H.P. TECHNICAL UNIVERSITY
HAMIRPUR (HP)

COURSE: B. PHARMACY

SCHEME OF TEACHING AND EVALUATION

PREAMBLE

The curriculum of an institution of higher learning is a living entity. It evolves with time; it reflects the ever changing needs of the society and keeps pace with the growing talent of the students and the faculty. The curriculum of Himachal Pradesh Technical University, Hamirpur (HPTU) is no exception. Half a century of experience in preparing graduates in engineering and postgraduates in science for a wide variety of industries has led to creation of the new curriculum. I sincerely believe that it will meet the aspirations of all stake holders – students, faculty and the employers of the graduates and postgraduates of H.P. Technical University Hamirpur.

In the university system the curricula and syllabi represented the upper limit of the material to be covered, the teacher having no motivation for stepping outside the defined territory. The curriculum and syllabi only serve as a guideline. The teacher enjoys freedom to expand it in any direction he feels appropriate, incorporates his latest knowledge and stimulates the creative minds of the students. He experiments with new contents and new techniques. A new teaching learning paradigm is born.

The curriculum is the culmination of the efforts of large number of faculty members and university staff and reflects their creative contribution. In keeping with the demands of the changing times, it contains many innovative features. I sincerely hope that the faculty and students will take full advantage of the dynamic features of the curriculum and make the teaching-learning process a truly sublime experience for all.

On behalf of the Senate of HP Technical University Hamirpur, I record my appreciation of the meticulous work done by the Dr.N.N.Sharma, Dean Academic in compiling the whole curricula of different programmes in this consolidated form. I also record my personal gratitude to the members of the Senate who have lent every bit of their wisdom to make the contents truly superior.

Prof. R. L. Sharma,
Vice-Chancellor

Teaching and Evaluation Scheme

SEMESTER- I (B. Pharmacy)

S. N.	Category	Paper Code	Subject	L	T	P/D	Credits	Evaluation Scheme				
								Internal Assessment			ESE	Subject Total
								CT	TA	Total		
	Theory:											
1	MC	HS-101	English Communication Skill	2	-	-	2	20	20	40	60	100
2	PC	BP -101	Pharmaceutical Chemistry-I (Inorganic Chemistry)	3	-	-	3	20	20	40	60	100
3	PC	BP-102	Pharmaceutics-I (Introduction to Pharmaceutics & Dispensing Pharmacy)	3	-	-	3	20	20	40	60	100
4	PC	BP-103	Anatomy, Physiology and Health education -I	3	-	-	3	20	20	40	60	100
5	MC	BP-104	Computer Fundamentals	3	-	-	3	20	20	40	60	100
6	MC	HS-102	Environmental Science	2	-	-	2	20	20	40	60	100
		Labs:										
1	PC	BP-111	Pharmaceutical Chemistry-I (Inorganic Chemistry)Laboratory			3	1	20	30	50	50	100
2	P C	BP-112	Pharmaceutics-I Laboratory			3	1	20	30	50	50	100
3	P C	BP-113	Anatomy, Physiology and Health education -I Laboratory			3	1	20	30	50	50	100
4	CC	BP-114	Computer Fundamentals - Laboratory			2	1	20	30	50	50	100
Total				**16**	**-**	**11**	**20**					
	Total work Load=27						**Total Credit =20**					

Legend:

L	Lecture	ESE	End Semester Examination
T	Tutorial	PC	Program Core Courses
P	Practical	FC	Foundation Courses
CT	Class Test	HS	Humanities and social science
TA	Teacher's Assessment	MC	Mandatory Course

SEMESTER – II (B. Pharmacy)

S. N.	Category	Paper Code	Subject	L	T	P/ D	Credits	Evaluation Scheme				
								Internal Assessment			ESE	Subject Total
								CT	TA	Total		
	Theory:											
1	MC	HS-204	Business Communication	2	-	-	2	20	20	40	60	100
2	PC	BP-201	Pharmaceutical Chemistry II (Organic Chemistry)	3	1	-	4	20	20	40	60	100
3	PC	BP-202	Physical Pharmacy I	3	-	-	3	20	20	40	60	100
4	PC	BP-203	Anatomy, Physiology and Pathophysiology-II	3	-	-	3	20	20	40	60	100
5	PC	BP-204	Pharmacognosy-I	3	-	-	3	20	20	40	60	100
6	FC	BP-205	Mathematics & Biostatistics	3	-	-	3	20	20	40	60	100
7.	MC	HS-103	Disaster Management	3	-	-	3	20	20	40	60	100
		Labs:										
1	PC	BP 211	Pharmaceutical Chemistry II-Laboratory	-	-	4	2	20	30	50	50	100
2	PC	BP 212	Physical Pharmacy I	-	--	3	1	20	30	50	50	100
3	PC	BP 213	Anatomy, Physiology and Pathophysiology - II Laboratory	-	-	3	1	20	30	50	50	100
4	PC	BP 214	Pharmacognosy-I Laboratory	-	-	3	1	20	30	50	50	100
Total				**19**	**0**	**13**	**26**					
Total Work Load 32				**Total Credit 23**								

Legend:

L	Lecture	ESE	End Semester Examination
T	Tutorial	PC	Program Core Courses
P	Practical	FC	Foundation Courses
CT	Class Test	HS	Humanities and social science
TA	Teacher's Assessment	MC	Mandatory Course

SEMESTER- III (B. Pharmacy)

S. N.	Category	Paper Code	Subject	L	T	P/ D	Credits	Evaluation Scheme				
								Internal Assessment			ESE	Subject Total
								CT	TA	Total		
	Theory:											
1	PC	BP 301	Pharmaceutical Chemistry-III (Heterocyclic & Organic Chemistry)	3	-	-	3	20	20	40	60	100
2	PC	BP 302	Pharmaceutics-II (Unit Operation-I)	3	-	-	3	20	20	40	60	100
3	PC	BP 303	Pharmaceutics-III (Hospital & Community Pharmacy)	3	-	-	3	20	20	40	60	100
4	PC	BP 304	Pathophysiology	3	1	-	4	20	20	40	60	100
5	PC	BP 305	Pharmacognosy-II	3	-	-	3	20	20	40	60	100
6	PC	BP 306	Pharmaceutical Analysis-I	3	-	-	3	20	20	40	60	100
		Labs:										
1	PC	BP 311	Pharmaceutical Chemistry-III -Laboratory	-	-	3	1	20	30	50	50	100
2	PC	BP 312	Pharmaceutics-II - Laboratory	-	-	3	1	20	30	50	50	100
3	PC	BP 313	Pharmaceutics-III-Laboratory	-	-	3	1	20	30	50	50	100
4	PC	BP 314	Pharmacognosy-II--Laboratory	-	-	3	1	20	30	50	50	100
5	PC	BP 315	Pharmaceutical Analysis-I Laboratory	-	-	3	1	20	30	50	50	100
Total				**18**	**1**	**15**	**24**					
	Total Work Load=34					**Total Credit 24**						

Legend:

L	Lecture	ESE	End Semester Examination
T	Tutorial	PC	Program Core Courses
P	Practical	FC	Foundation Courses
CT	Class Test	HS	Humanities and social science
TA	Teacher's Assessment	MC	Mandatory Course

SEMESTER- IV (B. Pharmacy)

S. N.	Category	Paper Code	Subject	L	T	P/ D	Credits	Evaluation Scheme				
								Internal Assessment			ESE	Subject Total
								CT	TA	Total		
	Theory:											
1	FC	BP 401	Human Values & Professional Ethics	2	1	-	3	20	20	40	60	100
2	PC	BP 402	Physical Pharmacy-II	3	1	-	4	20	20	40	60	100
3	PC	BP 403	Pharmaceutics-IV (Pharmaceutical Technology-I)	3	1	-	4	20	20	40	60	100
4	PC	BP 404	Pharmaceutical Analysis-II	3	1	-	4	20	20	40	60	100
5	PC	BP 405	Pharmaceutics-V (Unit Operation-II)	3	1	-	4	20	20	40	60	100
		Labs:										
1	CC	BP 411	Human Values & Professional Ethics-Laboratory			3	1	20	30	50	50	100
2	PC	BP 412	Physical Pharmacy-II Laboratory			3	1	20	30	50	50	100
3	PC	BP 413	Pharmaceutics-IV Laboratory			3	1	20	30	50	50	100
4	PC	BP 414	Pharmaceutical Analysis-II Laboratory			3	1	20	30	50	50	100
5	PC	BP 415	Pharmaceutics-V (Unit Operation-II) Laboratory			3	1	20	30	50	50	100
Total				**14**	**5**	**15**	**24**					
	Total Working = 34						**Total Credit =24**					

Note: After completion of IV semester, students are required to undergo Hospital training for 4 week tenure. The evaluation will be done during the 5th Semester as BP-516 **paper as Professional core course which will carry 2 credits.**

Legend:

L	Lecture	ESE	End Semester Examination
T	Tutorial	PC	Program Core Courses
P	Practical	FC	Foundation Courses
CT	Class Test	HS	Humanities and social science
TA	Teacher's Assessment	MC	Mandatory Course

SEMESTER- V (B. Pharmacy)

S. N.	Category	Paper Code	Subject	L	T	P/ D	Credits	Evaluation Scheme				
								Internal Assessment			ESE	Subject Total
								CT	TA	Total		
	Theory:											
1	PC	BP 501	Biochemistry	3	-	-	3	20	20	40	60	100
2	PC	BP 502	Medicinal Chemistry – I	3	-	-	3	20	20	40	60	100
3	PC	BP 503	Pharmacology – I	3	-	-	3	20	20	40	60	100
4	PC	BP 504	Pharmaceutical Biotechnology	3	-	-	3	20	20	40	60	100
5	PC	BP 505	Pharmaceutical Jurisprudence	3	-	-	3	20	20	40	60	100
6	PC	BP 506	Pharmacognosy III	3	-	-	3	20	20	40	60	100
Labs:												
1	PC	BP 511	Biochemistry Laboratory	-	-	3	1	20	30	50	50	100
2	PC	BP 512	Medicinal Chemistry – I Laboratory	-	-	3	1	20	30	50	50	100
3	PC	BP 513	Pharmacology – I Laboratory	-	-	3	1	20	30	50	50	100
4	PC	BP 514	Pharmaceutical Biotechnology Laboratory	-	-	3	1	20	30	50	50	100
5	PC	BP 515	Pharmacognosy III Laboratory	-	-	3	1	20	30	50	50	100
6	PC	BP 516	Hospital Training*	-	-	-	2		40	40	60	100
	Total			**18**	**0**	**15**	**25**					
	Total Work Load=33						**Total Credit 25**					

Note: The assessment of the hospital training will consider 50% marks for report writing and other 50% on the basis of presentation.

