lists of Practical's (Conduct any 15 Practicals)	Hrs.
1	Simulation of Crime Scene Investigation and Application of Forensic Science Principles.	4
2	Role Play and Documentation of Duties of First Responding Officer at a Simulated Crime Scene.	4
3	Demonstration of Chain of Custody through Evidence Handling and Transfer.	4
4	Comparative Study of Four Major Branches of Forensic Science: Biology, Chemistry, Toxicology, and Ballistics	4
5	Hands-On Identification Techniques in Forensic Biology, Chemistry, Toxicology, and Fingerprint Analysis	4
6	Case-Based Study on Forensic Applications of DNA Profiling, Firearms Examination, and Arson Detection	4
7	Survey Report on Specialized Forensic Branches: Forensic Psychology, Document Examination, Narcotics, and Audio Analysis	4
8	Flowchart Representation of Hierarchical Setup of Forensic Science Laboratories in India	4
9	Model Presentation on the Functioning of Directorate of Forensic Science Services and CFSL, RFSL, SFSL	4
10	Demonstration of Forensic Mobile Laboratory: Equipment and On-Field Investigation Tools	4
11	Identifying and Demonstrating Input, Output Devices and Parts of CPU.	4
12	Understanding and performing basic computer operations.	4
13	To understand working of Internal and External Storage Devices.	4
14	Understanding of OS Structure, functions and process management in Windows.	4
15	Understanding of concurrency and scheduling in OS	4
16	Tracing of an email using its headers to identify Sender's IP address	4
17	Identifying and testing Internet Connections using CMD.	4

Reference Books: -

1. Singh, P. K. *Introduction to Computer Networks*. VK Global Publications Pvt. Ltd., 2020.
2. Miller, Michael. *Computer Basics: Absolute Beginner's Guide*. 9th ed. Pearson Publication, 2020.
3. Singh, P. K. *Basics of Computer*. VK Global Publication, 2015.
4. Thareja, Reema. *Fundamentals of Computer*. Oxford Publication, 2014.
5. Lyman, M. D. *Criminal Investigation: The Art and the Science*. Pearson Education India, 2013.
6. Morley, Deborah. *Understanding Computers Today and Tomorrow*. 14th ed. Cengage Learning, 2012.

Evaluation Pattern: 60:40	
TotalMarks:50	
Internal Evaluation (20 marks): • Journal: 10 Marks • Students Performance: 10 Marks	**End Semester Examination (30 Marks):** • 1 Question • 2 Questions

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Programme: B.Sc. I	**Semester-** I
Type: Minor I	**Marks:**50
Credits: 2	**From: A.Y.2024-25**

Name of the Course: Basics of Forensic Chemistry I And Forensic Physics I (BFST 114)

Course Objectives: Students should be able to…

1) study the reactive intermediate and related reactions.
2) learn hybridization and its types.
3) examine the concept of fluid mechanics and related terms.
4) understand the concept and applications of radioactivity.

Course Outcomes: Students will be able to...

1) explain the Reactive Intermediate and related reactions.
2) describe the concept of hybridization, different types of hybridization and their geometry of molecules.
3) discuss the concept of fluid mechanics and related terms.
4) elaborate the concept and applications of radioactivity.

Module	Course II: BFST 114 Basics of Forensic Chemistry I And Forensic Physics I	Hrs.
Module-1:	**REACTIVE INTERMEDIATE AND RELATED REACTION** 1.1 Basics of chemistry 1.2 Reactive Intermediate and related reaction Carbocation Carbanion 1.3 Free radical 1.4 Carbene, Nitrene and Benzene 1.5 Normality and Morality 1.6 Introduction to Chemical compounds - Petroleum Products, Dyes, Drugs, Paints, Polymer, Insecticides, Pesticides.	7
Module-2:	**HYBRIDIZATION** 2.1 Concept of hybridization– Definition 2.2 different types of hybridization 2.3 Geometry of molecules 2.4 Valence Shell Electron Pair Repulsion (VSEPR) Theory. 2.5 Chromatography	7
Module-3:	**FLUID MECHANICS** 3.1 Introduction to fluids 3.2 Pressure in a fluid 3.3 Pascal's law and Archimedes' Principle 3.4 Atmospheric Pressure and Barometer 3.5 Buoyant Force, Steady and Turbulent Flow 3.6 Equation of continuity 3.7 Bernoulli's Principle and Application of Bernoulli's equation 3.8 Applications of fluid mechanics in Forensic Science	9

Module-4:	**RADIOACTIVITY** 4.1 Review of nuclear composition 4.2 Nuclear properties and half-life 4.3 Radioactive decay Schemes 4.4 Applications of Radioisotope 4.5 Carbon dating and Radiometric dating.	7

Reference Books: -

1. Puri, S., and Kalia. *Principles of Inorganic Chemistry*. Delhi, India: Milestone Publisher, 2020.
2. Hughey, E. *Inorganic Chemistry*. 4th ed. HarperCollins College Publishers, 2020.
3. Verma, H. C. *Concepts of Physics*. Bharati Bhavan Publishers, 2017.
4. Boyed, M. *Organic Chemistry*. London, England: Pearson, 2010.
5. Christian, G. D. *Analytical Chemistry*. 6th ed. Hoboken, NJ: Wiley, 2007.
6. Shriver, D. F., and P. W. Atkins. *Inorganic Chemistry*. 3rd ed. Great Britain: Oxford University Press, 2006.
7. Keith, S. *Mechanics*. 3rd ed. Addison-Wesley, 1971.

Evaluation Pattern: 60:40	
Total Marks:50	
Continuous Comprehensive Evaluation (20 Marks): • CCE-I: Compulsory home assignment (10 Marks) • CCE-II: Short & long answer question Test/seminar/open book test/ quiz/case study/book review/field work/industrial visit (10 Marks each) • CCE-III: Compulsory MCQ test (Each question for 1Mark) 10 Marks Note: -Best two scores of CCE will be considered out of three.	**End Semester Examination (30Marks):** • Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M Note: Conversion of 50 marks of ESE to 30 marks

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Programme: B.Sc. I	**Semester-** I
Type: Minor II	**Marks:**50
Credits: 2	**From: A.Y.2024-25**

Name of the Course: Basics of Forensic Biology I And Forensic Psychology I (BFST 115)

Course Objectives: Students should be able to…

1) learn the basics and concepts related to cell biology.
2) classify amino acids, proteins, carbohydrates.
3) study the science and history of psychology.
4) understand the structure and function of neurons in accordance of Behavior.

Course Outcomes: Students will be able to...

