



**RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR**

**FACULTY OF SCIENCE**

**DIRECTION NO. 5 OF 2013**

**DIRECTION GOVERNING THE EXAMINATION LEADING TO THE DEGREE OF BACHELOR  
OF SCIENCE IN FORENSIC SCIENCE**

**(THREE YEARS DEGREE COURSE)**

**(Issued under Section 14(8) of the Maharashtra Universities Act, 1994)**

Whereas, the Maharashtra Universities Act No. XXXV has come into force with effect from 22<sup>nd</sup> July, 1994, and further amended by Maharashtra Universities (Amendment and Continuance) Act, 2003, hereinafter referred as 'Act' has come into force from 8<sup>th</sup> August 2003.

**AND**

Whereas, the Higher & Technical Education Department, Government Resolution No. NGC-2011/ (20/11) M. Shi-4 dated 22<sup>nd</sup> July 2011, issued the orders to start **B.Sc. Forensic Science (Three years Degree Course)** from the academic session 2011-12.

**AND**

Whereas, the University Grants Commission, New Delhi, vide letter no: D. O. No. F. 1-2/2008 (XI Plan) dated 31<sup>st</sup> January 2008, regarding new initiatives under the XI Plan-Academic reforms in the University has suggested for improving quality of higher education and to initiate the Academic Reforms at the earliest.

**AND**

Whereas, the respective Ad-hoc Board of Studies in Forensic Science, in the Faculty of Science in its meeting held on 21-07-2011 vide item No. 1 have approved the syllabi and Scheme of Examination for **B.Sc. Forensic Science** in the university from the academic session 2011-2012 in the Faculty of Science, in terms of the norms as prescribed by U. G. C.

**AND**

Whereas, the Vice Chancellor has accepted the recommendations of Ad-hoc Board of Studies in Forensic Science in the Faculty of Science and on behalf of the Academic Council and Management Council under section 14(7)of the M.U. Act 1994.

**AND**

Whereas, the same course should be implemented by way of issuing appropriate direction under section 14(8) of Maharashtra University Act 1994, by the Hon'ble Vice Chancellor.

**AND**

Whereas, the university under its power and duties is expedient to make provision for research and for the advancement and dissemination of knowledge in various branches of studies. The proposal in this regard being recommended by the respective Board of Studies, Faculties and Academic Council are to be approved by the Management Council for the institution of such Degrees, Diplomas Certificates and other academic distinctions by giving effect to it by virtue of promulgating suitable Ordinances and syllabus for the respective courses to be started from the academic session 2011-12 and onwards.

**AND**

Whereas, it is expedient to provide an Ordinance for the purposes of prescribing Examination leading to the **B.Sc. Forensic Science** in the Faculty of Science, indicating therein the Syllabus and the Scheme of Examination.

**AND**

Whereas, the Hon'ble Vice Chancellor has already issued the Direction No. 12/2011 in this regard and notified on 2<sup>nd</sup> of August and was put to execution from the academic session 2011-12 itself.

**AND**

Whereas, during execution, certain ambiguity was identified in the clauses with respect to the standard of passing to the said course, and needs immediate intervention to rectify it for proper execution of the course herein after 2012-13.

Whereas, the framing of an ordinance as required under provision of the Act is a time consuming process.

Now, therefore, I, V. S. Sapkal, the Vice Chancellor of Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur in exercise of the powers conferred upon me in under section 14(8) of the Maharashtra University Act of 1994 do hereby issue the following direction:

**1. Title of the Direction:**

This direction may be called "**Direction Governing the Examination leading to Degree of Bachelor of Science in Forensic Science (Three years degree course) in the Faculty of Science**". This direction shall come into force with effect from the date of its issuance.

## 2. Nature of the Course:

The Degree of Bachelor of Science in Forensic Science under this Direction shall extend over a period of three academic years, comprised of six semesters viz, I to VI. At the end of each semester, there shall be a theory examination whereas the practical examination shall be conducted only in semesters II, IV and VI.

- i. The following shall be the examination leading to Degree of Bachelor of Science in Forensic Science:
  - a. The Bachelor of Science in Forensic Science, Semester-I Examination
  - b. The Bachelor of Science in Forensic Science, Semester-II Examination
  - c. The Bachelor of Science in Forensic Science, Semester-III Examination
  - d. The Bachelor of Science in Forensic Science, Semester-IV Examination
  - e. The Bachelor of Science in Forensic Science, Semester-V Examination
  - f. The Bachelor of Science in Forensic Science, Semester-VI Examination
- ii. The period of Academic Session shall be such as may be notified by the University.

## 3. Conduct of Examination:

The examinations specified in preceding section 2 leading to **B. Sc. Forensic Science ( Semesters I-VI)** shall be held twice a year at such places and on such dates as may be decided by the University. The main examination of Semesters I, III & V shall be held in winter whereas the examination of Semesters II, IV & VI shall be held in summer. The supplementary examination of Semesters I, III & V shall be held in summer whereas the supplementary examination of Semesters II, IV & VI shall be held in winter.

## 3. Eligibility Criteria:

- a. The student seeking admission to B.Sc. Semester I course examination should have passed 12<sup>th</sup> standard examination (10+2 Pattern) of the Maharashtra State Board of Secondary and Higher Secondary Education with English and other Modern Indian Languages together with Science or an examination recognized as equivalent thereto in such subject and with such

standard of attainments as may be prescribed and securing not less than 45% marks for open category and not less than 40% marks for reserved category.

b. In case of B.Sc. Semester II, III, IV, V and VI Examination: The student should have attended a minimum of 90 days in the respective semesters as per the rules of ATKT as mentioned in Para no. 8 (D) of this direction.

c. Intake Capacity: 50 (Reservation as per State Government Norms)

#### **4. Application of Other Ordinances and Directions of University:**

The students admitted to this Degree course shall be governed by the general Ordinances of the University which are applicable to all the regular or ex-students. These Ordinances includes complete as well as relevant provision of Ordinance No. 1, 2, 5, 6, 8, 7-A, 9, 10, 19, 26, 31, 109, Ordinance No. 30 of 2006, (amended Ordinance No. 4 of 2006), Direction 9 of 2008, Direction 5 of 2004 wherever applicable accordingly and Directions/Ordinances of ATKT as well as reassessment/provisional admission as issued from time to time.

#### **5. Fee Structure:**

- I. Tution Fee: The tution fee for the said course will be decided by the State Government for the Government Institutions whereas the fees will decided by the University for the affiliated colleges.
- II. Examination Fee: The examination fee for the said course will be decided by the University.

#### **6. Syllabus:**

The syllabus for this course shall be as prescribed by the Board of Studies in terms of Semester Pattern.

Scope of the subject of B.Sc. in Forensic Science Semesters I-VI shall be as indicated in the respective syllabi in force from time to time.

#### **7. Medium of Instruction / Examination:**

The medium of instructions and writing of examination shall be in English only.

**8. Standard of Passing and performance grading:**

**(A) Passing standard:**

Grades Six point scale, Passing with Minimum grade 'E', or 'D' or 'C' or 'B' or 'O' in 6 point scale.

"Pass" means minimum grade 'E' or above in 6 point scale

"Fail" means grade 'F' in 6 point scale

**Minimum marks for passing theory and practical examination:**

The learner should secure 35%marks in theory and 35% marks in practical of each paper separately for every semester

**(B) Performance grading:**

The PERFORMANCE GRADING of a student shall be based on the SIX point ranking system as under:

<b>Grade</b>	<b>Marks in %</b>	<b>Grade Point</b>
<b>O</b>	<b>70 &amp; above</b>	<b>6</b>
<b>A</b>	<b>60 to 69.99</b>	<b>5</b>
<b>B</b>	<b>55 to 59.99</b>	<b>4</b>
<b>C</b>	<b>50 to 54.99</b>	<b>3</b>
<b>D</b>	<b>45 to 49.99</b>	<b>2</b>
<b>E</b>	<b>35 to 44.99</b>	<b>1</b>
<b>F(Fail/Unsatisfactory)</b>	<b>34.99 &amp; below</b>	<b>0</b>

The performance grading shall be based on the aggregate performance and Semester End Examination.

- (C)** Carry forward of marks, in case, student fails in one or more subjects/courses:
- i)** The passing heads for practical examination and theory examination will be separate. The candidate, who will pass in any either (practical examination or theory) case, his/her marks will be carry forward.
  - ii)** A student who FAILS shall reappear for the concerned examinations.
- (D)** The ATKT rules for admission for the B.Sc. Forensic Science Course (Theory and Practical as separate passing head) shall be as given in the following table:

Admission to Semester	Candidates should have passed in all the subjects of the following examination of this University	Candidates should have passed at least two third of the passing heads of the following examinations
Semester I	As per Eligibility criteria	-----
Semester II		Semester I
Semester III	Semester I	Semester II
Semester IV	Semester II	Semester III
Semester V	Semester I, II, III & IV	N.A.
Semester VI	Semester I, II, III, IV & V	N.A.

## 9. Scheme of Examination:

- i. The Scheme of Examination shall be as per **Appendices: A-G** (Semester pattern). However, the Scheme of Examination reflects the basic structure of Theory, Practical and Project Work\* (only in Semester VI). The details/title of the theory papers can be suitably modified in future considering the need of the subject without disturbing the main structure.
- ii. **\*Practical and Project Work in Semester VI:** The Practical and project shall be assessed by the external examiner and the internal examiner. The project work shall be assessed by the project guide as an internal examiner. However, final marks shall be awarded by external examiner. The examinations of practical and project work shall not be held separately.

## 10. Other Rules:

- i. Provision of Ordinance No. 3 of 2007 relating to the award of grace marks for passing the examination, securing higher division/class and for securing distinction in subject(s) and Ordinance No. 10 relating to the exemptions and compartments shall apply to the examination under this Ordinance.
- ii. Notwithstanding anything to the contrary in this ordinance no person shall be admitted to this examination, if he/she has already passed this examination or an equivalent examination of any other statutory University.

## 11. Award of Degree:

A successful examinee shall be awarded Degree in prescribed form signed by the Vice-Chancellor of the University.

12. With the issuance of the Direction, the Direction No. 14 of 2011 shall stand repealed.

Nagpur

Date : 28.3.2013

Sd/-

(Dr. V.S. Sapkal)

Vice-Chancellor

## APPENDIX-A

### Scheme of Examination and Course Structure for B.Sc. Forensic Science

Effective from the academic year 2011 – 2012

#### SEMESTER I

<b>PAPER</b>	<b>Title of paper and Units</b>	<b>Examination Scheme</b>							<b>Teaching Scheme</b>	
		<b>Theory</b>				<b>Practical</b>			Theory per week	Practical per week
		Duration in Hrs	Maximum Marks	Total Marks	Minimum passing marks	Duration in Hrs	Maximum Marks	Minimum passing marks		
									<b>Total = 24</b>	<b>Total = 06</b>
<b>I</b>	Basics of Forensic Science <b>I, II, III</b>	<b>3</b>	<b>30</b>	<b>180</b>	<b>11</b>	N.A.	N.A.	N.A.	04	01
<b>II</b>	Basics of Forensic Chemistry <b>I, II, III</b>	<b>3</b>	<b>30</b>		<b>11</b>	N.A.	N.A.	N.A.	04	01
<b>III</b>	Basics of Forensic Physics <b>I, II, III</b>	<b>3</b>	<b>30</b>		<b>11</b>	N.A.	N.A.	N.A.	04	01
<b>IV</b>	Basics of Forensic Biology <b>I, II, III</b>	<b>3</b>	<b>30</b>		<b>11</b>	N.A.	N.A.	N.A.	04	01
<b>V</b>	Basics of Forensic Psychology <b>I, II, III</b>	<b>3</b>	<b>30</b>		<b>11</b>	N.A.	N.A.	N.A.	04	01
<b>VI</b>	Basics of Digital and Cyber Forensic <b>I, II, III</b>	<b>3</b>	<b>30</b>		<b>11</b>	N.A.	N.A.	N.A.	04	01
<p><b>Total Marks of Semester I = 180</b>  <b>N.A. : Not applicable</b></p> <p>Candidate should have to secure 35% marks in theory paper and 35% marks in practical of each paper separately for every semester.</p>										

## APPENDIX-B

### Scheme of Examination and Course Structure for B.Sc. Forensic Science

Effective from the academic year 2011 – 2012

#### SEMESTER II

PAPER	Title of paper and Units	Examination Scheme							Teaching Scheme	
		Theory				Practical			Theory per week	Practical per week
		Duration in Hrs	Maximum Marks	Total Marks	Minimum passing marks	Duration in Hrs	Maximum Marks	Minimum passing marks		
									<b>Total = 24</b>	<b>Total = 06</b>
<b>I</b>	Basics of Forensic Science <b>IV, V, VI</b>	<b>3</b>	<b>30</b>	<b>180</b>	<b>11</b>	<b>6-8*</b>	<b>40</b>	<b>14</b>	04	01
<b>II</b>	Basics of Forensic Chemistry <b>IV, V, VI</b>	<b>3</b>	<b>30</b>		<b>11</b>		<b>40</b>	<b>14</b>	04	01
<b>III</b>	Basics of Forensic Physics <b>IV, V, VI</b>	<b>3</b>	<b>30</b>		<b>11</b>		<b>40</b>	<b>14</b>	04	01
<b>IV</b>	Basic of Forensic Biology <b>IV, V, VI</b>	<b>3</b>	<b>30</b>		<b>11</b>		<b>40</b>	<b>14</b>	04	01
<b>V</b>	Basics of Forensic Psychology <b>IV, V, VI</b>	<b>3</b>	<b>30</b>		<b>11</b>		<b>40</b>	<b>14</b>	04	01
<b>VI</b>	Basics of Digital and Cyber Forensic <b>IV, V, VI</b>	<b>3</b>	<b>30</b>		<b>11</b>		<b>40</b>	<b>14</b>	04	01
<p><b>Total Marks of Semester II: 420</b></p> <p><b>Grand Total Marks of Semesters I and II = 600</b></p> <p>Candidate should have to secure 35% marks in theory paper and 35% marks in practical of each paper separately for every semester.</p>										

## APPENDIX-C

### Scheme of Examination and Course Structure for B.Sc. Forensic Science

**Effective from the academic year 2011 – 2012**

#### **SEMESTER III**

<b>PAPER</b>	<b>Title of paper and Units</b>	<b>Examination Scheme</b>							<b>Teaching Scheme</b>	
		<b>Theory</b>				<b>Practical</b>			Theory per week	Practical per week
		Duration in Hrs	Maximum Marks	Total Marks	Minimum passing marks	Duration in Hrs	Maximum Marks	Minimum passing marks		
									<b>Total = 24</b>	<b>Total = 06</b>
<b>I</b>	Advanced Forensic Science <b>I, II, III</b>	<b>3</b>	<b>30</b>	<b>180</b>	<b>11</b>	N. A.	N. A.	N. A.	04	01
<b>II</b>	Advanced Forensic Chemistry <b>I, II, III</b>	<b>3</b>	<b>30</b>		<b>11</b>	N. A.	N. A.	N. A.	04	01
<b>III</b>	Advanced Forensic Physics <b>I, II, III</b>	<b>3</b>	<b>30</b>		<b>11</b>	N. A.	N. A.	N. A.	04	01
<b>IV</b>	Advanced Forensic Biology <b>I, II, III</b>	<b>3</b>	<b>30</b>		<b>11</b>	N. A.	N. A.	N. A.	04	01
<b>V</b>	Advanced Forensic Psychology <b>I, II, III</b>	<b>3</b>	<b>30</b>		<b>11</b>	N. A.	N. A.	N. A.	04	01
<b>VI</b>	Advanced Digital and Cyber Forensic <b>I, II, III</b>	<b>3</b>	<b>30</b>		<b>11</b>	N. A.	N. A.	N. A.	04	01
<b>Total of Semester III = 180</b>  <b>N. A. = Not Applicable</b>  Candidate should have to secure 35% marks in theory paper and 35% marks in practical of each paper separately for every semester.										

