Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur 440033

Scheme and Syllabus

Bachelor of Science (Forensic Science)

Submitted by

Board of Studies,

Bachelor of Science (Forensic Science)

FYUGP-Scheme I-VIII Semester

Bachelor of Science (Honors/Research) (Forensic Science - Major)

Four Year (Eight Semester Degree Course)

Teaching and Examination Scheme

B.Sc. Sem-I (Forensic Science - Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
								Theory				Practical		
				(Th)	TU	P		Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	Forensic Science	BFS1T01	2	-	-	2	3	80	20	40	-	-	-
2	DSC	Forensic Science	BFS1P01	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Digital & Cyber Forensic	BFS1T02	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Digital & Cyber Forensic	BFS1P02	-	-	2	1	-	-	-	-	-	50	25
5	GE/OE	Refer GE/OE Basket	BGO1T01	2	-	-	2	3	80	20	40	-	-	-
6	GE/OE	Refer GE/OE Basket	BGO1T02	2	-	-	2	3	80	20	40	-	-	-
7	VSC	A. Soap, Detergent, and Disinfectant Technology B. Basic Techniques in Forensic Biology C. Optical Laboratory	BVS1P01	-	-	4	2	-	-	-	-	50	50	50
8	SEC	Refer SEC Basket	BVS1P02	-	-	4	2	-	-	-	-	50	50	50
9	AEC	English Compulsory	BAE1T01	2	-	-	2	3	50	50	40	-	-	-
10	VEC	Environmental Sci.	BVE1T01	2	-	-	2	3	80	20	40	-	-	-
11	IKS	Vedic Mathematics	BIK1T01	2	-	-	2	3	80	20	40	-	-	-
12	CC	Refer CC Basket	BCC1P01	-	-	4	2	-	-	-	-	-	100	50
Total				14	-	16	**22**		**530**	**170**		**125**	**275**	

B.Sc. Sem-II (Forensic Science- Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
				(Th)	TU	P		Theory				Practical		
								Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	Forensic Chemistry	BFS2T03	2	-	-	2	3	80	20	40	-	-	-
2	DSC	Forensic Chemistry	BFS2P03	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Forensic Physics	BFS2T04	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Forensic Physics	BFS2P04	-	-	2	1	-	-	-	-	-	50	25
5	GE/OE	Refer GE/OE Basket	BGO2T03	2	-	-	2	3	80	20	40	-	-	-
6	GE/OE	Refer GE/OE Basket	BGO2T04	2	-	-	2	3	80	20	40	-	-	-
7	VSC	A. Documentation of Crime Scene B. Basics Techniques of Microbial Forensics C. Python Programming	BVS2P03	-	-	4	2	-	-	-	-	50	50	50
8	SEC	Refer SEC Basket	BVS2P04	-	-	4	2	-	-	-	-	50	50	50
9	AEC	Second Language	BAE2T02	2	-	-	2	3	50	50	40	-	-	-
10	VEC	Constitution of India	BVE2T02	2	-	-	2	3	80	20	40	-	-	-
11	IKS	Indian Astronomy	BIK2T02	2	-	-	2	3	-	-	-	50	50	50
12	CC	Refer CC Basket	BCC2P02	-	-	4	2	-	-	-	-	-	100	50
Total				14	-	16	**22**		**530**	**170**		**125**	**275**	

Exit option: Award of UG Certificate in Major with 40-44 credits and an additional 4 credits core NSQF course/ Internship ORContinue with Major and Minor

B.Sc. Sem-III (Forensic Science - Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
								Theory				Practical		
				(Th)	TU	P		Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	Forensic Psychology	BFS3T05	2	-	-	2	3	80	20	40	-	-	-
2	DSC	Forensic Psychology	BFS3P05	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Forensic Biology	BFS3P06	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Forensic Biology	BFS3P06	-	-	2	1	-	-	-	-	-	50	25
5	Minor	Minor 1 (Refer Minor Basket)		2	-	-	2	3	80	20	40	-	-	-
6	Minor	Minor 1 (Refer Minor Basket)		-	-	2	1	-	-	-	-	25	25	25
7	Minor	Minor 2 (Refer Minor Basket)		2	-	-	2	3	80	20	40	-	-	-
8	Minor	Minor 2 (Refer Minor Basket)		-	-	2	1	-	-	-	-	-	50	25
9	GE/OE	Refer GE/OE Basket	BGO3T05	2	-	-	2	3	80	20	40	-	-	-
10	VSC	Refer VSC Basket	BVS3P05	-	-	4	2	-	-	-	-	50	50	50
11	AEC	Second Language	BAE3T03	2	-	-	2	3	50	50	40	-	-	-
12	FP	Field Project	BFP3P01	-	-	4	2	-	-	-	-	50	50	50
13	CC	Refer CC Basket	BCC3P03	-	-	4	2	-	-	-	-	-	100	50
Total				12	-	20	**22**		**450**	**150**		**150**	**350**	

B.Sc. Sem-IV (Forensic Science – Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
								Theory				Practical		
				(Th)	TU	P		Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	Digital & Cyber Forensics	BFS4T07	2	-	-	2	3	80	20	40	-	-	-
2	DSC	Digital & Cyber Forensics	BFS4P07			2	1	-	-	-	-	25	25	25
3	DSC	Forensic Science	BFS4T08	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Forensic Science	BFS4P08			2	1	-	-	-	-	-	50	25
5	Minor	Minor 3 (Refer Minor Basket)		2	-	-	2	3	80	20	40	-	-	-
6	Minor	Minor 3 (Refer Minor Basket)				2	1	-	-	-	-	25	25	25
7	Minor	Minor 4 (Refer Minor Basket)		2	-		2	3	80	20	40	-	-	-
8	Minor	Minor 4 (Refer Minor Basket)				2	1	-	-	-	-	-	50	25
9	GE/OE	Refer GE/OE Basket	BGO4T06	2	-	-	2	3	80	20	40	-	-	-
10	SEC	Refer SEC Basket	BVS4P06	-	-	4	2	-	-	-	-	50	50	50
11	AEC	English Compulsory	BAE4T03	2	-	-	2	3	50	50	40	-	-	-
12	CEP	Community Service	BCM4P01	-	-	4	2	-	-	-	-	50	50	50
13	CC	Refer CC Basket	BCC4P04	-	-	4	2	-	-	-	-	-	100	50
Total				12	-	20	**22**		**450**	**150**		**150**	**350**	