1) explain theories of evolution.
2) classify carbohydrates, enzymes, proteins, amino acids.
3) define psychology and explain its modern perspectives.
4) describe the nervous system and its types.

Module	Course II: BFST 115 Basics of Forensic Biology I And Forensic Psychology I	Hrs.
Module-1:	**CELL BIOLOGY:** 1.1 Origin of life and theories of evolution 1.2 geological time scale 1.3 Discovery of cell and the cell theory 1.4 Ultra structure of prokaryotic & eukaryotic cell 1.5 Structural organization and functions of plasma membrane and cell wall of prokaryotes & eukaryotes 1.6 Cellular Organelles and Cytoskeleton structures.	7
Module-2:	**BIOCHEMISTRY** 2.1 Properties and Classification of Amino acids 2.2 Properties and Classification of proteins 2.3 Properties and Classification of enzymes 2.4 Properties and Classification of nucleic acid 2.5 Properties and Classification of carbohydrates 2.6 Properties and Classification of lipids 2.7 Properties and Classification of vitamins.	8
Module-3:	**THE SCIENCE OF PSYCHOLOGY** 3.1 What is Psychology – Nature 3.2 Definition and its Goals 3.3 History of Psychology 3.4 Psychology: The Science 3.5 Early Schools of Psychology and Modern Perspectives 3.6 Scientific Study Methods in Psychology- Naturalistic 3.7 Observation, Experimental Case Studies and Survey.	8

Module-4:	**BIOLOGICAL PERSPECTIVES OF BEHAVIOUR** 4.1 Neurons-structure and function 4.2 synapse and neurotransmitters 4.3 Neuron and Nerves; Building the Network 4.4 Central Nervous System and Peripheral Nervous System 4.5 The Brain-structure and function 4.6 Glandular system.	7

Reference Books: -

1. Godkar, P. B. *Clinical Biochemistry*. 3rd ed.
2. Ciccarelli, S. K., and G. E. Meyer. *Psychology*. New Delhi: Pearson Education, 2006.
3. Edward, E. S., and Stephen M. K. *Cognitive Psychology: Mind and Brain*. New Delhi: Pearson Education, 2006.
4. Nelson, David L., and Michael M. Cox. *Lehninger Principles of Biochemistry*. 5th ed. W. H. Freeman, 2005.
5. Gupta, P. K. *Cell and Molecular Biology*. 3rd ed. Rastogi Publications, 2005.
6. *Cell Biology, Genetics, Molecular Biology, Evolution and Ecology*. S. Chand, 2004.

Evaluation Pattern: 60:40

Total Marks:50

Continuous Comprehensive Evaluation (20 Marks):	**End Semester Examination (30Marks):**
• CCE-I: Compulsory home assignment (10 Marks) • CCE-II: Short & long answer question Test/seminar/open book test/ quiz/case study/book review/field work/industrial visit (10 Marks each) • CCE-III: Compulsory MCQ test (Each question for 1Mark) 10 Marks Note: -Best two scores of CCE will be considered out of three.	• Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M Note: Conversion of 50 marks of ESE to 30 marks

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Board of Studies in Biotechnology

Programme: B.Sc. I	**Semester-** I
Type: Minor Practical I	**Marks:**50
Credits: 2	**From: A.Y.2024-25**

Name of the Course: Practical Course II (BFSP 116)

Course Objectives: Students should be able to…

1) summarize preparation & standardization of chemical solutions
2) determine the young's modulus.
3) study plant and animal cell structure.
4) understand Mitosis.

Course Outcomes: Students will be able to...

1) prepare & standardize chemical solutions.
2) determine the young's modulus.
3) draw plant and animal cell's structure.
4) demonstrate mitosis using onion root tip method.

Practical No.	Lists of Practical's (Conduct any 15 Practicals)	Hrs.
1	Preparation & standardization of H2SO4 solution and HCl Solution.	4
2	Estimation of Acetamide.	4
3	To perform the Water analysis.	4
4	To study five basic shapes of hybridization.	4
5	To Demonstrate Archimedes' Principle Using a measuring cup and Water	4
6	To Demonstrate Pascal's Law Using Hydraulic Press Model	4
7	Case Study Presentation on Application of Fluid Dynamics in Forensics	4
8	To observe and differentiate between steady and turbulent flow using a flow tube and colored water.	4
9	Study of plant and animal cell type's basic structure using micrographs or model.	4
10	Study of bacterial cell structure, shape and arrangement using micrographs or models.	4
11	Blood as liquid tissue – demonstrating the different types of blood cells	4
12	Mitosis demonstrated using onion root tip method	4
13	To study the historical perspective of psychology.	4
14	How to conduct psychological tests	4
15	Type A/B behavior patterns- Upinder Dhar & Jain M	4
16	Illusion (Muller-Lyre)	4

Reference Books: -

1. Atlas, Ronald M., and James W. S. *Handbook of Media for Clinical and Public Health Microbiology*. Taylor & Francis, 2013.
2. Singh, H., and P. S. Hemne. *B.Sc. Practical Physics*. 4th ed. S. Chand Publication, 2011.
3. White, and Manning. *Experimental College Physics*. 3rd ed. New York: McGraw-Hill Book Company, 2011.
4. Morris, and Boyed. *Organic Chemistry*. London, England: Pearson, 2010.
5. Christian, G. D. *Analytical Chemistry*. 6th ed. Hoboken, NJ: Wiley, 2004.
6. Gupta, Kumar. *Heterocyclic Chemistry*. Vols. 1–2. New York City: Springer, 1999.
7. Karch, S. B. *The Pathology of Drug Abuse*. Boca Raton, FL: CRC Press, 1996.

Evaluation Pattern: 60:40	
TotalMarks:50	
Internal Evaluation (20 marks): • Journal: 10 Mark • Students Performance: 10 Marks	**End Semester Examination (30 Marks):** • 1 Question • 2 Question

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Board of Studies in Biotechnology

Programme: B.Sc. I	**Semester-** I
Type: Minor II	**Marks:**50
Credits: 2	**From: A.Y.2024-25**

Name of the Course: Criminology I (BFST 117)

Course Objectives: Students should be able to…

1) earn the basics and concepts related to criminology.
2) classify schools of criminology.
3) study the crimes in India.
4) understand the nature and scope of criminology.

Course Outcomes: Students will be able to...

1) explain concept of crime.
2) classify schools of criminology.
3) define psychology and explain its modern perspectives
4) describe causes of crime.