## APPENDIX-D

### Scheme of Examination and Course Structure for B.Sc. Forensic Science

Effective from the academic year 2011 – 2012

#### SEMESTER IV

<b>PAPER</b>	<b>Title of paper and Units</b>	<b>Examination Scheme</b>							<b>Teaching Scheme</b>	
		<b>Theory</b>				<b>Practical</b>			Theory per week	Practical per week
		Duration in Hrs	Maximum Marks	Total Marks	Minimum passing marks	Duration in Hrs	Maximum Marks	Minimum passing		
									<b>Total = 24</b>	<b>Total = 06</b>
<b>I</b>	Advanced Forensic Science <b>IV, V, VI</b>	<b>3</b>	<b>30</b>	<b>180</b>	<b>11</b>	<b>6-8*</b>	<b>40</b>	<b>14</b>	04	01
<b>II</b>	Advanced Forensic Chemistry <b>IV, V, VI</b>	<b>3</b>	<b>30</b>		<b>11</b>		<b>40</b>	<b>14</b>	04	01
<b>III</b>	Advanced Forensic Physics <b>IV, V, VI</b>	<b>3</b>	<b>30</b>		<b>11</b>		<b>40</b>	<b>14</b>	04	01
<b>IV</b>	Advanced Forensic Biology <b>IV, V, VI</b>	<b>3</b>	<b>30</b>		<b>11</b>		<b>40</b>	<b>14</b>	04	01
<b>V</b>	Advanced Forensic Psychology <b>IV, V, VI</b>	<b>3</b>	<b>30</b>		<b>11</b>		<b>40</b>	<b>14</b>	04	01
<b>VI</b>	Advanced Digital and Cyber Forensic <b>IV, V, VI</b>	<b>3</b>	<b>30</b>		<b>11</b>		<b>40</b>	<b>14</b>	04	01
<p><b>Total marks of Semester IV: 420</b></p> <p><b>Grand Total Marks of Semesters III and IV = 600</b></p> <p>Candidate should have to secure 35% marks in theory paper and 35% marks in practical of each paper separately for every semester.</p>										

## APPENDIX-E

### Scheme of Examination and Course Structure for B.Sc. Forensic Science

**Effective from the academic year 2011 – 2012**

#### Semester V

<b>PAPER</b>	<b>Title of paper and Units</b>	<b>Examination Scheme</b>							<b>Teaching Scheme</b>	
		<b>Theory</b>				<b>Practical</b>			Theory per week	Practical per week
		Duration in Hrs	Maximum Marks	Total Marks	Minimum passing marks	Duration in Hrs	Maximum Marks	Minimum passing		
									<b>Total = 24</b>	<b>Total = 06</b>
<b>I</b>	Applied Forensic Science <b>I, II, III</b>	<b>3</b>	<b>30</b>	<b>180</b>	<b>11</b>	N. A.	N. A.	N. A.	04	01
<b>II</b>	Applied Forensic Chemistry <b>I, II, III</b>	<b>3</b>	<b>30</b>		<b>11</b>	N. A.	N. A.	N. A.	04	01
<b>III</b>	Applied Forensic Physics <b>I, II, III</b>	<b>3</b>	<b>30</b>		<b>11</b>	N. A.	N. A.	N. A.	04	01
<b>IV</b>	Applied Forensic Biology <b>I, II, III</b>	<b>3</b>	<b>30</b>		<b>11</b>	N. A.	N. A.	N. A.	04	01
<b>V</b>	Applied Forensic Psychology <b>I, II, III</b>	<b>3</b>	<b>30</b>		<b>11</b>	N. A.	N. A.	N. A.	04	01
<b>VI</b>	Applied Digital and Cyber Forensic <b>I, II, III</b>	<b>3</b>	<b>30</b>		<b>11</b>	N. A.	N. A.	N. A.	04	01
<p><b>Total Marks of Semester V = 180</b></p> <p><b>N. A. = Not Applicable</b></p> <p>Candidate should have to secure 35% marks in theory paper and 35% marks in practical of each paper separately for every semester.</p>										

## APPENDIX-F

### Scheme of Examination and Course Structure for B.Sc. Forensic Science

Effective from the academic year 2011 – 2012

#### SEMESTER VI

PAPER	Title of paper and Units	Examination Scheme							Teaching Scheme	
		Theory				*Practical + **Project			Theory per week	Practical per week
		Duration in Hrs	Maximum Marks	Total Marks	Minimum passing marks	Duration in Hrs	Maximum Marks	Minimum passing marks		
							*30 + **10	*10 + **4	<b>Total = 24</b>	<b>Total = 06</b>
<b>I</b>	Applied Forensic Science <b>IV, V, VI</b>	<b>3</b>	<b>30</b>	<b>180</b>	<b>11</b>	<b>6-8*</b>	<b>40</b>	<b>14</b>	04	01
<b>II</b>	Applied Forensic Chemistry <b>IV, V, VI</b>	<b>3</b>	<b>30</b>		<b>11</b>		<b>40</b>	<b>14</b>	04	01
<b>III</b>	Applied Forensic Physics <b>IV, V, VI</b>	<b>3</b>	<b>30</b>		<b>11</b>		<b>40</b>	<b>14</b>	04	01
<b>IV</b>	Applied Forensic Biology <b>IV, V, VI</b>	<b>3</b>	<b>30</b>		<b>11</b>		<b>40</b>	<b>14</b>	04	01
<b>V</b>	Applied Forensic Psychology <b>IV, V, VI</b>	<b>3</b>	<b>30</b>		<b>11</b>		<b>40</b>	<b>14</b>	04	01
<b>VI</b>	Applied Digital and Cyber Forensic <b>IV, V, VI</b>	<b>3</b>	<b>30</b>		<b>11</b>		<b>40</b>	<b>14</b>	04	01

**Total Marks of Semester VI: 420**

**Grand Total Marks of Semesters V and VI = 600**

Candidate should have to secure 35% marks in theory paper and 35% marks in practical of each paper separately for every semester.

**Grand Total Marks of Semesters I to VI: 1800 marks**

## **APPENDIX-G**

### **Guidelines for Theory Paper and Practical Pattern**

1. Each semester shall comprise of 90 teaching days.
2. Every subject in each semester has one theory paper and one practical whereas in semester VI, candidate has to submit practical record along with project report of assigned project.
3. **Theory Question Paper Pattern:**
  - **Each theory paper will be of maximum marks 30.**
  - There shall be three questions in question paper. Each question will carry 10 marks.
  - All questions shall be compulsory with internal choice within the questions.
  - Questions may be subdivided into sub-question a, b, c... and the allocation of marks will depend on the significance of the topic.
4. **Practical Examination:**
  - The duration of practical examination shall be 6-8 hours.
  - The student should submit a certified practical record duly signed by Teacher-in-charge and Head of the Department.
  - If the student fails to submit his/her certified practical record duly signed by Teacher-in-charge and Head of the Department, in that case he/she shall not be allowed to appear for practical examination and no marks shall be allotted to the student.
  - Project work: The Practical and project shall be assessed by the external examiner and the internal examiner. The project shall be evaluated by external and internal examiners together. The examiners will evaluate the Project Work taking into account the 1) Coverage of subject matter, 2) Arrangement and presentation 3) Reference and 4) applications . The examinations of practical and project work shall not be held separately.

- The project work shall be performed in a group confined with 8-10 students that includes case-studies related with the topic of the subject/course in forensic sciences. The project work will be confined to concerned college/Institution's laboratory, library and various sources of information. On the basis of this work, student must submit the Project Report at least one month prior to commencement of the final Practical Examination of Semester VI. The project report shall be comprised of well elaborated case study with references along with the declaration by the candidate that the work is original and not submitted to any University or Organization for award of the degree and certified by the supervisor and forwarded through Head/Course- Coordinator/Director/Principal of College.

5. Certificate Template:

**CERTIFICATE**

**Name of the College/Institution:**.....

**Name of the Department:**.....

This is to certify that this Practical Record contains the bonafied record of Practical Work of Shri/Kumari/Shrimati..... of Semester ..... during the academic year..... The candidate has satisfactorily completed the work prescribed by ..... University for the subject.....

Date: dd/mm/yyyy

Signature of Teacher-In-Charge

Place:.....

Signature of Head of Department

# **ANNEXURE I**

**RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR**



**BACHELOR OF SCIENCE SEMESTERS I AND II  
(FIRST YEAR: FORENSIC SCIENCE)**

**SYLLABUS AND SCHEME OF EXAMINATION**

**RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR**

**O -----: Title of the Course: -B.Sc. Forensic Science.**

**O -----: Eligibility for seeking admission in B.Sc. I Forensic Science, Semester I: 12th Science Pass**

R -----: Duration of the Course: Three Years (Full Time)

R -----: Fee Structure: As Per the State Government Rules

R -----: Intake Capacity 50

R -----: Teacher Qualifications: As per the U.G.C. / State Government Norms and Experts from Forensic Science Field and Related Industry with minimum 3 years of experience.

R -----: Standard of Passing:

- a) Candidate who secures minimum 35% in each subject/paper be declared to have passed the examination.
- b) Candidate who secures a minimum of 35% marks in each paper and an aggregate of 60% and above marks on the whole shall be declared to have passed the examinations in the First Class.
- c) Candidate who secures a minimum of 35% marks in each paper and an aggregate of 75% and above marks on the whole shall be declared to have passed the examinations with Distinction.

**Medium of Instruction: English**

**At least two Field Visits at Forensic Science Laboratory**

## B. Sc. FORENSIC SCIENCE

<b>Theory</b>	
<b>Paper I: Basics of Forensic Science-I</b>	
<b>Total Marks: 30</b>	
<b>Units with Description</b>	<b>Total Lectures</b>
<b>SEMISTER - I</b>	
<b>UNIT: I – CRIME SCENARIO IN INDIA</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Introduction to crime and history</li> <li>• Sociological aspects of crime and criminals in society</li> <li>• Types of crime and its causes – property crimes, public order crimes, violent crimes, cyber crimes, juvenile delinquency</li> <li>• Society-Criminal interaction and various types of crimes in India</li> <li>• Criminal behaviour - Theories and literature studies, criminal inheritance and factors responsible</li> </ul>	
<b>UNIT: II – CRIMINOLOGY &amp; LAW</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Procedures involved in detection of crime – latest evidence based research in detection and prevention of crime</li> <li>• Administrative steps towards crime prevention</li> <li>• Different agencies involved in crime detection and prevention</li> <li>• Indian Police System – State &amp; Central level, The Police Act of 1861, Medico-legal experts, Judiciary system</li> </ul>	
<b>UNIT: III – DEVELOPMENTAL GROWTH OF FORENSIC SCIENCE</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Introduction to Forensic science – nature, need and function</li> <li>• Laws and Principles, basics of Forensic Science</li> <li>• Historical development and scope of Forensic Science in India</li> </ul>	
<b>Paper I: Basics of Forensic Science-II</b>	
<b>Total Marks: 70</b>	
<b>SEMISTER - II</b>	
<b>UNIT: IV - FORENSIC SCIENCE LABORATORIES AND FACILITIES</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Growth of Forensic Science Laboratories in India – Central and State level laboratories</li> <li>• Educational setup in Forensic Science in India</li> <li>• Services and functionalities provided by various FSLs</li> <li>• Various divisions in the FSL – Ballistics, Biology, Chemistry Documents, Physics, Psychology, Serology, Toxicology</li> </ul>	

<b>UNIT: V- CRIME SCENE MANAGEMENT</b>		15 Lectures
<ul style="list-style-type: none"> <li>• Types of crime scenes – primary, secondary, crime scenes based on size of evidence</li> <li>• Crime scene Management – initial response, role of first responding officer, duty management</li> <li>• Forensic Scientists, Investigating officers and their assigned role and duties</li> <li>• Role of the Police and Judiciaries, Fire Brigade, Medico-legal officers and other experts</li> </ul>		
<b>UNIT: VI - PHYSICAL EVIDENCE COLLECTION &amp; PACKAGING</b>		15 Lectures
<ul style="list-style-type: none"> <li>• Physical evidence, types and importance in a criminal investigation</li> <li>• Protecting a scene of crime – various steps involved, contamination issues.</li> <li>• Recovery and preservation of samples from a crime scene – biological, toxicological, petroleum, explosives, trace items, projectiles and bullets</li> </ul>		
<b>Practical: Basics of Forensic Science</b>		
<b>Sr. No.</b>	<b>Title</b>	<b>Number</b>
1	Collection and Handling of toxicological samples	2
2.	Collection and Handling of Petroleum samples	2
3.	Collection and Handling of murder case samples	2
4.	Collection and Handling of toxicological samples	2
5.	Study of Bomb Blast scene	2
6.	Collection and Handling of firing crime scene samples	2
7.	Collection and Handling of Hit and run crime scene samples	2
8.	Collection and Handling of fire crime scene samples	2

<b>Theory: Paper II: Basics of Forensic Chemistry-II</b>		<b>Total Marks:30</b>
<b>Units with Description</b>	<b>Total Lectures</b>	
<b>SEMISTER - I</b>		
<b>UNIT: I - LIQUID STATE AND SOLUTIONS</b>	15	
<ul style="list-style-type: none"> <li>Liquid state: Free volume of liquid and density measurement, physical properties of liquid, vapor pressure, surface tension, surfactants, viscosity, molar refraction, optical activity, structure of liquid</li> <li>Solutions: Method of exploring concentration of solutions, binary liquids, vapor pressure, composite diagram of binary liquids and solutions, distillation, fractional distillation, vacuum distillation</li> </ul>		
<b>UNIT: II - CHEMICAL THERMODYNAMICS AND CHEMICAL KINETICS</b>	15	
<ul style="list-style-type: none"> <li>Chemical thermodynamics and kinetics, first law of thermodynamics, internal energy, enthalpy, second law of thermodynamics, entropy and its significance, free energy and work function</li> <li>Rate of reaction, order of molecularity of reaction, slow reaction and fast reaction, first order reaction, half life period of first order reaction, activation energy, temperature dependence of activation energy, explosive reactions, oscillatory reactions</li> </ul>		
<b>UNIT: III - INTRODUCTION OF PERIODIC TABLE &amp; PHYSICAL INSTRUMENTS</b>	15	
<ul style="list-style-type: none"> <li>Study of Modern Periodic Table, Long form of Periodic Table, periodic properties, atomic radiation, ionization potential, electron affinity, electro negativity, metallic characters, Non-metallic characters and magnetic properties, Comparative study of S and P block elements</li> <li>Conductance, Conductometry, Electro Motive Force, Potentiometry</li> </ul>		
<b>Paper II: Basics of Forensic Chemistry-II</b>		<b>Total Marks:70</b>
<b>SEMISTER – II</b>		
<b>UNIT: IV – INTRODUCTION OF ANALYTICAL TECHNIQUES</b>	<b>Total Lectures</b>	
<ul style="list-style-type: none"> <li>Introduction of Gravimetric analysis and Volumetric analysis</li> <li>Chromatographic separation, liquid chromatography (paper, column and TLC)</li> </ul>	15	
<b>UNIT: V – INTRODUCTION OF INORGANIC AND ORGANIC CHEMISTRY</b>		
<ul style="list-style-type: none"> <li>Empirical and molecular formulae, hybridization, nature of chemical bonding, polarization, hydrogen bonding, Van der Waals forces, IUPAC</li> </ul>		

nomenclature of alkanes, alkenes, haloalkanes, alcohol, ether, aldehydes, ketones, carboxylic acids, nitro compounds, nitrites including cyclic analogues and also aromatic compounds, naphthalene, anthrones and phenanthrones <ul style="list-style-type: none"> <li>• Reactive intermediates and related reactions</li> </ul>	15
<b>UNIT: VI – INTRODUCTION OF CHEMICAL COMPOUNDS</b>	
<ul style="list-style-type: none"> <li>• Heterocyclic Chemistry: Natural products, Petroleum products, insecticides, pesticides etc.</li> <li>• Introduction to dyes, Paints, polymers</li> </ul>	15

### **Practical: - Basic of Forensic Chemistry**

<b>Sr. no.</b>	<b>Name of experiment</b>	
1.	To determine the density of given liquid	2 nos.
2.	To determine the viscosity of given liquid	2 nos.
3.	To determine the surface tension of given liquid	2 nos.
4.	Standardization of given liquid by primary standard	2 nos.
5.	To determine strength of given acid	2 nos.
6.	Inorganic micro / semi micro qualitative analysis	2 nos.
7.	Identification of organic compound	3 nos.