Exit option; Award of UG Diploma in Major and Minor with 80-88 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor

B.Sc. Sem-V (Forensic Science - Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
				(Th)	TU	P		Theory				Practical		
								Exam Hrs.	SEE	CIE	Min	SEE	CIE	Min.
1	DSC	Forensic Chemistry	BFS5T09	2	-	-	2	3	80	20	40	-	-	-
2	DSC	Forensic Chemistry	BFS5P09	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Forensic Physics	BFS5T10	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Forensic Physics	BFS5P10	-	-	2	1	-	-	-	-	-	50	25
5	DSC	Forensic Psychology	BFS5T11	2	-	-	2	3	80	20	40	-	-	-
6	DSC	Forensic Psychology	BFS5P11	-	-	2	1	-	-	-	-	25	25	25
7	DSE	Elective 1 (Digital & Cyber Forensic/ Forensic Science / Forensic Biology)	BFS5T12	3	-	-	3	3	120	30	60	-	-	-
8	DSE	Elective 1 (Digital & Cyber Forensic/ Forensic Science / Forensic Biology)	BFS5P12	-	-	2	1	-	-	-	-	-	50	25
9	Minor	Minor 5 (Refer Minor Basket)		2	-	-	2	3	80	20	40	-	-	-
10	Minor	Minor 5 (Refer Minor Basket)		-	-	2	1	-	-	-	-	25	25	25
11	Minor	Minor 6 (Refer Minor Basket)		2	-	-	2	3	80	20	40	-	-	-
12	Minor	Minor 6 (Refer Minor Basket)		-	-	2	1	-	-	-	-	-	50	25
13	VSC	Refer VSC Basket	BVS5P07	-	-	4	2	-	-	-	-	50	50	50
14	CEP	NSS/ NCC/ Yoga/ Sports/ Cultural/ Community Service	BCM5P02	-	-	2	1	-	-	-	-	25	25	25
Total				**13**	**-**	**18**	**22**	**-**	**520**	**130**	**--**	**150**	**300**	**-**

B.Sc. Sem-VI (Forensic Science - Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
								Theory				Practical		
				(Th)	TU	P		Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	Forensic Science	BFS6T13	2	-	-	2	3	80	20	40	-	-	-
2	DSC	Forensic Science	BFS6P13	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Forensic Biology	BFS6T14	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Forensic Biology	BFS6P14	-	-	2	1	-	-	-	-	-	50	25
5	DSC	Digital & Cyber Forensics	BFS6T15	2	-	-	2	3	80	20	40	-	-	-
6	DSC	Digital & Cyber Forensics	BFS6P15	-	-	2	1	-	-	-	-	25	25	25
7	DSE	Elective 2 (Forensic Chemistry/ Forensic Physics/ Forensic Psychology)	BFS6T16	3	-	-	3	3	120	30	60	-	-	-
8	DSE	Elective 2 (Forensic Chemistry/ Forensic Physics/ Forensic Psychology)	BFS6P16	-	-	2	1	-	-	-	-	-	50	25
9	Minor	Minor 7 (Refer Minor Basket)		2	-	-	2	3	80	20	40	-	-	-
10	Minor	Minor 7 (Refer Minor Basket)		-	-	2	1	-	-	-	-	25	25	25
11	VSC	Refer VSC Basket	BVS6P08	-	-	4	2	-	-	-	-	50	50	50
12	OJT	Internship (Related to DSC)	BOJ6P01	-	-	8	4	-	-	-	-	100	100	100
Total				11	-	22	**22**		**440**	**110**		**225**	**325**	

Exit option: Award of UG Degree in Major with 120-132 credits OR Continue with Major and Minor

B.Sc. Sem-VII (Honors) (Forensic Science - Major)

S N	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
				(Th)	TU	P		Theory				Practical		
								Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	Forensic Science	BFS7T17	2	-	-	2	3	80	20	40	-	-	-
2	DSC	Forensic Science	BFS7P17	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Forensic Chemistry & Toxicology	BFS7T18	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Forensic Chemistry & Toxicology	BFS7P18	-	-	2	1	-	-	-	-	-	50	25
5	DSC	Forensic Biology & Serology	BFS7T19	2	-	-	2	3	80	20	40	-	-	-
6	DSC	Forensic Biology & Serology	BFS7P19	-	-	2	1	-	-	-	-	25	25	25
7	DSC	Digital & Cyber Forensics	BFS7T20	2	-	-	2	3	80	20	40	-	-	-
8	DSC	Digital & Cyber Forensics	BFS7P20	-	-	2	1	-	-	-	-	-	50	25
9	DSE	Elective 3 (Forensic Physics/ Forensic Psychology/Law)	BFS7T21	3	-	-	3	3	120	30	60	-	-	-
10	DSE	Elective 3 (Forensic Physics/ Forensic Psychology/Law)	BFS7P21	-	-	2	1	-	-	-	-	25	25	25
11	RM	Research Methodology	BFS7T22	2	-	-	2	3	80	20	40	-	-	-
12	RM	Research Methodology	BFS7P22	-	-	4	2	-	-	-	-	50	50	50
Total				13	-	14	**20**		**520**	**130**		**125**	**225**	