Legend:

L	Lecture	ESE	End Semester Examination
T	Tutorial	PC	Program Core Courses
P	Practical	FC	Foundation Courses
CT	Class Test	HS	Humanities and social science
TA	Teacher's Assessment	MC	Mandatory Course

SEMESTER- VI (B. Pharmacy)

S. N.	Category	Paper Code	Subject	L	T	P/ D	Credits	Evaluation Scheme				
								Internal Assessment			ESE	Subject Total
								CT	TA	Total		
	Theory:											
1	PC	BP 601	Medicinal Chemistry – II	3	1	-	4	20	20	40	60	100
2	PC	BP 602	Chemistry of Natural Products	3	1	-	4	20	20	40	60	100
3	PC	BP 603	Pharmacognosy IV	3	1	-	4	20	20	40	60	100
4	PC	BP 604	Pharmaceutics-VI (Pharmaceutical Technology – II)	3	1	-	4	20	20	40	60	100
5	PC	BP 605	Clinical Pharmacy	3	-	-	3	20	20	40	60	100
6	PC	BP 606	Pharmaceutical Microbiology	3	1	-	4	20	20	40	60	100
		Labs:										
1	PC	BP 611	Medicinal Chemistry – II Laboratory	-	-	3	1	20	30	50	50	100
2	PC	BP 612	Pharmacognosy-IV Laboratory	-	-	3	1	20	30	50	50	100
3	PC	BP 613	Pharmaceutics-VI (Pharmaceutical Technology – II) Laboratory	-	-	3	1	20	30	50	50	100
4	PC	BP 614	Pharmaceutical Microbiology Laboratory	-	-	3	1	20	30	50	50	100
	Total			**18**	**5**	**12**	**27**					
	Total Work Load=35						**Total Credit 27**					

Note: After completion of VI semester, students required to undergo Industrial training for 4 week tenure. The evaluation will be done during the 7th Semester as BP-716 paper as Professional core course which will carry 2 credits.

Legend:

L	Lecture	ESE	End Semester Examination
T	Tutorial	PC	Program Core Courses
P	Practical	FC	Foundation Courses
CT	Class Test	HS	Humanities and social science
TA	Teacher's Assessment	MC	Mandatory Course

SEMESTER- VII (B. Pharmacy)

S. N.	Category	Paper Code	Subject	L	T	P/ D	Credits	Evaluation Scheme				
								Internal Assessment			ESE	Subject Total
								CT	TA	Total		
	Theory:											
1	PC	BP 701	Medicinal Chemistry – III	3	1	-	4	20	20	40	60	100
2	PC	BP 702	Pharmacology – II	3	1	-	4	20	20	40	60	100
3	PC	BP 703	Pharmaceutical Industrial Management	3	-	-	3	20	20	40	60	100
4	PC	BP704	Pharmaceutics-VII (Biopharmaceutics and Pharmacokinetics)	3	1	-	4	20	20	40	60	100
5	PC	BP705	Industrial Pharmacognosy	3	1	-	4	20	20	40	60	100
6	PE	-	Elective *	3	-	-	3	20	20	40	60	100
		Labs:										
1	PC	BP 711	Medicinal Chemistry – III Laboratory			3	1	20	30	50	50	100
2	PC	BP 712	Pharmacology–II Laboratory			3	1	20	30	50	50	100
4	PC	BP 714	Pharmaceutics-VII (Biopharmaceutics and Pharmacokinetics) Laboratory			3	1	20	30	50	50	100
5	PC	BP715	Industrial Pharmacognosy Laboratory			3	1	20	30	50	50	100
6	PC	BP716	Industrial training Evaluation	--	-	-	2	-	40	40	60	100
Total				**18**	**4**	**12**	**28**					
	Total Work Load=34						**Total Credit 28**					

Note: The assessment of the Industrial training will consider 50% marks for report writing and other 50% on the basis of presentation.

***Elective:**

S. N.	Course Code	Specialization	Course Title
1	BP-475-1	Marketing	Pharmaceutical Marketing And Management
2	BP-475-2	Management	Total Quality Management
3	BP-475-3	Clinical Pharmacy	Clinical Trial & Research
4	BP-475-4	Technology	Herbal Cosmetic Technology
5	BP-475-5	Management	Pharmaceutical Production Management
6	BP-475-6	Quality Assurance	Quality Control and Quality Assurance
7	BP-475-7	Technology	Herbal Drug Technology

SEMESTER- VIII (B. Pharmacy)

S. N.	Category	Paper Code	Subject	L	T	P/ D	Credits	Evaluation Scheme				
								Internal Assessment			ESE	Subject Total
								CT	TA	Total		
	Theory:											
1	PC	BP 801	Instrumental Methods of Analysis	3	1	-	4	20	20	40	60	100
2	PC	BP 802	Pharmaceutics-VIII (Novel Drug Delivery Systems)	3	1	-	4	20	20	40	60	100
4	PC	BP 803	Pharmacology-III	3	1	-	4	20	20	40	60	100
5	PC	BP 804	Project (Practical / Review)	-	3	6	9	-	40	40	60	100
		Labs:										
1	PC	BP 811	Instrumental Methods of Analysis Laboratory	-	-	3	1	20	30	50	50	100
2	PC	BP 812	Pharmaceutics-VIII (Novel Drug Delivery Systems) Laboratory	-	-	3	1	20	30	50	50	100
4	PC	BP 813	Pharmacology- III Laboratory	-	-	3	1	20	30	50	50	100
Total				**9**	**6**	**15**	**24**					
	Total Work Load=30						**Total Credit 24**					

Legend:

L	Lecture	ESE	End Semester Examination
T	Tutorial	PC	Program Core Courses
P	Practical	FC	Foundation Courses
CT	Class Test	HS	Humanities and social science
TA	Teacher's Assessment	MC	Mandatory Course

1ST SEMESTER DETAILED SYLLABUS

HS-101 ENGLISH COMMUNICATION SKILLS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Unit-I

Communication: Need for effective communication, process of communication, The Seven Cs of Effective Communication - Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness; **Barriers to communication -** miscommunication, physical noise; Overcoming measures.

Unit-II

Essentials of Grammar: Sentence structure; Sentence formation, Use of appropriate diction, Tenses, articles and prepositions; English Phonetics: International phonetic alphabets - Production of sounds, Classification of consonant and vowel sounds.

Unit-III

Writing Skills: **Letter writing -** Formal, informal and demi-official letters; Business letters - quotations, supply orders, complaints, sales, adjustment letters, etc.; **Resume writing:** Difference between bio-data, CV and resume, Cover letter, Application for job.

Unit-IV

Soft skills: Classification of soft skills, soft skills for personality development & career growth; Capturing audience, Tone, Behavior and telephone etiquette - Good practice when making and receiving a call; Becoming a good leader and team-player, Personal SWOT analysis.

Text Books:

1. Herta A. Murphy, et al., Effective Business Communication, Tata Mc-Graw Hill: New Delhi
2. Krishna Mohan and Meenakshi Raman, Effective English Communication, TMH
3. B. K. Mitra, Personality and Soft Skills, Oxford press.

Reference Books:

1. R.W. Lesikar and John.D. Pettit, Business Communication: Theory and Application, All India Traveller Bookseller.
2. Francis Soundaraj, Speaking and Writing for Effective Business Communication, Macmillan.
3. Ronald B. Adler and George Rodman, Understanding Human Communication, Oxford University Press: New York.
4. Sharma Ramanand & Ashawat M.S., Communication Skill, JMD Prakashan.

BP 101-PHARMACEUTICAL CHEMISTRY- I (INORGANIC CHEMISTRY)

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

UNIT-I

Limit Tests: Introduction to Limit test; Limit tests for iron, arsenic, lead, heavy metals, chloride, sulphate.

Essential and Trace Elements: An outline of methods of preparation, uses, sources of impurities, tests for purity and identity of Transition elements and their compounds of pharmaceutical importance, Iron and haematinics, Mineral supplements.

Complexing and Chelating Agents: Introduction, Preparations, properties and assay of EDTA.

UNIT-II

Intra- and Extra-cellular Electrolytes: A brief Introduction to methods of preparation, uses, sources of impurities, tests for purity and identity of Physiological ions, Electrolytes (Sodium chloride, Potassium chloride, Calcium gluconate, Calcium lactate, Magnesium chloride) used for replacement therapy, Electrolytes combination therapy including ORS.

Gastrointestinal Agents: An outline of methods of preparation, uses, sources of impurities, tests for purity and identity the Acidifying agents (Dilute hydrochloric acid), Antacids (Aluminium hydroxide, Calcium carbonate, Magnesium carbonate (Light and Heavy), Sodium Bicarbonate, Magaldrate, algin tablets), Protective's and Adsorbents (Bismuth subcarbonate). Brief Introduction to Cathartics, emetics, poisons and antidotes, sedatives etc.

UNIT-III

Topical Agents: An outline of methods of preparation, uses, sources of impurities, tests for purity and identity of Protectives, Astringents and Anti-infectives.

Dental Products: An outline of methods of preparation, uses, sources of impurities, tests for purity and identity of Dentifrices, Anti-caries agents.

UNIT-IV

Gases and Vapours: An outline of methods of preparation, uses, sources of impurities, tests for purity and identity of Oxygen, Anesthetics and Respiratory stimulants.

Miscellaneous Agents: A Brief introduction and uses of Sclerosing agents, expectorants, emetics, poisons and antidotes, sedatives etc.

Pharmaceutical Aids: A Brief introduction and uses of Anti- oxidants, preservatives, filter aids, adsorbents, diluents, excipient, suspending agents, colorants etc.

Text Books

Note: Recent editions of the following books to be referred

1. Block JH, Roche E, Soine TO, Wilson CO. Inorganic Medicinal and Pharmaceutical Chemistry. Philadelphia: Lea and Febiger.

2. Vogel. Vogel's Textbook of Micro and Semi micro Qualitative Inorganic Analysis. Hyderabad: Orient Longman.

Reference Book

1. Atherden LM. Bentley and Driver's Textbook of Pharmaceutical Chemistry. New Delhi: Oxford University Press.

BP 102- PHARMACEUTICS-I (INTRODUCTION TO PHARMACEUTICS & DISPENSING PHARMACY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

UNIT-I

History of Pharmacy: History of pharmacy profession in India and the world, Pharmacy as a career, Pharmaceutical education in India and abroad, Pharmacopoeia of India and other Pharmacopoeias, Other official books.

Dosage Forms: Introduction to different dosage forms, their classification and applications with examples

UNIT-II

Typical prescriptions: Introduction to mixtures, Aromatic waters, solutions, tablet, capsules emulsions, creams, ointments, powders, capsules, pastes, jellies, suppositories, ophthalmic, pastilles, lozenges, pills, lotions, liniments, inhalations, paints, sprays.

UNIT-III

Prescription: Definition, various parts of prescription, Handling of prescription, sources of errors in prescription.

Pharmaceutical Calculations: Posology, calculation of doses for infants, adults and elderly patients; Enlarging and reducing recipes percentage solutions, alligation, alcohol dilution, proof spirit, isotonic solutions.

Incompatibilities: Physical, Therapeutic and Chemical incompatibilities; inorganic incompatibilities, Organic incompatibilities, Correction of incompatibilities.

UNIT-IV

Extemporaneous Preparations: Definitions, general formulation, manufacturing procedures and official products of syrups, spirits, elixirs, gargles, mouth washes, douches, draught**.** Infusion, decoction, tincture and extracts, methods of preparation of dry, soft and liquid extracts of IP.

Text Books

1. Indian Pharmacopoeia 1962.New Delhi: Indian Pharmacopoeia Commission.
2. Gaud RS, Gupta GD. Practical Pharmaceutics. New Delhi: CBS Publishers.

Reference Books

1. Carter SJ. Cooper and Gunn's Tutorial Pharmacy. New Delhi: CBS Publishers.
2. Carter SJ. Cooper and Gunn's Dispensing Pharmacy. New Delhi: CBS Publishers.

BP-103-ANATOMY, PHYSIOLOGY AND HEALTH EDUCATION – I

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

UNIT-I

Introduction: Scope of anatomy and physiology and basic terminology used, Structure of cell, its components and their functions.