Module	Course III: BFST 117 Criminology I	Hrs.
Module-1:	**THE CONCEPT OF CRIME** 1.1 Introduction and Definition of Crime – Legal and Social 1.2 Characteristics of Crime 1.3 Early Concept of Crime – 18th Century, 19th Century, 20th Century 1.4 Classification of Crime – Predatory Crime, Violent Crime, Inchoate Crime 1.5 Classification of Crime – Hate Crime, Sin vs Crime, Crime and Morality 1.6 Crimes in India, Crime Against Women, Crime Against Children 1.7 Human Trafficking 1.8 Cybercrimes	7
Module-2:	**NATURE & SCOPE OF CRIMINOLOGY** 2.1 Definition, Nature, Scope, Importance and Objectives of Criminology 2.2 Intention vs Motive 2.3 Criminology – Whether a Science? Possibility of Science of Criminology 2.4 Criminal Law – Nature and Elements 2.5 Indian Concept of Criminology 2.6 Schools and Branches of Criminology: Radical Criminology, Neo-Criminology, Sociological Criminology, Criminological Psychology, Cultural Criminology	8
Module-3:	**SCHOOLS OF CRIMINOLOGY** 3.1 Schools of Criminology (Pre-Classical, Classical, Neo-classical, Positive), , 3.2 Pioneers of Positive School 3.3 Clinical School 3.4 Sociological School of criminology	7

Module-4:	**BIOLOGY AND PSYCHOLOGY OF CRIME** 4.1 Heredity and Crime 4.2 Mental Disorder and Criminality – McNaughten Rule and Insanity 4.3 Intelligence Testing and Crime 4.4 Freud's Theory of Criminal Behavior 4.5 Psychological Concept of Crime 4.6 Conflict Theory of Crime 4.7 Gender and Crime 4.8 Modus Operandi – Principle, Elements, and Difference between Modus Operandi & Motive	8

Reference Books: -

1. Paranjape, N. V. *Criminology and Penology with Victimology*. 7th ed. Central Law Publication, 2018.
2. Siddique, Ahmad. *Criminology and Penology*. 6th ed. Eastern Book Company.
3. Advani, Neera. *Crime and Society in India*. New Delhi: Sage Publications, 2010.
4. Chaudhary, Usha. *Criminology and Criminal Justice*. New Delhi: Deep & Deep Publications, 2015.
5. Ishwaran, K. S. *Crime and Society in India*. New Delhi: Prentice-Hall of India, 2002.
6. Singh, R. K. *Indian Criminology*. Allahabad: Allahabad Law Agency, 2008.

Evaluation Pattern: 60:40

Total Marks:50

Continuous Comprehensive Evaluation (20 Marks):	**End Semester Examination (30Marks):**
• CCE-I: Compulsory home assignment (10 Marks) • CCE-II: Short & long answer question Test/seminar/open book test/ quiz/case study/book review/field work/industrial visit (10 Marks each) • CCE-III: Compulsory MCQ test (Each question for 1Mark) 10 Marks Note: -Best two scores of CCE will be considered out of three.	• Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M Note: Conversion of 50 marks of ESE to 30 marks

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Faculty of Science and Technology

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Board of Studies in Biotechnology

Programme: B.Sc. I	**Semester-** I
Type: Minor II	**Marks:**50
Credits: 2	**From: A.Y.2024-25**

Name of the Course: Law I (BFST 118)

Course Objectives: Students should be able to…

1) learn the basics and concepts related to law.
2) understand the sections of BNS 2023.
3) study the sections of BNSS 2023.
4) describe the sections of BSA 2023.

Course Outcomes: Students will be able to...

1) understand the fundamental principles, elements of criminal law.
2) apply the BNS to various criminal scenarios.
3) elaborate the sections of BNSS 2023.
4) understand the sections of BSA 2023.

Module	Course III: BFST 118 Law I	Hrs.
Module-1:	**INTRODUCTION TO LAW** 1.1 Classification of Law – Civil and Criminal Cases 1.2 Substantive Law and Procedural Law 1.3 Essential Elements of Criminal Law 1.4 Hierarchy of Criminal Courts in India 1.5 Classification of Offences 1.6 Constitution of India – Preamble, Fundamental Rights, Directive Principles of State Policy (Articles 14, 15, 20, 21, 22, 51A)	7
Module-2:	**INTRODUCTION TO BHARATIYA NYAY SANHITA, 2023** 2.1 Salient Features of BNS 2.2 New and Modified Definitions in BNS 2.3 Offences Against Women and Children – Sexual Offences 2.4 Offences Against Women and Children – Criminal Force and Assault 2.5 Offences Affecting the Human Body – Offences Affecting Life, Criminal Force and Assault	8
Module-3:	**INTRODUCTION TO BHARATIYA NAGRIK SURAKSHA SANHITA, 2023** 3.1 Salient Features of BNSS 3.2 Organizational Setup of Courts in India 3.3 Classification of Offences – Cognizable and Non-Cognizable 3.4 Classification of Offences – Bailable and Non-Bailable 3.5 Classification of Offences – Compoundable and Non-Compoundable 3.6 Criminal Procedure – Complaint, FIR, Investigation, Charge Sheet, Arrest & Bail Procedure 3.7 Search and Seizure, Arrest, Trial, Inquest, Victim Compensation	7

Module-4:	**INTRODUCTION TO BHARATIYA SAKSHYA ADHINIYAM, 2023** 4.1 Salient Features of BSA 4.2 Types of Evidence – Primary and Secondary, Oral and Documentary 4.3 Opinion of Experts and Expert Witness 4.4 Examination of Witnesses – Examination-in-Chief, Cross-Examination, and Re- Examination 4.5 Relevancy of Facts, Facts Which Need Not Be Proved, and Burden of Proof	8

Reference Books: -

1. *Bharatiya Nyaya Sanhita, 2023*. Bare Act.
2. *Bharatiya Nagarik Suraksha Sanhita, 2023*. Bare Act.
3. *Bharatiya Sakshya Adhiniyam, 2023*. Bare Act.
4. Deswal, Vageshwari, and Saurabh Kansal. *Taxmann's Law & Practice Series: BNS, BNSS, BSA*. Taxmann.
5. Srivastava, A. N. *Principles of Criminal Law*. Allahabad: Central Law Publications, latest ed.