**Note:-**Minimum 12 experiments should be conducted

**Theory: Paper III: Basics of Forensic Physics-I Total Marks: 30**

<b>Units with Description</b>	<b>Total Lectures</b>
<b>SEMISTER - 1</b>	
<b>UNIT: I – NEWTON’S LAW OF MOTION, ELASTICITY &amp; FLUID DYNAMICS</b>	15
<ul style="list-style-type: none"> <li>• Interpretation and applications of Newton’s laws of motion, Pseudo forces, elastic properties of matter, elastic constants and their interrelations</li> <li>• Fluid dynamics, equation of continuity, Bernoulli’s equation, stream line and turbulent flow, lines of flow in air foil, Purseuille’s equation</li> </ul>	
<b>UNIT: II – STUDY OF SOUND</b>	15
<ul style="list-style-type: none"> <li>• Velocity of sound, noise and sound intensity measurement, echo, reverberation, Sabine’s Formula, absorption coefficient, acoustics of buildings and factors affecting acoustics of buildings</li> <li>• Sound distribution in an auditorium, introduction to ultrasonic, production of ultrasonic waves, applications of ultrasonics</li> </ul>	
<b>UNIT: III – STUDY OF LIGHT</b>	15
<ul style="list-style-type: none"> <li>• Refraction through thin layers, thick lens, thick lens and lens combinations, aberrations, interference in thin films, fringes in wedge shaped films, Newton’s rings, simple table spectrophotometer, total internal reflection.</li> </ul>	

<b>Paper III: Basics of Forensic Physics-II: SEMISTER – II</b>		<b>Total Marks 70</b>
<b>UNIT: IV - LASER &amp; FIBER OPTICS</b>		15
<ul style="list-style-type: none"> <li>• Production of LASER, Types of LASER, Properties and applications of LASER, Optical fibers, Propagation of light through optical fiber, Angle of acceptance and numerical aperture, losses, Solar cells</li> </ul>		
<b>UNIT: V - RADIO ACTIVITY</b>		15
<ul style="list-style-type: none"> <li>• Review of nuclear composition, nuclear properties and half life, Radioactive decay schemes</li> <li>• Applications of Radio Isotopes, Radiometric dating</li> </ul>		
<b>UNIT: VI - ELECTRONICS CIRCUITS &amp; DIGITAL ELECTRONICS</b>		15
<ul style="list-style-type: none"> <li>• Basics of LR, CR, LCR circuits, Rectifier circuits, Timer circuits, Transistor and its characteristics, Introduction to OPAM, remote sensing and controlling, Photo-sensors, Logic gates and their applications, Flip- flops and counters</li> </ul>		

**Practical: -  
Basic  
of  
Forensic  
Physics**

<b>Sr. no.</b>	<b>Name of experiment</b>
1.	Fly wheel
2.	Y by vibration
3.	$\eta$ of posseuli Method
4.	Spectrophotometer (determination of angle of prism A)
5.	Refractive index of liquid by using LASER
6.	Ultrasonic interferometer
7.	Sound Intensity measurement
8.	Laser Parameter
9.	Solar cell
10.	Combination of lenses
11.	Newton's rings
12.	Wedge shaped film
13.	Frequency of AC mains
14.	LDR characteristics
15.	LCR series resonance
16.	Bridge ratifer (to study load regulation)
17.	Transistor (CE) characteristics

18. De morgan's theorems
19. Ex or gate, NAND and NOR as universal building blocks

**Note:-** Minimum 12 experiments should be conducted.

**Theory: Paper IV: Basics of Forensic Biology-I Total Marks: 30**

<b>Units with Description</b>	<b>Total Lectures</b>
<b>SEMISTER – 1</b>	
<b>UNIT: I – CELL BIOLOGY, ORGANIC AND BIOCHEMICAL COMPOUNDS</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Cell theory, Cell Structure and Function in Prokaryotes and Eukaryotes.</li> <li>• Unicellular and Multicellular organisms</li> <li>• Composition of blood, study of blood components and its functions and body fluid analysis.</li> <li>• Properties, Classification and function of carbohydrates, proteins, nucleic acids and lipids</li> </ul>	
<b>UNIT: II – PLANT MORPHOLOGY AND ANATOMY</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Principles of Taxonomy and systems of classification of angiosperms (Bentham and Hooker) and Gymnosperms (Chamberlain)</li> <li>• Mechanical and conducting tissue systems in plants</li> <li>• Morphology of root, leaf, stem, flowers and their modifications.</li> <li>• Anatomy of mono and dicot roots, leaves and stems - secondary growth, growth rings, calculation of life of wood</li> </ul>	
<b>UNIT: III - HUMAN PHYSIOLOGY AND ANATOMY</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Nutrition - BMR, Calorie value, balanced diet, obesity, digestive system.</li> <li>• Skeletal Muscle physiology and Nervous system Physiology, coordination systems, brain functions and receptor organs</li> <li>• Respiratory system physiology - exchange of gases, process of pulmonary respiration</li> <li>• Mechanism of blood circulation, cardiac mechanism.</li> <li>• Morphological study of human body parts and regions - Gross and Microscopic, Microbe-Human interaction</li> </ul>	
<b>Paper IV: Basics of Forensic Biology-II</b>	<b>Total Marks: 70</b>
<b>SEMISTER – II</b>	
<b>UNIT: IV – MICROBIOLOGY AND BIOTECHNOLOGY</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Microscopy - Principles and types</li> <li>• Historical introduction to microbiology</li> <li>• Basics of Microbiology and concepts of Pure culture techniques.</li> <li>• Broad classification of microorganism</li> <li>• Recombinant DNA technology and its application in Health and Diseases, Western and Southern Blot techniques</li> </ul>	
<b>UNIT: V – EVOLUTION AND GENETICS</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Origin of life and Geological time scale</li> <li>• Theories and evidences of evolution - Darwinism, Lamarkism, fossil record and biochemical evidences.</li> </ul>	

<ul style="list-style-type: none"> <li>• Origin and Concept of Species - specification and isolation, geographical and reproductive.</li> <li>• Genetic Materials - Structural organization and functions</li> <li>• Mendelian Principles, Mendels Laws and Ratio</li> <li>• Sex linked inheritance, sex determination and crossing over - Karyotyping analysis, Chromosomal mapping, DNA and RNA structural types</li> </ul>	
<b>UNIT: VI - IMMUNOLOGY</b>	
<ul style="list-style-type: none"> <li>• Immunity and Immune System</li> <li>• Structure and interaction of antigens and antibody</li> <li>• Virology and Bacteriology - structure, genetics and diseases</li> <li>• B cell / T cell development, diversity and recognition</li> <li>• Immunoglobulins structure - transplantation and types, immune system disorders.</li> <li>• Various types of microbial cultures</li> <li>• Failures of Body defenses</li> </ul>	15 Lectures

**Practical: - Basic of Forensic Biology**

Sr. No.	Name of experiment	
1.	Qualitative analysis of sugar, proteins, lipids and nucleic acids	1
2.	Study of morphological types of red blood cells	1
3.	Study of plant-material (wild and cultivated from families, magnoniaceae, combretaceae, amaranthaceae, convolovalacea	2
4.	Study of conducting tissue, -xylem and phloem elements in angiosperms and Gymnosperms as seen in L.S. and R.C.S.	2
5.	Preparation of media and sterilization	1
6.	Antigen-antibody reaction (blood groupings)	1
7.	Study of body fluids	1
8.	Radial immune diffusion analysis	1
9.	Isolation of chromosomal DNA	1
10	Restriction digestion of DNA	1
11	Chromatography- separation of Amino acids, sugars, lipids using paper chromatography and thin layer chromatography, determination of RF values	2

**Note:-** Minimum 12 experiments should be conducted

**Paper V: Basics of Forensic Psychology-I Total Marks: 30**

Units with Description	Total Lectures
<b>SEMISTER – I</b>	
<b>UNIT: I - THE SCIENCE OF PSYCHOLOGY</b>	
<ul style="list-style-type: none"> <li>• Concepts of psychology - Definition of psychology, goals of psychology</li> <li>• History of psychology - Development of psychology, role of psychologist</li> <li>• Different perspectives in Psychology - Modern perspectives, Humanistic, behaviouristic, cognitive, psychodynamic.</li> <li>• Types of psychology professions - Psychiatrist, Psychologist, Counselor</li> <li>• The science and research methods - Interview, observation, case study method</li> <li>• Professional and Ethical issues in psychology - APA code of conducts for Psychologist</li> </ul>	15 Lectures
<b>UNIT: II – BIOLOGICAL PERSPECTIVE</b>	
<ul style="list-style-type: none"> <li>• Nerve and neuron - Building the network, structure of neuron, neural impulses, neurotransmitters</li> <li>• Nervous System -Central nervous system, structure and function of CNS, types of amnesia, Peripheral nervous system</li> <li>• Human brain - structure and function, significance of left and right brain, types of Amnesia</li> <li>• Endocrine system- Pituitary gland, Thyroid gland, Neurotransmitters</li> </ul>	15 Lectures
<b>UNIT: III - CONSCIOUSNESS &amp; PERCEPTION</b>	
<ul style="list-style-type: none"> <li>• Consciousness - Definition of consciousness, states of consciousness</li> <li>• Altered state of consciousness - Dreams, awake states including day dreaming</li> <li>• Rhythms of consciousness (Circadian rhythms) Sleep – stages of sleep, Dreams – Content, REM sleep and non-REM sleep</li> <li>• Altered states – Hypnosis, Meaning, Hypnotic Phenomena, Hypnotic stages</li> <li>• Attention and awareness - Attention: Definition, characteristics, selective attention and divided attention</li> <li>• Sensation and perception- Basic concepts in perception, Gestalt Principles, problems in attention and perception, assessment attention and perception</li> </ul>	15 Lectures
<b>Paper V: Basics of Forensic Psychology-II Total Marks: 70</b>	
<b>SEMISTER – II</b>	
<b>UNIT: IV – LEARNING AND MEMORY</b>	
<ul style="list-style-type: none"> <li>• Learning: Definition, and types of learning.</li> <li>• Classical conditioning – Conditioned stimulus, unconditioned stimulus</li> <li>• Operant Conditioning – Thorndike’s law of effect   basics of operant conditioning, generalization, discrimination, shaping, chaining. Schedules</li> </ul>	15 Lectures

<p>of reinforcement</p> <ul style="list-style-type: none"> <li>• Reinforcement – Primary And Secondary ; Positive Reinforces, Punishment Schedules of reinforcement</li> <li>• Cognitive Learning – latent learning; observational learning</li> <li>• Basic Processes of Memory – Encoding, Storage, Retrieval. Sensory – Iconic Memory and Echoic</li> <li>• Memory ; STM – Working Memory, LTM</li> <li>• Types of memory: Declarative, Procedural, Semantic, Episodic Memory. Explicit memory And Implicit memory.</li> <li>• Associative models of memory – LOP, PDP, Information processing approach.</li> <li>• Techniques to improve memory: Rehearsal, Chunking, Mnemonics.</li> <li>• Forgetting – Decay Theory: Interference Theory; Perspective Memory; Absence Of Retrieval Cues; Tip – Of – The – Tongue</li> </ul>	
<b>UNIT: V – COGNITION, MOTIVATION AND EMOTION</b>	
<ul style="list-style-type: none"> <li>• Thinking-Theories and models of thinking, types of Thinking</li> <li>• Decision making and problem solving: Stages of problem solving, methods of problem of problem solving, theories of decision making.</li> <li>• Concept formation: Types of concepts.</li> <li>• Intelligence: Definition, Tests of intelligence, concepts of. IQ.</li> <li>• Motivation: types and approaches of motivation and emotion.</li> <li>• Stress and coping endocrine system : Types of stresses, relaxation techniques</li> </ul>	
<b>UNIT: VI - THEORIES OF PERSONALITY</b>	
<ul style="list-style-type: none"> <li>• Understanding personality: Definition- mainly all port's definition, stressing uniqueness, enduring characteristics, temperament.</li> <li>• Approaches – Psychodynamic (Freud, Jung &amp; Adler), Humanistic (Rogers &amp; Maslow) Dispositional approaches – Type (Jung. Type A &amp; B, Rotter and Big – 5 and Trait (Catelli) Behavioral Approaches - Locus of control and Social learning theory.</li> <li>• Assessment of personality – Questionnaires, Rating Scales and Projective tests, biological model assessment of personality</li> </ul>	

**Practical: Basics of Forensic Psychology**

1. Introduction of Psychology Practicals.  
1 nos.
2. Conduction of Personality Test.
  - D.A.P.  
2 nos.
  - H.T.P.  
2 nos.
3. Conduction of Personality Test.
  - a. Eysenck Personality Inventory  
2 nos.
  - b. Children Personality Questionnaire  
2 nos.
  - c. Sack's Sentence Completion test.  
2 nos.
4. Visit to Rehabilitation centre, Mental Hospital/ FSL.

**Paper VI: Basics of Digital and Cyber Forensics-I      Total Marks: 30**

<b>Units with Description</b>	<b>Total Lectures</b>
<b>SEMISTER – 1</b>	
<b>UNIT: I – BASICS OF COMPUTERS</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Computer organization, Components of computers – Input &amp; Output devices, CPU</li> <li>• Memory Hierarchy and types of Memory (RAM and ROM and their types) external storage devices</li> <li>• Application Software and System Software</li> </ul>	
<b>UNIT: II – DATA REPRESENTATIONS</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Integers, real, binary, octal, hexadecimal &amp; their conversions</li> <li>• Logic gates – Negation, OR, AND, XOR etc. and their combinations</li> </ul>	
<b>UNIT: III - INTRODUCTION TO OPERATING SYSTEM</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Basics of Operating System, memory structure, concurrency, scheduling, synchronization &amp; memory management, process description and control</li> <li>• Introduction to Operating System (Batch Operating System, Distributed operating system, etc) Introduction to Windows and Linux operating System</li> </ul>	
<b>Paper VI: Basics of Digital and Cyber Forensics-II</b>	<b>Total Marks: 70</b>
<b>SEMISTER – II</b>	
<b>UNIT: IV – FILE SYSTEMS &amp; NETWORKING</b>	15 Lectures
<ul style="list-style-type: none"> <li>• Introduction to file systems – FAT12, FAT16, FAT32, NTFS, Ext2, Ext3 &amp; HFS.</li> <li>• Structure of File System, Inode etc.</li> <li>• Basics of Networking – Introduction to Networking Types of topologies, LAN, MAN, WAN and related terminologies, Networking Devices (Switches, hub, bridge)OSI Reference Model, TCP/IP Protocol Model</li> </ul>	
<b>UNIT: V – INTRODUCTION TO INTERNET</b>	15 Lectures
<ul style="list-style-type: none"> <li>• World Wide Web, E-mails, Chat, Search Engines, Network Security – Threats, Vulnerabilities, Access Control, Malicious Code (Virus, Worms,</li> </ul>	

Trojans, etc.) • Introduction to Security and Security model(CIA triad)	
<b>UNIT: VI – CYBER CRIME &amp; DIGITAL EVIDENCE</b>	15 Lectures
• What is cyber crime, types of cyber crimes, Digital evidence, Digital Vs Physical evidence, nature of digital evidence, precautions while dealing with digital evidence	

**Practical: - Basic of Digital and Cyber Forensics**

**Max Marks:-40  
(60 Periods)**

<b>Sr. No.</b>	<b>Name of experiment</b>
1.	Finding results of different logic gates and their combinations
2.	Working with windows file (creation, modification, deletion, attributes) folder (creation, nesting, attributes)
3.	Working with Linux- file (Creation, modification, deletion, attributes), folder (creation, nesting attributes).
4.	Working with external storage devices using windows- Reading and writing data on floppy, CD,DVD, USB thumbdrive
5.	Working with external storage devices using Linux-reading writing data on floppy, CD, DVD, USB, thumb drive.
6.	Understanding LAN-client/server, user creation, password protection.
7.	Use of internet- visiting websites with given URL, searching in formation using search engine.
8.	Use of E-mail, creating e-mail, sending and receiving e-mails with attachments.
9.	Networking commands- like ping, IP config. etc, with various switches.
10.	Tracing E-mail, finding senders IP address, of received email, tracing route of email received using tool available on internet, e.g. Visual Trace Route etc.

