

FACULTY OF CHEMICAL SCIENCES

SYLLABUS

FOR

B.Sc. in Forensic Sciences

(SEMESTER – I & II)

(Under Choice based Credit System)

Examinations: 2021 Onwards

**I K GUJRAL PUNJAB TECHNICAL UNIVERSITY
KAPURTHALA**

Note:

(i) Subject to change in the syllabi at any time. Please visit the University website time to time.

IK Gujral Punjab Technical University

VISION

To be an institution of excellence in the domain of higher technical education that serves as the fountainhead for nurturing the future leaders of technology and techno- innovation responsible for the techno-economic, social, cultural and environmental prosperity of the people of the State of Punjab, the Nation and the World.

MISSION

To provide seamless education through the pioneering use of technology, in partnership with industry and society with a view to promote research, discovery and entrepreneurship and To prepare its students to be responsible citizens of the world and the leaders of technology and techno-innovation of the 21st Century by developing in them the desirable knowledge, skill and attitudes base for the world of work and by instilling in them a culture for seamlessness in all facets of life.

OBJECTIVES

To offer globally-relevant, industry-linked, research-focused, technology- enabled seamless education at the graduate, postgraduate and research levels in various areas of engineering & technology and applied sciences keeping in mind that the manpower so spawned is excellent in quality, is relevant to the global technological needs, is motivated to give its best and is committed to the growth of the Nation;

To foster the creation of new and relevant technologies and to transfer them to industry for effective utilization;

To participate in the planning and solving of engineering and managerial problems of relevance to global industry and to society at large by conducting basic and applied research in the areas of technologies. To develop and conduct continuing education programmes for practicing engineers and managers with a view to update their fundamental knowledge base and problem-solving capabilities in the various areas of core competence of the University;

To develop strong collaborative and cooperative links with private and public sector industries and government user departments through various avenues such as undertaking

of consultancy projects, conducting of collaborative applied research projects, manpower development programmes in cutting-edge areas of technology, etc;

To develop comprehensive linkages with premier academic and research institutions within the country and abroad for mutual benefit;

To provide leadership in laboratory planning and in the development of instructional resource material in the conventional as well as in the audio-visual, the video and computer-based modes;

To develop programmes for faculty growth and development both for its own faculty as well as for the faculty of other engineering and technology institutions;

To anticipate the global technological needs and to plan and prepare to cater to them;

To interact and participate with the community/society at large with a view to inculcate in them a feel for scientific and technological thought and endeavour; and

To actively participate in the technological development of the State of Punjab through the undertaking of community development programmes including training and education programmes catering to the needs of the unorganized sector as well as that of the economically and socially weaker sections of society.

ACADEMIC PHILOSOPHY

The philosophy of the education to be imparted at the University is to awaken the “**deepest potential**” of its students as holistic human beings by nurturing qualities of self-confidence, courage, integrity, maturity, versatility of mind as well as a capacity to face the challenges of tomorrow so as to enable them to serve humanity and its highest values in the best possible way.

TITLE OF THE PROGRAM: B.Sc. FORENSIC SCIENCES

YEAR OF IMPLEMENTATION: New Syllabus will be implemented from October 2021 onwards.

DURATION: The course shall be three years, with semester system (6 semesters, with two semesters in a year). The Choice based credit system will be applicable to all the semesters.

ELGIBILITY FOR ADMISSION: Candidates with 50% marks (5% relaxation for SC/ST) in aggregate in 10+2 with Medical (Physics, Chemistry & Biology)

INTAKE CAPACITY: 30 (Thirty)

MEDIUM OF INSTRUCTION: English.

SCHEME OF THE PROGRAM:

Semester-I

Sr. No.	Course Code	Course Type	Course Title	L-T-P*	Credits	Marks Distribution		Marks
						Internal	External	
1.	BFS 101-21	Core Theory	Introduction to Forensic Science	3-1-0	4	40	60	100
2.	BFS 102-21	Core Theory	Crime & Society	3-1-0	4	40	60	100
3.	BFS 103-21	Core Theory	Forensic Chemistry	3-1-0	4	40	60	100
4.	BFS 104-21	Core Practical/Lab	Introduction to Forensic Science Practicals	0-0-4	2	60	40	100
5.	BFS 105-21	Core Practical/Lab	Crime & Society Practicals	0-0-4	2	60	40	100
6.	BFS 106-21	Core Practical/Lab	Forensic Chemistry Practical	0-0-4	2	60	40	100
6.	BTHU 103-18	Ability Enhancement Compulsory Course (AECC)-I	English	1-0-0	1	40	60	100
7.	BTHU 104-18	Ability Enhancement Compulsory Course-(AECC)	English Practical/Laboratory	0-0-2	1	30	20	50
8.	HVPE-101-18	Ability Enhancement Compulsory Course-(AECC)	Human Values, De-addiction & Traffic Rules	3-0-0	3	40	60	100
9.	HVPE-102-18	Ability Enhancement Compulsory Course-(AECC)	Human Values, De-addiction & Traffic Rules (Lab/Seminar)	0-0-1	1	25	--**	25
10.	BMPD 102-18		Mentoring & Professional Development	0-0-1	1	25	--**	25
Total				13-3-12	23	460	440	900

Second Semester

Course Code	Course Type	Course Title	Load Allocations			Marks Distribution		Total Marks	Credits
			L*	T*	P	Internal	External		
BFS-201-21	Core Theory	Criminal Law	3	1	0	40	60	100	4
BFS-202-21	Core Theory	Forensic Psychology	3	1	0	40	60	100	4
BFS-203-21	Core Theory	Criminalistics	3	1	0	40	60	100	4
BFS-204-21	Core Practical/Laboratory	Criminal Law Practical	0	0	4	60	40	100	2

BFS-205-21	Core Practical/Laboratory	Criminalistics Practical	0	0	4	60	40	100	2
BFS-206-21	Core Practical/Laboratory	Forensic Psychology	0	0	4	60	40	100	2
BFS-207-21	Ability Enhancement Compulsory Course (AECC) - III	Forensic Science & Society	2	0	0	40	60	100	2
EVS-102-18	Ability Enhancement Compulsory Course (AECC) - IV	Environmental Science	2	0	0	40	60	100	2
TOTAL			13	03	12	380	420	800	22

*A course can either have four Hrs Lecture or Three Hrs Lecture + One Hrs Tutorial as per requirement

**The Human Values, De-addiction and Traffic Rules (Lab/ Seminar) and Mentoring and Professional Development course will have internal evaluation only.