Evaluation Pattern: 60:40

Total Marks:50

Continuous Comprehensive Evaluation (20Marks):	**End Semester Examination (30Marks):**
• CCE-I: Compulsory home assignment (10 Marks) • CCE-II: Short & long answer question Test/seminar/open book test/ quiz/case study/book review/field work/industrial visit (10 Marks each) • CCE-III: Compulsory MCQ test (Each question for 1Mark) 10 Marks Note: -Best two scores of CCE will be considered out of three.	• Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M Note: Conversion of 50 marks of ESE to 30 marks

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Board of Studies in Biotechnology

Programme: B.Sc. I	**Semester-** I
Type: Minor Practical II	**Marks:**50
Credits: 2	**From: A.Y.2024-25**

Name of the Course: Practical Course III (BFSP 119)

Course Objectives: Students should be able to…

1) learn various forms of crime
2) understand the Indian police system
3) describe concept of criminology
4) conduct crime analysis.

Course Outcomes: Students will be able to...

1) analyze relationship between crime & society.
2) elaborate the Indian police system
3) understand concept of criminology.
4) conduct crime analysis.

Practical No.	Lists of Practical's (Conduct any 15 Practicals)	Hrs.
1	Understand the concept of cyber criminology.	4
2	To study socio economic crimes.	4
3	To understand various forms of crime.	4
4	Understand the Structure of State police System.	4
5	Understand the structure of Police Commissionerate System.	4
6	Learn basic functions and duties of police.	4
7	Field visit to any of the following criminal justice administrations – police station/ magistrates court/crime record bureau, forensic science labs.	4
8	To understand the significance of different records maintained at the police station.	4
9	Compare important sections of BNS with IPC.	4
10	Compare important sections of BNSS with CrPC.	4
11	Compare important sections of BSA with IEA.	4
12	To prepare a schedule of five cognizable and five non-cognizable offences.	4
13	To determine the Frequency of A.C. mains by sonometer using a wire of magnetic/non-magnetic material.	4
14	To study a crime case in which an accused was punished on charge of murder.	4
15	To study a crime case in which an accused was punished on charge of Rape.	4
16	To study a Hit & Run case.	4

Reference Books: -

1. Paranjape, N. V. *Criminology and Penology with Victimology*. 7th ed. Central Law Publication, 2018.
2. Siddique, Ahmad. *Criminology and Penology*. 6th ed. Eastern Book Company.
3. Ishwaran, K. S. *Crime and Society in India*. New Delhi: Prentice-Hall of India, 2002.
4. Singh, R. K. *Indian Criminology*. Allahabad: Allahabad Law Agency, 2008.
5. Srivastava, A. N. *Principles of Criminal Law*. Allahabad: Central Law Publications, latest ed.

6. *Bharatiya Nyaya Sanhita, 2023*. Bare Act.
7. *Bharatiya Nagarik Suraksha Sanhita, 2023*. Bare Act.

Evaluation Pattern: 60:40	
TotalMarks:50	
Internal Evaluation (20 marks): • Journal: 10 Marks • Students Performance: 10 Marks	**End Semester Examination (30 Marks):** • 1 Question • 2 Question

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Board of Studies in Biotechnology

Programme: B.Sc. I	**Semester**- II
Type: Major I	**Marks:**50
Credits: 2	**From: A.Y.2024-25**

Name of the Course: Basics of Forensic Science II (BFST 121)

Course Objectives: Students should be able to…

1. study the crime scene investigative agencies.
2. understand the investigative agencies working process.
3. learn the types and powers of court.
4. acquire the basic concepts of laws related to forensic science.

Course Outcomes: Students will be able to…

1. describe about the agencies involved in crime scene investigation.
2. analyze the investigative agencies and their process.
3. explain the setup of the judicial system.
4. discuss the basic concepts of law related to forensic science.

Credits 2	**Course I: BFST 121** **Basics of Forensic Science II**	**Hrs.**
Module -1:	**AGENCIES INVOLVED IN CRIME DETECTION AND INVESTIGATION I** 1.1 Functions and hierarchical set up of Law enforcement agencies 1.2 civil police 1.3 reserve police 1.4 Government Examiners of Questioned Documents 1.5 Fingerprint Bureaus 1.6 National Crime Records Bureau 1.7 Police & Detective Training Schools 1.8 NICFS.	08
Module -2:	**AGENCIES INVOLVED IN CRIME DETECTION AND INVESTIGATION II** 2.1 Bureau of Police Research & Development 2.2 National and State Police Academies 2.3 Police Training Schools/Colleges 2.4 Dog Squad 2.5 Bomb Detection and Defusal Squad 2.6 RAW, CBI, INTERPOL and FBI.	07
Module -3:	**JUDICIAL SYSTEM** 3.1 Courts: Types, powers and jurisdiction 3.2 Admissibility of evidence in Courts 3.3 Definition of Experts 3.4 Provisions in Cr.P.C.,1973 & Indian Evidence Act relating to experts & their report 3.5 Court Procedures pertaining to Expert Testimony & Witness	07
Module -4:	**INTRODUCTION TO LAW** 4.1 Meaning, Nature and Importance of Law 4.2 Classification of Law 4.3 Basics of Indian Constitution 4.4 Basics of Criminal Law 4.5 Elements of Criminal Law 4.6 Classification Offences	08

Reference Books: -

1. Gandhi, B. M. *Penal Law*. Eastern Book Company, 2023.
2. Jain, M. P. *Indian Constitutional Law*. LexisNexis, 2018.
3. Lyman, M. D. *Criminal Investigation: The Art and the Science*. Pearson Education India, 2013.
4. Sarthi, V. P. *Law of Evidence*. 6th ed. Lucknow: Eastern Book Company, 2006.
5. James, Stuart H., and J. J. Nordby. *Forensic Science: An Introduction to Scientific and Investigative Techniques*. USA: CRC Press, 2003.
6. Sharma, B. R. *Forensic Science in Criminal Investigation and Trial*. Universal Law Publishing, 2003.

Evaluation Pattern: 60:40	
Total Marks:50	
Continuous Comprehensive Evaluation (20 Marks): • CCE-I: Compulsory home assignment (10 Marks) • CCE-II: Short & long answer question Test/seminar/open book test/ quiz/case study/book review/field work/industrial visit (10 Marks each) • CCE-III: Compulsory MCQ test (Each question for 1Mark) 10 Marks Note: -Best two scores of CCE will be considered out of three.	**End Semester Examination (30Marks):** • Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M Note: Conversion of 50 marks of ESE to 30 marks

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Board of Studies in Biotechnology

Programme: B.Sc. I	**Semester-** II
Type: Major II	**Marks:**50
Credits: 2	**From: A.Y.2024-25**

Name of the Course: Basics of Computer and Digital Forensics II (BFST122)

Course Objectives: Students should be able to…

1. study the basics of network security.
2. learn the overview of digital & cyber forensic and its applications.
3. understand the basic digital forensics and techniques for conducting the forensic examination on different digital devices.
4. examine the digital evidence such as data acquisition, identification analysis

Course Outcomes: Students will be able to…

1. explain the basics of network security.
2. analyze the overview of digital & cyber forensic and its applications.
3. perform the basic digital forensics and techniques for conducting the forensic examination on different digital devices.
4. discuss the digital evidences such as the data acquisition, identification analysis.