## ***List of Books For First Year B.Sc.***

### **Paper I: Basics of Forensic Science**

1. Introduction to Forensic Science in Crime Investigation By Dr.(Mrs.) Rukmani Krishnamurthy
2. Henry Lee's Crime Scene Handbook by Henry C Lee
3. Forensic Biology by Shrikant H. Lade
4. Crime Scene Processing and Laboratory Work Book by Patric Jones
5. Forensic Science: An Introduction to Scientific and Investigative Techniques 3rd ed. by Stuart H. James
6. Criminalistics: An Introduction to Forensic Science, 9th ed. By Richard Saferstein
7. Compute Crime and Computer Forensic by Dr. R.K. Tiwari
8. Criminal Profiling: An Introduction to a Behavioral Evidence Analysis, 3rd ed. By Brent E. Turvey
9. Forensic Science in Criminal Investigation and Trial, 4th ed. By B.R. Sharma
10. Handbook of Forensic Psychology by Dr. Veerraghavan
11. Crime Scene Management with Special Emphasis on National level Crime Cases by Dr. Rukmani Krishnamurthy under publishing
12. Text Book of Medical Jurisprudence, Forensic Medicine and Toxicology by Parikh C.K.
13. The Identification of Firearms and Forensic ballistics by Barrard and Gerald

### **Paper II: Basics of Forensic Chemistry**

1. Thermodynamics for Chemists by S, Glasstone
2. Principles of Physical Chemistry and Puri, Sharma and Pathania
3. Advanced Inorganic Chemistry by Madan, Malik and Tuli
4. Concise Inorganic Chemistry by J.D. Lee
5. Organic Chemistry by Moris and Boyed
6. Heterocyclic Chemistry by Gupta and Kumar Vol I and Vol II
7. Insecticides with Modes of Action by I. Ishaya and D. Deghilee
8. Natural Products by S.V. Bhat
9. Instrumental Analysis by Skoog, Holler and Crouch
10. Practical Books:
11. Physical Chemistry Parcticals by J.B. Yadav
12. Qualitative Analysis by Vogel

### **Paper III: Basics of Forensic Physics**

1. Principle of Electronic by V.K. Gupta
2. Digital Electronics by Malnino
3. Digital Electronics by Flloyd
4. Op-amp by Gaikwad
5. Engineering Physics by Gaur and Gupta

#### **Paper IV: Basics of Forensic Biology**

1. Principles of Biochemistry by Lehninger
2. Harper's Biochemistry by Murray
3. Physical Chemistry by Atkins
4. Physical Chemistry by Castellan
5. Biological Spectroscopy by Lalcowicz
6. Analytical Biochemistry by Holme
7. Enzyme Kinetics by Plowman
8. Enzyme Structure and Mechanism by Ferst
9. Biophysical Chemistry by Upadhyay
10. Biochemistry by Satyanarayamn
11. Microbiology by Pelczar
12. Microbiology by Devis
13. General Microbiology by Powar- Dagainawala
14. Cell Biology by Powar
15. Principles of genetics by Gardner
16. DNA Cloning by Glover
17. Molecular Cloning by Maniatis
18. Fundamental Immunology by Paul
19. Essential Immunology by Roitt
20. Molecular Biology of Gene by Watson
21. Transgenic animals by Grosveld
22. Transgenic Plants by Hiatt
23. Industrial Microbiology by Casida
24. Nucleic acid and protein sequence analysis- A practical approach by Bishop
25. Gymnosperms by Chamberlein
26. Flora of Bentham by R. Hooker
27. Genes and Evolution by Jha
28. Plant Anatomy by Faha

29. Ecology by Odum

**Paper V: Basics of Forensic Psychology**

1. General Psychology by Cicarelli
2. General Psychology by Vipin Kumar
3. Cognitive Psychology by Galloti
4. Mannuals of Respective Test
5. Psychological testing by Anastasi
6. Abnormal Psychology by Barlow and Durand.
7. Psychology and Work, by Schultz D (2006),8<sup>th</sup> edi.
8. Experimental Psychology, Solso .R.L.(2008)
9. Social Psychology, Barron and Barron.
10. Behavior Modification, Martin Garry,(2002),7<sup>th</sup> edi.
11. Introduction to Psychology, Morgan, King, Weiss and Schopler, VII edition, (1989) McGraw Hill, India.
12. Abnormal psychology & modern life,Carson RC & Butcher JN (10th Ed) Harper-Collins NY
13. The Counseling process Patterson, Lewis E. ; & Welfel, Elizabeth Reynold – [2000] Hilgard,
14. Introduction to Psychology, Atkinson and Atkinson, (1975) Oxford IBH Publishing Co. Pvt. Ltd.
15. Introduction to Forensic Science in Crime Investigation By Dr.(Mrs.) Rukmani Krishnamurthy

**Paper VI: Basics of Digital and Cyber Forensics**

1. Introduction to Forensic Science in Crime Investigation By Dr.(Mrs.) Rukmani Krishnamurthy
2. Cyber Law in India by Farooq Ahmad- Pioneer Books
3. Information Technology Law and Practice by Vakul Sharma- Universal Law Publishing Co. Pvt. Ltd.
4. The Indian Cyber Law by Suresh T. Vishwanathan- Bharat Law House New Delhi
5. Guide to Cyber and E- Commerce Laws by P.M. Bukshi and R.K. Suri- Bharat Law House, New Delhi
6. Guide to Cyber Laws by Rodney D. Ryder- Wadhwa and Compney, Nagpur
7. The Information technology Act, 2000- Bare Act- Professional Book Publishers, New Delhi.

8. Computer Forensics: Principles and Practices by Linda Volonino, Reynaldo Anzaldúa and Jana Godwin - Pearson Prentice-Hall 2007.
9. First Responder's Guide to Computer Forensics by Richard Nolan et al. - Carnegie Mellon, 2005.
10. Digital Evidence and Computer Crime, 2<sup>nd</sup> ed. By Eoghan Casey- Academic Press, 2004.
11. The Regulation of Cyberspace by Andrew Murray, 2006- Routledge –Cavendish.
12. Scene of the Cybercrime: Computer Forensics Handbook by Syngress.
13. Security and Incident Response by Keith J. Jones, Richard Bejtlich and Curtis W. Rose
14. List of Websites for more information is available on : [Http://www.garykessler.net.library/forensicsurl.html](http://www.garykessler.net.library/forensicsurl.html)
15. Operating system by William Stallings
16. Computer Networking by Tanenbaum
- Computer Security Basics By Rick Lehtin

# **ANNEXURE II**

**RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR**



**BACHELOR OF SCIENCE: SEMESTER III AND IV  
(SECOND YEAR: FORENSIC SCIENCE)  
SYLLABUS AND SCHEME OF EXAMINATION**

## **Second Year B. Sc Forensic Science Syllabus**

O -----: **Title of the Course: -B.Sc. Forensic Science.**

O -----: **Eligibility:**

**A learner should have to pass I and II Semesters**

OR

- I. A student shall be allowed to keep term for Semester III if he/she passes (grade 'E' or above in each course ) each of Semester I and Semester II

OR

He/she fails in not more than two courses of Semester I and Semester II taken together.

- II. A student shall be allowed to keep term for Semester IV irrespective of grades obtained in each course of Semester III.

However student has to pass either of Semester I or Semester II in order to appear for Semester IV

OR

He/she has passed Semester I and Semester II and fails in not more than two courses of Semester III and Semester IV taken together

OR

He/she has passed Semester III and Semester IV and fails in not more than two courses of Semester I and Semester II taken together

R -----: Fee Structure: - As Per the State Government Rules

R -----: Intake Capacity - 50

R -----: Teacher Qualifications: - As per the U.G.C./ State Government Norms and Experts from Forensic Science Field and Related Industry with minimum 3 years of experience.

R -----: Standard of Passing:

- vi) Candidate who secures minimum 35% in each subject/paper be declared to have passed the examination.
- vii) Candidate who secures a minimum of 35% marks in each paper and an aggregate of 60% and above marks on the whole shall be declared to have passed the examinations in the First Class.
- viii) Candidate who secures a minimum of 35% marks in each paper and an aggregate of 75% and above marks on the whole shall be declared to have passed the examinations with Distinction.

Medium of Instruction: English

At least two Field Visits at Forensic Science Laboratory

# **Syllabus for S.Y. B.Sc. Forensic Science**

Paper I: Advanced Forensic Science

Paper II: Advanced Forensic Chemistry

Paper III: Advanced Forensic Physics

Paper IV: Advanced Forensic Biology

Paper V: Environmental Studies and Advanced Psychology

Paper VI: Advanced Digital and Cyber Forensic

# B. Sc. FORENSIC SCIENCE

## Theory

### Paper I: Advanced Forensic Science-III Total Marks: 30

Units with Description	Total Lectures
<b>SEMISTER – III</b>	
<b>UNIT: I – Crime and Crime Scene management:</b>	15
<ul style="list-style-type: none"> <li>• Criminals, criminal behavior, criminal profiling, portrait parley, general crime scene procedures and their management, Crime Scene survey, Crime Scene Documentation, collection and preservation of physical evidence, crime scene reconstruction</li> </ul>	
<b>UNIT: II – Recognition of Bloodstain Patterns:</b>	15
<ul style="list-style-type: none"> <li>• History of Bloodstain Pattern interpretation, properties of human blood, target surface considerations, Size, Shape and Directionality of bloodstains, Spattered blood, other Bloodstain Patterns, interpretation of Bloodstain on clothing and footwear, Documentation and Photography for Bloodstain Pattern Analysis</li> </ul>	
<b>UNIT: III – Fingerprints:</b>	15
<ul style="list-style-type: none"> <li>• Introduction to Forensic science – nature, need and function</li> <li>• Laws and Principles, basics of Forensic Science</li> <li>• Historical development and scope of Forensic Science in India</li> </ul>	
<b>Paper I: Advanced Forensic Science-IV Total Marks: 70</b>	
<b>SEMISTER - IV</b>	
<b>UNIT: IV - Forensic Documents:</b>	15
<p>Various types of forensic documents: genuine and forged documents, classification of forensic documents: Specimen writings, admitted writings, Handling, preservation and marking of documents, natural variation and disguise in writing, Principle of Handwriting Identification, general and individual characteristics, Basic Tools needed for forensic documents examination and their use.</p>	

<p>Various types of forgeries and their detection. Analysis of paper and inks.</p> <ul style="list-style-type: none"> <li>•</li> </ul>	
<p><b>UNIT: V Criminal Justice System:</b></p>	15
<p>Structure of Police, Prosecution and Judicial Organization, Introduction to IPC (Indian Penal Code) and Cr.P.C – section 291, 292 and 293. Indian Evidence Act – Introduction and Sections 32, 45, 46, 47, 57, 58, 60, 73, 135, 136, 137, 159. Court Testimony- admissibility of expert testimony, Examination in chief, Cross Examination and Re-examination, Ethics in Forensic Science.</p> <ul style="list-style-type: none"> <li>•</li> </ul>	
<p><b>UNIT: VI - Impressions and Prints:</b></p>	15
<p><b>Footprints:</b> Importance, Gait Pattern, Casting of footprints in Different medium, Taking Control samples.</p> <p><b>Tire Marks/prints</b> and Skid marks, taking control samples, Forensic Significance.</p> <p><b>Lip Prints-</b> Nature, Location, collection and evaluation, taking control samples, Forensic Significance.</p> <p><b>Bite Marks-</b> Nature, Location, collection and evaluation, taking control samples, Forensic Significance.</p> <ul style="list-style-type: none"> <li>• <b>Ear Prints-</b> Nature, Location, collection and evaluation, taking control samples, Forensic Significance</li> </ul>	

## Practical - Advanced Forensic Science:

<b>Sr. No.</b>	<b>Topic</b>	<b>No. of Practical</b>
1.	Reconstruction and evaluation of various type of crime scene.	2
2.	Sketching and Photography of various type of crime scene.	2
3.	Document and Fingerprint Photography.	2
4.	To take Plain and Rolled inked fingerprints and to identify the patterns.	2
5.	To perform ridge tracing and ridge counting.	2
6.	To identify ridge characteristics.	2
7.	To develop Latent fingerprints with Powder method.	2
8.	Lifting of Fingerprints.	2
9.	Identification of normal/ disguise writings.	2
10.	Detection of forgeries including traced and stimulated Forgery and build up documents.	2
11.	Examination of ink by TLC method.	2
12.	Examination of security features of Currency Notes and Indian Passports.	

**Paper II: Advanced Forensic Chemistry-III Total Marks: 30**

Units with Description	Total Lectures
<b>SEMISTER – III</b>	
<b>UNIT: I PHYSICAL CHEMISTRY</b>	15
Chemical thermodynamics- Gibbs- Helmholtz's energy efficiency, entropy, work function. a) Chemical kinetics –rate, order and molecularity of rxn. Energy of activation, molecular activation-collision theory, Specific reaction rate-half life expression. b) Electro chemistry: Laws of electrochemistry, Electro chemical cell, salt bridge, EMF-set up of cell –calus •	
<b>UNIT: II - : INORGANIC CHEMISTRY</b>	15
<ul style="list-style-type: none"> <li>• Chemical thermodynamics and kinetics, first law of thermodynamics, internal energy, enthalpy, second law of thermodynamics, entropy and its significance, free energy and work function</li> <li>• Rate of reaction, order of molecularity of reaction, slow reaction and fast reaction, first order reaction, half life period of first order reaction, activation energy, temperature dependence of activation energy, explosive reactions, oscillatory reactions</li> </ul>	
<b>UNIT: III - SPECTROSCOPY (PHYSICAL ANALYTICAL)</b>	15
<ul style="list-style-type: none"> <li>• Study of Modern Periodic Table, Long form of Periodic Table, periodic properties, atomic radiation, ionization potential, electron affinity, electro negativity, metallic characters, Non- metallic characters and magnetic properties, Comparative study of S and P block elements</li> <li>• Conductance, Conductometry, Electro Motive Force, Potentiometry</li> </ul>	
<b>Paper II: Advanced Forensic Chemistry-IV Total Marks: 70</b>	
<b>SEMISTER – IV</b>	
<b>UNIT: IV – QUALITATIVE-QUANTATIVE ANALYSIS</b>	15
Organic - inorganic products. -Chemical, oils, petroleum products, cement	

<b>UNIT: V – FORENSIC CHEMISTRY</b>	
Screening, sampling-methods type (collection), statistical method, different standard methods b) Inorganic analysis. c) Micro-chemical method	15
<b>UNIT VI: MISCELLANEOUS</b>	
Characteristics/examination/act/organic-inorganic products -Gold,silver,tobacco,tea,sugar,salts,fertilizers,dyes,drugs,paits,fats -various acts (legal aspects)	15

## **Practical- Advanced Forensic Chemistry**

<b>Sr. No.</b>	<b>Title</b>
1.	Commercial analysis(double titration) - 01
2.	Titration –complexometric (EDTA titration) -02
3.	Qualitative analysis(Acidic /basic radicals) -04
4.	Identification of organic compounds(characterization ) -04
5.	Gravimetric Analysis -01
6.	Physical Experiments -02
7.	Conductometric Titration - 03
8.	PH-metry Titration - 01
9.	Potentiometry Titration -03