B.Sc. Forensic Sciences, Choice Based Credit System, Batch 2021 and onwards

EXAMINATION AND EVALUATION

THEORY					
S.No.			Weightage in Marks		Remarks
1	Internal Evaluation	Mid-Semester Examination	30	10	MSTs, Quizzes, assignments, attendance, etc. Constitute internal evaluation. Best of two mid-semester exams will
2		Attendance	5	5	
3		Assignments	5	5	

					be considered for evaluation
4	External Evaluation	End-Semester Examination	60	30	Conduct and checking of the answer sheets will be at the university level.
	Total		100	50	

PRACTICAL

1	Internal Evaluation	Daily evaluation of practical performance/ record/ viva voce	15	
2		Attendance	5	
3		Internal Practical Examination	10	
4	External Evaluation	Final Practical Examination	20	
		Total	50	

PATTERN OF END-SEMESTER EXAMINATION

- I. **Part A** will be One Compulsory question consisting of short answer type questions [Q No. 1(a-h)] covering whole syllabus. There will be no choice in this question. It will be of 16 marks comprising of **8 questions of 2 marks each**.
- II. **Part B** will be comprising of eight questions [2-9]. Student will have to attempt any six questions from this part. It will be of 24 marks with **6 questions of 4 marks each**.
1. **Part C** will be comprising of two compulsory questions with internal choice in both these questions [10-11]. It will be of 20 marks with **2 questions of 10 marks each**.

SYLLABUS OF THE PROGRAM

The syllabus has been upgraded as per provision of the UGC module and demand of the academic environment. The contents of the syllabus have been duly arranged unit wise and included in such a manner so that due importance is given to requisite intellectual and laboratory skills. The application part of the respective contents has been appropriately emphasized.

SEMESTER-I

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	BFS 101-21			
Subject Title:	Basics of Forensic Sciences			
Contact Hours:	L:3	T:1	P:0	Credits:4
Examination Duration (hours)	3			
Objective(s):	To teach the fundamental concepts of Forensic Sciences			

Unit	Contents	Contact Hours
I	History of Development of Forensic Science in India Functions of forensic science. Historical aspects of forensic science. Definitions and concepts in forensic science. Scope of forensic science. Need of forensic science. Basic principles of forensic science.	12
II	Tools and Techniques in Forensic Science Branches of forensic science. Forensic science in international perspectives, including set up of INTERPOL and FBI. Duties of forensic scientists. Code of conduct for forensic scientists. Qualifications of forensic scientists. Data depiction. Report writing.	12
III	Organizational set up of Forensic Science Laboratories in India Hierarchical set up of Central Forensic Science Laboratories, State Forensic Science Laboratories, Government Examiners of Questioned Documents, Fingerprint Bureaus, National Crime Records Bureau, Police & Detective Training Schools, Bureau of Police Research & Development, Directorate of Forensic Science and Mobile Crime Laboratories. Police Academies. Police dogs. Services of crime laboratories. Basic services and optional services.	12
IV	Domains in Forensic Science: Branches of Forensic Science, Police officers, Prosecution, Judicial Officers and Medico legal expert etc. Role and Qualifications of forensic scientists. Code of conduct for forensic scientists, Ethical issue in Forensic Science, professional standards for practice of Criminalistics, sanction against expert for unethical conduct.	10

Reference Books

S.No.	Author(s)	Title of the Book	Publisher/Year
1	B.B. Nanda and R.K. Tiwari	<i>Forensic Science in India: A Vision for the Twenty First Century</i>	Select Publishers, New Delhi (2001)
2	M.K. Bhasin and S. Nath,	<i>Role of Forensic Science in the New Millennium,</i>	University of Delhi, Delhi (2002).
3	S.H. James and J.J. Nordby	<i>Forensic Science: An Introduction to Scientific and Investigative Techniques,</i>	CRC Press, Boca Raton (2005).
4	W.G. Eckert and R.K. Wright	<i>Introduction to Forensic Sciences, 2nd Edition, W.G. Eckert (ED.)</i>	CRC Press, Boca Raton (1997).

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	BFS 102-21			
Subject Title:	Crime & Society			
Contact Hours:	L:3	T:1	P:0	Credits:4
Examination Duration (hours)	3			
Objective(s):	To teach the importance of criminology, causes and consequences of crime in society.			

Details of the Course (Crime & Society)

Unit	Contents	Contact Hours
I	Basics of Criminology Definition, aims and scope. Theories of criminal behavior – classical, positivist, sociological. Criminal anthropology. Criminal profiling. Understanding modus operandi. Investigative strategy. Role of media.	8
II	Crime Elements, nature, causes and consequences of crime. Deviant behavior. Hate crimes, organized crimes and public disorder, domestic violence and workplace violence. White collar crimes Victimology. Juvenile delinquency. Social change and crime. Psychological Disorders and Criminality. Situational crime prevention.	12
III	Criminal Justice System Broad components of criminal justice system. Policing styles and principles. Police's power of investigation. Filing of criminal charges. Community policing. Policing a heterogeneous society. Correctional measures and rehabilitation of offenders. Human rights and criminal justice system in India.	12
IV	Crime Scene Investigation and Management Types and classification of Crime Scene, Crime Scene Management, Initial response, Securing the scene of crime, Various crime scene search methods, Various methods of preservation of crime scene: Photography, Sketching, Videography, Voice Recording, Notes taking. Collection methods and labelling, packing and forwarding of evidences, documentation and chain of custody, Role of First Responding Officer and Investigating officer.	12

I.K. Gujral Punjab Technical University, Kapurthala

Reference Books

S.No.	Author(s)	Title of the Book	Publisher/Year
1	S.H. James and J.J. Nordby	<i>Forensic Science: An Introduction to Scientific and Investigative Techniques,</i>	CRC Press, Boca Raton (2005).
2	D.E. Zulawski and D.E. Wicklander,	<i>Practical Aspects of Interview and Interrogation,</i>	CRC Press, Boca Raton (2002).
3	R. Saferstein,	<i>Criminalistics 8th Edition,</i>	Prentice Hall, New Jersey (2004).
4	J.L. Jackson and E. Barkley,	<i>Offender Profiling: Theory, Research and Practice</i>	Wiley, Chichester (1997).