Module	COURSE I - BFST122 Basics of Computer and Digital Forensics II	Hrs.
Module -1:	**NETWORK SECURITY** 1.1 Network Security Threats 1.2 Vulnerabilities 1.3 Access control 1.4 Virus 1.5 Trojans 1.6 Security plan and policies.	08
Module -2:	**CYBER CRIMES AND DIGITAL EVIDENCE** 2.1 What is cyber crime 2.2 Types of cyber crimes 2.3 Digital evidence 2.4 Digital vs Physical Evidence 2.5 Nature of Digital Evidence 2.6 Precautions while dealing with Digital Evidence.	07
Module -3:	**Computing Investigations** 3.1 Understanding Computing Investigations 3.2 Procedure for corporate High-Tech investigations 3.3 Understanding data recovery 3.4 workstation 3.5 software conducting investigations.	08
Module -4:	**CRIMES AND INCIDENT SCENES** 4.1 Processing crimes and incident scenes 4.2 Securing a computer incident or crime 4.3 Seizing digital evidence at scene 4.4 Storing digital evidence 4.5 Obtaining digital hash Reviewing case	07

Reference Books: -

1. Singh, P. K. *Introduction to Computer Networks*. VK Global Publications Pvt. Ltd., 2020.
2. Miller, Michael. *Computer Basics: Absolute Beginner's Guide*. 9th ed. Pearson Publication, 2020.
3. Singh, P. K. *Basics of Computer*. VK Global Publication, 2015.
4. Thareja, Reema. *Fundamentals of Computer*. Oxford Publication, 2014.
5. Morley, D. *Understanding Computers Today and Tomorrow*. 14th ed. Cengage Learning Publication, 2012.
6. Nelson, Bill, Amelia Phillips, Frank Enfinger, and Christopher Stuart. *Guide to Computer Forensics and Investigations*. 2nd ed. Thomson Course Technology, 2006. ISBN 0-619-21706-5.

Evaluation Pattern: 60:40	
Total Marks:50	
Continuous Comprehensive Evaluation (20 Marks): • CCE-I: Compulsory home assignment (10 Marks) • CCE-II: Short & long answer question Test/seminar/open book test/ quiz/case study/book review/field work/industrial visit (10 Marks each) • CCE-III: Compulsory MCQ test (Each question for 1Mark) 10 Marks Note: -Best two scores of CCE will be considered out of three.	**End Semester Examination (30Marks):** • Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M Note: -Conversion of 50 marks of ESE to 30 marks

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Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Biotechnology

Programme: B.Sc. I	**Semester-** II
Type: Major Practical I	**Marks:**50
Credits: 2	**From: A.Y.2024-25**

Name of the Course: Practical Course I (BFSP 123)

Course Objectives: Students should be able to…

1)study the principles of forensic science.

2) learn about creation & sending about email.

3)understand the development and hierarchical set up of laboratories

4)learn & Understand use of Microsoft Office suite.

Course Outcomes: Students will be able to...

1)analyze principles of forensic science.

2)describe the development and hierarchical set up of laboratories.

3)operate the creation & sending about email.

4)perform the networking Commands.

Practical No.	Lists of Practical's (Conduct any 15 Practicals)	Hrs.
1	To study the hierarchical set up of Law enforcement agencies.	4
2	To analyze statistical data of the National Crime Records Bureau regarding various crimes.	4
3	To study the history of crime cases from a forensic science perspective.	4
4	To Review The sections of forensic science at INTERPOL and compare with those in Central Forensic Science Laboratories in India.	4
5	To study the annual reports of the National Crime Records Bureau and depict the data on different types of crime cases by way of smart art/templates.	4
6	To write reports on different types of crime cases.	4
7	To prepare a schedule of five cognizable and five non-cognizable offences	4
8	To study the powers and limitations of the Court of Judicial Magistrate of First Class.	4
9	To study a crime case in which an accused was punished on charge of murder under Section 302.	4
10	Use of E-mail, creating e-mail, Sending and Receiving emails with Attachments	4
11	Networking commands-like ping, IP-configuration, etc., with various switches.	4
12	Tracing E-mail, finding sender's IP address, of received email, tracing route of email Received using tools available on internet, e.g. Visual Trace Route etc.	4
13	Working with MS-office (word, excel, power-point).	4
14	Understanding the working of Firewall.	4
15	To understand the Cyber Crime Investigation Process: Forensics Readiness, Warrants and Secure the crime scene, Collect the evidence, secure the Evidence.	4
16	To understand the Searching and Seizing of Evidences.	4

REFERENCE BOOKS:

1. Gandhi, B. M. *Penal Law*. Eastern Book Company, 2023.
2. Jain, M. P. *Indian Constitutional Law*. LexisNexis, 2018.
3. Lyman, M. D. *Criminal Investigation: The Art and the Science*. Pearson Education India, 2013.
4. Singh, P. K. *Introduction to Computer Networks*. VK Global Publications Pvt. Ltd., 2020.
5. Miller, Michael. *Computer Basics: Absolute Beginner's Guide*. 9th ed. Pearson Publication, 2020.
6. Singh, P. K. *Basics of Computer*. VK Global Publication, 2015.

Evaluation Pattern: 60:40

TotalMarks:50

Internal Evaluation (20 marks):	**End Semester Examination (30 Marks):**
• Journal: 10 Marks • Students Performance: 10 Marks	• 1 Question • 2 Question

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Faculty of Commerce and Management

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Biotechnology

Programme: B.Sc. I	**Semester-** II
Type: Minor I	**Marks:**50
Credits: 2	**From: A.Y.2024-25**

Name of the Course: Basics of Forensic Chemistry II and Forensic Physics II (BFST 124)

Course Objectives: Students should be able to…

1. learn the importance of chemical kinetics.
2. learn the laws of thermodynamics.
3. understand basics and applications of laser in forensic science.
4. study the basic concept of optics.

Course Outcomes: Students will be able to…

1. explain the introduction of chemical kinetics and their rate of reaction.
2. describe basic terms in thermodynamics and their all laws and statements.
3. apply different laser techniques and phenomenon in forensic science.
4. describe different types of lenses, Lens Equation, types of aberration.