**Paper III: Advanced Forensic Physics-III Total Marks : 30**

<b>Units with Description</b>	<b>Total Lectures</b>
<b>SEMISTER – III</b>	
<b>UNIT: I – Basic Spectroscopy:</b>	15
Introduction, electromagnetic spectrum, sources of radiations, conventional sources for UV, Visible and IR rays, shorter wavelength radiation (X-ray tube), Interaction of radiation with matter: Reflection, absorption, transmission, fluorescence,, phosphorescence. •	
<b>UNIT: II – Analog and Digital Electronics</b>	15
Generation of various types of waveforms, wave shaping circuits, Active filters, A to D and D to A convertors, Modulation, need of Modulation, Amplitude and Frequency Modulation and its applications, Fourier transforms. •	
<b>UNIT: III – Physics of Speech (1 Credit)</b>	15
Introduction, the generation of sound, amplitude vibration, simple harmonic motion, addition of sine waves, physical properties of vibrating systems, propagation of sound waves, standing waves, modes of vibration. •	
<b>Paper III: Advanced Forensic Physics-IV Total Marks : 70</b>	
<b>SEMISTER – IV</b>	
<b>UNIT: IV - Fire Arms:</b>	15
Introduction, brief history of fire arms, weapon types and their operations, proof marks.	
<b>UNIT: V - Ammunition:</b>	
A brief history of ammunition, ammunition components, non toxic shots,	

propellants, priming compound and primers, head stamp marking on ammunition.	15
<b>UNIT: VI - Ballistics:</b>	
Introduction, types of ballistics: internal, external and terminal ballistics, velocity recoil, theory of recoil, barrel pressure measurement, ballistic coefficient, angle of elevation of the barrel.	15

### **Practicals (Advanced Forensic Physics)**

1. Investigations of fake documents using UV light.
2. Thermal Analysis of given sample using DSC/TGA
3. Gravimetric analysis (density measurement of given sample)
4. Electrostatic development analyzer
5. Classification and measurements of bullets
6. Segregation of Speech Sample
7. Study of absorption coefficient of given Sample
8. Study of transmission coefficient of given Sample
9. Waveform generator
10. Study of AM modulation
11. Study of FM modulation
12. Study of low pass Active filters
13. Study of High pass Active filters
14. Analog to Digital Convertor
15. Digital to Analog Convertor
16. Fourier transforms
17. Wave clipping and Clamping using diodes.
18. Digital counter
19. Photosensitive relay using LDR
20. Study of Timer (IC-555)

**Paper IV: Advanced Forensic Biology-III****Total Marks: 30**

Units with Description	Total Lectures
<b>SEMISTER – III</b>	
<b>UNIT: I</b> <ul style="list-style-type: none"><li>• Crime Scene Investigation-</li><li>• Protection of Biological Evidences</li><li>• Documentation</li><li>• Chain of Custody</li><li>• Recognition of Biological evidences encountered in various cases.</li><li>• Search &amp; Collection of Biological Evidences</li><li>• Packaging &amp; transportation of Biological Evidences</li><li>•</li></ul>	15
<b>UNIT: II</b> <ul style="list-style-type: none"><li>• Analysis of Biological Fluid</li><li>• Saliva</li><li>• Semen</li><li>• Vaginal Fluid</li><li>• Urine</li><li>• Sweat</li><li>• Serological Concepts</li><li>• Antigen / Antibodies</li><li>• Polyclonal antibodies</li><li>• Monoclonal antibodies</li><li>• Antiglobulins</li><li>• Serological Techniques</li><li>• Electrophoretic Methods – Agarose gel, SDS, Natured/Denatured</li><li>• Identification of Blood</li><li>• Properties</li><li>• Blood Grouping – Human &amp; Non-human</li><li>• Presumptive &amp; Confirmatory Tests</li><li>• Human &amp; Animal Hair morphology</li><li>•</li></ul>	15

❖ <b>UNIT: III - Genetics</b>	
<p>Structural &amp; definitive properties of Chromosomes</p> <p>Human Genome</p> <p>Deoxyribose Nucleic Acid – Structural properties</p> <p>Sources of DNA evidence</p> <p>❖ DNA Extraction</p> <p>Basic Principles</p> <p>Method of DNA extraction</p> <p>❖ DNA Quantification</p> <p>Slot Blot Assay</p> <p>Southern /Northern Blotting</p> <p>❖ DNA Amplification by Polymerase Chain Reaction</p> <p>❖ DNA Electrophoresis</p> <p>❖ DNA databasing</p> <p>•</p>	15
<b>Paper IV: Advanced Forensic Biology-IV Total Marks: 70</b>	
<b>SEMISTER – 1V</b>	
UNIT IV:	
<p>❖ Analysis of Skeletal Remains</p> <p>• Forensic Anthropology</p> <ul style="list-style-type: none"> <li>□ Skeletal system &amp; bone formation</li> <li>□ Skeletal indicators of health &amp; injuries</li> <li>□ Identification of joint wear &amp; deterioration</li> <li>□ Estimation of Age, Sex &amp; Race</li> <li>□ Estimation of Time Since Death</li> <li>□ Human V/s Animal Bone morphology</li> </ul> <p>Facial Reconstruction</p> <p>❖ Forensic Odontology</p> <ul style="list-style-type: none"> <li>• Development of Dental structure</li> <li>• Estimation of Age, Sex &amp; Race</li> <li>• Bitemark Analysis</li> </ul> <p>❖ Forensic Pathology</p> <ul style="list-style-type: none"> <li>• Decomposition – Muscular Physiology</li> <li>• Causes of Death – Asphyxia, drowning, etc.</li> <li>• Time of Death</li> <li>• Post Mortem Examination – wounds, injuries, etc.</li> </ul>	15

<ul style="list-style-type: none"> <li>• Digestive System &amp; digestive paths of macromolecules, enzymes &amp; end products</li> <li>• Undigested stomach contents post mortem</li> <li>• Role of a Forensic Pathologist</li> <li>•</li> </ul>	
UNIT V:	
<ul style="list-style-type: none"> <li>❖ Forensic Entomology <ul style="list-style-type: none"> <li>• Basic Principle of Insect Biology</li> <li>• Life Cycle</li> <li>• Estimation of Time of Death</li> <li>• Preservation of Sample</li> </ul> </li> <li>❖ Forensic Botany <ul style="list-style-type: none"> <li>• Identification of Plant specimen</li> <li>• Analysis of pollen &amp; aquatic microorganisms</li> <li>• Techniques for dating specimens using plant material</li> <li>• Dendrochronology</li> <li>• Algal colonisation</li> <li>• Application of plant ecology</li> </ul> </li> <li>•</li> </ul>	15
UNIT: VI -	
<ul style="list-style-type: none"> <li>❖ Ecology <ul style="list-style-type: none"> <li>• Terrestrial environments</li> <li>• Aquatic conditions</li> <li>• Water Chemistry</li> <li>• Temperature control</li> <li>• Chemical cycles</li> <li>• Food chains</li> </ul> </li> <li>❖ Endangered plants and animal species</li> <li>•</li> </ul>	15

### **Practical: Advanced Forensic Biological**

<b>Sr No</b>	<b>Title</b>
1.	Microscopic Comparison of a. Animal Hair    b. Human Hair
2.	Microscopic Comparison of Fibres
3.	Presumptive Tests for Blood a. Phenolphthalin b. Benzidine c. Leucomalachite Green (LMG) d. Luminol
4.	Confirmatory Tests for Blood    by Crystallization Assays
5.	ABO Grouping & Rhesus Factor
6.	Species Identification from various biological fluids a. Electrophoresis b. Precipitin tests c. Acid Phosphatase test for semen d. Prostate Specific Antigen (PSA)
7.	Microscopic examination for spermatozoa
8.	Detection of Alpha Amylase activity    by Starch-Iodine Assay
9.	DNA Extraction & Quantification by colorimetric methods.
10.	Microscopic examination of Pollens and Aquatic microorganisms.

**Paper V: Advanced Forensic Psychology-III****Total Marks: 30**

Sr. No.	Topic	No. of Lectures
	<b>SEMISTER – III</b>	
<b>Unit-I</b>	<b>The Content of Forensic Psychology. (Credits 1)</b> History of Forensic Psychology (Historical Perspective) Defining Forensic Psychology. Importance of Forensic Psychology. Services provided by Forensic Psychologists.	15
<b>Unit-II</b>	<b>Assessment and Evaluation in Forensic Psychology,( Psychological Testing) (Credits 1)</b> What is Psychological Tests? , Types of Tests. Characteristics of good test. , Tests that are used in Forensic Psychology Assessment. , Intelligence Tests. ,Achievement Tests ,Personality Tests The MMPI Test.	15
<b>Unit-III</b>	<b>Applying Social Psychology in the interpersonal aspects of legal system. (Credits 1)</b> Before the trial begins: 1. Effect of police procedure and media coverage. , 2. Eye Witness Testing: Problems and Solutions. The Central participation in trial , 1. Effect of Attorney, Judges, Jurors, and Defenders	15
<b>Paper V: Advanced Forensic Psychology-IV</b>		<b>Total Marks: 70</b>
	<b>SEMESTER IV</b>	
<b>Unit-IV</b>	<b>Legal Aspects of Forensic Psychology. (1 Credit)</b> Introduction. Historical Background Survey into Psychological evidence in court. Ethical and Professional Issues The role of Forensic Psychology. Civil cases, Criminal cases.	<b>15</b>
<b>Unit-V</b>	<b>Personality Disorders. (1 Credit)</b> Defining and Diagnosing Personality Disorders. Odd-Eccentric Personality Disorders. Dramatic-Emotional Personality Disorders. Anxious-Fearful Personality Disorders. Alternative Conceptualization of Personality Disorder.	<b>15</b>
<b>Unit-VI</b>	<b>Stress and Health. (1 Credit)</b> Stress Factors in the stress reaction. Coping with the stress. Statistics in Forensic Psychology. Descriptive Statistics, Inferential Statistics	<b>15</b>
	<b>Total</b>	<b>45</b>

**Practical: Advanced Forensic Psychology**

- 1 Introduction to practical.
- 2 Reaction Time: Comparison of RT under simple and disjunctive conditions.
3. Language: The influence of negative framing on verbal comprehension
4. Concept Formation: Comparison of the speed of development of 2 types of concepts.
5. The Method of Loci
- 6 Release from Proactive Inhibition in short- term Memory as a function of Semantic Similarity of Material
7. Models of Memory: Levels of Processing Approach.
8. Thinking and Problem Solving.

9. Use of Chi Square test on Locus of Control scores.
10. Correlation coefficient Raven's Standard Progressive Matrices (SPM) and Abstract Reasoning (AR) scores.
11. Level of Aspiration
12. Eysenck Personality Questionnaire

(Practical on brain mapping and profiling can be done in the Forensic Lab. )

**Paper VI: Advanced Digital and Cyber Forensic-III****Total Marks: 30**

Sr. No.	Topic	No. of Lectures
<b>SEMISTER – III</b>		
<b>Unit-I</b>	<b>Computer Forensic</b> (1 Credit) Introduction to Computer/Cyber Forensic, Cyber Forensic Steps (Identification, Seizure, Acquisition, Authentication, Presentation, Preservation), Who is Computer Forensic Expert, Cyber Forensic Investigation Process, The Goal of the Forensic Investigation, Why Investigate (Internet usage exceeds norm, Using email inappropriately, Use of Internet, email, or PC in a non-work-related manner, Theft of information, Violation of security policies or procedures, Intellectual property infractions, Electronic tampering ), Establishing a Basis or Justification to Investigate, Determine the Impact of Incident, Auditing V/s Cyber Forensic Investigations	15
<b>Unit-II</b>	<b>Incident Response</b> (1 Credit)Introduction to Incident Response Process(What is Computer Security Incident, What are the goals of Incident Response, Who is involved in Incident Response Process, Incident Response Methodology, Formulate a Response Strategy, Investigate the Incident.),Preparing For Incident Response, Overview of Pre-incident Preparation, Identifying Risk, After Detection of an Incident.	15
<b>Unit-III</b>	<b>Cyber Forensic Tools and Utilities</b> (1 Credit) Introduction, Examining a Breadth of Products, Cyber Forensic Tools Good, Better, Best: What's the Right Incident Response Tool for Your Organization? , Tool Review Forensic Toolkit, EnCase, Cyber check suites, what is disk Imaging etc. Specifications for Forensic tools Tested	15

**Paper VI: Advanced Digital and Cyber Forensic-IV****Total Marks: 70**

<b>SEMISTER – IV</b>		
		No of Lectures
<b>Unit-IV</b>	<b>Evidence Collection and Analysis Tools</b> (1 Credit) Volatile and Non volatile Evidences collection (Safeback, Gettime, FileList,Filecvf and Excel, Getfree, Swapfiles and Getswap ,GetSlack, Temporary Files), Detailed Procedures for Obtaining a bit stream backup of hard drive, File System (Details of File system, Data Structure Of File System, Data Recovery in Different file system)	15
<b>Unit-V</b>	<b>Concealment Techniques:</b> (1 Credit) Introduction to Cryptography, Types of Cryptographic Algorithms(Secret Key Cryptography, Public Key Cryptography, Hash Function),Electronic Signature, Stenography, Reversing the Stenographic Process, Cloaking Techniques(Data Hide and Seek),Renaming Files, Manipulating File System, Data Hiding on NTFS with Alternate data Stream	15
<b>Unit-VI</b>	<b>Biometrics</b> (1 Credit) Introduction to Biometrics, What is Biometrics, Why use Biometrics, Model of Biometric system Various types of Biometric methods, User Acceptance, Evaluating Accuracy, Advantages & disadvantages General Biometric System (Identification and Verification), General Architecture Comparison of different Biometric Technologies, What makes Biometrics difficult.	15

## Paper VI –List of Practical

1. Identification , Seizure ,Search of Digital media
2. Evidence Collection
3. Demonstration of various Forensic tools like Partition magic, Encase etc.
4. Data Recovery, Deleted File Recovery viewing small Disk.
5. Viewing small disk MBR.
6. **Demonstration of Concealment Techniques (Cryptography PGP)**
7. Demonstration of Concealment Techniques (Stenography)
8. **Demonstration of other Concealment Techniques**
9. Formatting NTFS and EX2, EX3.
10. **Case study of Biometric Techniques**

## **Paper I Advanced Forensic Science**

## **List of**

### **Books:**

1. Introduction to Criminalistics: The foundation of Forensic Science by B. J. Fisher, W.J. Tilstone, C. Woytowicz.
2. Henry Lee's Crime Scene Handbook By Henry C. Lee, Timonthy Palmbach
3. Practical Crime Scene Analysis and Reconstruction by Ross M. Gardner and Tom Bevel.
4. Forensic Science: An Introduction to Scientific and Investigative Techniques By S.H James, JJ Nordby.
5. Advanced Crime Scene Photography by C.D. Duncan.
6. Forensic Science in Court- The Role of Expert Witness by Wilson Wall.
7. Scientific Examination of Questioned Documents by Ordway Hilton.
8. Questioned Documents by Albert S. Osborn.
9. Suspect Documents their scientific examination By Wilson R. Harrison.
10. Friction Ridge Skin By James F. Cowger
11. Speculation in Fingerprint Identification By Chatterjee S. K.
12. Criminal Investigation, Practical Fingerprinting by Briges B. C.
13. Introduction to Forensic Science in Crime Investigation By Dr.(Smt) Rukmani Krishnamurthy

## **Paper II: Advanced Forensic Chemistry List of Books**

1. Thermodynamics for Chemists by S, Glasstone
2. Principles of Physical Chemistry and Puri, Sharma and Pathania
3. Advanced Inorganic Chemistry by Madan , Malik and Tuli
4. Concise Inorganic Chemistry by J.D. Lee
5. Organic Chemistry by Moris and Boyed
6. Heterocyclic Chemistry by Gupta and Kumar Vol I and Vol II
7. Insecticides with Modes of Action by I. Ishaya and D. Deghilee
8. Natural Products by S.V. Bhat
9. Instrumental Analysis by Skoog, Holler and Crouch
10. Practical Books:
11. Physical Chemistry Parcticals by J.B. Yadav
12. Qualitative Analysis by Vogel

### **Paper III: Advanced Forensic Physics**

List of Books:

1. Spectroscopy by H.E. White (for unit 1)
2. The Physics of Speech by D.B.Fry (Cambridge University Press) (for Unit 3)
3. Handbook of Firearms and Ballistics Examination and Interpreting Forensic Evidence by Brian J Heard, 2<sup>nd</sup> Ed. Publication: Wiley-Blackwell (for Unit 4,5 and 6)
4. Op-Amp and liner Integrated circuits by Ramankat Gayakwad.
5. Op-Amp and liner Integrated circuits: by Robert Coughling and Driscoll
6. Electronics Communication systems: by Kennedy & Davis

### **Paper IV: Advanced Forensic Biology**

List of Books

1. Forensic Biology – Richard Li
2. Practical Skills in Forensic Science – Alan Langford, John Dean et al
3. Fundamentals of Forensic DNA Typing – John M. Butler
4. Scientific & Legal Applications of Bloodstain Pattern Interpretation – Stuart H. James

### **Paper V: Advanced Forensic Psychology**

**List of Books:**

1. Clark, H.H., & Chase, W.G.(1972) on the process of sentences against pictures. *Cognitive Psychology*, 3, 472-571.
2. Galotti, K.M.(2004) *Cognitive Psychology: In and out of the laboratory*. ( 3<sup>rd</sup> ed.) Wadsworth/ Thomson Learning.
3. Underwood. B.J.(1968). *Experimental Psychology: An Introduction*. NewYork: Appleton Century Croft Ltd.
4. Anastasi, A.& Urbina, S. (1997) *Psychological Testing*. (7<sup>th</sup> ed.) International edition, Prentice Hall International, Inc.
5. Garret, H.E. (1973). *Statistics in Psychology and Education*. (6<sup>th</sup> ed.) Bombay: Vakils, Feffer and Simons Pvt.Ltd.
1. Surprenant, A.M., Francis, G., & Neath, I.(2005) . *Cog lab Reader*. Thomson Wadsworth.