B.Sc. Sem-VIII (Honors) (Forensic Science - Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
				(Th)	TU	P		Theory				Practical		
								Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	Forensic Science	BFS8T23	2	-	-	2	3	80	20	40	-	-	-
2	DSC	Forensic Science	BFS8P23	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Forensic Chemistry & Toxicology	BFS8T24	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Forensic Chemistry & Toxicology	BFS8P24	-	-	2	1	-	-	-	-	-	50	25
5	DSC	Forensic Biology & Serology	BFS8T25	2	-	-	2	3	80	20	40	-	-	-
6	DSC	Forensic Biology & Serology	BFS8P25	-	-	2	1	-	-	-	-	25	25	25
7	DSC	Digital & Cyber Forensics	BFS8T26	2	-	-	2	3	80	20	40	-	-	-
8	DSC	Digital & Cyber Forensics	BFS8P26	-	-	2	1	-	-	-	-	-	50	25
9	DSE	Elective 4 (Forensic Physics/ Forensic Psychology/Law)	BFS8T27	3	-	-	3	3	120	30	60	-	-	-
10	DSE	Elective 4 (Forensic Physics/ Forensic Psychology/Law)	BFS8P27	-	-	2	1	-	-	-	-	25	25	25
11	OJT	Apprenticeship (Related to DSC)	BOJ8P02	-	-	8	4	-	-	-	-	100	100	100
Total				11	-	18	**20**		**440**	**110**		**175**	**275**	

Four Year UG Honours Degree in Major and Minor with 160-176 credits

B.Sc. Sem-VII (Research) (Forensic Science - Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
								Theory				Practical		
				(Th)	TU	P		Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	Forensic Psychology	BFS7T17R	2	-	-	2	3	80	20	40	-	-	-
2	DSC	Forensic Psychology	BFS7P17R	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Forensic Biology & Serology	BFS7T18R	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Forensic Biology & Serology	BFS7P18R	-	-	2	1	-	-	-	-	-	50	25
5	DSC	Forensic Physics	BFS7T19R	2	-	-	2	3	80	20	40	-	-	-
6	DSC	Forensic Physics	BFS7P19R	-	-	2	1	-	-	-	-	25	25	25
7	DSE	Elective 3 (Digital & Cyber Forensics/ Forensic Chemistry & Toxicology/ Forensic Science)	BFS7T20R	3	-	-	3	3	120	30	60	-	-	-
8	DSE	Elective 3 (Digital & Cyber Forensics/ Forensic Chemistry & Toxicology/ Forensic Science)	BFS7P20R	-	-	2	1	-	-	-	-	-	50	25
9	RM	Research Methodology	BFS7T21R	2	-	-	2	3	80	20	40	-	-	-
10	RM	Research Methodology	BFS7P21R	-	-	4	2	-	-	-	-	50	50	50
11	RP	Research Project/ Dissertation (Core)	BRP7P01	-	-	6	3	-	-	-	-	75	75	75
Total				11	-	18	**20**		**440**	**110**		**175**	**275**	

'R' in the subject code indicates 'Research'.

B.Sc. Sem-VIII (Research) (Forensic Science - Major)

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
				(Th)	TU	P		Theory				Practical		
								Exam Hrs.	SEE	CIE	Min	SEE	CIE	Min
1	DSC	Forensic Science	BFS8T22R	2	-	-	2	3	80	20	40	-	-	-
2	DSC	Forensic Science	BFS8P22R	-	-	2	1	-	-	-	-	25	25	25
3	DSC	Forensic Chemistry & Toxicology	BFS8T23R	2	-	-	2	3	80	20	40	-	-	-
4	DSC	Forensic Chemistry & Toxicology	BFS8P23R	-	-	2	1	-	-	-	-	-	50	25
5	DSC	Digital & Cyber Forensics	BFS8T24R	2	-	-	2	3	80	20	40	-	-	-
6	DSC	Digital & Cyber Forensics	BFS8P24R	-	-	2	1	-	-	-	-	25	25	25
7	DSE	Elective 4 (Forensic Physics/ Forensic Biology/ Forensic Psychology)	BFS8T25R	3	-	-	3	3	120	30	60	-	-	-
8	DSE	Elective 4 (Forensic Physics/ Forensic Biology/ Forensic Psychology)	BFS8P25R	-	-	2	1	-	-	-	-	-	50	25
9	RP	Research Project / Dissertation (Core)	BRP8P02	-	-	14	7 (4+2 +1)	-	-	-	-	175	175	175
Total				09	-	22	**20**		**360**	**90**		**225**	**325**	

'R' in the subject code indicates 'Research'.

Four Year UG Honours with Research Degree in Major and Minor with 160-176 credits

Total Credits:

1. Three Year UG Degree Program: 132
2. Four Year UG Degree Program: 172

Abbreviations: Generic/Open Electives: OE, Vocational Skills & Skill Enhancement Courses: VSEC, Vocational Skill Courses: VSC, Skill Enhancement Courses: SEC, Ability Enhancement Courses: AEC, Indian Knowledge Systems: IKS, Value Education Courses: VEC, On Job Training (Internship/Apprenticeship): OJT, Field Project: FP, Community Engagement & Service: CEP, Co-curricular Courses: CC, Research Methodology: RM, Research Project: RP

VSC Basket (Forensic Science)

Semester	Course Category	Name of Course	BoS	Course Code
I	**VSC**	A. Soap, Detergent, and Disinfectant Technology B. Basic Techniques in Forensic Biology C. Optical Laboratory	Forensic Science	**BVS1P01**
II	**VSC**	A. Documentation of Crime Scene B. Basics Techniques of Microbial Forensics C. Python Programming	Forensic Science	**BVS2P03**
III	**VSC**	A. Crime Scene Investigation B. Forensic Biology	Forensic Science	**BVS3P05**
V	**VSC**	A. Practical Aspects of Forensic Journalism B. Forensic Biology C. Forensic Psychology	Forensic Science	**BVS5P07**
VI	**VSC**	A. Statistics in Forensic Science B. Forensic Biology C. Forensic Psychology	Forensic Science	**BVS6P08**

Basket for <u>ELECTIVE</u> (DSE) Category Courses (Forensic Science)

Semester	Course Category	Name of Course	Course Code
V	Elective 1	A. Digital & Cyber Forensic B. Forensic Science C. Forensic Biology	BFS5T12
VI	Elective 2	A. Forensic Chemistry B. Forensic Physics C. Forensic Psychology	BFS6T16
VII (Honors)	Elective 3	A. Forensic Physics B. Forensic Psychology C. Law	BFS7T21
VIII (Honors)	Elective 4	A. Forensic Physics B. Forensic Psychology C. Law	BFS8T27
VII (Research)	Elective 3	A. Digital & Cyber Forensics B. Forensic Chemistry & Toxicology C. Forensic Science	BFS7T20R
VIII (Research)	Elective 4	A. Forensic Physics B. Forensic Biology C. Forensic Psychology	BFS7T25R

'R' in the subject code indicates 'Research'.