Module	Course II: BFST 124 Basics Of Forensic Chemistry II and Forensic Physics II	Hrs.
Module -1:	**CHEMICAL KINETICS** 1.1 Introduction and Rate of reaction 1.2 Definition and units of rate constant 1.3 Factors affecting rate of reaction 1.4 Order and Molecularity of reaction 1.5 First order reaction and Characteristics of first order reaction 1.6 Pseudo- unimolecular reactions.	07
Module -2:	**THERMODYNAMICS** 2.1 Introduction (Basic terms involved in thermodynamics) 2.2 Statement of Zeroth law, First law and Third law 2.3 Spontaneous & non–spontaneous processes 2.4 definitions, distinguishing points and examples 2.5 Second law of thermodynamics and its different Statements.	08
Module -3:	**CONCEPT OF LASER AND ITS APPLICATIONS** 3.1 A brief history of lasers 3.2 Einstein's prediction: The Three Processes 3.3 Pumping schemes 3.4 Characteristics of lasers 3.5 Types of lasers: Ruby laser, He-Ne laser 3.6 Applications of lasers in Forensic Science.	07
Module -4:	**CONCEPTS OF OPTICS ITS APPLICATION** 4.1 Introduction to development of optics 4.2 Types of Lenses, Lens maker's formula 4.3 Cardinal points of an optical system 4.4 Aberration and its types: Monochromatic, chromatic 4.5 Interference in thin film- thin films 4.6 Interference due to transmitted light 4.7 Newton's rings.	08

REFERENCE BOOKS:

1. Bahl, Tuli, and Arun Bahl. *Essentials of Physical Chemistry*. 28th ed. New Delhi, India: S. Chand Publication, 2019.
2. Skoog, Douglas A., F. James Holler, and Stanley R. Crouch. *Instrumental Analysis*. Cengage Learning, 2018.
3. Glasstone, Samuel. *Thermodynamics for Chemists*. 2017.
4. Verma, H. C. *Concepts of Physics*. Bharati Bhavan Publishers, 2017.
5. Soni, and Dharmarha. *Textbook of Physical Chemistry*. Sultan Chand & Sons, 2016.
6. Avadhanulu, M. N., and P. S. Hemne. *An Introduction to Lasers: Theory and Applications*. S. Chand Publication, 2010.

Evaluation Pattern: 60:40

Total Marks:50

Continuous Comprehensive Evaluation (20 Marks):	**End Semester Examination (30Marks):**
• CCE-I: Compulsory home assignment (10 Marks) • CCE-II: Short & long answer question Test/seminar/open book test/ quiz/case study/book review/field work/industrial visit (10 Marks each) • CCE-III: Compulsory MCQ test (Each question for 1Mark) 10 Marks Note: -Best two scores of CCE will be considered out of three.	• Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M Note: Conversion of 50 marks of ESE to 30 marks

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Board of Studies in Biotechnology

Programme: B.Sc. I	**Semester-** II
Type: Minor I	**Marks:**50
Credits: 2	**From: A.Y.2024-25**

Name of the Course: Basics of Forensic Biology II and Forensic Psychology II (BFST 125)

Course Objectives: Students should be able to…

1. learn the basic concepts of microbiology.
2. study the basic principle of immunology.
3. understand the concepts of sensation and perception.
4. examine the concept of Learning and its theories.

Course Outcomes: Students will be able to…

1. explain concepts of microbiology.
2. describe basic principles of immunology.
3. elaborate concepts related to sensation and perception.
4. discuss theories of Learning.

Module	Course II: BFST 125 Basics of Forensic Biology II and Forensic Psychology II	Hrs.
Module -1:	**BASICS OF MICROBIOLOGY** 1.1 Concept of pure culture technique 1.2 Stains and staining techniques 1.3 Control of Microorganisms: Physical & Chemical methods of control 1.4 Microscopy principle and types of Microscopies. 1.5 Broad classification of microorganisms	07
Module -2:	**IMMUNITY** 2.1 Definition. 2.2 Types-natural, acquired, active, passive. 2.3 Antigens-Definition and types of antigens. 2.4 Factors influencing antigenicity. 2.5 Antibody-Definition, structure and types. 2.6 Properties and functions of Immunoglobulin Agglutination and Precipitation.	08
Module -3:	**SENSATION AND PERCEPTION** 3.1 Sensation and Perception-Definition 3.2 Perceptual constancies 3.3 Gestalt Principle of Perception-perceptual organization and Grouping of Stimuli in Perceptual Organization 3.4 Depth Perception 3.5 Errors in Perception-Illusion, Hallucination Individual Factors in Perception.	07
Module -4:	**LEARNING** 4.1 Definition of Learning 4.2 Types of Learning 4.3 Theories of Learning - Classical Conditioning, Operant Conditioning, Trial-Error Learning, Insight Learning, Cognitive Learning Theory Tolman's Latent Learning, Bandura's Observational Learning Theory.	08

Reference Books: -

1. Kumar, Surinder. *Essentials of Microbiology*. JP Medical Ltd., 2015.
2. Roitt, Ivan. *Roitt's Essential Immunology*. Wiley-Blackwell, 2011.
3. Upadhyay, A., and K. Upadhyay. *Biophysical Chemistry*. Himalaya Publishing House, 2010.
4. Ciccarelli, Saundra K., and J. E. Meyer. *Psychology*. New Delhi: Pearson Education, 2006.
5. Edward, E. S., and Stephen M. K. *Cognitive Psychology: Mind and Brain*. New Delhi: Pearson Education, 2006.
6. Goldsby, Richard A., Thomas J. Kindt, Barbara A. Osborne, and Janis Kuby. *Kuby's Immunology*. 6th ed. New York: W. H. Freeman and Company, 2006.

Evaluation Pattern: 60:40

Total Marks:50

Continuous Comprehensive Evaluation (20 Marks):	**End Semester Examination (30Marks):**
• CCE-I: Compulsory home assignment (10 Marks) • CCE-II: Short & long answer question Test/seminar/open book test/ quiz/case study/book review/field work/industrial visit (10 Marks each) • CCE-III: Compulsory MCQ test (Each question for 1Mark) 10 Marks Note: -Best two scores of CCE will be considered out of three.	• Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M Note: Conversion of 50 marks of ESE to 30 marks

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Board of Studies in Biotechnology

Programme: B.Sc. I	**Semester**- II
Type: Minor Practical I	**Marks:**50
Credits: 2	**From: A.Y.2024-25**

Name of the Course: Practical Course II (BFSP 126)

Course Objectives: Students should be able to…

1. study reaction between k2s2o8 & ki, semi micro qualitative analysis.
2. learn to determine the wavelength of a given laser source by using plane diffraction grating.
3. understand blood groupings techniques.
4. examine span of attention.