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	BFS 103-21			
Subject Title:	Basics in Forensic Chemistry			
Contact Hours:	L:3	T:1	P:0	Credits:4
Examination Duration (hours)	3			
Objective(s):	To teach the fundamental concepts of cell biology & biochemistry.			

Unit	Contents	Contact Hours
I	Organic Chemistry: Structure & Bonding Introduction, hybridization, nature of chemical bonding, polarization, hydrogen bonding, Van-der Waals forces, elementary ideas of Inductive effect, Electromeric effect, Resonance effect, Hyperconjugation. Types of Organic reactions: Addition, Substitution, Elimination and Rearrangement Reaction. Reactive Intermediates: Formation, Geometry and stability of carbocations, carbanions, free radicals and carbenes.	12
II	Inorganic Chemistry: Atomic Structure Heisenberg's uncertainty principle, Schrodinger wave equation, Quantum numbers, shapes of s, p & d orbitals. Aufbau principle, Pauli's exclusion principle and Hund's rule of maximum multiplicity. Periodic Table, Periodic properties, atomic & ionic radii, ionization energy, electron affinity and electronegativity and their trends in periodic table. Factors affecting ionization potential.	12
III	Physical Chemistry: Adsorption & catalysis Adsorption, types, applications & factors affecting adsorption. Catalysis, homogeneous & heterogeneous catalysis, enzyme catalysis, autocatalysis. Rate of a reaction, factors affecting rate of a reaction, zero & first order reactions, half life of a reaction, activation energy, transition state theory and collision theory.	12
IV	Analytical Chemistry: Gravimetric & volumetric analysis Principle, theory and types and applications of gravimetric & volumetric analysis	8

Reference Books

S.No.	Author(s)	Title of the Book	Publisher/Year
1	Lee, J.D.	Concise Inorganic Chemistry	ELBS, 1991.
2	Douglas, B.E. and Mc Daniel D.H.	Concepts & Models of Inorganic Chemistry	Oxford, 1970
3	R.T. Morrison & P.S. Boyd	Organic Chemistry	Allyn and Bacon Inc., Boston, 1992
4	D. W. Ball	Physical Chemistry	Thomson Press, India (2007)

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	BFS 104-21			
Subject Title:	Basics of Forensic Sciences Practical			
Contact Hours:	L:0	T:0	P:4	Credits:2
Examination Duration (hours)	3			
Objective(s):	To make the students learn practical aspects of Forensic Sciences			

Sr. No.	Contents	Contact Hours
I	<ol style="list-style-type: none"> 1. To study the history of crime cases from forensic science perspective. 2. To cite examples of crime cases in which apprehensions arose because of Daubert standards. 3. To review the sections of forensic science at INTERPOL and compare with those in Central Forensic Science Laboratories in India. Include suggestions for improvements if any. 4. To study the annual reports of National Crime Records Bureau and depict the data on different type of crime cases by way of smart art/templates. 5. To write report on different type of crime cases. 6. To review how the Central Fingerprint Bureau, New Delhi, coordinates the working of State Fingerprint Bureaus. 7. To examine the hierarchical set up of different forensic science establishments and suggest improvements. 8. To examine the list of projects undertaken by the Bureau of Police Research and Development and suggest the thrust areas of research in Police Science. 9. To compare and contrast the role of a Police Academy and a Police Training School. 10. To compare the code of conduct prescribed by different establishments for forensic scientists. 	

Reference Books

S.No.	Author(s)	Title of the Book	Publisher/Year
1	B.B. Nanda and R.K. Tiwari	<i>Forensic Science in India: A Vision for the Twenty First Century</i>	Select Publishers, New Delhi (2001)
2	M.K. Bhasin and S. Nath,	<i>Role of Forensic Science in the New Millennium,</i>	University of Delhi, Delhi (2002).
3	S.H. James and J.J. Nordby	<i>Forensic Science: An Introduction to Scientific and Investigative Techniques,</i>	CRC Press, Boca Raton (2005).
4	W.G. Eckert and R.K. Wright	<i>Introduction to Forensic Sciences,</i> 2 nd Edition, W.G. Eckert (ED.)	CRC Press, Boca Raton (1997).

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	BFS 105-21			
Subject Title:	Crime & Society Practical			
Contact Hours:	L:0	T:0	P:4	Credits:2
Examination Duration (hours)	3			
Objective(s):	To make the students learn practical aspects of subject Crime & Society			

Sr. No.	Contents	Contact Hours
I	<ol style="list-style-type: none"> 1. To review past criminal cases and elucidate which theory best explains the criminal behavior of the accused. 2. To review crime cases where criminal profiling assisted the police to apprehend the accused. 3. To cite examples of crime cases in which the media acted as a pressure group. 4. To evaluate the post-trauma stress amongst victims of racial discrimination. 5. To correlate deviant behavior of the accused with criminality (take a specific example). 6. To evaluate victimology in a heinous crime. 7. To examine a case of juvenile delinquency and suggest remedial measures. 8. To evaluate how rising standards of living affect crime rate. 9. To review the recommendations on modernization of police stations and evaluate how far these have been carried out in different police stations. 10. To visit a 'Model Police Station' and examine the amenities vis-à-vis conventional police stations. 11. To examine steps being taken for rehabilitation of former convicts and suggest improvements. 12. To prepare a report on interrogation cells and suggest improvements. 	