B.Sc. Sem-I (Forensic Science - Major)

DSC I (Forensic Science)

Paper (BFS1T01): Basics of Forensic Science

Course Outcomes: By the end of this Course, the learners will be able to:

1. Apply fundamental principles and laws of forensic science to analyze and interpret crime scene evidence.
2. Evaluate the historical development and contributions of forensic science, including key concepts and scientists' contributions.
3. Assess the setup, services, and functionalities of forensic science laboratories in India, including divisions and areas of specialization.
4. Apply crime scene investigation techniques, including crime scene classification, evidence preservation, collection, and documentation.
5. Understand the role and functions of investigation agencies in society, including their structure and modern techniques of interview and interrogation.

Unit I: **Introduction to Forensic Science and its Historical Development.**

Forensic Science: Definition, Nature, need and functions. Basic Principles and Laws of Forensic Science: Locard's Principle of Exchange, Law of Progressive Change, Law of Individuality, Law of Circumstantial Fact, Principle of Analysis, Law of Probability, and Law of Comparison. Corpus Delicti, Modus Operandi, Signature. Historical development in India and world, Specific contribution of scientists in the field of Forensic Science. Scope of Forensic Science in India and world.

Unit II: Development of Forensic Science

Educational setup of Forensic Science in India, Services and functionalities provided by various FSLs, Structure of the FSLs, Various divisions in the FSL – General Analytical and Instrumentation, Ballistics, Biology, Chemistry Documents, Physics, Psychology, Serology, Toxicology, Cyber Forensic, Tape Authentication and Speaker Identification (TASI), DNA division. Mobile Forensic Science Laboratories. Growth and development of Forensic Science Laboratories in India – Central and State level, GEQDs, Eminent scientists and Forensic Experts in India and their contributions to the field.

Unit III: **Crime Scene Investigation**

Types and classification of Crime Scene, Initial response, Securing the scene of crime, Various crime scene search methods, Various methods of preservation of crime scene: Photography, Sketching, Videography, Voice Recording, Notes taking. Collection methods and labelling, packing, and forwarding of evidences, documentation and chain of custody, Role of First Responding Officer and Investigating officer.

Unit IV: Investigation Agencies and Society

Structure, role and functions of CID, CBI, IB, RAW, NCRB, BPR&D, DFS, DFSS, and NICFS. Techniques of interview and interrogation and other modern techniques).

Practical (BFS1T01): Basics of Forensic Science

1. To conduct mock 'Crime Scene Investigation'.
2. To perform a crime scene survey of a given crime scene
3. Sketching of a Crime Scene using Triangulation method.
4. Sketching of a Crime Scene using Baseline method.
5. Preliminary examination of suspected bloodstains at the scene of crime.
6. Preliminary examination of suspected saliva stains.
7. Preliminary examination of suspected semen stains at the sexual assault crime scene.
8. To write forwarding letter for evidences encountered at murder crime scene.
9. To write forwarding letter for evidences encountered at hit and run crime scene.
10. To write forwarding letter for evidences encountered at sexual assault crime scene.

B.Sc. Sem-I (Forensic Science - Major)

DSC II (Digital and Cyber Forensic)

Paper (BFS1T02): Fundamentals of Computers

Course Outcomes: By the end of this Course, the learners will be able to:

1. Understand the meaning and basic components of a Digital computer system
2. Understand the concepts and need of primary, secondary memory and different storage devices
3. Explain input devices and output devices.
4. Understand the role and functionalities of operating system, its various types.
5. Explain Network concept, LAN, WAN and MAN, Network devices, networking architecture etc.

Unit I: Components of Digital Computer

Basic Components of Digital Computers: Block Diagram**.**

CPU: Functions of Each Unit: Primary Memory, ALU and CU: Fetch and Execution cycle, Execution of Instructions in Single Address CPU.

Memory: RAM, ROM, PROM, EPROM, EEPROM and Cache. CISC and RISC Technology

Unit II: Various types of devices

Storage Devices: Hard Disk, Optical Disk, Pen Drive, SD Card, and Cloud as storage.

Input Devices: Keyboard, Mouse, Light Pen, Touch Screen, Voice Input, MICR, OCR, OMR, Barcode Reader and Flatbed Scanner.

Output Devices: VDU, Printers: Dot Matrix, Laser and Inkjet, Plotters: Drum, Flat-Bed and Inkjet.

Unit III: Introduction to Operating System

Introduction of Operating System, Functions of OS, **Types of OS:** Single user, Multi-User, single tasking, multi-tasking, RTOS and Distributed, **Examples:** Windows, Linux, Unix, Dos, Mac and Android.