### **Paper VI: Advanced Digital and Cyber Forensic**

**Hardware and software required:**

Hard Disk of any size,  
Partitioning magic software,  
Encase software,  
PGP software,  
Invisible Secret software,  
WinHex software,

**List of Books:**

1. Incident Response and Computer Forensic by *Kelvin Mandia*, TMH Publication.
2. Digital Forensics: Digital Evidence in Criminal Investigations by *Angus McKenzie Marshall*
3. Cyber Forensic A Field Manual for Collecting, Examining and Preserving Evidence of Computer Crimes by *Albert J Menendez*. Auerbach Publications.
4. First Responder's Guide to Computer Forensics by *Richard Nolan et al.* - Carnegie Mellon, 2005.
5. Cyber Forensic by *Marecella Menendez*.
6. Computer Forensic by *Newman*.
7. Cyber Crime Investigation Field Guide, by *B Middleton*.

# **ANNEXURE III**

**RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR**



**BACHELOR OF SCIENCE: SEMESTERS V AND VI  
(THIRD YEAR: FORENSIC SCIENCE)**

**SYLLABUS AND SCHEME OF EXAMINATION**

## **Third Year B. Sc Forensic Science Syllabus**

**O -----:- Title of the Course: -B.Sc. Forensic Science.**

**O -----:- Eligibility:**

**A learner should clear I, II, III and IV Semesters**

**OR**

III. A student shall be allowed to keep terms for Semester VI irrespective of grades obtained in each course of Semester V.

IV. The result of Semester VI shall be kept in abeyance until the student passes each of Semester I, Semester II, Semester III, Semester IV and Semester V.

R -----:- Duration of the Course: - Three Years (Full Time.)

R -----:- Fee Structure: - As Per the State Government Rules

R -----:- Intake Capacity - 50

R -----:- Teacher Qualifications: - As per the U.G.C./ State Government Norms and Experts from Forensic Science Field and Related Industry with minimum 3 years of experience.

R -----:- Standard of Passing: -

- ix) Candidate who secures minimum 35% in each subject/paper be declared to have passed the examination.
- x) Candidate who secures a minimum of 35% marks in each paper and an aggregate of 60% and above marks on the whole shall be declared to have passed the examinations in the First Class.
- xi) Candidate who secures a minimum of 35% marks in each paper and an aggregate of 75% and above marks on the whole shall be declared to have passed the examinations with Distinction.

Medium of Instruction: English

At least two Field Visits at Forensic Science Laboratory

## Semester V - Theory

**Paper I: Applied Forensic Science-V**

**Total: 30**

Units with Description	Total Lectures
<b>SEMISTER – V</b>	
<p><b>Unit I : Global History &amp; Development of Forensic Science &amp; Other National Agencies</b></p> <p>Global perspective in the field of forensic science: - history, development, education and training. Organizational setup of forensic science lab and other national &amp; international agencies: - FSL, CFSL, GEQD, FPB, NICFS, CID,CBI, Central Detective Training Schools, NCRB, NPA, Mobile Forensic Science Laboratories, IB, CPO, FBI, CIA, CSI, DAB, DEA, Bureau of Alcohol, Tobacco and Firearms. Understanding the role and duties of criminal investigators, qualification of a forensic scientist. Ethical Issues in Forensic Science: - defining ethics, professional standards for practice of criminalistics, code of conduct for expert witnesses, sanction against expert for unethical</p> <ul style="list-style-type: none"> <li>• conduct. Laboratory sections. Various analytical and specialized tools of investigation.</li> </ul>	15
<p><b>Unit II : Quality Management System</b></p> <p>General requirements for standardization and calibration of laboratories: - Introduction, scope and need of standardization. Quality management requirements: - Testing and calibration procedures, total quality assurance, quality control, quality planning, Resulting and report writing. Quality Audit:-Internal &amp; External Audit, Accreditation &amp; certification, NABL, ISO, IEC, BIS, ASCLD/LAB, ABC, IAI. Laboratory management procedures: - Lab information management</p> <ul style="list-style-type: none"> <li>• system, validation of equipments and safety protocols.</li> </ul>	15
<p><b>Unit III : Procedural Criminal Law &amp; Policing System</b></p> <p>Scientific Report writing: - Components of reports and report format relating to Crime Scene and Laboratory findings. Stages in criminal proceedings: - FIR, Investigation, prosecution and trial stage. Remand and bail processes. Crimes under Special and Local laws: - Crimes under Dowry</p>	15

<p>Prohibition Act, Crimes under Immoral Traffic Act, Specific offences under the Indian Penal Code (Homicide, sexual offences, offences against property). Classification of offences: Cognizable and Non cognizable offence, bailable and non bailable offences, compoundable and non-compoundable offences. Role of media, Role &amp; Functions of Police.</p> <ul style="list-style-type: none"> <li>• Introduction to Forensic science – nature, need and function</li> <li>• Laws and Principles, basics of Forensic Science</li> <li>• Historical development and scope of Forensic Science in India</li> </ul>	
<p><b>Paper I: Applied Forensic Science-VI</b> <span style="float: right;"><b>Total: 70</b></span></p>	
<p style="text-align: center;"><b>SEMISTER - VI</b></p>	
<p><b>Unit IV: Crime Scene Management, Reconstruction &amp; Crime Scene Analysis</b></p>	15
<p>Components of Crime Scene Management – Information management, manpower, technology &amp; logistics management, role of crime scene managers and first responding officers, educational background &amp; hierarchy. Understanding crime scene security, contamination control, documentation protocols and maintaining health &amp; safety procedures. Crime Scene Reconstruction:  - defining crime scene reconstruction, nature &amp; stages of crime scene reconstruction, reconstruction based on blood spatter patterns, shooting range of firearm projectile and gunshot residue, linking cases by MO and Signatures. Defining Crime Scene Analysis, interpretation of exhibits, role of a crime scene analyst, theory &amp; principles of analysis, arguments and ethics in crime scene analysis</p> <ul style="list-style-type: none"> <li>• and data interpretation.</li> </ul>	
<p><b>Unit V: Questioned Documents</b></p>	
<p>Functions of a Forensic Document Examiner: - Required training and education. Collection protocols of writing standards and process of comparison. Various writing features and their estimation. General and individual characteristics of handwriting. Identification of writer of anonymous writings. Application of Forensic Stylistics/Linguistics in the identification of writer. Examination of built-up documents and determination of sequence of strokes. Determination of age of documents by examining various factors. Identification and comparison of typescripts: -</p>	15

<p>Identification of typist, various types of printing processes, printing and machine defects, and alterations in typed text. Various types of typewriting devices: - examination of typewriters with proportional letter spacing, electronic typewriters, dot matrix, inkjet &amp; laser printers, machines used for printing security documents, cheques, and currency notes, etc. Photocopy &amp; photocopier examination: - photocopier identification, visual photocopy examination, photocopy forgery. Paper &amp; watermark examination: - Paper size and thickness, paper opacity, colour and brightness, understanding watermarks. Examination of alterations, erasures, overwriting, additions and obliterations. Decipherment of secret writings, indentations &amp; charred documents. Physical comparison of documents, examination of seal rubber &amp; other mechanical impressions. Examination of counterfeit currency notes, Indian Passports/Visas, Stamp Papers, Postal Stamps</p> <ul style="list-style-type: none"> <li>• etc. Examination of fake credit cards and electronic documents.</li> </ul>	
<p><b>Unit VI: Forensic Medicine</b></p>	
<p>Global Medical Jurisprudence, Legal Procedure in India: - Police inquest, Magistrate's inquest, Coroner's inquest, Oath and affirmation. Documentary evidence: - Medical certificates, medical reports, dying declaration. Understanding laws and ethics of medical practice. Medico legal aspects of death: - Diagnosis of death- somatic &amp; molecular, early and intermediate changes following death, late changes after death- putrefaction, autolysis, bacterial action, factors affecting these changes. Determination of time since death, including by histopathological methods. Medico legal investigation of sexual offences, including examination of victims and suspects. Medico legal aspects of death:- causes of death such as asphyxia, electrocution, thermal trauma, heat burns, starvation, natural death, sudden death, death by accident. Medico legal aspects of wounds: - medical and legal definition of wounds, types of mechanical and regional injuries, aging of wounds,</p> <ul style="list-style-type: none"> <li>• difference between suicidal, homicidal and accidental wounds.</li> </ul>	<p>15</p>

## Practical: Applied Forensic Science

1. Calibration of various instruments
2. Various safety methods
3. Report writing and interpretation
4. Scientific Report Writing
5. Presentation of expert evidence in a mock courtroom
6. Blood Spatter Analysis
7. Range of firing
8. Reconstruction of various types of crime scene
9. Identification of Handwriting General and individual characteristics.
10. Detection of various type of forgery.
11. Identification of Indented and Invisible writing.
12. Identification of typescripts and printing matter.

### **Section-A**

### **Section - B**

### PROJECT STUDY

**Paper II: Applied Forensic Chemistry-V**

**Total: 30**

Units with Description	Total Lectures
<b>SEMISTER - V</b>	
<b>Unit –I : Separation and detection technique</b>	15
<p><b>Gas chromatography:</b> Theoretical principles, instrumentations and technique, columns, stationary phases, detectors, Forensic applications.</p> <p><b>HPLC:</b> Review of theory, Instrumentation, Technique, column, detectors, LC-MS, Forensic applications.</p> <p><b>Atomic Absorption Spectroscopy-</b> Introduction, Basic principles, Instrumentation and Techniques, Forensic applications.</p> <p><b>Flame spectrometry-</b> Principle, Instrumentation and working, Forensic applications.</p> <p><b>Inductive Coupled Plasma Spectroscopy -</b> Principles and Instrumentation, Forensic applications.</p> <ul style="list-style-type: none"> <li>• <b>Thermal methods-</b>TGA, DTA, DSC.</li> </ul>	
<b>Unit-II: Forensic Toxicology</b>	15
<p>Introduction and concept of forensic toxicological examination and its significance</p> <p><b>Poisons:</b> (Plant Poison, Animal Poison, Metallic Poison) classification of poisons, types of poisoning, collection and preservation of toxicological exhibits in fatal and survival cases, signs and symptoms of poisoning, mode of action and its effect on vital functions, medico-legal and post mortem examination report/finding studies, specific analysis plan/ approach to toxicological examination of poisoning samples, excretion of poisons, detection of poisons on the basis of their</p> <ul style="list-style-type: none"> <li>• metabolic studies, interpretation of analytical data and forming of opinion.</li> </ul>	
<b>Unit-III: Miscellaneous</b>	15
<p><b>Polymers-</b>Introduction-General idea of structures, types, tacticity, polymerization processes with examples, radical and ionic mechanism of polymerization, characteristic properties of polymers, Structure, preparation and applications of Polyethylene (types and</p>	

<p>Ziegler-Natta process), Teflon, PVC, Polystyrene,  <b>General idea of plasticizers, stabilizers, fillers, Epoxy Resins, Feviseal.</b>  <b>Plastics-</b> Classification of plastics, application of plastics.  <b>Rubber-</b> types of rubber, vulcation of rubber, synthetic rubbers,  <b>Fibres (synthetic fibres)-</b>classification, properties, polyamides-Nylon, polyesters-Terylene or Dacron.  <b>Fibre reinforced plastics-</b> types, properties, applications.  <ul style="list-style-type: none"> <li>• <b>Glass fibre reinforced plastics-</b> properties, applications.</li> </ul> <b>Relevant provisions of:</b>  1. The Poisons Act, 1919, and Section 284 of IPC, 1860 (Negligent conduct with respect to poisonous substance).  2. Explosives Act 1984, (Definition, Powers of Central Govt. and Licensing Authority, Offences and Penalties) and Section 286 of IPC, 1860, (Negligent conduct with respect to explosive substance),  <ul style="list-style-type: none"> <li>• 3. Explosive Substances Act 1908, (Definition, Offences and Penalties).</li> </ul> </p>	
<p><b>Paper II: Applied Forensic Chemistry-VI</b> <span style="float: right;"><b>Total: 70</b></span></p>	
<p><b>SEMISTER – VI</b></p>	
<p><b>Unit-IV: Narcotic Drug and Psychotropic Substances</b></p> <p>Analysis of Narcotic Drugs and Psychotropic Substances, Drug effects, drug Hazards, Tolerance and dependence of drugs, Problems of drug addiction, Identification of drug addict, Drug addicts and crimes, Classification of Narcotics and other drugs, Analytical techniques for identification of drugs.  Types of Pharma drugs, Steroids, Forensic Pharmacological studies, Ingestion of drugs ,absorption, distribution, metabolism, pathways of drug metabolism, drug metabolism and drug toxicity,  <ul style="list-style-type: none"> <li>• excretion of drugs.</li> </ul> </p>	<p>15</p>
<p><b>Unit-V: Study of Analysis of Beverages</b></p> <p>Introduction, Definition of alcohol and illicit liquor, Alcoholic and non-alcoholic beverages and their composition, Proof spirit, absorption, de-toxication and excretions of alcohol, problems in</p>	<p>15</p>

<p>alcohol cases and difficulties in diagnosis, Alcohol and prohibition, Consequences of drunken</p> <ul style="list-style-type: none"> <li>• driving, Analytical techniques in the analysis of alcohol and other articles. Case study.</li> </ul>	
<b>UNIT VI: MISCELLANEOUS</b>	
<p><b>Arson:</b> chemistry of fire, investigation and evaluation of clue material, analysis of arson exhibits by instrumental methods: Management of Arson cases,</p> <p><b>Food adulteration:</b> Introduction, Prevention of food adulteration, Analytical techniques for analysis of exhibits involved in food and other material cases.</p> <p><b>Relevant provision of:-</b></p> <ol style="list-style-type: none"> <li>1. Prevention of Food Adulteration Act 1954 (Definition, Power of Food Inspector, Offences and Penalties),</li> <li>2. Narcotic Drugs &amp; Psychotropic Substances Act 1985 (Definition, Licit Opium Cultivation, Minimum and Commercial Quantity in Narcotic Drugs, Offences and Penalties),</li> <li>3. Prevention of Illicit Trafficking in NDPS Act 1985 (Detention of a Person Under the Act),</li> <li>4. Drugs Control Act 1940 (Definition, Power of Chief Commissioner Under the Act),</li> <li>5. Drugs &amp; Cosmetics Act 1945 (Definition, Adulterated, Misbranded, Spurious Drugs and Cosmetics, Offences and Penalties),</li> <li>• 6. Arson cases.</li> </ol>	15

### **Practical: Applied Forensic Chemistry**

1. Identification of food adulteration.-vegetable oil, Cold drinks etc. (2 nos).
2. Quantitative or qualitative study of drug opiates. (2 nos).
3. Examination of fire arson cases by GC, TLC. (1 nos).
4. Detection and determination of various adulterants in alcohol, by colour tests.(Qualitative analysis) (2 nos.).
5. Chemical analysis of explosive materials.(Gun powder)- Colour test, Microscopic examination.(2 nos).
6. Analysis of alcohol from blood (quantitative by GC). (2 nos).
7. Extraction methods of drugs, Poisons. (2 nos).