Reference Books

S.No.	Author(s)	Title of the Book	Publisher/Year
1	S.H. James and J.J. Nordby	<i>Forensic Science: An Introduction to Scientific and Investigative Techniques,</i>	CRC Press, Boca Raton (2005).
2	D.E. Zulawski and D.E. Wicklander,	<i>Practical Aspects of Interview and Interrogation,</i>	CRC Press, Boca Raton (2002).

3	R. Saferstein,	<i>Criminalistics</i> 8 th Edition,	Prentice Hall, New Jersey (2004).
4	J.L. Jackson and E. Barkley,	<i>Offender Profiling: Theory, Research and Practice</i>	Wiley, Chichester (1997).

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I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	BFS 106-21			
Subject Title:	Forensic Chemistry Practical			
Contact Hours:	L:0	T:0	P:4	Credits:2
Examination Duration (hours)	3			
Objective(s):	To make the students learn practical aspects of Forensic chemistry			

Sr. No.	Contents
I	<ol style="list-style-type: none"> 1. To determine the density of given liquid. 2. To determine relative viscosity of given organic liquids by viscometer. 3. To determine the surface tension of given liquid by Stalgnometer. 4. To study kinetics of acid catalyzed ester hydrolysis. 5. Determination of hardness of water from a given sample of water by EDTA method. 6. Organic qualitative analysis. 7. To determine strength of given acid. 8. To standardize the given NaOH solution & find the strength of given HCl solution. 9. Paper Chromatography of toxic metal ions. 10. Thin Layer Chromatography of Organic poisons. 11. Identification of toxic metal ions in given solution by colour tests. 12. Identification of adulteration in petrol using density method. 13. Iodometric estimation of copper.

Reference Books

S.No.	Author(s)	Title of the Book	Publisher/Year
1	J.B. Yadav	Practical Physical Chemistry	Krishna
2	Vogel, A.I.	Vogel's book on Inorganic Qualitative Analysis	ELBS
3	F.G. Mann and B. C. Saunders	Practical Organic Chemistry	Longman, New York

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	BTHU101-18			
Subject Title:	English			
Contact Hours:	L:1	T:0	P:0	Credits:4
Examination Duration (hours)	3			
Objective(s):	To learn effective communication both oral & written.			

Unit	Contents	Contact Hours
I	Theory of Communication Types and modes of Communication	4
II	Language of Communication Verbal and Non-verbal (Spoken & verbal), Personal, Social and Business Barriers and Strategies, Intra-personal, Inter-personal and Group communication	6
III	Reading and Understanding Close Reading, Comprehension, Summary Paraphrasing, Analysis and Interpretation, Translation(from Hindi/Punjabi to English and vice-versa), Literary/Knowledge Texts	10
IV	Documenting, Report Writing, Making Notes, Letter Writing	10

Reference Books

1. *Fluency in English - Part II*, Oxford University Press, 2006.
2. *Business English*, Pearson, 2008.
3. *Language, Literature and Creativity*, Orient Blackswan, 2013.
4. *Language through Literature* (forthcoming) ed. Dr. Gauri Mishra, Dr Ranjana Kaul, Dr Brati Biswas
5. *On Writing Well*. William Zinsser. Harper Resource Book. 2001
6. *Study Writing*. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	BTHU102-18			
Subject Title:	English Practical			
Contact Hours:	L:0	T:0	P:4	Credits:2
Examination Duration (hours)	3			
Objective(s):	To learn effective communication both oral & written.			

Sr. No.	Contents
I	<p>Interactive practice sessions in Language Lab on Oral Communication</p> <p>Listening Comprehension</p> <p>Self Introduction, Group Discussion and Role Play</p> <p>Common Everyday Situations:</p> <p>Conversations and Dialogues</p> <p>Communication at Workplace</p> <p>Interviews</p> <p>Formal Presentations, Effective Communication/ Mis-communication</p> <p>Public Speaking</p>

Reference Books

- a. *Fluency in English* - Part II, Oxford University Press, 2006.
- b. *Business English*, Pearson, 2008.
- c. *Practical English Usage*. Michael Swan. OUP. 1995.
- d. *Communication Skills*. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
- e. *Exercises in Spoken English*. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	HVPE-101-18			
Subject Title:	Human Values, De-addiction & Traffic Rules			
Contact Hours:	L:3	T:0	P:0	Credits:3
Examination Duration (hours)	3			
Objective(s):	To develop a sense of social responsibility, traffic rules and about menace of drugs.			

Unit	Contents	Contact Hours
I	<p>Course Introduction – Need, Basic Guidelines, Content and Process for Value Education</p> <p>Understanding the need, basic guidelines, content and process for Value Education</p> <p>Self Exploration–what is it? – its content and process; ‘Natural Acceptance’ and Experiential Validation-as the mechanism for self exploration</p> <p>Continuous Happiness and Prosperity- A look at basic Human Aspirations</p> <p>Right understanding, Relationship and Physical Facilities- the basic requirements for 19ulfilment of aspirations of every human being with their correct priority</p> <p>Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario</p> <p>Method to 19ulfil the above human aspirations: understanding and living in harmony at various levels</p>	6
II	<p>Understanding Harmony in the Human Being – Harmony in Myself!</p> <p>Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’</p> <p>Understanding the needs of Self (‘I’) and ‘Body’ – <i>Sukh</i> and <i>Suvidha</i></p> <p>Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer)</p> <p>Understanding the characteristics and activities of ‘I’ and harmony in ‘I’</p> <p>Understanding the harmony of I with the Body: <i>Sanyam</i> and <i>Swasthya</i>;</p> <p>correct appraisal of Physical needs, meaning of Prosperity in detail</p> <p>Programs to ensure <i>Sanyam</i> and <i>Swasthya</i></p> <p>Practice Exercises and Case Studies will be taken up in Practice Sessions.</p>	6
III	<p>Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship</p> <p>Understanding harmony in the Family- the basic unit of human interaction</p> <p>Understanding values in human-human relationship; meaning of <i>Nyaya</i> and program for its 19ulfilment to ensure <i>Ubhay-tripti</i>;</p> <p>Trust (<i>Vishwas</i>) and Respect (<i>Samman</i>) as the foundational values of relationship</p> <p>Understanding the meaning of <i>Vishwas</i>; Difference between intention and competence</p> <p>Understanding the meaning of <i>Samman</i>, Difference between respect and differentiation; the other salient values in relationship</p> <p>Understanding the harmony in the society (society being an extension of family): <i>Samadhan</i>, <i>Samridhi</i>, <i>Abhay</i>, <i>Sah-astitva</i> as comprehensive Human Goals</p>	6