Course Outcomes: Students will be able to...

1. analyze principles of forensic science.
2. describe the development and hierarchical set up of laboratories.
3. operate the creation & sending about email.
4. perform the networking Commands.

Practical No.	Lists of Practical's (Conduct any 15 Practicals)	Hrs.
1	Chemical Kinetics I: Hydrolysis of Methyl Acetate 3	4
2	Chemical Kinetics II: Study of Reaction Between K2S2O8 & KI	4
3	To study laws of Thermodynamics.	4
4	To study the order and Molecularity of reaction.	4
5	To determine the wavelength of a given (He-Ne LASER) LASER source by using plane diffraction grating.	4
6	Measurement of divergence of laser.	4
7	To find the refractive index of a liquid using convex lens and plane mirror	4
8	To find the refractive index of a liquid using a concave mirror and a plane mirror.	4
9	Study of morphological types of red blood cells	4
10	Antigen-antibody reaction (blood groupings)	4
11	Staining Techniques, Simple, Negative staining, Gram Staining	4
12	Mitochondria – Stained preparation of mitochondria from i)Onion peeling ii) Hydrilla leaf iii) Oral mucosa by using Janus Green B	4
13	Serial Learning	4
14	Recall-Recognition	4
15	Span of Attention	4
16	Retroactive Inhibition and Proactive Inhibition	4

REFERENCE BOOKS:

1. Bahl, Tuli, and Arun Bahl. *Essentials of Physical Chemistry*. 28th ed. New Delhi, India: S. Chand Publication, 2019.
2. Skoog, Douglas A., F. James Holler, and Stanley R. Crouch. *Instrumental Analysis*. Cengage Learning, 2018.
3. Glasstone, Samuel. *Thermodynamics for Chemists*. 2017.
4. Kumar, Surinder. *Essentials of Microbiology*. JP Medical Ltd., 2015.
5. Roitt, Ivan. *Roitt's Essential Immunology*. Wiley-Blackwell, 2011.
6. Upadhyay, A., and K. Upadhyay. *Biophysical Chemistry*. Himalaya Publishing House, 2010.

Evaluation Pattern: 60:40	
TotalMarks:50	
Internal Evaluation (20 marks): • Journal: 10 Marks • Students Performance: 10 Marks	**End Semester Examination (30 Marks):** • 1 Question • 2 Question

Karmaveer Bhaurao Patil University, Satara

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Faculty of Commerce and Management

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Biotechnology

Programme: B.Sc. I	**Semester**- II
Type: Minor II	**Marks:**50
Credits: 2	**From: A.Y.2024-25**

Name of the Course: Criminology II (BFST 127)

Course Objectives: Students should be able to…

1. learn the basics and concepts related to criminology.
2. classify schools of criminology.
3. study the crimes in India.
4. understand the nature and scope of criminology.

Course Outcomes: Students will be able to…

1. define and explain core criminological concepts and theories.
2. analyze the relationship between crime, society, and the individual.
3. understand the Indian criminal justice system and its challenges.
4. develop research skills to investigate criminological issues.

Module	COURSE III: BFST 127 Criminology II	Hrs.
Module -1:	**CRIME TOPOLOGIES-** 1.1 Organized Crimes- Definition, Characteristics of Crime and Criminals, Types. 1.2 White Collar Crimes- Definition, Classification, White Collar Crimes in India, Corporate Crimes, Judicial Response, Blue collar crimes, domestic crimes. 1.3 Cyber Crimes- Definition, Nature, Reasons, Classification, Impact of Cyber Crime, 1.4 The I.T. Act. 1.5 Sexual Offences - Indian Perspective, Crime against Women, Sexual Abuse of Children, POCSO. 1.6 Drugs, alcohol & Crime - Main Causes of Drug Addiction, Illicit of Drug Trafficking, Alcoholism, Drug addicts & Crime, Drunkenness & Criminal Responsibility. 1.7 Terrorism and Counter-Terrorism.	08
Module -2:	**THEORIES OF CRIMINAL BEHAVIOR** 2.1 Sociological Theory of Crime- Introduction, Sociological Theory of Crimina Behavior, Theory of Differential Association, Crimes in Urban & Rural Areas. 2.2 Theories of Criminal Behavior – Classical and neoclassical theories, biological & physiological theory, psychological, sociological, geographical, economic theory	07
Module -3:	**PENOLOGY** 3.1 Penology, Meaning, Aim & Philosophy of Punishment, Concept of Punishment, Justification for Punishment, Theories of Punishment Forms of Punishment in Criminal law – retributive, deterrent, reformative, expiatory 3.2 Typologies of Punishment - imprisonment for a term, life imprisonment, death penalty, fines, forfeiture Recidivism, Judicial sentencing, capital punishment	07

Module -4:	**VICTIMOLOGY** 4.1 Victim-offender relationship, Victimology, Victimization, impact of victimization – physical and financial impact, victim typology, Types of victims, victim protection, Rights of the Crime victims, Victim compensation in India, Victimization of children 4.2 Juvenile Delinquency - Definition & Meaning of Juvenile Delinquency, causes, Juvenile Justice in India, Crimes against juveniles and penalties for them, Observation homes, Special homes or correction homes between modus operandi & motive.	08

Reference Books: -

1. Paranjape, N. V. *Criminology and Penology with Victimology*. 7th ed. Central Law Publication, 2018.
2. Siddique, Ahmad. *Criminology and Penology*. 6th ed. Eastern Book Company.
3. Advani, Neera. *Crime and Society in India*. New Delhi: Sage Publications, 2010.
4. Chaudhary, Usha. *Criminology and Criminal Justice*. New Delhi: Deep & Deep Publications, 2015.
5. Ishwaran, K. S. *Crime and Society in India*. New Delhi: Prentice-Hall of India, 2002.
6. Singh, R. K. *Indian Criminology*. Allahabad: Allahabad Law Agency, 2008.