Unit IV: Network and Networking Systems

Network: Network terminology, **Topologies**: Linear, Circular, Tree and Mesh. **Types of Networks**: LAN, WAN and MAN, **Networking Devices**: Repeaters, Bridges, Routers and Gateway. Modem for Communication between PC's, Wi-Fi network, Bluetooth and Infrared devices, **Network Architecture:** Peer-to-Peer, Client/Server

Practical (BFS1T02): Fundamentals of Computers

1. Identify and explain the functions of each unit in the CPU, including the primary memory, ALU, and CU.
2. Investigate and compare storage devices such as hard disks, optical disks, pen drives, SD cards, and cloud storage.
3. Compare the usability and functionality of different input devices.
4. Set up and use output devices, including VDUs, laser printers, inkjet printers.
5. Explore different operating systems, including Windows, Linux, Unix, DOS, Mac, and Android.
6. Discuss the functions of an operating system, such as process management, memory management, file system management, and user interface.
7. Configure a LAN using appropriate networking devices, including repeaters, bridges, routers, and gateways.
8. Transfer files between computers on the LAN and demonstrate shared resources.
9. Set up small-scale networks using different topologies and analyze their advantages and limitations.
10. Set up a client/server network using appropriate networking devices and software.
11. Configure client and server systems and establish network communication.
12. Demonstrate the use of client/server architecture for file sharing and resource access.

B.Sc. Sem-I (Forensic Science - Major)

VSC (Forensic Chemistry)

VSC 1-A (BVS1P01): Soap, Detergent and Disinfectant Technology

Course Outcome: By the end of this Course, the learners will be able to:

1. Recall historical information, understand sustainable development in disinfectant technology,
2. Apply mechatronic solutions for soap manufacturing, and apply their knowledge to create different products.
3. Analyze various determinations and comparisons, evaluate different aspects related to soaps and detergents, and
4. They will have practical skills in soap and detergent manufacturing processes and an understanding of the principles behind them.

List of Practical

1. Brief History of Soap and Soap-Making Processes, Formulation and Marketing Challenges
2. Sustainable development in cleaning action of disinfectant technology and Innovations
3. in advances and Mechatronic Solutions for Soap Manufacturing Technology from
4. Saponification Systems.
5. Determination of the surface tension of given liquid in the presence of surfactant.
6. Determination of alkali content of soap.
7. Determination of pH of water samples and surfactant (Soap, detergent, Toiletries)
8. Estimation of hardness of water by titration with soap solution.
9. Determination of CMC of various soaps and detergents in market.
10. Comparison of cleansing actions of various commercial soaps and detergents.
11. Preparation of hand sanitizer.
12. Preparation of Soap, Detergents / Surfactants, Cleaners / Cleaning Powder.
13. Preparation of Laundry Care / fabric care / wash.
14. Preparation of Household and Industrial Detergent.
15. Preparation of Liquid Soaps/ Liquid Detergents / Acid Slurry.

B.Sc. Sem-I (Forensic Science - Major)

VSEC (Forensic Biology)

VSC 1-B (BVS1P01): Basic Techniques in Forensic Biology

Course Outcome: By the end of this Course, the learners will be able to:

1. Demonstrate knowledge and understanding of Neubauer's chamber and its application in forensic biology, including the ability to accurately count and analyze cells or particles.
2. Implement general safety guidelines and identify potential hazards in a forensic biology laboratory, ensuring a safe working environment for oneself and others.
3. Explain the basic concepts of laboratory equipment and apparatus used in forensic biology, including glassware and common laboratory instruments, and their appropriate usage.
4. Prepare different types of solutions, including molar normal formal and molal solutions, and determine their concentrations accurately using appropriate techniques.
5. Perform pH measurements of solutions used in forensic biology, interpret the results, and understand the implications of pH in various forensic applications.

List of Practical:

1. Study of Neubauer's chamber and its utility in forensic biology.
2. General guidelines for safety in a forensic biology laboratory, possible laboratory hazards.
3. General concept of basic equipment and apparatus (Glassware and laboratory instruments).
4. Preparation of molar normal Formal and molal solution (lower and higher range).
5. Determination of pH of solutions used in forensic biology.
6. Preparation of various microbial basal media.
7. Preparation of percent solution.
8. Preparation of various types of graphs used in forensic biology.
9. Sterilization of glassware and basal media.
10. Microbial culturing from the soil sample.
11. Preparation of various staining reagents used in forensic biology.
12. Preparation of temporary slides.

B.Sc. Sem-I (Forensic Science - Major)

VSEC (Forensic Physics)

VSC 1-C (BVS1P01): Optical Laboratory

Course Outcome: By the end of this Course, the learners will be able to:

1. Analyze and interpret experimental results to determine parameters such as dispersive power of a prism, focal length of lenses, resolving power of gratings, and magnification of microscopes.
2. Apply appropriate measurement techniques, such as using a spectrometer or Newton's rings, to determine angles, radii, and other optical properties.
3. Understand the concepts like Brewster's law, wavelength determination using transmission grating, and the working principles of compound, stereo, and comparison microscopes.
4. Develop skills in experimental setup, data collection, and analysis, enhancing their ability to conduct precise optical measurements.

List of Practical:

1. Determination of Dispersive Power of a Prism
2. Determination of Angle of Prism using Spectrometer
3. Determination of Focal Length of Concave Lenses
4. Determination of Focal Length of Convex Lenses
5. Determination of Focal Length of Combination of Lenses
6. Determination of Wavelength of Light using Plane Transmission Grating
7. Determination of Resolving Power of Grating
8. Determination of Radius of Curvature of Plano-Convex Lens by Newton’s Rings
9. Study of Brewster’s Law
10. Determination of R.I. of Glass by using Brewster’s Law
11. Determination of Resolving Power of Microscope
12. Determination of Magnification of Microscope
13. Study of Compound Microscope
14. Study of Stereo Microscope
15. Study of Comparison Microscope

B.Sc. SEMESTER – I

BVE1T01: ENVIRONMENTAL SCIENCE

COURSE OUTCOMES:

At the end of the course, students shall be able to:

- Explain the basics of Environmental Science and Atmospheric Science along-with the components of Environment
- Explicate the importance of Environmental Education.
- Elucidate the fundamentals of atmospheric science including formation, depletion and effects of ozone layer and acid rain on environment.
- Describe the various physical and chemical characteristics and properties of Water and Soil
- Understand the Ecology and its allied branches
- Comprehend about Population and Community Ecology
- Study the changes in Population by understanding the concept of Population ecology

Unit-I: Basics of Environmental Science (7.5 Hrs)

A. Introduction of Environmental Science: Definition, Types, Classification, Characteristics, Components and principles of environment. Scope and need for environmental science, Multidisciplinary nature of environmental science, Environmental ethics.
B. Environmental Education: Goals, Objectives and principles of environmental education, formal and non-formal environmental education, environmental programme, importance of environmental education, environmental awareness.
C. Components of Environment: Atmosphere (Structure and composition),hydrosphere – distribution of water, hydrological cycle, global water balance, lithosphere – Internal structure of Earth, types of rocks, Biosphere- Boundaries of biosphere.