Elementary Tissues of the Human Body: Epithelial, connective, muscular and nervous tissues, their sub-types and their characteristics.

UNIT-II

Osseous System: Structure, composition and functions of skeleton Classification of joints, types of movements of joints, Disorders of joints.

Skeletal Muscles: Gross anatomy; physiology of muscle contraction, physiological properties of skeletal muscles and their disorders.

UNIT-III

Haemopoietic System: Composition and functions of blood and its elements, their disorders, blood groups and their significance, mechanism of coagulation, disorders of platelets and coagulation.

Lymph and Lymphatic System: Composition, formation and circulation of lymph; disorders of lymph and lymphatic system. Basic physiology and functions of spleen.

UNIT-IV

Cardiovascular System: Basic anatomy of the heart, Physiology of heart, blood vessels and circulation. Basic understanding of Cardiac cycle, heart sounds and electrocardiogram. Blood pressure and its regulation. Brief outline of cardiovascular disorder like hypertension, hypotension, arteriosclerosis, angina, myocardial infarction, congestive heart failure and cardiac arrhythmias.

Text Book

1. Chatterjee CC. Human Physiology, Calcutta: Medical Allied Agency.
2. Ghai CL. Textbook of Practical Physiology. New Delhi: Jay Pee Brothers.
3. Vander AJ, Sherman JH, Lucians DS. Human Physiology. New Delhi: Tata McGraw Hill.

Reference Book

1. Tortora GJ, Derrickson B. Principles of Anatomy and Physiology. New York: John Wiley & Sons.
2. Ross and Wilson. Anatomy and Physiology in Health and Illness. Sydney: Churchill Livingstone.
3. Guyton AC, Hall JE. Textbook of Medical Physiology. New York: WB Sanders Co.
4. Difore SH. Atlas of Normal Histology. Philadelphia: Lea and Febiger.

BP 104 - COMPUTER FUNDAMENTALS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

UNIT-I

Fundamentals of Computer: Introduction to computers, Characteristics of computers, Historical perspective of computers, Computer generations, Types of computers and uses, Software and Hardware, Basic organization of a computer system and functions performed by each unit. Various Input devices and output devices. Memory storage: Memory Cells, Semiconductor and Magnetic core memory, ROM and its types, RAM, Cache and Virtual Memory. Secondary Storage devices and their organization (Hard disk, Floppy disk, CD and DVD).

UNIT-II

Operating System: Definition, Need and organization of OS, Functions performed by operating system. Mobile Phone OS.

Data Communication and Networks: Basic elements of a commutation system, Data transmission mode, Network Topologies (ring, star, fully connected and Bus), LAN and WAN, Bounded and unbounded communication media.

UNIT-III

Internet Technology: Internet, Services provided by internet, Potential uses and abuses of internet, Working of search engine, Effective use of social media sites. Concept and implementation of E-Services (Digital India).

Role of Computers in Pharmacy: Use of computer in various pharmaceutical and clinical applications like drug information services hospital and community pharmacy, drug design, pharmacokinetics and data analysis.

UNIT-IV

Word Processing: Features and uses of MS -Word processing, File handling(opening, creating, saving printing and editing), Formatting, Printing setups, Table Handling, Mail Marge, Spell check, file protection etc. in MS-Word.

Spreadsheet: Basics of spreadsheet, feature and uses of Excel, Worksheet, formatting Sheets, Data (Sort and Filter), Calculation and graphing using formulae and function, Goal seek, scenario etc.

Presentation Package: Introduction to power point, features and uses of PowerPoint, creating a new presentation, editing and formatting, working with slides in different views, Animation, Transitions, Action buttons, Macros, Insert (text, slide, picture).

Text Book

1. Rajaraman V. Fundamental of Computers. New Delhi: Prentice Hall (India).

Reference Book

1. Sinha PK, Sinha P. Computer Fundamentals. New Delhi: BPB Publications.

HS 102 - ENVIRONMENTAL SCIENCE

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

UNIT-I

Introduction to Environment: Definition; Natural and manmade environments and inter-relationships amongst and between them, components of environment and relationship between different components, Relationship between man and environment, impact of technology on environment, environmental degradation.

Ecosystems: Introduction, Biotic components, abiotic components, Function of ecosystems (food chain and food web, Energy flow), Types of ecosystems.

Biodiversity: Introduction, genetic, species and ecosystem diversity, bio-geographic classification of India, value and importance of biodiversity, threats to biodiversity, endangered and endemic species in India, conservation of biodiversity.

UNIT-II

Environmental Pollution: ***Air Pollution****:* Composition of air, structure of atmosphere, ambient air quality standards, classification of air pollutants, sources of common air pollutants like SPM, SO_2, NOX, natural and anthropogenic sources, effects of common air pollutants, carbon credit. ***Noise Pollution:*** Introduction, sources of noise pollution, ambient noise levels, effects of noise pollution on human being and wildlife, noise pollution controls, noise standards. *Water Pollution:* Introduction, water quality standards, sources of water pollution, classification of water pollutants, effects of water pollutants, eutrophication, measures to control water pollution.

UNIT-III

Energy Resources: Understanding natural resources, renewable and non-renewable resources, sustainable energy resources, destruction versus conservation, forest resources, water resources, food resources, energy resources and land resources, conventional energy sources and their problems, advantages and limitations non-conventional energy sources, problems due to overexploitation of energy resources.

UNIT-IV

Social Issues and Environment: Sustainable development and practices of improving environment, laws and acts for environmental protection, waste management.

Text Books:

1. Botkin DB, Keller EA. Environmental science. New York: John Wiley & Sons.

Reference Books:

1. Nebel BJ, Wright RT. Environmental science – the way the world works. New Jersey: Prentice Hall.

BP 111- PHARMACEUTICAL CHEMISTRY-I (INORGANIC CHEMISTRY) LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To carry out the limit test for chloride in the given sample.
2. To carry out the limit test for sulphate in the given sample.
3. To carry out the limit test for iron in the given sample.
4. To carry out the limit test for heavy metals in the given sample.
5. To identify the given inorganic pharmaceutical compound.(Sodium bicarbonate/ Mag. Sulphate)
6. To carry out qualitative analysis of given inorganic mixture(Sodium Chloride/ Sodium acetate)
7. To carry out qualitative analysis of given inorganic mixture(Sodium bicarbonate/ Potassium chloride)
8. To carry out qualitative analysis of given inorganic mixture (Barium Sulphate/ Lead acetate)
9. To carry out qualitative analysis of given inorganic mixture (Zinc Sulphate/ Lead acetate)
10. To carry out qualitative analysis of given Unknown inorganic mixture.
11. Preparation of Inorganic Pharmaceuticals (Boric Acid/ Magnesium Sulphate /Potash Alum).
12. To Perform assay of Inorganic Pharmaceutical (EDTA).

BP 112 - PHARMACEUTICS-I LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To Prepare and submit Chloroform water BP
2. To Prepare and submit Concentrated Peppermint Water BP
3. To Prepare and submit Mixtures of Light Magnisium Carbonate and Kaolin.
4. To Dispensing and Submit ORS and Effervescent Compound Powder BPC.
5. To Prepare and dispense 20 g of Eutectic mixture (Menthol & camphor)
6. To Prepare and dispense 20 mL of Turpentine liniment.
7. To Prepare and dispense 20 g of Zinc & Salicylic acid dusting powder.
8. To Prepare and dispense 20 g of Simple ointment.
9. To Prepare and dispense 20 mL of Liquid paraffin emulsion.
10. To Prepare and dispense 20 mL of castor oil emulsion.
11. To Prepare and dispense 8 Glycero-gelatin suppositories.
12. Chemical incompatibility- Ferric chloride & potassium Iodide.
13. To prepare and dispense 20 gm Unna's Paste.

BP 113 - Anatomy, Physiology and Health Education -I Laboratory

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3Hrs / Week)

1. To study the Microscopic structure of Elementary tissues
2. To Study the human skeleton with respect to Anatomy and Physiology.
3. To Study the different systems with the help of charts and models.
4. To Estimate the haemoglobin content of blood sample.
5. To find out the Blood group of blood sample.
6. To Determine the bleeding time, clotting time of sampled blood.
7. To determine the total RBC Count from blood sample.
8. To determine the Total leucocyte count, Differential leucocyte count of given blood sample(2).
9. To Estimate the Erythrocyte sedimentation rate. .
10. To Record the body temperature, pulse rate and blood pressure, basic understanding of Electrocardiogram-PQRST waves and their significance.
11. To carry out the Body Mass Index.

BP114-- COMPUTER FUNDAMENTALS - LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	2	1	50	50	100	3 hours

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (2 Hrs / Week)

1. To perform character, paragraph and page formatting in M S-Word.
2. To perform Mail merge and write the steps for performing the mail merge.
3. To create a personal Resume in MS-word.
4. To create a Chart and Pivotal table in M.S. Excel for statistical data.
5. To perform the various type of functions in Ms-Excel.
6. To perform the different Animation and Transitions in MS PowerPoint.
7. To perform Macro in MS PowerPoint.
8. To create email ID, sending and managing mail account.
9. To perform the steps for online submission of form.
10. To perform the OS Installation and write the Steps.

2ND SEMESTER DETAILED SYLLABUS

HS-204 - BUSINESS COMMUNICATIONS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
2	0	0	2	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

UNIT - I

Introduction to Business Communication: Importance of communication in business, process and models of communication, Types of information- order, advise, suggestion, motivation, persuation, warning and education.

UNIT- II

Business Communication: Letters, Cover Letter, Differences between bio-data, CV and Resume, Letter for Job Application, Thank You Letter, Letter of Complaint, Memos, Memorandum drafting; E. Communication: Email and Social Media.

Oral Communication: Types of oral communication, Barriers to oral communication, Mass Communication – Nature & Scope of Mass Communication, function of mass communication – Media of mass communication.

UNIT-III

Business Report Writing: Report Writing: Types, Structure of a report, Methods and Models of Report Writing, Technical Proposal - Concept, Layout, and Examples of Technical Proposals.

Types of reports: Progress and Annual reports – format and Analysis of sample reports from industry – Synopsis and thesis writing.

UNIT IV

Spoken and Presentation Skills: Impromptu speech – tackling hesitation, shyness and nervousness in speaking –Public speaking; Academic and professional presentations – Group discussions, Planning, preparing and delivering a presentation, essentials of presentation - etiquette, clarity, lively delivery – speech rhythm, speech initiators body language – voice, posture & gesture, eye contact, dress codes; Interviewing, Negotiating a job offer.

Text Books:

1. Essentials of Business Communication by R. Pal and JS Korlahhi, Sultan Chand & Sons, New Delhi.
2 Basic Communication Skills for Technology by Andre J. Rutherford, Pearson Education Asia, patparganj, New Delhi 92.

Reference Books:

1. Business Communication by Meenakshi Raman and Prakash Singh (Oxford)
2. Advanced Communication Skills, V. Prasad, Atma Ram Publications, New Delhi.
3. Sharma Ramanand & Ashawat M.S., Communication Skill, JMD Prakashan

BP 201- PHARMACEUTICAL CHEMISTRY-II (ORGANIC CHEMISTRY)

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

UNIT-I

Theory of resonance: Allyl radical as a resonance hybrid, stability, and orbital picture. Resonance stabilization of Allyl cations: hyper conjugation.