	<p>Visualizing a universal harmonious order in society- Undivided Society (<i>AkhandSamaj</i>), Universal Order (<i>SarvabhaumVyawastha</i>)- from family to world family! Practice Exercises and Case Studies will be taken up in Practice Sessions</p>	
IV	<p>Understanding Harmony in the Nature and Existence – Whole existence as Co-existence</p> <p>Understanding the harmony in the Nature Interconnectedness and mutual 20ulfilment among the four orders of nature- recyclability and self-regulation in nature Understanding Existence as Co-existence (<i>Sah-astitva</i>) of mutually interacting units in all-pervasive space Holistic perception of harmony at all levels of existence Practice Exercises and Case Studies will be taken up in Practice Sessions.</p>	4
V	<p>Implications of the above Holistic Understanding of Harmony on Professional</p> <p>Natural acceptance of human values Definitiveness of Ethical Human Conduct Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order Competence in professional ethics: Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems Strategy for transition from the present state to Universal Human Order: At the level of individual: as socially and ecologically responsible engineers, technologists and managers b) At the level of society: as mutually enriching institutions and organizations</p>	6

Reference Books

Text Book

R R Gaur, R Sangal, G P Bagaria, 2009, *A Foundation Course in Value Education*.

Reference Books

1. Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA
2. E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
3. A Nagraj, 1998, *Jeevan Vidya ek Parichay*, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991
5. PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.
6. A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.

7. Subhas Palekar, 2000, *How to practice Natural Farming*, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *Limits to Growth*
– *Club of Rome's report*, Universe Books.
9. E G Seebauer & Robert L. Berry, 2000, *Fundamentals of Ethics for Scientists & Engineers*, Oxford University Press
10. M Govindrajran, S Natrajan & V.S. Senthil Kumar, *Engineering Ethics (including Human Values)*, Eastern Economy Edition, Prentice Hall of India Ltd.
11. B P Banerjee, 2005, *Foundations of Ethics and Management*, Excel Books.
12. B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008.

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, <http://uhv.ac.in>
2. Story of Stuff, <http://www.storyofstuff.com>
3. Al Gore, *An Inconvenient Truth*, Paramount Classics, USA
4. Charlie Chaplin, *Modern Times*, United Artists, USA
5. IIT Delhi, *Modern Technology – the Untold Story*

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	HVPE102-18			
Subject Title:	Human Values, De-addiction & Traffic Rules Lab/Seminar			
Contact Hours:	L:0	T:0	P:4	Credits:2
Examination Duration (hours)	3			
Objective(s):	To develop a sense of social responsibility, traffic rules and about menace of drugs.			

Sr. No.	Contents
I	One each seminar will be organized on Drug De-addiction and Traffic Rules. Eminent scholar and experts of the subject will be called for the Seminar atleast once during the semester. It will be binding for all the students to attend the seminar

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	BMPD 102-18			
Subject Title:	Mentoring & Professional Development			
Contact Hours:	L:0	T:0	P:1	Credits:1
Examination Duration (hours)	3			
Objective(s):	To learn the life long learning skills.			

Sr. No.	Contents
I	Part-A (Class Activities) 1. Expert and video lectures 2. Aptitude Test 3. Group Discussion 4. Quiz (General/Technical) 5. Presentations by the students 6. Team building Exercises 7* A part of above six points practicals on Fundamentals of Computers are also added as per Annexure-I
II	Part-B (Outdoor Activities) 1. Sports/NSS/NCC 2. Society Activities of various students chapter i.e. ISTE, SCIE, SAE, CSI, Cultural Club, etc.

Evaluation shall be based on rubrics for Part – A & B

Mentors/Faculty incharges shall maintain proper record student wise of each activity conducted and the same shall be submitted to the department.

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	BFS 201-21			
Subject Title:	Criminal Law			
Contact Hours:	L:3	T:1	P:4	Credits:6
Examination Duration (hours)	3			
Objective(s):	To Learn & Understand: <i>1. Elements of Criminal Procedure Code related to forensic science.</i> <i>2. Acts and provisions of the Constitution of India related to forensic science.</i> <i>3. Acts governing socio-economic crimes.</i> <i>4. Acts governing environmental crimes</i>			