8. Colour Tests for identification of poisons, drugs. (2 nos).
9. Plant, animal, Metallic poison analysis. (2 nos.).
10. Polymer Testing.
11. Separation of Sampling Material by TLC (drugs, poison etc.) (2 nos).
12. Study of Steroids (separation by TLC).
13. Examination of chemicals used in Trap cases by UV-visible spectroscopy. (2 nos)
14. Examination of other metal

**Paper III: Applied Forensic Physics-V**

**Total Marks: 30**

Units with Description	Total Lectures
<b>SEMISTER - V</b>	
<b>Unit – I: Causes and Investigation of Vehicular Accidents- an overview</b>	15
<p>Automobile accidents- Introduction, sources of information, eye witnesses, Tire and other mark, Pedestrian impacts and vehicle speed, vehicle condition, vehicle speed and damage, curved scuffmarks, Time and distance, reaction time, Photography and plans; Rail Accidents- Investigation of rail crash: criminal and safety investigation, Investigation principles, Best Practices: rail company tests, inspection of driving cab, examination of electrical/electronic/technological system and their failure. Necessary equipments required for</p> <ul style="list-style-type: none"> <li>• forensic examination.</li> </ul> <p><b>Legal Aspect:</b></p> <ol style="list-style-type: none"> <li>1. Relevant Provisions of Motor Vehicle Act, 1939 (Offenses and Penalties).</li> <li>2. Relevant Provisions of Railway Act, 1989, (Offenses and Penalties).</li> <li>3. Relevant Provisions of Indian Penal Code, 1860, (Sections 337 (causing hurt), 304 A (causing death due to negligence) and 279 (rash and negligent driving)).</li> </ol>	
<b>Unit – II: Experimental Techniques</b>	15
<p>Forensic Photography; Introduction, 35 mm film / Digital SLR camera, Digital photo imaging, ISO number, Exposure Index, Photo imaging evidence; angle, scale, depth of field, light, ambient light, color temperature, flash/ strobe. Crime scene investigation report writing. Magnetic Measurement; (magnetic susceptibility). Electric Measurements; (Hall voltage, Resistivity measurement &amp; FET characteristics), Radiation Detection; Geiger Muelier counter, Optical fiber communication system,</p> <ul style="list-style-type: none"> <li>• Piezoelectricity and piezoelectric measurements.</li> </ul>	
<b>Unit – III: Exterior Ballistics</b>	15
<p>Introduction, General consideration, Parabolic trajectory of a bullet, Vacuum trajectory and calculation of remaining velocity, Air resistance, Bullet drop, Wind deflection, Gyroscopic drift,</p>	

Twist verses stability, Canting, Shooting up/ down, Velocity of falling shot and falling bullet, Escape velocity, Maximum horizontal and vertical range of shot pellets, Ricochet; Critical angle for ricochet for the bullet and the surface, Relationship between the angle of incidence and ricochet, <ul style="list-style-type: none"> <li>Stability in flight after ricochet, Lethal effects of ricochet bullet.</li> </ul>	
<b>Paper III: Applied Forensic Physics-VI</b>	
<b>Total Marks: 70</b>	
<b>SEMISTER – VI</b>	
<b>Unit – IV: Terminal (Wounds) Ballistics</b>	
Introduction, Stopping power of bullet, Injuries and the quantity of energy of projectiles, Shock wave and cavitation effect, Wounding mechanism, Elements of wound Ballistics; Nature of target, Velocity of projectile, Constructional features of projectile. Range; Classification of range (maximum horizontal/ vertical, effective, dangerous, safe and legal sense), Contact Range, Point blank range, near range, chips range, distant range. Penetration of shots in different regions of the body. <ul style="list-style-type: none"> <li>Legal Aspect: Arms Act, 1950, (Licensing, Offenses and Penalties).</li> </ul>	15
<b>Unit – V: Forensic Microscopy</b>	
Basics of microscope, Compound microscope- parts and properties, Comparison microscope, Stereomicroscope, Polarizing microscope- polarization and applications, Micro spectrophotometer, <ul style="list-style-type: none"> <li>Scanning Electron Microscope (SEM). Transmission Electron Microscope (TEM).</li> </ul>	15
<b>Unit – VI: Forensic Applications in Trace Analysis</b>	
Review of physical properties of materials: temperature, weight and mass, density, refractive index; methods of comparing refractive indices, 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. Forensic analysis and examination of soil, the significance of soil evidence, Variations in soil, Collection and preservation of soil evidence. Fiber; Types, Identification and comparison of manufactured fibers (Microscopic examination, Dye composition, Chemical composition, Other properties for examination),	15

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|---|--|
| <ul style="list-style-type: none"><li>• Significance of match, Collection and preservation of fiber evidence.</li></ul> |  |
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**Practical: Applied Forensic Physics ( Any 12)**

1. Comparison of glass fragments and Study of fractures in forensic material.
2. Examination of soil sample.
3. Determination of density of a given sample.
4. Determination of refractive index of a transparent material.
5. Examination of tire/ other marks.
6. Study of scuffmarks.
7. Analysis of accident scene photography and Physical examination accidental vehicle.
8. Testing and examination of given electric components / parts / circuits.
9. To study the effect of magnetic field on aqueous solution of paramagnetic salt,
10. Measurement of resistivity by four probe method.
11. Measurement of Hall voltage.
12. Working with Gieger Muelier counter.
13. Working with Compound microscope and Working with Comparison microscope.
14. Working with Stereomicroscope and Working with Polarizing microscope.
15. Working with Micro spectrophotometer.
16. Working with communication kit and Optical fiber parameters.
17. Simulation of bullet trajectory.
18. Development of 35 mm photograph.
19. Measurement of recoil ( Sample calculations) and Determination of remaining velocity (Sample Calculations).
20. Twist versus muzzle velocity (Sample Calculations) and Muzzle velocity (Sample Calculations).
21. Determination of remaining velocity (Sample Calculations).
22. Identification of firearm injury.
23. Piezoelectric measurements.
24. Fiber strength measurements.
25. FET Characteristics.

**Paper IV: Applied Forensic Biology-V****Total Marks: 30**

Units with Description	Total Lectures
<b>SEMISTER – V</b>	
<b>UNIT I : FORESIC SEROLOGY</b>	15
<p>Determination of human and animal origin from bones, hairs, nails, skin, body tissue, fluids / strains viz. blood, menstrual blood, semen, saliva, sweat, pus, vomit, etc., through immunediffusion and immune – electrophoresis. Serogenetic markers:- Blood groups – biochemistry and genetics of ABO, Rh, Mn systems, stains and other fluids / stains viz. menstrual blood, semen, saliva, sweat, tear, pus, vomit, hair, bone, nail blood specific ABH substances, determination of secretor / non secretor Lewis antigen, Bombay Blood group, Polymorphic enzymes typing – PGM, GLO, ESD, EAP, AK, ADA, etc., and their forensic significance, HLA typing, role serogenetic</p> <ul style="list-style-type: none"> <li>• markers in individualization, paternity disputes etc.</li> </ul>	
<b>UNIT II : WILD LIFE FORENSIC AND FORENSIC ORNITHOLOGY</b>	15
<p>Introduction and importance of wild life, Protected and endangered species of Animals and Plants. Identification of wild life materials such as skin, fur, bones, nails, horn, teeth, flowers and plants by conventional and modern methods. Identification of Pug marks of various animals census of wild life population. Birds flight and means of locomotion, Strikes and collisions, Quarantine issues, Crime Scenes, Confiscated Bird Goods, Anthropological Arte facts, Applications of Forensic</p> <ul style="list-style-type: none"> <li>• Ornithology, Feather structure and topography. Blood Grouping – Human &amp; Non-human</li> <li>• Presumptive &amp; Confirmatory Tests</li> <li>• Human &amp; Animal Hair morphology</li> </ul> <p>16</p>	
<b>❖ UNIT III : FORENSIC MICROBIOLOGY AND PALYNOLOGY</b>	15
<p>Development of forensic microbiology, Types and identification of microbial organisms/ fungi of forensic significance, Techniques in forensic microbiology.</p>	

<p>Understanding Bioterrorism: - Types of biological agents – Category A, B, C. Planning and response to bioterrorism - Preparedness          Biosurveillance, Biodefence. Epidemiology of Bioterrorism, Punishments for Bioterrorism act          Under Prevention of Terrorism Act, 2002. Study of spore, powdered minerals and pollens of forensic importance, Use of pollen grains &amp; spores in criminal or civil investigation, Applications          ❖ of Forensic Palynology.</p>	
<p><b>Paper IV: Applied Forensic Biology-VI</b> <span style="float: right;"><b>Total Marks: 70</b></span></p>	
<p style="text-align: center;"><b>SEMISTER – VI</b></p>	
<p><b>UNIT IV: DNA PROFILING AND ITS FORENSIC SIGNIFICANCE</b></p>	
<p>History of DNA fingerprinting, Human genetics – Heredity, Alleles, Mutations &amp; Population          Genetic, Molecular Biology of DNA. Forensic Application of recombinant DNatechnology/          Forensic Biotechnology, Human Genome Project, Variations, Polymorphism in DNA          system – DNA markers RELP, RAPD, VNTRs, SNP, Autosomal – STR, Y-STR, Mitochondrial          DNA. Forensic Significance of DNA Profiling:- Application in disputed paternity cases, child swapping, Missing person’s identity – immigration, veterinary &amp; wild life and Agriculture cases, legal perspectives – legal standards for admissibility of DNA profiling, procedural and ethical concerns, status of development of DNA profiling in India and abroad. New and future</p> <ul style="list-style-type: none"> <li>• technologies: DNA chips, SNPs and limitations of DNA profiting.</li> </ul>	<p>15</p>
<p><b>UNIT V: FORENSIC ANTHROPOLOGY &amp; ODONTOLOGY</b></p>	
<p>Introduction &amp; History of Anthropology, Physical Anthropology &amp; Human Variability,          Understanding Archeology &amp; Osteology, Scene Processing, Examining remains – Human or Animal / Old or New, Issues involved in development of biological profile, Issues in Identification,          Age estimation in childhood and adulthood, Sexual Dimorphism, Population Ancestry, Stature estimation, Individualization &amp; Identification, Evidence for cause and manner of death from bones,          Documentation &amp; Expert Witness Testimony. Portrait Parle, Bertillon system, Facial reconstruction, Super-imposition techniques, Reconstruction based on craniometric and somatoscopic methods. Importance of tissue depth to reconstruct various facial features.          Introduction &amp; History of Odontology, Dental Training required, Expert</p>	<p>15</p>

<p>Witness Testimony, Body Identification by Dental Records, Post Mortem Examination &amp; Records, Antemortem examination &amp; records, Record Analysis &amp; Processing, Forensic Dentistry in Mass Disasters, Bite Mark Analysis – Time of Death, Response of Assailant or Victim, Collection of Bite mark evidence &amp;</p> <ul style="list-style-type: none"> <li>• comparison.</li> </ul>	
<p><b>UNIT VI : FORENSIC ENTOMOLOGY</b></p>	
<p>Introduction &amp; History, Identification of insects, Training required, Determination of Time elapsed since death, Dipterans Larval Development, Successional Colonization of Body, Determination of displacement and disturbance of the body, Presence and Position of wounds, Drugs consumption ante mortem, Human &amp; Animal neglect or abuse, Collection of entomological evidence, Challenges</p> <ul style="list-style-type: none"> <li>• encountered in Entomology, Report Submission, Testifying in Court.</li> </ul>	15

**Practical: Applied Forensic Biology ( Any 12)**

1. To determine titre of antisera.
2. To perform precipitin test for species of origin determination.
3. To perform Immunodiffusion test for species of origin.
4. To perform electrophoresis for separation of various polymorphic enzymes.
5. Extraction and isolation of DNA from blood.
6. Blood grouping from stains of blood, semen, saliva and other body fluids by Absorption inhibition, Absorption-elution and mixed agglutination technique, determination of secretor/ non-secretor status.
7. Identification of orders of insects and other arthropods of forensic significance.
8. Preparation of permanent slides by using maceration technique of various forensic material of Plant origin.
9. Determination of age from skull sutures.
10. Determination of age from Teeth.
11. Determination of sex from skull.

12. Determination of sex from Pelvis.
13. To examine Barr bodies from blood sample.
14. To identify blood strains.
15. To identify semen stains.
16. To identify saliva stains.
17. To determines species of origin from blood.
18. Identification and culture of bacteria of forensic significance.
19. Identification of wild life materials such as skin, fur, bones, nails, horn, teeth, flowers and plants
20. Identification of birds from feathers.
21. Study of pollen grains and spores of forensic significance.
22. Examination of fur, nails, horn, teeth.
23. Examination of hair of different animals such as Dogs, Cats, Cow, Horse, Goats etc.
24. Determination of human hair morphology.

**Paper V: Applied Forensic Psychology-V****Total Marks: 30**

<b>Units with Description</b>	<b>Total Lectures</b>
<b>SEMISTER – V</b>	
<b>UNIT I: Essentials of Forensic Psychology</b> 1. Development of forensic psychology 2. Ethical standards of forensic psychology 3. Scientific methods used in forensic psychology 4. Importance of study of forensic psychology.	15
<b>UNIT II: Causes of criminal behaviour and Psychological theories</b>	
1. Psychological Factor & delinquency 2. ADHD & conduct disorder 3. Psychopathy & antisocial personality disorder 4. Sexual disorder 5. Substance abuse 6. Treatment <b>Psychological theories:</b> 1. Learning behavioural theory 2. Psycho analytic theory 3. Cognitive theory 4. REBT	15
<b>UNIT III: Investigative psychology</b>	
1. Criminal psychological profiling-Nature, definition. 2. Psychological tests used Criminal psychological profiling 3. Psychological autopsy 4. Forensic hypnosis (Narco analysis) 5. Polygraph 6. Stalking 7. The Psychology of violence	15
<b>Paper V: Applied Forensic Psychology-VI</b>	
<b>Total Marks: 70</b>	
<b>SEMISTER – VI</b>	
<b>UNIT IV: Essentials of Forensic Psychology</b> 1. Development of forensic psychology 2. Ethical standards of forensic psychology 3. Scientific methods used in forensic psychology 4. Importance of study of forensic psychology.	15
<b>UNIT V: Causes of criminal behaviour and Psychological theories</b>	
1. Psychological Factor & delinquency 2. ADHD & conduct disorder 3. Psychopathy & antisocial personality disorder 4. Sexual disorder	15

5. Substance abuse 6. Treatment  <b>Psychological theories:</b> 1. Learning behavioral theory 2. Psycho analytic theory 3. Cognitive theory 4. REBT	
<b>UNIT VI: Investigative psychology</b>	
1. Criminal psychological profiling-Nature, definition. 2. Psychological tests used Criminal psychological profiling 3. Psychological autopsy 4. Forensic hypnosis (Narco analysis) 5. Polygraph 6. Stalking 7. The Psychology of violence	15

**Practical: Applied Forensic Psychology ( Any 12)**

1. Relevant questions by using lie detection test.
2. Irrelevant questions by using lie detection test.
3. control questions by using lie detection test.

Conduction of Psychological tests – Intelligence test:

4. Wechsler’s adult intelligence scale
5. Wechsler’s intelligence scale for children
6. Standard progressive matrices by Raven.
7. Nonverbal test of intelligence by Dr. Nafde.(age group 16-18)
8. Nonverbal test of intelligence by Dr. Nafde.(age group 19-21)

Personality test:

9. Minnesota multi phasic personality inventory
10. Eyscenk personality inventory
11. 16.P.F. by R.B. Cattle
12. Thematic apperception test.
13. Rorschak inkblot test

14. Children apperception test

15. Picture Frustration study by Rosenswieg(Children form)

16. Picture Frustration study by Rosenswieg(Adult form)

Aptitude test : Differential aptitude test.