Reactive Intermediates: Carbocations, carbanions, carbenes, nitrene .

Aliphatic Compounds: Structure, nomenclature, preparation and reactions of alkanes, alkenes, dienes and alkynes.

UNIT-II

Alicyclic Compounds: Structure, nomenclature, preparation and reactions of cycloalkanes.

Aromatic Compounds: Structure, nomenclature, preparation and reactions of benzene, polynuclear aromatic compounds, arenes.

Alkyl Halides: Structure, nomenclature, preparation and reactions of aliphatic and aromatic alkyl halides.

UNIT-III

Alcohols: Structure, nomenclature, preparation and reactions of aliphatic alcohols, aromatic alcohols and phenols.

Ethers, Esters and Epoxides: Structure, nomenclature, preparation and reactions of alcohols, ethers, esters and epoxides.

Amines: Structure, nomenclature, preparation and reactions of aliphatic and aromatic amines.

UNIT-IV

Aldehydes and Ketones: Structure, nomenclature, preparation and reactions of Aldehydes and ketones.

Carboxylic Acids: Structure, nomenclature, preparation and reactions of carboxylic acids. Functional derivatives of carboxylic acids.

Text Books

1. Roberts JD, Caserio MC. Basic Principles of Organic Chemistry. New York: WA. BenjaminInc.
2. Furniss NS, Hannaford AJ, Smith PWG, Tatehell AR. Vogel's Textbook of Practical Organic Chemistry. London: ELBS/Longman.
3. Sykes PA. A Guidebook to Mechanisms in Organic Chemistry. Hyderabad: Orient Longman.

Reference Books

1. Mann FC, Saunders BC. Practical Organic Chemistry. London: ELBS/ Longman.
2. Morrison TR, Boyd RN. Organic Chemistry. New Delhi: Prentice Hall India.

BP-202 PHYSICAL PHARMACY-I

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

UNIT - I

Matter and Properties of Matter: States of matter, change in the state of matter, latent heats and vapor pressure, sublimation-critical point, Eutectic mixtures, gases, aerosol-inhalers, relative humidity, liquid complexes, liquid crystals, glassy state, crystalline and amorphous solids, polymorphism.

UNIT-II

Liquid State and solutions: Physical properties (surface tension, parachor, viscosity, refractive index, optical rotation, dipole moments and chemical constituents), Ideal and real solutions, solutions of gases in liquids, colligative properties, partition coefficient, conductance and its measurement, Debye Huckel theory.

UNIT-III

Thermodynamics: First law, thermochemistry, second law, Entropy and disorder, third law, free energy functions and applications, absolute temperature scale, thermochemical equations.

Buffers: Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity.

UNIT-IV.

Kinetics: General considerations and concepts, law of mass action, rate and order of reaction, molecularity of reaction, study of zero, pseudo zero and first order kinetics, half-life determination, determination of order of reaction.

Drug Stability: Physical degradation of drugs, chemical decomposition of drugs – modes and preventive measures, influence of temperature, light, solvent, catalytic species and other factors on reaction rate. Stability testing of dosage forms by conventional Arrhenius approach.

Books Recommended:

1. Martin A, Bustamante P, Chun AHC. Physical Pharmacy. New Delhi: B. I. Waverly Pvt. Ltd.
2. Brey WS. Physical Chemistry and Biological Applications. London: Academic Press.
3. Shoemaker DP, Garland CW. Experiments in Physical Chemistry. New York: McGraw Hill.
4. Subramanyam CVS. Principles of Physical Pharmacy. New Delhi: Vallabh Prakashan.
5. Subramanyam CVS. Text book of Physical Pharmacy. New Delhi: Vallabh Prakashan.

BP- 203 ANATOMY, PHYSIOLOGY AND PATHOPHYSIOLOGY - II

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

UNIT-I

Digestive System: Gross anatomy of the gastro-intestinal tract, functions of its different parts including those of liver, pancreas and gall bladder, various gastrointestinal secretions and their role in the absorption and digestion of food, Disorders of digestive system. **Respiratory System:** Anatomy of respiratory organs and its functions, respiration, mechanism and regulation of respiration, respiratory volumes and vital capacity.

UNIT-II

Central Nervous System: Functions of different parts of brain and spinal cord. Neurohumoral transmission in the central nervous system, reflex action electroencephalogram, specialized functions of the brain, Cranial nerves and their functions.

Autonomic Nervous System: Physiology and functions of the autonomic nervous system. Mechanism of neurohumoral transmission in the ANS.

Sense Organs: Basic anatomy and physiology of the eye (vision), ear (hearing), taste buds, nose (smell) and skin (superficial receptors).

UNIT-III

Urinary System: Various parts, structures and functions of the kidney and urinary tract, Physiology of urine formation and acid-base balance, Diseases of the urinary system.

Reproductive System: Male and female reproductive systems and their hormones, physiology of menstruation, coitus and fertilization, Spermatogenesis and oogenesis, Pregnancy, its maintenance and parturition.

Endocrine System: Basic anatomy and physiology of Pituitary, Thyroid, Parathyroid. Adrenals, Pancreas, Testes and ovary, their hormones and functions.

UNIT-IV

Health Education: Classification of food requirements: Balanced diet, nutritional deficiency disorders, their treatment and prevention, specifications for drinking water.

Family planning: Medical termination of pregnancy.

Communicable diseases: Brief outline, causative agents, modes of transmission and prevention of Chicken pox, diphtheria, tuberculosis, poliomyelitis, malaria, filariasis, rabies, tetanus, leprosy, syphilis, gonorrhoea, and AIDS.

First aid: Emergency treatment of shock, snake bites, burns, poisoning, and resuscitation methods.

Reference Book

1. Tortora GJ, Derrickson B. Principles of Anatomy and Physiology. New York: John Wiley & Sons.
2. Ross and Wilson.Anatomy and Physiology in Health and Illness. Sydney: Churchill Livingstone.
3. Guyton AC, Hall JE. Textbook of Medical Physiology. New York: WB Sanders Co.
4. Difore SH. Atlas of Normal Histology. Philadelphia: Lea and Febiger.

Text Book

1. Chatterjee CC. Human Physiology, Calcutta: Medical Allied Agency.
2. Ghai CL. Textbook of Practical Physiology. New Delhi: Jay Pee Brothers.
3. Vander AJ, Sherman JH, Lucians DS. Human Physiology. New Delhi: Tata McGraw Hill.

BP 204 PHARMACOGNOSY - I

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

UNIT-I

Introduction: Definition, history, scope and development of Pharmacognosy. Introduction to plant parts and tissue: Definition and function of leaf, stem, root, flower, fruits and seed, modification of leaf, stem and root.

Definition, classification and function of plant tissues.

UNIT-II

Microscopy: Study of Plant cell and its components, various tools used in microscopy (microscopes, micrometers, camera lucida, microphotography), Details of mountants, clearing agents, chemo-microscopic reagents.

Microscopic difference between Monocot and Dicot leaf, stem and root.

Sources of Drugs: Biological, marine, mineral and plant tissue culture as source of drugs.

UNIT-III

Classification of Drugs: Alphabetical, morphological, taxonomical, chemical and pharmacological classification of crude drugs.

Cultivation, Collection, Processing and Storage of Crude Drugs: Factors influencing cultivation of medicinal plants. Pest management and natural pest control agents. Plant hormones and their applications. Polyploidy, mutation and hybridization with reference to medicinal plants.

UNIT-IV

Plant Taxonomy: Study of the following families of plants, with examples of medicinally or economically important plants, Apocynaceae (Vinca, Kurchi) Solanaceae (Datura, Withania),

Rutaceae (Orange peel, Lemon peel) Umbellifereae (Coriander, Fennel), Liliaceae (Aloevera, Lahsun), Zingiberaceae (Curcuma, Ginger).

Text Book:

1. Indian Herbal Pharmacopoeia. Vol. I & II. New Delhi: ICMR & RRL.
2. Quality Standards of Indian Medicinal Plants. New Delhi: ICMR.

Reference Book

1. Trease GE, Evans WC. Pharmacognosy. UK: Baillier & Tindall.
2. Wallis TE. Analytical Microscopy. London: J and A Churchill Ltd.
3. Handa SS and K. K. Kapoor,, Textbook of Pharmacognosy, New Delhi, Vallabh Prakashan.
4. Medicinal Plants of India. New Delhi: ICMR

BP - 205: MATHEMATICS & BIOSTATISTICS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

UNIT-I

Matrices: Matrices, Types of matrices, Addition of matrices, Subtraction and multiplication of matrices, Transpose of matrix, Adjoint of matrix, Inverse of matrix, Unit matrix, solution of systems of linear equations by matrix method.

Functions, Limit and Continuity: Type of functions, domain and range of a function, limit of a function, properties of limits, evaluation of limit of a function, continuity of a function at a point, Types of Discontinuity

UNIT-II

Differentiation: Definition of Derivatives, formation of Derivatives, Law of derivatives, Delta method, chain rule, repeated derivatives, derivative of implicit functions and explicit functions.

Biometrics: Data collection, Random and non-random sampling methods, significant digits and rounding of numbers; Measures of central tendency (mean, mode, median), Histograms.

UNIT-III

Measures of Dispersion: Methods of studying variation (range, quadratic deviation, mean deviation, standard deviation), Coefficient of variation, confidence limits.

Measurement of Skewness: Karl Pearson's coefficient of skewness, Bowley's coefficient of skewness, Kelly's coefficient of skewness.

UNIT-IV

Correlation Analysis: Types of correlation, Methods of studying correlation.
Regression Analysis : Regression lines, regression equations.

Test of Hypothesis: Setting of hypotheses (test for successes) Test for hypothesis, standard error and sampling distribution estimation, test of significance for large and small samples. Chi square test, t-test, F- test and analysis of variance.

Text Book

1. Gupta SP. Statistical Methods. New Delhi: Sultan Publications.
2. Walia R. "Spectrum; Statistical Analysis Methods". Sharma Publication, Jalandhar Punjab.

Reference Book

1. Bolton S. Pharmaceutical Statistics: Practical and Clinical Applications. New York: Informa Healthcare.
2. Meier PC, Zund RE. Statistical Methods in Analytical Chemistry. Wiley-Interscience.
3. Sundar Rao PSS, Richard J. An Introduction to Biostatistics: A Manual for Students in Health Sciences. New Delhi: Prentice-Hall.

HS - 103: DISASTER MANAGEMENT

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

UNIT I

Introduction: Principles of Disaster Management. Natural Disasters such as Earthquake, Floods, Fire, Landslides, Tornado, Cyclones, Tsunamis, Nuclear, Chemical. Assessment of Disaster Vulnerability of a location and vulnerable groups, National policy on disaster Management.

UNIT II

Prevention, Preparedness and Mitigation measures for various Disasters, Post Disaster Relief & Logistics Management, Emergency Support Functions and their coordination mechanism, Resource & Material Management, Management of Relief Camp, Information systems & decision making tools.

UNIT III

Renewable and non-renewable resources, Role of individual in conservation of natural resources for sustainable life styles. Use and over exploitation of Forest resources, Deforestation, Timber extraction, Mining, Dams and their effects on forest and tribal people.

UNIT IV

Global Environmental crisis, Current global environment issues, Global Warming, Greenhouse Effect, role of Carbon Dioxide and Methane, Ozone Problem, CFC's and Alternatives, Causes of Climate Change Energy Use: Past, present and future, Role of Engineers.