Details of Syllabus

Unit	Contents	Contact Hours
I	Law to Combat Crime: Classification – civil, criminal cases. Essential elements of criminal law. Constitution and hierarchy of criminal courts. Criminal Procedure Code. Cognizable and non-cognizable offences. Bailable and non-bailable offences. Sentences which the court of Chief Judicial Magistrate may pass. Summary trials – Section 260(2). Judgements in abridged forms – Section 355.	12
II	Indian Penal Code pertaining to offences against persons – Sections 121A, 299, 300, 302, 304A, 304B, 307, 309, 319, 320, 324, 326, 351, 354, 359, 362. Sections 375 & 377 and their amendments. Indian Penal Code pertaining to offences against property Sections – 378, 383, 390, 391, 405, 415, 420, 441, 463, 489A, 497, 499, 503, 511. Indian Evidence Act – Evidence and rules of relevancy in brief. Expert witness. Cross examination and re-examination of witnesses. Sections 32, 45, 46, 47, 57, 58, 60, 73, 135, 136, 137, 138, 141. Section 293 in the code of criminal procedure.	14
III	Constitution of India Preamble, Fundamental Rights, Directive Principles of State Policy. – Articles 14, 15, 20, 21, 22, 51A.	10
IV	Acts Pertaining to Socio-economic and Environmental Crimes Narcotic, Drugs and Psychotropic Substances Act. Essential Commodity Act. Drugs and Cosmetics Act. Explosive Substances Act. Arms Act. Dowry Prohibition Act. Prevention of Food Adulteration Act. Prevention of Corruption Act. Wildlife Protection Act. I.T. Act. Environment Protection Act. Untouchability Offences Act	16

Reference Books

- III D.A. Bronstein, *Law for the Expert Witness*, CRC Press, Boca Raton (1999).
 JJJ Vipa P. Sarthi, *Law of Evidence*, 6th Edition, Eastern Book Co., Lucknow (2006).
 KKK A.S. Pillia, *Criminal Law*, 6th Edition, N.M. Tripathi Pvt Ltd., Mumbai (1983).
 LLL R.C. Nigam, *Law of Crimes in India*, Volume I, Asia Publishing House, New Delhi (1965).
 MMM (Chief Justice) M. Monir, *Law of Evidence*, 6th Edition, Universal Law Publishing Co. Pvt. Ltd., New Delhi (2002).

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	BFS 202-21			
Subject Title:	Forensic Psychology			
Contact Hours:	L:3	T:1	P:4	Credits:6
Examination Duration (hours)	3			
Objective(s):	To Learn & Understand: <ol style="list-style-type: none"> 1. <i>The overview of forensic psychology and its applications.</i> 2. <i>The legal aspects of forensic psychology.</i> 3. <i>The significance of criminal profiling.</i> 4. <i>The importance of psychological assessment in gauging criminal behavior.</i> 5. <i>The tools and techniques required for detection of deception.</i> 6. <i>The critical assessment of advanced forensic techniques like polygraphy, narco analysis and brain electrical oscillation signatures.</i> 			

Details of Syllabus

Unit	Contents	Contact Hours
I	Basics of Forensic Psychology Definition and fundamental concepts of forensic psychology and forensic psychiatry. Psychology and law. Ethical issues in forensic psychology. Assessment of mental competency. Mental disorders and forensic psychology. Psychology of evidence – eyewitness testimony, confession evidence. Criminal profiling. Psychology in the courtroom, with special reference to Section 84 IPC.	10
II	Psychology and Criminal Behavior Psychopathology and personality disorder. Psychological assessment and its importance. Serial murderers. Psychology of terrorism. Biological factors and crime – social learning theories, psycho-social factors, abuse. Juvenile delinquency – theories of offending (social cognition, moral reasoning), Child abuse (physical, sexual, emotional), juvenile sex offenders, legal controversies.	12
III	Detection of Deception Tools for detection of deception – interviews, non-verbal detection, statement analysis, voice stress analyzer, hypnosis. Polygraphy – operational and question formulation techniques, ethical and legal aspects, the guilty knowledge test. Narco analysis and brain electrical oscillation signatures – principle and theory, ethical and legal issues.	08

Reference Books

4. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, *Scientific Evidence in Civil and Criminal Cases*, 4th Edition, The Foundation Press, Inc., New York (1995).
5. R. Saferstein, *Criminalistics*, 8th Edition, Prentice Hall, New Jersey (2004).
6. J.C. DeLadurantey and D.R. Sullivan, *Criminal Investigation Standards*, Harper & Row, New York (1980).

7. J. Niehaus, *Investigative Forensic Hypnosis*, CRC Press, Boca Raton (1999).
8. E. Elaad in *Encyclopedia of Forensic Science, Volume 2*, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000).

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	BFS 203-21			
Subject Title:	Criminalistics			
Contact Hours:	L:3	T:1	P:4	Credits:6
Examination Duration (hours)	3			
Objective(s):	To Learn & Understand: <ol style="list-style-type: none"> 1. <i>The methods of securing, searching and documenting crime scenes.</i> 2. <i>The art of collecting, packaging and preserving different types of physical and trace evidence at crime scenes.</i> 3. <i>The legal importance of chain of custody.</i> 4. <i>The tools and techniques for analysis of different types of crime scene evidence.</i> 			

Details of Syllabus

Unit	Contents	Contact Hours
I	Crime Scene Management Types of crime scenes – indoor and outdoor. Securing and isolating the crime scene. Crime scene search methods. Safety measures at crime scenes. Legal considerations at crime scenes. Documentation of crime scenes – photography, videography, sketching and recording notes. Duties of first responders at crime scenes. Coordination between police personnel and forensic scientists at crime scenes. The evaluation of 5Ws (who?, what?, when?, where?, why?) and 1H (how?). Crime scene logs.	10
II	Crime Scene Evidence Classification of crime scene evidence – physical and trace evidence. Locard principle. Collection, labeling, sealing of evidence. Hazardous evidence. Preservation of evidence. Chain of custody. Reconstruction of crime scene.	8
III	Forensic Physics-I Glass evidence – collection, packaging, analysis. Matching of glass samples by mechanical fit and refractive index measurements. Analysis by spectroscopic methods. Fracture analysis and direction of impact. Paint evidence – collection, packaging and preservation. Analysis by destructive and non-destructive methods. Importance of paint evidence in hit and run cases. Fibre evidence – artificial and man-made fibres. Collection of fibre evidence. Identification and comparison of fibres. Semen and Blood based evidence, their collection, analysis and preservation.	10
IV	Forensic Physics-II Soil evidence – importance, location, collection and comparison of soil samples. Cloth evidence – importance, collection, analysis of adhering material. Matching of pieces. Toolmark evidence. Classification of toolmarks. Forensic importance of toolmarks. Collection, preservation and matching of toolmarks. Restoration of erased serial numbers and engraved marks. Forensic gemmology.	10

Reference Books

6. M. Byrd, *Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence*, CRC Press, Boca Raton (2001).
7. T.J. Gardener and T.M. Anderson, *Criminal Evidence*, 4th Ed., Wadsworth, Belmont (2001).
8. S.H. James and J.J. Nordby, *Forensic Science: An Introduction to Scientific and Investigative Techniques*, 2nd Edition, CRC Press, Boca Raton (2005).
9. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, *Techniques of Crime Scene Investigation*, CRC Press, Boca Raton (2013).