Evaluation Pattern: 60:40

Total Marks:50

Continuous Comprehensive Evaluation (20 Marks):	**End Semester Examination (30Marks):**
• CCE-I: Compulsory home assignment (10 Marks) • CCE-II: Short & long answer question Test/seminar/open book test/ quiz/case study/book review/field work/industrial visit (10 Marks each) • CCE-III: Compulsory MCQ test (Each question for 1Mark) 10 Marks Note: -Best two scores of CCE will be considered out of three.	• Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M Note: Conversion of 50 marks of ESE to 30 marks

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Programme: B.Sc. I	**Semester-** II
Type: Minor II	**Marks:**50
Credits: 2	**From: A.Y.2024-25**
Name of the Course: Law II (BFST 128)	

Course Objectives: Students should be able to…

1. learn offenses against the person, property, and the state.
2. understand types of crimes.
3. study the crimes and punishment.
4. comprehend Acts and its amendments.

Course Outcomes: Students will be able to…

1. analyze offenses against the person, property, and the state.
2. classify types of crimes.
3. differentiate the crimes and punishment.
4. apply Acts and its amendments.

Module	Course III: BFST 128 Law II	Hrs.
Module -1:	**OFFENCES** 1.1 Scheduled Castes and the Scheduled Tribes (Prevention of Atrocities) Act,1989 and 2015 with amendments. 1.2 Prevention of Corruption Act 1988 and 2018 with amendments. 1.3 Offences related to property 1.4 Offences related to documents & property marks	07
Module -2:	**MAJOR ACTS I** 2.1 Wildlife Protection Act. 2.2 Introduction, objectives and scope of the Act 2.3 Authorities under the Act, Classification and protection of wildlife species 2.4 Wildlife trade and illegal wildlife trafficking 2.5 Wildlife Advisory Board, Protected areas 2.6 I.T. Act.2000 and its amendments. 2.7 Introduction, objectives and scope of the Act 2.8 Important definitions 2.9 Legal recognition of electronic records	08
Module -3:	**MAJOR ACTS II** 3.1 Narcotic Drugs and Psychotropic-Introduction, objectives and scope of the Act Important definitions, Narcotic drugs, Psychotropic substances, Manufactured drugs, Prohibition and control of narcotic drugs, Sale, purchase and transport, Offences and punishments, Search, seizure and arrest, Sampling and sealing procedures, Chain of custody of seized drugs, Forensic examination of narcotic substances, Role of forensic science laboratories, Controlled substances and precursor chemicals, Bail provisions, Role of forensic toxicology in NDPS cases 3.2 Substances Act Drugs and Cosmetics Act - Introduction, objectives and scope of the Act, Misbranded drugs, Adulterated drugs, Spurious drugs, Regulation of import, manufacture and sale of drugs, Drug Inspectors and their powers, Government Analysts and their functions, Adulteration and spurious drugs, Offences and penalties, Seizure and prosecution procedures, Role of forensic toxicology, Role of forensic laboratories in drug analysis.	08

Module -4:	**MAJOR ACTS III** 4.1 Dowry, Prohibition Act - Introduction, objectives and scope of the Act, Definition of dowry, Dowry and marriage-related transactions, Prohibition of giving and taking dowry, Demand for dowry, Penalties for giving and taking dowry, Penalties for demanding dowry, Dowry advertisements, Dowry-related offences, Dowry articles and their legal status 4.2 POCSO Act - Introduction, objectives and scope of the Act, Definition of child, Sexual offences against children, Penetrative sexual assault, aggravated penetrative sexual assault, Sexual assault, Aggravated sexual assault, Sexual harassment of children	07

Reference Books: -

1. *Information Technology Act, 2000*. Government of India.
2. *Wild Life (Protection) Act, 1972*. Government of India.
3. *Narcotic Drugs and Psychotropic Substances Act, 1985*. Government of India.
4. *Drugs and Cosmetics Act, 1940*. Government of India.
5. *Protection of Children from Sexual Offences Act, 2012*. Government of India.
6. Bhaskar Chaursia, *Textbook of Forensic Pharmacy (Pharmaceutical jurisprudence)*, CBS Publications & Distributers, 2018

Evaluation Pattern: 60:40

Total Marks:50

Continuous Comprehensive Evaluation (20 Marks):	**End Semester Examination (30Marks):**
• CCE-I: Compulsory home assignment (10 Marks) • CCE-II: Short & long answer question Test/seminar/open book test/ quiz/case study/book review/field work/industrial visit (10 Marks each) • CCE-III: Compulsory MCQ test (Each question for 1Mark) 10 Marks Note: -Best two scores of CCE will be considered out of three.	• Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M Note: Conversion of 50 marks of ESE to 30 marks

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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Biotechnology

Programme: B.Sc. I	**Semester-** II
Type: Minor Practical II	**Marks:**50
Credits: 2	**From: A.Y.2024-25**

Name of the Course: Practical Course III (BFSP 129)

Course Objectives: Students should be able to…

1. learn various forms of crime
2. understand the Indian police system
3. understand concept of criminology.
4. conduct crime analysis.

Course Outcomes: Students will be able to…

1. analyze relationship between crime & society
2. elaborate the Indian police system
3. understand concept of criminology.
4. conduct crime analysis.

Practical No.	Lists of Practical's (Conduct any 15 Practicals)	Hrs.
1	Describe accidental deaths and suicides in India	4
2	To study socio economic crimes	4
3	To understand various forms of crime	4
4	Describe accidental deaths and suicides in India	4
5	Learn basic functions and duties of police	4
6	Important Court Decisions and Case Studies	4
7	Field visit to any of the following criminal justice administrations – District Court/ Observation/Juvenile home/ Police Training Academy/ Forensic Medicine Department /Fire Station	4
8	To study the history of crime cases from forensic science perspective	4
9	Frye vs Daubert standards.	4
10	To cite example of a case for opinion of an expert	4
11	To study a crime case in which an accused was punished on charge of Dacoity	4
12	To study a crime case in which an accused was punished on charge of Robbery	4
13	To study the important sections of IT Act	4
14	Cyber Crime Scenario in India.	4
15	To study laws & punishments for crime against women	4

REFERENCE BOOKS:

1. Paranjape, N. V. *Criminology and Penology with Victimology*. 7th ed. Central Law Publication, 2018.
2. Siddique, Ahmad. *Criminology and Penology*. 6th ed. Eastern Book Company.
3. Advani, Neera. *Crime and Society in India*. New Delhi: Sage Publications, 2010.
4. *Information Technology Act, 2000*. Government of India.
5. *Wild Life (Protection) Act, 1972*. Government of India.
6. *Narcotic Drugs and Psychotropic Substances Act, 1985*. Government of India.
7. *Drugs and Cosmetics Act, 1940*. Government of India.

Evaluation Pattern: 60:40	
TotalMarks:50	
Internal Evaluation (20 marks): • Journal: 10 Marks • Students Performance: 10 Marks	**End Semester Examination (30 Marks):** • 1 Question • 2 Question