Unit-II: Basics of Atmospheric Science (7.5 Hrs)

A. Atmospheric Chemistry: Structure of atmosphere based on temperature, photochemical reaction in the atmosphere, temperature inversion and lapse rate, smog formation, types of smog (sulphur and photochemical smog), adverse effect of smog on human being, aerosol.
B. Green House Effect: Greenhouse gases, relative contribution and effects of greenhouse effect, control of greenhouse gases. Ozone depletion: chemistry of ozone depletion, Dobson Unit, ozone depleting substances (ODS), ozone hole, consequences of ozone depletion, mitigation measures and international protocols.
C. Acid Rain: Chemistry of Acid Rain, effect of acid rain on ecosystem, control measures. Precipitation – Forms of precipitation (rain, drizzle, snow, sleet, and hail), types of precipitation (conventional, orographic, and cyclonic).

Unit-III: Basics of Ecology (7.5 Hrs)

A. Ecology: Definition, subdivision and modern branches of ecology, ecology spectrum, scope of ecology. Application and significance of ecology to human beings.
B. Abiotic Factors: Temperature: effect of temperature on plants and animals, Adaptation to meet extreme temperature. Light: Zonation in marine habitat, effects of light on plants and animals, Microclimate and fire, Shelford law of tolerance, Leibigs law of minimum.
C. Biotic Factor: Inter specific relationship Positive: Mutualism (symbiosis), commensalism, proto- cooperation Negative: Parasitism, predation, competition, Antibiosis, Neutralism.

Unit-IV: Ecosystems and food chain (7.5 Hrs)

A. Ecosystem: Definition, structure and function of ecosystem, types of ecosystem: Terrestrial (forest, grassland, desert, cropland), Aquatic (Marine and freshwater)
B. Food chain: Definition & types: Grazing food chain, detritus food chain, and parasitic food chain, food web in forest and grassland ecosystem. Ecological pyramids (number biomass and energy), energy flow in ecosystem (Y- shaped). Energy flow and the law of thermodynamics.
C. Biogeochemical Cycles: Definition, classification, gaseous cycle (oxygen, carbon and nitrogen) Sedimentary cycle (phosphorus and sulphur).

Reference Books:

1. Text Book of Environment: K M Agrawal, P.K. Sikdar, and S.C. Deb, Mc'Millan Publication, Mumbai.
2. Man and Environment: M.C. Dash and P.C. Mishra, Mc'Millan Publication, Mumbai.
3. Environmental Science: S.C. Santra, New Central Book Pvt.Ltd, Kolkatta.
4. Environmental Problems and Solution: D.K. Asthana, S.Chand Publication, New Delhi.
5. Environmental Chemistry: S.S. Dara, S.Chand Publication ,New Delhi.
6. Environmental Chemistry: A.K. Dey, New Age International Publishers,2001.
7. A Textbook of Environmental Studies: Dr S.Satyanarayan, Dr S.Zade, Dr S Sitre and Dr P.U. Meshram, Allied Publishers, New Delhi.
8. Environmental Biology: Biswarup Mukherjee, Tata McGraw-Hill Publishing Company Ltd, New Delhi,1996.
9. Animal Ecology and Distribution of Animals: Veer Bala Rastogi , Rastogi Publication, Meerut (U.P).
10. Ecology and Environment: P.D.Sharma, Rastogi Publication ,Meerut (U.P).
11. Fundamentals of Environmental Biology: S. Arora, Kalyani Publishers.
12. Environmental Biology: P.K.G. Nair, Himalaya Publication.
13. Environmental Biology: K.C. Agrawal, Agro Botanical Publisher ,Bikaner,1994

Indian Knowledge System (IKS)

SEM1: VEDIC MATHEMATICS (BIK1T01)

Course Outcomes: This course will enable the students to

1. Improve speed and accuracy in numerical calculations
2. Acquire IQ skills and high-end technical knowledge
3. gain test taking skills & creativity of calculations

UNITS	TOPICS	HOURS
Unit 1	(i)Addition - Subtraction - Combined operations - Beejank (ii) Multiplication methods: Urdhwatiryagbhayam, Nikhilam, Ekanyunen, Ekadhiken, Antyayordashakepi. (iii) Vinculum - Operations. (iv) Awareness of 1 to 5 Vedic sutras as per Shankaracharya Bharthikrishan Teerthji Swamiji's book.	**8**
Unit 2	(i) Division methods : Nikhilam, Paravartya Yojayet, Dhwajank(ii) GCD and LCM (iii) Expression of GCD in terms of two numbers.	**8**
Unit 3	(i) Divisibility tests, Osculation & Reverse osculation. (ii) Division Algorithm, Quotient & Remainder. (iii) Duplex method.	**7**
Unit 4	i) Squares & Square-roots for 6 digit number. (ii) Cubes & Cube-roots for 6 digit number, Contribution of Indian Mathematicians in Arithmetic.	**7**
	TOTAL	**30 HRS**

Reference Books:

1. Tirthaji B.K. (1965) Vedic Mathematics, MotilalBanarsidass
2. Bidder G.P. (1856) On Mental Calculation. Minutes of Proceedings, Institution ofCivil Engineers (1855-56), 15, 251-280
3. Scripture E.W. (1891) American Journal of Psychology. Vol. IV 1-59
4. Mitchell F.D. (1907) American Journal of Psychology. Vol. XVIII 61-143
5. Aitken A.C. (1954) The Art of Mental Calculation: With Demonstrations. Transactions of the Society of Engineers. 45, 295-309
6. Dow A. (1991) A Unified Approach to Developing Intuition in Mathematics, Scientific Research on the Transcendental Meditation and TM-Sidhi Program Vol 5,3386-3398
7. Williams K.R. (1984) Discover Vedic Mathematics. Vedic Mathematics Research Group
8. Nicholas, Williams, Pickles (1984) Vertically and Crosswise. Inspiration Books