Text Books:

1. Disaster Management By G. K. Ghosh A. P. H. Publishing Corporation.
2. Environmental Studies, R Rajgopalan, Oxford University Press

Reference Books:

1. Disaster Management By B Narayan A. P. H. Publishing Corporation.
2. Environmental Studies, Basak, Pearson Publication.
3. Satish M. Citizen's guide to disaster management. New Delhi: Macmillan Publishers.
4. Duggal KN. Elements of public health engineering. New Delhi: S Chand & Co.
5. Trivedi RK, Goel PK. Introduction to air pollution. Hyderabad: BS Publications.
6. Rao CS. Environmental pollution control engineering. New Delhi: Wiley Eastern.

BP 211 - PHARMACEUTICAL CHEMISTRY-II LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	4	2	50	50	100	3 hours

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs / Week)

1. To carry out the synthesis of Benzoin and calculate its percentage yield and melting point.
2. To carry out the synthesis of Anthraquinone and calculate its percentage yield and melting point.
3. To carry out the synthesis of β- naphthyl benzoate and calculate its percentage yield and melting point.
4. To carry out the synthesis of Benzyl alcohol and Benzoic acid and calculate its percentage yield and melting point.
5. To identify the given organic compound (a carbohydrate).
6. To identify the given organic compound (an aldehyde).
7. To identify the given organic compound (a ketone).
8. To identify the given organic compound (an alcohol).
9. To identify the given organic compound (an amine).
10. To identify the given organic compound (a phenol).

BP-212: PHYSICAL PHARMACY- I LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. Determination surface tension of liquid by drop weight method
2. Determination of viscosity of liquids using Ostwald's viscometer.
3. To prepare various concentrations of acetate buffer and compare theoretical pH values (using Henderson Hasselbalch equation) with experimental values (using pH meter).
4. To determine the solubility of benzoic acid at different temperature and report molar heat of fusion.
5. To determine solubities of three liquids co-existing together (Co-solvency Effect).
6. Determination of refractive index of liquid and also to study the variation of refractive index with the variation in the composition of a binary mix (Benzene in carbon tetra chloride)
7. Determination of specific rotation of a given sugar solution and also report the percent w/v composition of given solution using polarimeter.
8. Determination of partition coefficient of benzoic acid between benzene and water
9. Determination of shelf life using accelerated stability studies
10. Determination of rate constant for first order reactions.
11. Determination of rate constant for second order reactions
12. Determination of Critical solution temperature of Phenol water system and to determine effect of addition of electrolyte on CST of phenol- water system.

BP 213: ANATOMY, PHYSIOLOGY AND PATHOPHYSIOLOGY - II LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs / Week)

1. To carry out physical examination of urine sample
2. To carry out qualitative analysis of urine sample for the normal constituents.
3. To carry out qualitative analysis of urine sample for the abnormal constituents
4. To study the anatomy and physiology of human digestive system
5. To study the anatomy and physiology of human central nervous system
6. To study the anatomy and physiology of human urinary system
7. To study the anatomy and physiology of human reproductive system
8. To study the anatomy and physiology of human endocrine system
9. To study the Histology of various normal and abnormal tissue
10. To determine the vital capacity of human body by using spirometer

BP- 214: PHARMACOGNOSY - I LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (2 Hrs/ Week)

1. Types, care and use of microscopes.
2. To study microscopy of Monocot and Dicot Stem.
3. To study microscopy of Monocot and Dicot Leaf.
4. To study microscopy of Monocot and Dicot Root.
5. To study the various parts of flower.
6. Microscopic measurements of Starch grains.
7. Microscopic measurements of Pholem fibre.
8. To perform Quantitative microscopy (lycopodium spore method).
9. To Study Morphological characteristics of following plant families mentioned in theory:
   a) Coriander and fennel
   b) Vinca and Kurchi
   c) Lahsun and aloe
   d) Orange peel and lemon peel
   e) Curcuma and ginger
10. Determination of leaf constants such as stomatal index and stomatal number.
11. Determination of leaf constants such as s vein-islet number and vein-termination number.

3RD SEMESTERDETAILED SYLLABUS

BP 301 -PHARMACEUTICAL CHEMISTRY-III (HETEROCYCLIC AND ORGANIC CHEMISTRY)

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

Stereochemistry: Isomerism and nomenclature and associated physicochemical properties, optical activity, stereoisomerism, specification of configuration, Reactions involving stereoisomers, chirality, chiral reagents, conformations.

Reaction Mechanisms: Addition reactions, Elimination reactions, Substitution reactions (nucleophilic and electrophilic substitutions).

UNIT-II

Pericyclic Reactions: Cycloaddition and Sigmatropic reactions, Electrocyclic reactions, Orbital symmetry rules.

α-β- Unsaturated Carbonyl Compounds.

Structure and properties, preparation, interaction of functional groups, electrophilic and nucleophilic addition, Michael addition, the Diels-Alder reaction, chemistry of ethyl acetate and malonic acid esters**.**

UNIT-III

Heterocyclic Compounds: Chemistry, preparations and properties of some important heterocyclics containing 5 & 6 atoms with one or two heteroatoms like O, N, S.

Carbohydrates: Classification, structure, physical properties, chemical reactions. Synthesis and inter conversions of monosaccharide's.

UNIT-IV

Lipids: Classification, physical properties and chemical reactions of lipids.

Proteins: Classification, structure and chemical reactions.

Nucleic Acids: Classification, structure and chemical reactions of nucleic acids. Nucleotides and nucleosides.

Books Recommended

1. Mann FC, Saunders BC. Practical Organic Chemistry. London: ELBS/ Longman.
2. Morrison TR, Boyd RN. Organic Chemistry. New Delhi: Prentice Hall India.
3. Vogel AI. Textbook of Practical Organic Chemistry. London: ELBS/ Longman.
4. Eliel EL. Stereochemistry of Organic Compounds. New York: McGraw Hill.
5. Finar IL. Organic Chemistry. Vol. I & II. London: ELBS/Longman.
6. Sykes PA. Guidebook to Mechanisms in Organic Chemistry. Hyderabad: Orient Longman.

BP 302 -PHARMACEUTICS-II (UNIT OPERATION-I)

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 3 Hrs /Week)

UNIT-I

Introduction: Unit processes, material and energy balances, units and their conversions, dimensional formulae, dimensionless equations

Fluid Flow: Types of flow, Reynold's number, Viscosity, Concept of boundary layer, basic equations of fluid flow, valves, flow meters, manometers and measurement of flow and pressure.

UNIT-II

Filtration and Centrifugation: Study of Poiseuille's equation, Kozeny-Carman equation, Darcy's equation, filter aids and filter media. Construction and working of filter press, filter leaf, meta filter, drum filter, sintered glass filter, seitz filter, and candle filter. Theory and principle of centrifugation, industrial centrifuges - basket, super, and conical disk centrifuges.

Material of Construction: General study of Properties and applications of the materials of construction with special reference to stainless steel, plastic and glass.

UNIT-III

Crystallization: Definition, characteristics, crystal forms, crystal habits, mechanism of crystallization, solubility curves, Mier's super-saturation theory, construction and working of agitated batch crystallizer, Swenson-Walker crystallizer, Krystal crystallizer and vacuum crystallizer. Caking of crystals and its prevention.

Dehumidification and Humidity Control: Definition of humidity, humid heat, humid volume, study of psychrometric charts, wet bulb theory. Applications of humidity, control inpharmaceuticals. **Refrigeration and Air Conditioning:** Principle and applications of refrigeration and air conditioning.

UNIT-IV

Material Handling Systems: Liquid handling - Different types of pumps; Gas handling-Various types of fans, blowers and compressors; Solid handling-Bins, Bunkers, Conveyors, Air transport.

Ion exchange: Mechanisms, ion exchange resins, preparation and applications of ion exchange resins. Ion exchange equipment – Fixed bed ion exchange equipment, moving bed ion exchange equipment, fluidized bed ion exchange equipment.

Books Recommended

Note: Recent editions of the following books to be referred

1. Badger WL, Banchero JT. Introduction to Chemical Engineering. London: McGraw Hill.
2. McCabe WL, Smith JC, Harriolt P. Unit Operations of Chemical Engineering. London: McGrawHill.
3. Subrahmanyam CVS. Pharmaceutical Engineering. New Delhi: Vallabh Prakashan.
4. Carter SJ. Cooper and Gunn's Tutorial Pharmacy. New Delhi: CBS Publishers.
5. Brown CG. Unit Operations (Indian Ed.). New Delhi: CBS Publishers.
6. Bhatt ND, Panchal VM. Machine Drawing. Anand: Charocar Publishing House.

BP 303 - PHARMACEUTICS III (HOSPITAL & COMMUNITY PHARMACY)

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 3 Hrs /Week)

UNIT-I

Organization and Structure: Organization of a hospital and hospital pharmacy, Responsibilities of pharmacist, Pharmacy and therapeutic committee, Budget preparation and Implementation.

Hospital Formulary: Contents, preparation and revision of hospital formulary.

UNIT-II

Drug Store Management and Inventory Control: Organization of drug store, Types of materials stocked, storage conditions, Purchase and Inventory Control principles, purchase procedures, Purchase order, procurement and stocking.

Drug distribution Systems in Hospitals: Out-patient dispensing - methods adopted, Dispensing of drugs to in-patients, Types of drug distribution systems, Charging policy, labeling, Dispensing of drugs to ambulatory patients, Dispensing of controlled drugs.

UNIT-III

Central Sterile Supply Unit and Its Management: Types of materials for sterilization, packing of materials prior to sterilization, sterilization equipments, Supply of sterile materials.

Drug Information Services: Sources of Information on drugs, disease, treatment schedules, procurement of information, Computerized services (e.g., MEDLINE), Retrieval of information, Medication error.

UNIT-IV

Records and Reports: Prescription filling, drug profile, patient medication profile, cases on drug interaction and adverse reactions, idiosyncratic cases etc.

Nuclear Pharmacy: Introduction to Radio- pharmaceuticals, radio-active half-life, Units of radioactivity Production & Dispensing of radio-pharmaceuticals, methods of isotopic tagging, preparation of radioisotopes in laboratory using radiation dosimetry, radio-isotope generators, Permissible radiation dose level, Radiation hazards and their prevention, specifications for radio-active laboratory.

Books Recommended

Note: Recent editions of the following books to be referred

1. Hassan WE. Hospital Pharmacy. Philadelphia: Lea & Febiger.
2. Remington's: The Science and Practice of Pharmacy.Easton (PA): Mack Publishing Co.
3. Turco S, King RE. Sterile Dosage Forms. Philadelphia: Lea & Febiger.
4. Allwodd MC, Fell JT. Textbook of Hospital Pharmacy. Oxford: Blackwell.
5. Chittion HM, Witcofski RL. Nuclear Pharmacy. Philadelphia: Lea & Febiger.

BP 304 - PATHOPHYSIOLOGY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 3 Hrs / Week)

Note: In pathophysiology of different diseases, the molecular basis should be discussed, wherever applicable.

UNIT-I

Basic Principles of Cell Injury and Adaptation: Definition of pathology, health and disease. Terminologies used in pathology. Basic principles of cell injury and adaptation: Causes, pathogenesis and morphology of cell injury, Cellular adaptation's-physiologic and pathologic adaptations, Cellular ageing and death. Free radicals, Antioxidant enzymes-superoxide dismutase, catalase and glutathione peroxidase, Malondialdehyde.