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	BFS 204-21			
Subject Title:	Criminal Law Practical			
Contact Hours:	L:0	T:0	P:4	Credits:2
Examination Duration (hours)	3			
Objective(s):	To make the students learn practical aspects of Criminal Law			

Sr. No.	Contents
	<ol style="list-style-type: none"> 1. To prepare a schedule of five cognizable and five non-cognizable offences 2. To study the powers and limitations of the Court of Judicial Magistrate of First Class. 3. To prepare a schedule of the offences which may be tried under Section 260(2) of Criminal Procedure Code. 4. To study a crime case in which an accused was punished on charge of murder under Section 302. 5. To study a crime case in which an accused was punished on charge of rape under Section 375. 6. To cite example of a case in which the opinion of an expert was called for under Section 45 of the Indian Evidence Act. 7. To cite a case wherein a person was detained under Article 22(5) of the Indian Constitution. Express your views whether the rights of the person as enlisted in this Article were taken care of. 8. To cite a case under Article 14 of the Constitution of India wherein the Right to Equality before Law was allegedly violated. 9. To list the restrictions imposed on Right to Freedom of Worship under the Constitution of India. 10. To prepare a schedule of persons convicted under Narcotics, Drugs and Psychotropic Act statistically analyze the age group to which they belonged. 11. To study a case in which Drugs and Cosmetic Act was invoked. 12. To study a case in which Explosive Substances Act was invoked. 13. To study a case in which Arms Act was invoked. 14. In light of Section 304B of the Indian Penal Code, cite a case involving dowry death. 15. To study a case wherein the Untouchability Offences Act was invoked on the basis of Article 15 of the Constitution of India.

Reference Books:

1. D.A. Bronstein, *Law for the Expert Witness*, CRC Press, Boca Raton (1999).
2. Vipa P. Sarthi, *Law of Evidence*, 6th Edition, Eastern Book Co., Lucknow (2006).
3. A.S. Pillia, *Criminal Law*, 6th Edition, N.M. Tripathi Pvt Ltd., Mumbai (1983).
4. R.C. Nigam, *Law of Crimes in India*, Volume I, Asia Publishing House, New Delhi (1965).

5.(Chief Justice) M. Monir, *Law of Evidence*, 6th Edition, Universal Law Publishing Co. Pvt. Ltd., New Delhi (2002).

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	BFS 205-21			
Subject Title:	Forensic Psychology Practical			
Contact Hours:	L:0	T:0	P:4	Credits:2
Examination Duration (hours)	3			
Objective(s):	To Learn & Understand practical aspects of Forensic Psychology			

Sr. No.	Contents	Contact Hours
I	6. To cite a crime case where legal procedures pertaining to psychic behavior had to be invoked. 7. To prepare a report on relationship between mental disorders and forensic psychology. 8. To review a crime case involving serial murders. Comment on the psychological traits of the accused. 9. To cite a crime case involving a juvenile and argue for and against lowering the age for categorizing an individual as juvenile. 10. To study a criminal case in which hypnosis was used as a means to detect deception. 11. To prepare a case report on thematic appreciation test. 12. To prepare a case report on Minnesota multiphasic personality inventory test. 13. To prepare a case report on thematic appreciation test. 14. To prepare a case report on word association test. 15. To prepare a case report on Bhatia's battery of performance test of intelligence. 16. To cite a criminal case in which narco analysis was used as a means to detect deception.	

Reference Books

1. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, *Scientific Evidence in Civil and Criminal Cases*, 4th Edition, The Foundation Press, Inc., New York (1995).
2. R. Saferstein, *Criminalistics*, 8th Edition, Prentice Hall, New Jersey (2004).
3. J.C. DeLadurantey and D.R. Sullivan, *Criminal Investigation Standards*, Harper & Row, New York (1980).
4. J. Niehaus, *Investigative Forensic Hypnosis*, CRC Press, Boca Raton (1999).

5.E. Elaad in *Encyclopedia of Forensic Science, Volume 2*, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000).

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	BFS 206-21			
Subject Title:	Criminalistics Practical			
Contact Hours:	L:0	T:0	P:4	Credits:2
Examination Duration (hours)	3			
Objective(s):	To Learn & Understand practical aspects of Criminalistics			

Sr. No.	Contents	Contact Hours
I	13. To prepare a report on evaluation of crime scene. 14. To reconstruct a crime scene (outdoor and indoor). 15. To compare soil samples by density gradient method. 16. To compare paint samples by physical matching method. 17. To compare paint samples by thin layer chromatography method. 18. To compare glass samples by refractive index method. 19. To identify and compare tool marks. 20. To compare cloth samples by physical matching.	

Reference Books

1. M. Byrd, *Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence*, CRC Press, Boca Raton (2001).
2. T.J. Gardener and T.M. Anderson, *Criminal Evidence*, 4th Ed., Wadsworth, Belmont (2001).
3. S.H. James and J.J. Nordby, *Forensic Science: An Introduction to Scientific and Investigative Techniques*, 2nd Edition, CRC Press, Boca Raton (2005).
4. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, *Techniques of Crime Scene Investigation*, CRC Press, Boca Raton (2013).