B.Sc. Sem-II (Forensic Science - Major)

DSC I (Forensic Chemistry)

Paper (BFS2T03): Basics of Forensic Chemistry & Toxicology

Course Outcomes: By the end of this Course, learners will be able to:

1. Recall and describe the key concepts and principles in toxicology.
2. Develop a comprehensive understanding of the significance of toxicological findings in forensic investigations.
3. Apply the knowledge and techniques of isolation and extraction methods used in toxicology for the purpose of isolating and identifying poisons in forensic samples.
4. Analyze and interpret chromatographic techniques used in toxicology, including paper chromatography, thin-layer chromatography (TLC), high-performance thin-layer chromatography (HPTLC), and column chromatography, to separate and identify toxic compounds in forensic samples.
5. Evaluate the properties, classification, fractionation, commercial uses, adulteration, and forensic significance of petroleum products.

Unit I - Basics of Toxicology

Introduction, history, Classification of poisons, characteristics and modes of action of poisons, types of poisoning, fatal dose and fatal period, signs and symptoms of common poisoning and their antidotes. Significance of toxicological findings.

Unit II – Methods of Isolation and Extraction of Poison

Introduction, principle, working, applications, limitations, and forensic significance of distillation, fractional distillation, steam distillation, dialysis, electrodialysis, solvent extraction, dry ashing, etc.

Unit III – Chromatographic Techniques used in Toxicology

Introduction, principle, theory, stationary phases, mobile phases, retardation factor, applications and forensic significance of paper chromatography, TLC, HPTLC, column chromatography etc.

Unit IV – Petroleum Products

Introduction, classification, fractionation of petroleum products, commercial uses of different petroleum fractions, nature and purpose of dyes used in petroleum products, adulteration of petroleum products, forensic significance of petroleum products.

Practical Paper (BFS2T03): Basics of Forensic Chemistry & Toxicology

1. To determine the density of given liquid.
2. To determine relative viscosity of given organic liquids by viscometer.
3. To determine the surface tension of given liquid by Stalagmometer.
4. To study kinetics of acid catalysed ester hydrolysis.
5. Organic qualitative analysis.
6. To determine strength of given acid.
7. To standardize the given NaOH solution & find the strength of given HCl solution.
8. Paper chromatography of toxic metal ions.
9. Thin Layer Chromatography of organic poisons.
10. Identification of toxic metal ions in given solution by colour tests.
11. Identification of adulteration in petrol using density method.

B.Sc. Sem-II (Forensic Science - Major)

DSC II (Forensic Physics)

Paper (BFS2T04): Basics of Forensic Physics

Course Outcomes: By the end of this Course, the learners will be able to:

1. Recall and describe the primary causes and types of vehicular accidents, sources of information for accident investigation, methods for estimating vehicle speed from skid/scuff marks, and various aspects related to motor vehicle examination, including brake systems and steering failure.
2. Develop a comprehensive understanding of tools and tool marks, including the identification and documentation of different types of tool marks the collection and preservation of tool mark evidence, and the forensic examination of tool marks.
3. Apply knowledge and techniques related to glass evidence, including the composition of glass, methods for comparing glass fragments, classification of glass samples, analysis of glass fractures, and the proper collection and preservation of glass evidence.
4. Analyze different types of manufactured fibers, including their microscopic examination, dye composition, chemical composition, and other properties for examination.

Unit I: Vehicular Accidents

Primary Causes of Road Accident, Types of Road Accident, Sources of Information, Eye Witnesses, Tyre and Other Marks, Pedestrian Impacts and Vehicle Speed, Vehicle Condition, Vehicle Speed and Damage, Types of Skid Marks, Curved Scuffmarks, Speed Estimation from Skid/Scuffmarks. Time and Distance, Reaction Time and Peripheral Vision of a Driver, Photography and Plans, Brake System and Steering Failure, Motor Vehicle Examination.

Unit II: Tools & Tool Marks

Common Hand Tools, Marks Made by Hand Tools (Impression / Compression Marks, Dent, Saw Marks, Drill Marks and Holes, Punctures, Point to Point Blade Cut Marks, Scratch and Scour Marks), Collection, Documentation and Forensic Examination of Tool Marks.

Unit III: Glass Evidence

Composition of Glass, Comparison of Glass Fragments, Measuring and Comparing Density and Refractive Index of Glass, Classification of Glass Samples, Glass Fractures, Collection and Preservation of Glass Evidence.

Unit IV: Fibre Evidence

Types, Identification and Comparison of Manufactured Fibres (Microscopic Examination, Dye Composition, Chemical Composition, Other Properties for Examination), Significance of Match, Collection and Preservation of Fibre Evidence. Forensic Examination of Cloth and Cloth Fibres.

Practical (BFS2T04): Forensic Physics

1. Study of Hand Tools
2. Study of Tool Marks
3. Examination of Fibres under Microscope
4. Strength Measurements of Fibres
5. Comparison of Glass Fragments
6. Study of Glass Fractures
7. Measurement of Refractive Index of glass
8. Measurement of Density of glass
9. Examination of broken glass
10. Examination of skid marks
11. Forensic Examination of Cloth

B.Sc. Sem-II (Forensic Science - Major)

VSC (Forensic Science)

VSC I-A (BVS2P03): Documentation of Crime Scene

Course Outcome: By the end of this Course, the learners will be able to:

1. Recall techniques for crime scene photography and note-taking.
2. Comprehend the purpose and significance of different types of crime scene photography and sketching.
3. Apply photography techniques, note-taking skills, and sketching techniques to document crime scenes accurately.
4. Analyze crime scenes to determine appropriate photography angles and sketching details.
5. Evaluate the quality and effectiveness of crime scene photography, note-taking, and sketching.
6. Create comprehensive documentation of crime scenes through photography, note-taking, and sketching.