17. Abstract reasoning

18. Numerical

19. Spatial

20. Verbal

21. Verbal

22. Clerical

23. Mechanical

24. Differential aptitude test.

25. Measuring Locus of control .

**Paper VI: Applied Digital and Cyber Forensic-V****Total Marks: 30**

Units with Description	Total Lectures
<b>SEMISTER – V</b>	
<b>Unit I: Data and Evidence Recovery</b>	15
<p>Computer and cyber forensic basics, Cell Phone / Mobile Forensics, Blue-Tooth, Computer Ethics and Application Programs.            Data and Evidence Recovery-Formatted Partition Recovery, Data Recovery Tools, Data Recovery Procedures and Ethics, Fine Transfer Protocol (FTP), Preserve and safely handle original media,            Document a "Chain of Custody", Complete time line analysis of computer files based on file creation, file modification and file access, Recover Internet Usage Data, Recover Swap Files/Temporary Files/Cache Files, Introduction to Encase Forensic Edition, Forensic Tool Kit (FTK) etc, Use computer forensics software tools to cross validate findings in computer evidence related cases.</p>	
<b>Unit II: Cyber Forensics Investigation</b>	15
<p>Technical issues – Security Technologies: Certification and key Distribution, Cryptographic Applications, Digital Signature Protocols for Transactions, SSL-Secure Socket Layer, SET-Secure Electronic Transaction.            Cyber Forensics Investigation- Introduction to Cyber Forensic Investigation, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Encryption and Decryption methods, Search and Seizure</p> <ul style="list-style-type: none"> <li>• of Computers, Recovering deleted evidences, Password Cracking</li> </ul>	
<b>Unit III: Security Issues</b>	15
<p>Security Issues –Types of Attacks(Active and Passive) Stealing Passwords, Social Engineering, Bugs and Backdoors, Illegal accessing, Authentication Failures, Protocol Failures, Information Leakage, Viruses and Worms, Denial-of-Service, etc. – Firewalls, Packet Filters, Application-Level Filtering, Circuit-Level Gateways, Dynamic Packet Filters, Distributed Firewalls; Digging for</p>	

<p>Worms, Packet Filtering, Implementing policies (Default allow, Default Deny) on proxy, etc.,  Introduction to Cyber Security, Implementing Hardware Based Security, Software Based Firewalls,  Security Standards, Threats, crimes, etc.;;  Why require a security? Picking a Security Policy, Strategies for a Secure Network,  <ul style="list-style-type: none"> <li>The Ethics of Computer Security, Security Threats, and levels, Security Plan (RFC 2196)</li> </ul> </p>	
<p><b>Paper VI: Applied Digital and Cyber Forensic-VI</b> <span style="float: right;"><b>Total Marks: 70</b></span></p>	
<p style="text-align: center;"><b>SEMISTER – VI</b></p>	
<p><b>Unit VI: Electronic World</b></p>	
<p>E-Governance, Introduction, IT and business, EDI, E-Business, E-Banking, Real Time Gross Settlement (RTGS), Mobile Banking  E-commerce: Concerns for E-commerce Growth, Concepts Electronic Communication, PCs and Networking, E-mail, Internet and intranets. EDI, EDI to E-commerce, UN/EDIFACT Concerns for E-commerce Growth, Internet bandwidth, Technical issues, Security issues. India E-commerce Readiness, Legal issues, Credit Card Business Electronic Commerce providers. CyberCash,  <ul style="list-style-type: none"> <li>Digicash, VeriSign Software Package: EDI software developed by NIC for Customs</li> </ul> </p>	<p>15</p>
<p><b>Unit V: Forensics auditing</b></p>	
<p>Forensics auditing – step-by-step, how-to process for securing, investigating, and auditing or assessing various IT environments.  Introduction to Forensic Accounting: Introduction to Forensic Accounting and Fraud Examination;  Principles of Forensic Accounting and Fraud Examination; Roles of the Forensic Accountant;  Introduction to Fraud and Forensic Accounting; The Nature of Fraud, Why People Commit Fraud,  Fighting Fraud, Fraud Prevention, Fraud Detection, Recognizing the Symptoms of Fraud; Data-Driven Fraud Detection, Fraud Investigation, Investigating Theft Acts; Investigating Concealment,  Conversion Investigation Methods; Private Sources of Information, Inquiry Methods and Fraud  Reports Honesty Testing, The Fraud Reports, Management Fraud;</p>	<p>15</p>

<p>Financial Statement Fraud;  Revenue-and Inventory-Related Financial Statement Frauds; Liability, Asset, and Inadequate Disclosure Frauds; Fraud Against Organizations, Consumer Fraud; Identity Theft, Investment Scams, Money Laundering; Bankruptcy, Divorce, and Tax Fraud, Fraud in E-Commerce;  Resolution of Fraud, Legal Follow-Up, Being an Expert Witness;  Financial Statement Fraud Standards; Avoiding common mistakes in fraud risk assessment and examination; Credit Card</p> <ul style="list-style-type: none"> <li>• Frauds, Online Transaction Frauds, Cheque Frauds etc.</li> </ul>	
<p><b>Unit VI: Information technology law</b></p>	
<p>IT Act 2000: Scope, Objectives, E- Governance, Creation, Recognition and Verification of Digital Signature Digital Signature and Penalties under IT Act 2000, Certifying Authority and Controller.</p> <ul style="list-style-type: none"> <li>• Emerging trends in Information Technology law.</li> </ul>	15

### **Practical: Applied Digital and Cyber Forensic**

1. Data Recovery integrated with forensic technology (2 nos.)
2. Mobile Forensic using cell phone forensic suit (2 nos.)
3. Computer Forensic Investigation Tools, Digital Forensics investigation Tools (2 nos.)
4. Access Data e Discovery (2 nos.)
5. Creation & verification of Digital Signature (2 nos.)
6. Hardware Data Recovery-Salvation DATA Tools (2 nos.)
7. Network Analysis (2 nos.)
8. Detail Analysis of E-mail, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery (2 nos.)
9. Working on En Case Software (2 nos.)
10. Imaging of discs using various tools (2 nos.)
11. Image processing using tools like, Photoshop, Corel Photo paint etc. (2 nos.)
12. E-Commerce (E-shopping of any product to understand the transaction and security issues) (2 nos.)

## **Paper I: Applied Forensic Science**

### **List of Books:**

1. International Standard on General requirements for the competence of testing and calibration laboratories, 1st Ed., 1999-12-15, ISO/IEC 17025:1999(E).
2. Willard Merritt, Dean & Settle; Instrumental Methods of Analysis, 7th Ed., CBS Pub. & Distributors, New Delhi (1986)
3. Tewari R K, Sastry P K and Ravikumar K. V; Computer Crime & Computer Forensics, Select Pub. New Delhi. (2003)
4. V.D. Dudeja; Cyber Crimes & Law Vol. 2, Common Wealth
5. Nanda, B.B. and Tewari, R.K. (2001): Forensic Science in India: A vision for the twenty first century Select Publisher, New Delhi.
6. James, S. H. and Nordby, J. J. (2003) Forensic Science: An introduction to scientific and investigative techniques CRC Press, USA.
7. Guharaj, P. V., Chandran M. R. (2006) Forensic Medicine, 2<sup>nd</sup> Ed., Universities Press (India) Pvt. Ltd., Hyderabad.
8. Di Maio J. M. Vincent, Dana S. E. (2006) Handbook of Forensic Pathology, VIVA Books Pvt. Ltd., India.
9. Parikh C. K. (1999) Parikh's Textbook of Medical Jurisprudence, Forensic Medicine and Toxicology. Sixth Ed., CBS Publishers & Distributors Pvt. Ltd., India.
10. Barnett (2001): Ethics in Forensic Science.
11. O'Hara & Osterburg: Introduction to Criminalistics, 1949, The MacMillan Co., 1964.
12. Osterburg: Crime Laboratory.
13. Saferstien: Forensic Science, Handbook, Vol. I, II & III, Prentice Hall Inc. USA.
14. Saferstein: Criminalistics, 1976, Prentice Hall Inc., USA.
15. Nickolas : Scientific Criminal Investigation
16. Deforest, Gansellen & Lee: Introduction to Criminalistics.
17. Sharma, B.R.: Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad, 1974.
18. Kirk: Criminal Investigation, 1953, Interscience Publisher Inc. New York.
19. Indian Penal Code 1860.
20. Dowry Prohibition Act
21. Immoral Traffic Act
22. Criminal Procedural Code

## **Paper II - Applied Forensic Chemistry**

### **Reference books**

1. Instrumental Method of Chemical Analysis. Chatwal & Anand, Himalya Publication.
2. S. N. Tiwari, Analytical Toxicology, Govt. of India publications, New Delhi 1987
3. Brown P. R., Advance in Chromatography.
4. Introduction of Forensic Science in Crime Investigation by Dr. (Mrs.) R. Krishnamurthy.
5. Howard: Forensics Analysis by Gas Chromatography.
6. Yinon: Forensic Application of Mass Spectroscopy 1994.
7. Prakash M. et.al; Methods in Toxicology Anmol Publication, New Delhi (1998)
8. Parikh C.K; Text Book of Medical Jurisprudence Forensic Medicines and Toxicology. CBS Pub. New Delhi (1999)
9. Balraj S. Parmar et.al; Pesticide Formulation, CBS Publishers, New Delhi (2004)
10. Casarett & Doll Toxicology, The basic Science of Poisons
11. Curry A. S., Poison Detection in Human Organs 1976
12. Curry : Analytical Method in Human Toxicology 1986.
13. Lee and Gaensslem.: Advances in Forensic Science (Vol. 2) Instrumental Analysis.
14. Settle F. A.: Handbook of Instrumental Technique for Analytical Chemistry, Prentice Hall 1997.
15. Serope Kalpakjian, Steven R Schmid. "Manufacturing Engineering and Technology". International edition. 4th Ed. Prentice Hall, Inc. 2001. [ISBN 0-13-017440-8](#).
16. Hans-J. Koslowski. "Dictionary of Man-made fibers". Second edition. Deutscher Fachverlag. 2009.
17. Borrow: Molecular Spectroscopy 1980.
18. Willard H. H. et. al : Instrumental Methods of Analysis 1974.
19. Moonesens A. A. et. al. : Scientific Evidence in Criminal Cases 1973.
20. Lundquist and Curry: Methods of Forensic Sciences 1963.
21. Holfmann, F. G., Hand book of drug and alcohol abuse.
22. Arena Poisoning, Chemistry Symptoms and treatment,
23. Analysis of Plant Poisons, Dr. M P Goutam.
24. Drug Abuse Handbook, Karch.s.
25. Constitution of India
26. Indian Evidence Act.
27. Criminal Procedure code.
28. Indian Penal Code.
29. Bare Acts with short notes on the following : Narcotic Drugs & Psychotropic Substances Act, Drugs & Cosmetics Act, Explosive Substances Act, Dowry Prohibition Act, Prevention of Food Adulteration Act, Prevention of Corruption Act, Arms Act, Wild Life Protection Act

### **Paper III: Applied Forensic Physics**

#### **List of Books:**

1. Encyclopedia of Forensic Science, Volume one: Jay A Siegel, Pekka J Saukko, Geoffery Knupfer. Academic Press.
2. Criminalistics, An Introduction to Forensic Science: Richard Saferstein, 10<sup>th</sup> Edition, Pearson Education International.
3. Forensic Science An Introduction to Scientific and Investigative Techniques : Stuart H. James and Jon J. Nordby., 3<sup>rd</sup> Edition CRC Press, Taylor & Francis Group.
4. Forensic Ballistics in Criminal Justice: Kaushalendra Kumar.
5. Firearms in Criminal Investigation and Trials: B. R. Sharma, 4<sup>th</sup> Edition, Universal Law Publishing Company. New Delhi.
6. Handbook of Firearms and Ballistics, Examining and Interpreting Forensic Evidence: Brian J. Heard, John Wiley & Sons.
7. Advanced Practical Physics, Vol.II: Dr. S.P.Singh, Pragati Prakashan, Meerut.
8. Practical Physics: Worsnoff and Flint.

## **Paper IV: Applied Forensic Biology**

### **List of Books**

1. Practical Crime Scene Analysis & Reconstruction – Roos M. Gardner & Tom Bevel
2. Death Scene Investigation – Scott A. Wagner
3. Forensic Science in criminal investigation and trials – B.R. Sharma
4. Forensic Science in Crime Investigation – Dr. Mrs. Rukmani Krishnamurthy
5. Forensic Science – An introduction to scientific and investigative techniques – Stuart H. James & Jon J. Nordby
6. Forensic Medicine – P.V. Guharaj & M. R. Chandran
7. Bryant, V.M. Jr, Mildenhall, D.C. and Jones, J.G., Forensic Palynology in the United States of America Palynology. 1990, 14.PP.193-208
8. Faegri, K. Iverson, J. and Krzywinski, K. Textbook of Pollen Analysis 4<sup>th</sup> Edition. John Wiley & Sons, New York 1989.
9. Microbial forensics By Roger Breeze, Bruce Budowle, Steven E. Schutzer. Elsevier Academic Press
10. The Forensic Laboratory Handbook Procedures and Practice By Ashraf Mozayani, Carla Noziglia. 2<sup>nd</sup> edition. 2011. Human Press.
11. Forensic Science in Wildlife Investigations. Adrian Linacre Taylor and Francis, 2009
12. The Wildlife Detectives: How Forensic Scientists Fight Crimes Against Nature By Donna M. Jackson, Wendy Shattil, Bob Rozinski UniversalAthenaeum (Denver, CO, U.S.A.)
13. Forensic Entomology: The Utility of Arthropods in Legal Investigations Jason H. Byrd, James L. Castner Taylor and Francis, 2009
14. Forensic entomology: an introduction By Dorothy E. Gennard Wiley.
15. Forensic palynology Dallas Mildenhall, Patricia Wiltshire, Vaughn Bryant Elsevier, 2006
16. Forensic palynology: an in-depth look at its indispensable value National University, San Diego, 2002

## **Paper V: Applied Forensic Psychology**

### **List of Books:**

1. Graham J. Towel & David A. Crighton, Forensic Psychology, BPS BLACKWELL Cochrane, R. E., Tett, R. P., Vandecreek, L. (2003). Psychological testing and the selection of police officers: A National Survey. *Criminal Justice and Behavior*, 30(5), 511-537.
2. Kocsis, R. N. (2003). Criminal psychological profiling: Validities and abilities. *International Journal of Offender Therapy and Comparative Criminology*, 47(2), 126-144.
3. Indian Penal Code 1860
4. Mental Health Act 1987.
5. Juvenile Justice Act 1986
6. Prof. Paranjape N. V., Criminology and Penology, Central Law Publication, Allahbad.
7. Barlow & Durand. V. M. (2005) Abnormal Psychology, 6th Ed. New Jersey
8. Seligman, Systems & Skill, 6th Ed. New Jersey
9. Serial Crime, Theoretical & Practical issues in behavioural profiling, Petherick, Woodworth Publications.
10. Manual of Psychological Test in Syllabus

## **Paper VI: Applied Digital and Cyber Forensics**

### **List of Books:**

1. File System Forensic Analysis by Brian Carrier, Publisher: Addison-Wesley Professional
2. Cyber Law & Crimes (IT Act 2000 & Computer Crime Analysis) by Barkha & Ram Mohan, Publisher: Asian Law House, Hyderabad
3. Cyber Crime – Dr. R C Mishra, Publisher: Authorspress
4. Forensic Science in Crime Investigation Dr. Rukmani Krishnamurthy, Publisher: Selective & Scientific Books
5. Handbook of Security, Cryptography & Digital Signature
6. Forensic Science – From the Crime Scene to the Crime Lab by Richard Saferstein
7. E-Commerce: The Cutting Edge of Business, Kamlesh K. Bajaj & Debjani Nag, Tata McGraw Hill
8. Cyber Law and E .Commerce, David Baumer, J C Poindexter, TMG Cyberlaw Simplified Vivek Sood, TMG
9. e- Commerce Strategy , Technologies and Applications, David Whiteley, McGraw Hill International
10. E- Security, Electronic Authentication and Information Systems Security Sundeep Oberoi, TMG
11. Firewalls and Internet Security: Repelling the Wily Hack