UNIT-II

Basic Mechanisms Involved in Inflammation and Repair: Definition, causes, signs, types of inflammation and chemical-mediators. Pathogenesis of acute inflammation (vascular events, Cellular events, transdate, exudate, edema, phagocytosis). Pathogenesis of chronic-inflammation and difference between acute and chronic inflammation. Tissue renewal and repair: regeneration healing and fibrosis. Wound healing: process of wound healing, types of cells, factors influencing healing of wounds.

UNIT-III

Pathophysiology (etiology, pathogenesis, sign &symptoms) of following disorders

CNS Disorders: Epilepsy, psychosis, depression**, CVS:** Hypertension, angina, congestive heart failure, atherosclerosis, myocardial infarction and different types of anemia's, **Endocrine:** Diabetes, thyroid disorders**, GIT:** Peptic ulcer, ulcerative colitis, hepatic disorders**, Joint:** Rheumatoid arthritis, gout, **Urinogenital:** Acute and chronic renal failure, urinary tract infections, sexually transmitted diseases,**Neoplasms:** Common types of neoplasm's, **Respiratory Diseases:** Asthma and tuberculosis.

UNIT-IV

Hypersensitivity: Hypersensitivity type I, II, III, IV. Biological significance of hypersensitivity. Allergy due to food, chemicals and drugs. **Auto-immunity**: Brief introduction to concept of immunity, Mechanism of Autoimmunity. Classification of autoimmune diseases in man. Transplantation rejection (types and mechanisms). Acquired Immune Deficiency Syndrome (AIDS), Amyloidosis**.**

Books Recommended

Note: Recent editions of the following books to be referred

1. Cotran RS, Kumar V, Collins T. Robbins' Pathological Basis of Disease.
2. Gennaro A. Remington's: The Science and Practice of Pharmacy. Pennsylvania: Mack Publishing.
3. Wilson JD. Harrison's Principles of Internal Medicine. New York: McGraw Hill.
4. Dipiro JT. Pharmacotherapy. A Pathological Approach. Stanford: Appleton & Lange.
5. Gilman AG, Goodman LS, Rall TW, Murad F. The Pharmacological Basis of Therapeutics. New York: McMillan.

BP 305 - PHARMACOGNOSY-II

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40Hrs: 3 Hrs / Week)

UNIT-I

Adulteration: Adulteration of crude drugs and their detection by organoleptic, microscopic, physical, chemical and biological methods of evaluation

Phytoconstituents of Medicinal Importance: Introduction, classification, chemical tests of alkaloids, terpenoids and glycosides.

UNIT-II

Carbohydrates and Derived Products: Introduction& Classification and identification test of carbohydrate. Detailed study of following drugs:

- **Monosaccharide:** Honey
- **Polysaccharides:** Starch,
- **Gums and Mucilage:** Agar, Isabgol, Guar gum, Acacia, Tragacanth,
- **Carbohydrate derivatives:** Chitin and Pectin

Lipids: Introduction & Classification and identification test of Lipids. Detailed study of following drugs:

- **Fixed oil:** Castor oil, Linseed oil, Mustard oil, Rice bran oil, Cod liver oil
- **Fat:** Cocoa butter, Kokum butter
- **Wax:** Beeswax, Wool fat

UNIT-III

Tannins: Introduction & Classification and identification test of Tannins Detailed study of following drugs:

- **Hydrolysable:** Harde, Bahera, Galls
- **Condensed:** Pale catechu, Black catechu, Ashoka and Arjuna

Pharmacopoeial Studies: British Herbal Pharmacopoeia, Ayurvedic Pharmacopoeia of India, Indian Herbal Pharmacopoeia

UNIT-IV

Pharmaceutical Aids: Introduction, Detailed study of Talc, diatomite, kaolin, bentonite, gelatin and natural colours.

Fibres: Introduction,DetailedStudy of fibres used in pharmacy such as cotton, silk, wool, nylon, glass wool, polyester and asbestos.

Books Recommended

Note: Recent editions of the following books to be referred

1. Harborne JB. Phytochemical Methods. London: Chapman & Hall.
2. Trease GE, Evans WC. Pharmacognosy. UK: Baillier&Tindall.
3. Wallis TE. Textbook of Pharmacognosy. London: J & A Churchill Ltd.
4. Kokate CK. Practical Pharmacognosy. New Delhi: VallabhPrakashan.
5. Iyengar MA. Pharmacognosy of Powdered Crude Drugs.Manipal.

BP 306: -PHARMACEUTICAL ANALYSIS-I

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

Introduction: Significance of quantitative analysis in quality control, Different techniques of analysis, Preliminaries and definitions.

Volumetric Analysis: Fundamentals of volumetric analysis, methods of expressing concentration, primary and secondary standards. Significant figures, Rules for retaining significant digits, types of errors, Mean, Standard deviation, Statistical Treatment of small data sets, Selection of sample, Precision and accuracy.

UNIT-II

Acid Base Titrations: Concept of acid-base, Role of solvent, Ionization, Law of mass action, Ionic product of water, pH, Relative strengths of acids and bases, Common-ion effect, Hydrolysis of salts.

Buffers and Indicators: Buffer solutions, Henderson-Hasselbalch equation, Neutralization curves, Acid-base indicators, Theory of indicators, Choice of indicators, Mixed indicators, Polyprotic system, Polyamine and amino acid systems, Amino acid titration, assay of Phosphoric acid, Sodium Hydroxide, calcium carbonate etc.

UNIT-III

Iodometry, Iodimetry and Electrochemical Techniques: Cell representations, Measurement of electrode potential, Oxidation-reduction curves, Iodimetry and Iodometry, Titrations involving ceric sulphate, potassium iodate, potassium bromate, potassium permanganate; titanouschloride and Sodium 2, 6-dichlorophenol indophenol.

Precipitation Titrations: Precipitation reactions, Solubility products, Effects of acids, temperature and solvent upon the solubility of a precipitate. Argentometric titrations and

titrations involving ammonium or potassiumthiocyanate, mercuric nitrate, and barium sulphate indicators, Gay-Lussac method; Mohr's method, Volhard's method and Fajan's method.

UNIT-IV

Oxidation-Reduction Titrations: Concepts of Oxidation and reduction, Redox reactions, Strengths and equivalent weights of oxidizing and reducing agents, Theory of Redox titrations, Redox indicators.

Gravimetric Analysis: Precipitation techniques, Solubility products; the colloidal state, Supersaturation coprecipitation, Post-precipitation, Digestional washing of the precipitate, Filtration, Filter papers and crucibles, Ignition, Thermogravimetric curves, Specific examples like barium sulphate, aluminium as aluminium oxide, calcium as calcium oxalate and magnesium as magnesium pyrophosphate, Organic precipitants.

Books Recommended

Note: Recent editions of the following books to be referred

1. Beckett AH, Stenlake JB. Practical Pharmaceutical Chemistry, London: Athilone Press.
2. Jeffery GH, Bessett J, Mendham J, Denney RC. Vogel's Textbook of Quantitative Inorganic Analysis including Elementary Instrumental Analysis. London: ELBS and Longman.
3. Atherden LM. Bentley and Driver's Textbook of Pharmaceutical Chemistry. New Delhi: Oxford University Press.
4. Gary DC. Analytical Chemistry. New York: John Wiley and Sons.
5. Connors KA. Textbook of Pharmaceutical Analysis. New York: John Wiley and Sons.
6. Kalthoff IM, Stenger VA. Volumetric Analysis – Titration Methods. Vol.2. New York: Wiley Interscience.
7. Indian Pharmacopoeia. Ghaziabad: The Indian Pharmacopoeia Commission.

BP 311- PHARMACEUTICAL CHEMISTRY-III (HETEROCYCLIC & ORGANIC CHEMISTRY) LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing Practical's assigned by the examiner

b. Viva-voce examination

c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practical's performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To carry out synthesis of barbituric acid from diethyl malonate.
2. To carry out synthesis of benzanilide from aniline and benzoyl chloride.
3. To determine the physicochemical constants for oils / fats.
4. To prepare stereo-models of isomeric compounds. .
5. To assign *R* and *S* configuration by making use of stereo-models.
6. To perform the synthesis of glucosazone from glucose.
7. To perform the synthesis of anthraquinone from anthracene.
8. To identify the given unknown organic compounds (A).
9. To identify the given unknown organic compounds (B)
10. To identify the given unknown organic compounds (C)

BP 312- PHARMACEUTICS-II – (UNIT OPERATION-I) LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To learn about the various terms used in unit operations.
2. To study the various factors on the rate of filtration using calcium carbonate suspension.
3. To study the effect of various filter aids on the rate of filtration and report& to study the specific cake & filter medium resistance.
4. To study the influence of centrifugal effect in separating the oil phase of freshly prepared turpentine liniment emulsion IP.
5. To find out the rate of crystal growth in the given solution
6. To determine the absolute humidity, adiabatic saturated humidity, percentage relative humidity, humid heat, humid volume and dew point by using psychometric chart.
7. To determine the humidity of the air by dew point method.
8. To determine the water vapor permeability across the given packaging material.
9. To determine the leaching of contents from glass containers used for packaging parenterals by performing hydrolytic resistance test.
10. To prepare and study crystal habits using various techniques.

BP 313- PHARMACEUTICS-III--(HOSPITAL & COMMUNITY PHARMACY) LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To sterilize the various surgical equipments using dry heat sterilization.
2. To sterilize the surgical dressings, Rubber gloves and rubber closures using wet heat sterilization.
3. To prepare five ampoules of water for injection I.P.
4. To prepare 50 ml of 5% Dextrose solution and sterilize it by filtration method.
5. To prepare 50 ml of normal saline for injection I.P.
6. To study various equipments, material, and clothing used in aseptic techniques.
7. To find out the percentage variation in length and width of given sample of bandage.
8. To perform thread count for given sample of dressing/gauge.
9. To prepare the drug profile of Paracetamol/Given sample of drug.
10. To prepare the patient medication profile.

BP 314- PHARMACOGNOSY-II LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing a practical exercises assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practical performed / project executed by the candidate related to the paper during the course of the semester.

List of Experiments (3 Hrs/ Week)

Note: Minimum of 10 experiments to be carried out

1. To perform the chemical tests for Carbohydrates.
2. To study morphology of Isabgol.
3. To study microscopy of Ashokaand Arjuna
4. To perform microscopy of Maize, Wheat, Potato and Rice starch.
5. To study morphology of Castor oil/ Cod Liver oil.
6. To study morphology of Cocoa butter/ Kokum butter/ Beeswax.
7. To determine the stomatal number and stomatal index of leaf.
8. To perform chemical tests forTannins.
9. To study morphology and chemical tests of Talc/ Kaolin/ Bentonite.
10. To study chemical tests and microscopy of Cotton/ Silk/ Wool/ Nylon.
11. To study morphology of Harde and Bahera.
12. To study morphology of Pale catechu and Black catechu.
13. To study morphology of Ashoka and Arjuna.

BP 315:- PHARMACEUTICAL ANALYSIS-I LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner

b. Viva-voce examination

c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To perform the calibration of analytical weights and volumetric apparatus.
2. To prepare 1 N oxalic acid solution.
3. To prepare1 N sodium hydroxide solution and its standardization.
4. To prepare and standardize 1 N *hydrochloric acid* solution.
5. To prepare acidic and basic solution of 1 N potassium permanganate.
6. To determine the normality of ferrous salt solution by redox titration.
7. To determine normality of sodium thiosulphate solution by Iodometric method.
8. To perform standardization of silver nitrate solution by Mohr's method.
9. To perform standardization of ammonium thiocyanate solution by silver nitrate.
10. To determine the barium in barium chloride gravimetric method.
11. To estimate the water of crystallization in barium chloride.