List of Practical

1. To perform an overview photography of the crime scene of outdoor crime scene.
2. To perform a midrange photography of the crime scene of outdoor crime scene.
3. To perform a close-up photography of the crime scene of outdoor crime scene.
4. To perform an overview photography of the crime scene of indoor crime scene.
5. To perform a midrange photography of the crime scene of indoor crime scene.
6. To perform a close-up photography of the crime scene of indoor crime scene.
7. Note-taking at the crime scene.
8. To draw a rough sketch of the crime scene.
9. To draw a fair sketch of the crime scene.
10. Taking videography of crime scene.

B.Sc. Sem-II (Forensic Science - Major)

VSEC

VSC I-B (BVS2P03): Basics Techniques in Microbial Forensics

Course Outcomes: By the end of this Course, the learners will be able to:

1. Apply the appropriate staining techniques to visualize and identify bacteria accurately.
2. Analyze and interpret growth curve data to understand the different phases of bacterial growth.
3. Demonstrate knowledge of the principles and procedures involved in isolating bacteria from various samples.
4. Prepare and differentiate between differential media and transport media for bacterial culturing.
5. Perform agarose gel electrophoresis to separate DNA samples and analyze the results for bacterial identification.

List of Practicals

1. Determination of the growth curve of bacteria.
2. To perform simple staining of bacteria.
3. To perform Gram staining of bacteria.
4. Isolation of bacteria from spoiled food samples using the streak plate method.
5. Isolation of bacteria from a water sample using pour plate method.
6. Preparation of differential media for bacterial culturing (MacConkey's Medium)
7. Preparation of transport media for bacterial culturing (Peptone water Medium)
8. Steam sterilization of media and glassware.
9. Determination of antibiotic sensitivity of bacteria.
10. Determination of oligodynamic activity on bacteria.
11. Isolation of DNA from Bacterial cell.
12. Separation of DNA on agarose gel electrophoresis.

B.Sc. Sem-II (Forensic Science - Major)

VSEC (Digital & Cyber Forensics)

VSC I-C (BVS2P03): Python Programming

Course Outcome: By the end of this Course, the learners will be able to:

1. Have an understanding of Python programming, including installation, basic syntax, variables, operators, conditional statements, looping, functions, data structures (lists, strings, dictionaries), file handling, and object-oriented concepts.
2. Create and utilize functions in Python, understanding their role in modular programming and code reusability.
3. Evaluate the usage of conditional statements (if, elif, else) in Python and demonstrate their effectiveness in controlling program flow.
4. They will be able to apply their knowledge to create and execute Python programs with various functionalities.

List of Practical

1. Installing python
2. Write a program in Python to display "Hello World" string on screen
3. Demonstration of constant and variables in python
4. Demonstration of operators in python
5. Demonstration of conditional statements in python
6. Demonstration of looping in python (for, while, nested)
7. Function in python
8. Working with lists in python
9. Working with strings in python
10. Working with dictionaries in python
11. Working with files in python
12. Python programming using object-oriented concepts

SEM 2 : CONSTITUION OF INDIA (BVE2T02)

Syllabus

UNIT – I:

- Historical Background to the Framing of the Indian Constitution: General Idea about the Constituent Assembly of India.

UNIT – II

- Preamble – Nature and key concepts/Constitutional values, Socialism, Secularism, Democracy, Justice, Liberty, Equality and Fraternity

- Salient Features of the Constitution of India

UNIT – III

- General study about the kinds, nature and importance of; Fundamental Rights, Directive Principles of State Policy and Fundamental Duties.

UNIT –IV

Introduction of the Constitutional Institutions and Authorities;

- Central Legislature and Executive (Parliament of India, President of India and Council of Ministers)
- State Legislature and Executive (State legislative Assemblies, Governors and Council of Ministers)
- Higher Judiciary (Supreme Court of India and High Courts)

Indian Knowledge System (IKS)

SEM2: INDIAN ASTRONOMY (BIK2T02)

Course Outcomes: This course will enable the students to understand that

1. It is possible to create a map of the intellectual growth of a culture usingastronomy as a probe.
2. The growth of Indian astronomy occurs in distinct stages analogous to phasetransitions of the evolution of cultures
3. Indian Astronomy therefore provides an excellent window to the pastdramatic transitions.

UNITS	TOPICS	HOURS
Unit 1	Astronomy in Prehistoric Era, Astronomy in Vedic Era, Vedang Jyotish, Astronomical References In Religious Scriptures, Astronomies of the West	**8**
Unit 2	Arya Bhatta, Panch Siddhantika of Varahamihira, Surya Siddhanta Varahamihira to Bhaskar Acharya-II, Siddhant Shiromani of Bhaskar Acharya-II, Bhaskar Acharya-II to Jai Singh, Jai Singh and his Observatories.	**8**
Unit 3	After Jai Singh, Interaction with the Astronomies of the World, Modern Era Astronomy , Our Universe, Cosmology	**7**
Unit 4	Panchang Horoscope and Astrology , Siddhantas, Karnas and Koshtakas, Observational Instruments of Indian Astronomy	**7**
	TOTAL	**30 HRS**

Reference Books:

1. The Story Of Astronomy In India, Chander Mohan, Pothi.com
2. Indian Astronomy: An Introduction. Front Cover · S. Balachandra Rao.Universities Press, 2000
3. Astronomy in India: A Historical Perspective, Thanu Padmanabhan,Springer Science & Business Media
4. Hindu Astronomy, W. Brennand, Alpha Editions
5. Origin and Growth of Astronomy in India, https://www.tifr.res.in/~archaeo/FOP/FOP%20pdf%20of%20ppt/Vahia%20Origin% 20of%20Astronomy.pdf