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	BFS 207-21			
Subject Title:	Forensic Science & Society			
Contact Hours:	L:2	T:0	P:0	Credits:2
Examination Duration (hours)	3			
Objective(s):	To Learn & Understand: <i>1.Importance of forensic engineering.</i> <i>2.Importance of forensic archeology.</i> <i>3.Importance of forensic intelligence.</i>			

Details of Syllabus

Unit	Contents	Contact Hours
I	Forensic Engineering Role of mechanical, electronics and computer engineers in forensic science. Accident investigations. Failure of signaling and control systems. Ergonomics. Applications of animations, simulations and digital imaging in solving crime cases. Episodes involving fire engineering.	8
II	Forensic Archeology Role of forensic archeology. Searching the archeological site. Methods of digging the burial site. Recovery of remains. Documenting the recovered material. Preservation of remains.	6
III	Forensic Intelligence Role of forensic intelligence in crime analysis. Methods of crime analysis. Databases in forensic intelligence. Management of serial crimes by application of forensic intelligence.	8

Reference Books

1. J.F. Brown and K.S. Obenski, *Forensic Engineering – Reconstruction of Accidents*, C.C. Thomas, Springfield (1990).
2. E.W. Killam, *The Detection of Human Remains*, C.C. Thomas, Springfield (1990).
3. R.K. Noon, *Introduction to Forensic Engineering*, CRC Press, Boca Raton (1992).
4. O. Ribaux and P. Margot in *Encyclopedia of Forensic Sciences*, Volume 1, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Ed.), Academic Press, London (2000).

I.K. GUJRAL PUNJAB TECHNICAL UNIVERSITY				
Course Name	B.Sc. in Forensic Sciences			
Subject Code:	EVS102-18			
Subject Title:	Environmental Studies			
Contact Hours:	L:2	T:0	P:0	Credits:2
Examination Duration (hours)	3			
Objective(s):	To learn the basics of Environmental issues.			

Details of Syllabus

Unit	Contents	Contact Hours
I	Introduction to Environmental Studies Multidisciplinary nature of Environmental Studies: Scope & Importance Need for Public Awareness Ecosystems Concept of an Ecosystem: Structure & functions of an ecosystem (Producers, Consumers & Decomposers) Energy Flow in an ecosystem: Food Chain, Food web and Ecological Pyramids Characteristic features, structure & functions of following Ecosystems: • Forest Ecosystem • Aquatic Ecosystem (Ponds, Lakes, River & Ocean)	4
II	Natural Resources Renewable & Non-renewable resources Forest Resources: Their uses, functions & values (Biodiversity conservation, role in climate change, medicines) & threats (Overexploitation, Deforestation, Timber extraction, Agriculture Pressure), Forest Conservation Act Water Resources: Their uses (Agriculture, Domestic & Industrial), functions & values, Overexploitation and Pollution of Ground & Surface water resources (Case study of Punjab), Water Conservation, Rainwater Harvesting, Land Resources: Land as a resource; Land degradation, soil erosion and desertification. Energy Resources: Renewable & non-renewable energy resources, use of alternate energy resources (Solar, Wind, Biomass, Thermal), Urban problems related to Energy	8
III	Biodiversity & its conservation Types of Biodiversity: Species, Genetic & Ecosystem India as a mega biodiversity nation, Biodiversity hot spots and biogeographic regions of India Examples of Endangered & Endemic species of India, Red data book Environmental Pollution & Social Issues Types, Causes, Effects & Control of Air, Water, Soil & Noise Pollution Nuclear hazards and accidents & Health risks Global Climate Change: Global warming, Ozone depletion, Acid rain, Melting of Glaciers & Ice caps, Rising sea levels Environmental disasters: Earthquakes, Floods, Cyclones, Landslides	8
IV	Field Work Visit to a National Park, Biosphere Reserve, Wildlife Sanctuary Documentation & preparation of a Biodiversity (flora & fauna) register of campus/river/forest Visit to a local polluted site : Urban/Rural/Industrial/Agricultural Identification & Photography of resident or migratory birds, insects (butterflies) Public hearing on environmental issues in a village	16

Reference Books

1. Carson, R. 2002. *Silent Spring*. Houghton Mifflin Harcourt.

2. Gadgil, M., & Guha, R. 1993. *This Fissured Land: An Ecological History of India*. Univ. of California Press.
3. Gleeson, B. and Low, N. (eds.) 1999. *Global Ethics and Environment*, London, Routledge.
4. Gleick, P. H. 1993. *Water in Crisis*. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. *Principles of Conservation Biology*. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. *Science*, 339: 36-- 37.
7. McCully, P. 1996. *Rivers no more: the environmental effects of dams*(pp. 29---64). Zed Books.
8. McNeill, John R. 2000. *Something New Under the Sun: An Environmental History of the Twentieth Century*.
9. Odum, E.P., Odum, H.T. & Andrews, J. 1971. *Fundamentals of Ecology*. Philadelphia: Saunders.
10. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. *Environmental and Pollution Science*. Academic Press.
11. Rao, M.N. & Datta, A.K. 1987. *Waste Water Treatment*. Oxford and IBH Publishing Co. Pvt. Ltd.
12. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. *Environment*. 8th edition. John Wiley & Sons.
13. Rosencranz, A., Divan, S., & Noble, M. L. 2001. *Environmental law and policy in India. Tripathi 1992*.
14. Sengupta, R. 2003. *Ecology and economics: An approach to sustainable development*. OUP.
15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. *Ecology, Environmental Science and Conservation*. S. Chand Publishing, New Delhi.
16. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. *Conservation Biology: Voices from the Tropics*. John Wiley & Sons.
17. Thapar, V. 1998. *Land of the Tiger: A Natural History of the Indian Subcontinent*.
18. Warren, C. E. 1971. *Biology and Water Pollution Control*. WB Saunders.
19. Wilson, E. O. 2006. *The Creation: An appeal to save life on earth*. New York: Norton.
20. World Commission on Environment and Development. 1987. *Our Common Future*. Oxford University Press.