4TH SEMESTER DETAILED SYLLABUS

BP 401 -HUMAN VALUES & PROFESSIONAL ETHICS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
2	1	0	3	40	60	100	3 hours

Note: The question paper shall consist of five units as per the syllabus. The paper setter will set two questions from each Section/Unit. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12 marks.

Objectives:

- To enable students to explore the purpose of value education.
- To understand the purpose of harmony with oneself, family, society and nature.

UNIT I

Introduction –Need and Basic Guidelines

- Understanding the need , basic guidelines, content and process of value Education
- Self-Exploration – purpose, content and process, 'Natural Acceptance' and Experiential Validation – as the mechanism for self-explanation.

UNIT II

Process for Value Education

- Continuous Happiness and Prosperity – A look at basic Human Aspirations.
- Right Understanding, Relationship and Physical Facilities – basic requirements for fulfillment of aspirations of every human being with their correct priority
- Understanding Happiness and prosperity – A critical appraisal of the current scenario.
- Method to fulfill the human aspirations; understanding and living in harmony at various levels

UNIT III

Harmony in Human Beings

1. Understanding human being as a co-existence of the self and the body.
2. Understanding the needs of Self ('I') and 'Body' – Sukh and Suvidha.
3. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)

UNIT IV

Harmony in Myself and body

- Understanding the characteristics and activities of 'I' and harmony in 'I'

- Understanding the harmony of I with the Body: Sanyam and Swasthya: correct appraisal of Physical needs, meaning of Prosperity in detail.

UNIT V

Harmony in Family, Society and Nature

- Understanding harmony in the family, society and nature.
- Understanding values in human relationship; meaning of Nyaya and Program for its fulfillment to ensure Ubhay-tripti.
- Trust (Vishwas) and Respect (Samman) as the foundational values of relationship.

Text Books

1. R R Gaur, RSangal and GP Bagaria, A Foundation Course in value Education, Published by Excel Books (2009).
2. R R Gaur, R Sangal and G P Bagaria, Teacher's Manual (English), 2009.

Reference Books

1. E.F. Schumacher, Small is Beautiful; a study of economics as if people mattered, Blond & Briggs, Bratain, 1973.
2. PL Dhar, RR Gaur, Science and Humanism, common wealth publishers, 1990.
3. A.N. Tripathy, Human values, New Age International Publishers, 2003.
4. E.G. Seebauer& Robert, L BERRY, Foundational of Ethics for Scientists &Engineers, Oxford University Press, 2000.
5. M. Govindrajran, S.Natrajan& V.S. Senthi Kumar, Engineering Ethics (including human Values), Eastern Economy Edition, Prentice hall of India Ltd.
6. B.L. Bajpai, 2004, Indian Ethos and Modern Management, New Royal book Co; Lucknow, 2004, Reprinted 2008.

BP 402 - PHYSICAL PHARMACY-II

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

Surface and Interfacial Phenomenon: Liquid interface, surface and interfacial tensions, surface free energy, measurement of surface and interfacial tensions, spreading coefficient, adsorption at liquid interfaces, surface active agents, concept of HLB, solubilization, detergency, adsorption at solid interfaces, solid-gas and solid-liquid interfaces, complex films, electrical properties of interface.

Viscosity and Rheology: Newtonian systems, Law of flow, kinematic viscosity, effect of temperature; Non-Newtonian systems: plastic, pseudoplastic, dilatant; thixotropy, thixotropic systems in formulation, determination of viscosity;Viscometers: capillary, falling sphere, rotational.

UNIT-II

Colloidal Dispersions: Definition, types, properties of colloids, protective colloids, applications of colloids in pharmacy.

Complexation : Types of complexes, metal complexes, organic molecular complexes, inclusion compounds, methods of analysis of complex

UNIT-III

Suspensions and Emulsions: Interfacial properties of suspended particles, settling in suspensions, theory of sedimentation, effect of Brownian movement, sedimentation parameters, wetting of particles, controlled flocculation, flocculation in structured vehicles, sedimentation behavior of flocculated suspensions, rheological considerations; Emulsions-types, theories,physical stability.

UNIT-IV

Micromeretics and Powder Rheology: Particle size and distribution, average particle size,

number and weight distribution, particle number, methods for determining particle size: optical microscopy, sieving, sedimentation, measurement of particle volume, specific surface, methods of determining surface area: permeability, adsorption, Derived properties of powders: porosity, packing arrangement, densities, bulkiness and flow properties.

Analytical techniques: Brief introduction and applications of newer analytical techniques – DSC, SEM, TEM.

Books Recommended

Note: Recent editions of the following books to be referred

1. Martin A, Cammarata A, Swarbrick J. Physical Pharmacy. Mumbai: Varghese & Co.
2. Martin A, Bustamante P, Chun AHC. Physical Pharmacy.4th Edition. New Delhi: BI Waverley Ltd.
3. Shotton E, Ridgaway K. Physical Pharmaceutics. London: Oxford University Press.
4. Subhramanyam. C.V.S. Textbook of Physical Pharmaceutics.VallabhPrakashan, New Delhi.
5. Gennaro AR. Remington's Pharmaceutical Sciences. Pennsylvania: Mack Publishing Co.

BP 403 - PHARMACEUTICS-IV (PHARMACEUTICAL TECHNOLOGY-I)

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

Preformulation: Introduction to preformulation, Study of physicochemical characteristics of drug substances. Application of preformulation considerations in the development of solid, liquid oral and parenteral dosage forms.

Stability: Stability testing of various pharmaceutical products as per ICH Guidelines.Brief study on stability guidelines of WHO and USFDA.

UNIT-II

Liquid Dosage Forms: Formulation and manufacturing considerations. Filling and packaging methods.

Extraction and Galenical Products: Principle and method of extraction, preparation of infusion,tinctures, dry and soft liquid extracts.

UNIT-III

Semisolid Dosage Forms: Definition, types, mechanisms of drug penetration, factors influencing penetration, semisolid bases and their selection. Formulation aspects of ointments, suppositories and pastes their evaluation and packaging.

Blood Products and Plasma Substitutes: Collection, processing and storage of whole human blood, concentrated human RBCs, dried human plasma, human fibrinogen, human thrombin, human normal immunoglobulin, human fibrin, foam plasma substitutes -ideal requirements, properties of plasma substitutes like PVP, dextran, etc.

UNIT-IV

Pharmaceutical Aerosols: Definition, propellants, general formulation, manufacturing' and packaging methods, pharmaceutical applications.

Surgical Products: Definition, primary wound dressing, absorbents, surgical cotton, surgical gauzes etc., bandages, adhesive tape, protective cellulosic hemostastics, official dressings, absorbable and nonabsorbable sutures, ligatures and catguts. Medical prosthetics and organ replacement materials.

Books Recommended

Note: Recent editions of the following books to be referred

1. Aulton ME. Pharmaceutics-The Science of Dosage Form Design. London: ELBS/Churchill Livingstone.
2. Lachman L, Lieberman HA, Kanig JL. The Theory and Practice of Industrial Pharmacy. Philadelphia: Lea &Febiger.
3. Ansel HC. Introduction to Pharmaceutical Dosage Forms. Mumbai: Verghese & Co.
4. Banker GS, Rhodes CT. Modern Pharmaceutics. New York: Marcel Dekker.
5. Jellinek JS. Formulation and Function of Cosmetics. New York: John Wiley & Sons.
6. Rawlins EA. Bentley's Textbook of Pharmaceutics. London: ELBS.
7. Thomssen SG. Modern Cosmetics, Mumbai: Universal Publishing.

BP 404 :- PHARMACEUTICAL ANALYSIS-II

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

Non-aqueous Titrations: Theoretical considerations, scope and limitations, Acid base equilibria in non-aqueous media, titration of weak bases, titration of weak acids, indicators (Note: Pharmaceutical products should be selected for illustrating application in drug analysis and quality control).

Complexometric Titrations: Concept of complexation and chelations, Werner's coordination number, electronic structure of some complex ions, stability constants, titration curves, masking anddemasking agents, types of complexometric titrations, metal ion indicators and application in drug analysis.

UNIT-II

Miscellaneous Methods of Analysis: Diazotisation titrations, Kjeldahl method of nitrogen estimation, Karl-Fischer titration, Oxygen flask combustion.

Potentiometry: Theoretical consideration, ion-selective electrodes, measurement of potential, location of the end-point, instrumentation, analytical application, pH meter, definition of pH, relationship between pH and potential, equipment and applications.

Coulometry: Principles and application controlled potential coulometry, cell design, instrumentation, method, electrode selection and advantages and limitations.

UNIT-III

Polarography: Theory, mass transport processes, current potential relationship, polarization choice of electrode, effect of oxygen, instrumentation and calculation of concentration.

Amperometry: Principle, instrumentation and pharmaceutical applications.

Extraction procedures: Liquid-solid extraction, Liquid-Liquid extraction, separation of mixtures by extraction, distribution law, successive extraction separation of drugs from excipients.

UNIT-IV

Chromatography: Fundamentals of the TLC, HPLC, GLC, Paper chromatography and column chromatography with relevant examples of pharmaceutical and/or natural products.

Conductometry: Ohm's law, specific resistance, specific conductance, conductivity cell, ionic conductivity, change of conductivity during titration, change in volume during conductometric titration, method and instrumentation.

Books Recommended

Note: Recent editions of the following books to be referred

1. Beckett AH, Stenlake JB. Practical Pharmaceutical Chemistry. London: Athlone Press.
2. Chatten LG. (Editor). Pharmaceutical Chemistry.Vol.I & II. New York: Marcel Dekker.
3. Connors KA. Textbook of Pharmaceutical Analysis. New York: John Wiley & Sons.
4. Kolthoff IM, Stenger VA.Volumetric Analysis.Vol.II. Titration Methods. New York: Interscience.

BP 405 -PHARMACEUTICS-V (UNIT OPERATION-II)

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks

Theory (40Hrs: 3 Hrs / Week)

UNIT-I

Heat Transfer: Concept of heat flow by conducting through single wall, applications of Fourier's law, forced and natural convections, surface co-efficients, study on single, multi pass heat exchangers and liquid-liquid heat interchangers, radiation, black body, Stefan-Boltzmann equation.

Evaporation: Theory of evaporation. Evaporators – steam jacketed kettle, horizontal tube evaporator, climbing film evaporator, forced circulation evaporator, multiple effect evaporator.

UNIT-II

Distillation: Raoult's law, volatility, Rayleigh's equation, Study on principles and equipments of simple, flash, fractional, azeotropic, extractive, vacuum, steam, and molecular distillation methods.

Drying: Theory of drying, Classification and types of dryers – Principle, construction and working of tray dryer, fluidized bed dryer, freeze dryer, and spray dryer.

UNIT-III

Size Reduction and Size Separation: Definition, objectives, factors affecting size reduction, laws governing energy and power requirement of a mill, stress strain relationship of deformation in solids. Types of mills, construction and working of ball mill, hammer mill, fluid energy mill,

Size separation: Definition and objectives of size separation, standard sieves as per IP. Mechanical sieve shakers, sedimentation tanks, cyclone separators, air separators.

Reactors: Fundamentals of reactors design for chemical reactions.

UNIT-IV

Mixing: Theory of mixing, solid-solid, solid-liquid and liquid-liquid mixing. Equipments-cylindrical, V-cone, double cone, ribbon, sigma blade, planetary, zig-zag and barrel mixers. Mixing devices, -propellers, turbines, paddles, and baffles.Vortex formation and prevention. Homogenization and study on Silverson emulsifier, Rapisonic homogenizer and colloid mill**.**

Corrosion: Definition,classification and mechanism of corrosion, factors, prevention and control.

Books Recommended

Note: Recent editions of the following books to be referred

1. Badger WL, Banchero JT. Introduction to chemical engineering. Singapore:McGraw-Hill Book Company;1955.
2. Carter SJ. Cooper and Gunn's Tutorial pharmacy. 6thed. New Delhi:CBS Publishers;2000.
3. Coulson JM, Richardson JF, Backhurst JR, Harker JH. Chemical engineering Vol 1 and 2. 2nded. New Delhi:Asian Book Pvt Ltd;1998.
4. Don WG, James O. Perry's chemical engineer's handbook. Singapore: McGraw-Hill Book Company;1984.
5. Gennaro AL. Remington: The science and practice of pharmacy Vol I and II. 20th ed. Philadelphia:Lippincott Williams and Wilkins;2000.
6. McCabe WL, Smith JC, Harriott P. Unit operations of chemical engineering. 5th ed. Singapore: McGraw-Hill Book Company;1993.
7. Paradkar A. Introduction to pharmaceutical engineering. 11th ed. Pune:Nirali Prakashan;2009.
8. Rawlins EA. Bentley's textbook of pharmaceutics. 8thed. New Delhi:Reed Elsevier India Pvt Ltd;2010.
9. Sambamurthy K. Pharmaceutical engineering. New Delhi: New Age International Publishers;1998.
10. Subrahmanyam CVS, Thimmasetty J, Sarasija S, Kusumdevi V. Pharmaceutical engineering Unit operations I and II. 2nd ed. Delhi: Vallabh Prakashan;2012.

BP 411- HUMAN VALUES AND PROFESSIONAL ETHICS LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

Practice Session (3 Hrs/Week)

PS 1: Introduce yourself in detail. What are the goals in your life? How do you set your goals in your life? How do you differentiate between right and wrong? What have been your achievements and shortcomings in your life? Observe and analyze them.

PS 2: Now-a-days, there is a lot of voice about many techno-genic maladies such as energy and natural resource depletion, environmental pollution, global warming, ozone depletion, deforestation, soil degradation, etc. – all these seem to be man-made problems threatening the survival of life on Earth – What is the root cause of these maladies & what is the way out in your opinion?

On the other hand, there is rapidly growing danger because of nuclear proliferation, arms race, terrorism, criminalization of politics, large scale corruption, scams, breakdown of relationships, generation gap, depression & suicidal attempts, etc – what do you think, is the root cause of these threats to human happiness and peace – what could be the way out in your opinion?

PS 3: Observe that each one of us has Natural Acceptance, based on which one can verify right or not right for him. Verify this in case of:

What is Naturally Acceptable to you in relationship- Feeling of respect or disrespect?

What is Naturally Acceptable to you – to nurture or to exploit others?

Is your living the same as your natural acceptance or different?

Out of the three basic requirements for fulfillment of your aspirations- right understanding, relationship and physical facilities, observe how the problems in your family are related to each. Also observe how much time & effort you devote for each in your daily routine.

PS 4: List down all your desires. Observe whether the desire is related to Self (I) or Body. If it appears to be related to both, see which part of it is related to Self (I) and which part is related to Body.

PS 5: Observe that any physical facility you use, follows the given sequence with time:
Necessary & tasteful→ unnecessary & tasteful → unnecessary & tasteless → intolerable
In contrast, observe that any feeling in you is either naturally acceptable or not acceptable at all. If naturally acceptable, you want it continuously and if not acceptable, you do not want it any moment!
List down all your activities. Observe whether the activity is of 'I' or of Body or with the participation of both 'I' and Body.
Observe the activities within 'I'. Identify the object of your attention for different moments (over a period of say 5 to 10 minutes) and draw a line diagram connecting these points. Try to observe the link between any two nodes.

PS 6: Chalk out programs to ensure that you are responsible to your body- for the nurturing, protection and right utilization of the body. Find out the plants and shrubs growing in and around your campus.
Find out their use for curing different diseases.

PS 7: Form small groups in the class and in that group initiate dialogue and ask the eight questions related to trust. The eight questions are:
1a. Do I want to make myself happy? 1b. Am I able to make myself always happy?
2a. Do I want to make the other happy? 2b. Am I able to make the other always happy?
3a. Does the other want to make him happy? 3b. Is the other able to make him always happy?
4a. Does the other want to make me happy 4b. Is the other able to make me always happy?
What is the answer? What is the answer?
Intention (Natural Acceptance) Competence
Let each student answer the questions for himself and everyone else. Discuss the difference between intention and competence. Observe whether you evaluate your intention & competence as well as the others' intention & competence.

PS 8: Observe on how many occasions you are respecting your related ones (by doing the right evaluation) and on how many occasions you are disrespecting by way of under-evaluation, over evaluation or otherwise evaluation.
Also observe whether your feeling of respect is based on treating the other as yourself or on differentiations based on body, physical facilities or beliefs.

PS 9: Write a note in the form of story, poem, skit, essay, narration, dialogue to educate a child. Evaluate it in a group. Develop three chapters to introduce 'social science- its need, scope and content' in the primary education of children

PS 10: List down units (things) around you. Classify them in four orders. Observe and explain the mutual fulfillment of each unit with other orders.

PS 11: Make a chart for the whole existence. List down different courses of studies and relate them to different units or levels in the existence.
Choose any one subject being taught today. Evaluate it and suggest suitable modifications to make it appropriate and holistic.

PS 12: Choose any two current problems of different kind in the society and suggest how they can be solved on the basis of natural acceptance of human values. Suggest steps you will take in present conditions.

PS 13: Suggest ways in which you can use your knowledge of Technology/Engineering/ Management for universal human order, from your family to the world family.
Suggest one format of humanistic constitution at the level of nation from your side.

BP 412- PHYSICAL PHARMACY- II LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To determine the viscosity of given sample using Ostwald viscometer.
2. To determine the hydrophilic lipophilic (HLB) value of a given surfactant ester.
3. To determine the critical micelle concentration (CMC) of sodium lauryl sulfate using stalagmometer based on surface tension measurements.
4. To determine and report the particle size distribution analysis of powder by microscopy method.
5. To determine and report the particle size distribution analysis of powder by sedimentation method.
6. To perform the preparation and physical stability evaluation of sulfur colloids.
7. To determine and report the true density, bulk density, porosity and flow properties of different powders.
8. To determine the optimum concentration of gum acacia required for maximum physical stability of calcium carbonate suspension.
9. To formulate and evaluate deflocculated and flocculated suspensions.
10. To identify and evaluate the physical stability of a prepared emulsion.
11. To analyze copper –glycine complexes by pH titration method.

BP 413- PHARMACEUTICS-IV (PHARMACEUTICAL TECHNOLOGY-I) LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To determine the solubility of paracetamol/aspirin in different solvents.
2. To determine the dissociation constant of a given drug at different pH.
3. To determine, report and interpret the partition coefficient of a given drug by shake flask method.
4. To study the compatibility of a given drug with different excipients by FTIR spectroscopy.
5. Formulation, evaluation and packaging of a liquid oral solutions.
6. To perform the extraction of active principles of a given crude drug powder using simple percolation.
7. To perform the extraction of active principles of a given crude drug powder using continuous hot percolation.
8. To perform the evaluation of a given aerosol sample.
9. To formulate and evaluate an ointment preparation.
10. To perform sinking time and water holding capacity of surgical cotton.

BP 414- PHARMACEUTICAL ANALYSIS-II LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To prepare and standardize 0.1 N perchloric acid solution.
2. To determine metformin hydrochloride by non-aqueous titration.
3. To prepare and standardize 0.5 N ethylenediaminetetraacetic acid (EDTA) solution.
4. To estimate the water content in the given sample by Karl-Fischer method.
5. To carry out the assay of caffeine/propranolol by potentiometer method.
6. To standardize of sodium bicarbonate by potentiometric method.
7. To demonstrate column chromatography.
8. To determine $R_f$value of given sample of amino acid (glycine, leucine, alanine) by paper chromatography.
9. To determine boric acid by conductometry.
10. To determine $R_f$value of given sample of amino acid (glycine, leucine, alanine) by TLC.

BP 415- PHARMACEUTICS-V (UNIT OPERATION-II) LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner

b. Viva-voce examination

c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To study the effect of various factors affecting rate of evaporation.
2. To determine the equilibrium moisture content of starch and Bentonite at different humidity's and at room temperatures.
3. To dry calcium carbonate slurry and plot the rate of drying curve.
4. To prepare the purified water and water for injection by distillation.
5. To separate out the ethanol from water-ethanol mixture by simple distillation method.
6. To determine the average particle size and particle size distribution of the given sample by sieving.
7. To perform size reduction of the given sample using a Ball Mill and calculation of Kick's law and Rittinger's law co-efficient.
8. To study the effect of number of balls on size reduction using Ball Mill.
9. To determine the mixing efficiency when the propeller blade is introduced in different positions.
10. To determine the mixing index of blenders for a solid mixture

5TH SEMESTER DETAILED SYLLABUS

BP 501 –BIOCHEMISTRY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

Bio energetics : Concept of free energy and its determination, Energy rich compounds; ATP; Cyclic AMP; their biological significance

Biological Oxidation: Electron transport chain (its mechanism and role), Inhibitors and Uncouplers of ETC, Oxidative phosphorylation and Substrate level phosphorylation.

Enzymes and Co-enzymes: Nomenclature, enzyme kinetics and its mechanism of action, mechanism of inhibition, enzymes and iso-enzymes in clinical diagnosis. Coenzymes, categories of reactions requiring coenzymes; Structure of coenzymes, and their biochemical role Vitamins - water soluble, fat soluble

UNIT-II

Carbohydrate : Introduction: Definition, classification and biological significance, Glycolysis along with significance and energetic, Glycogenesis, glycogenolysis, TCA cycle; (Amphibolic nature of TCA cycle) along with significance and energetic, Gluconeogenisis and its significance, HMP Shunt Pathway and its significance, Uronic acid pathway and galactose metabolism, Brief study on metabolic disorders

Biosynthesis of Nucleic Acids: Biosynthesis of DNA and RNA.

UNIT-III

Genetic Code and Protein Synthesis: Genetic code, Components of protein synthesis, and Inhibition of protein synthesis.

Lipid Metabolism: Oxidation of fatty acids, beta-oxidation and energetics, alpha-oxidation, omega-oxidation, Biosynthesis of ketone bodies and their utilization, Biosynthesis of saturated and unsaturated fatty acids, Cholesterol metabolism, Essential fatty acids and eicosanoids(prostaglandins, thromboxanes and leukotrienes), phospholipids and sphingolipids. Brief study on metabolic disorders

UNIT-IV

Metabolism of Ammonia and Nitrogen Containing Monomers: Nitrogen balance, Biosynthesis of amino acids, Catabolism of amino acids, Conversion of amino acids to specialized products, Assimilation of ammonia, Urea cycle, metabolic disorders of urea cycle, Metabolism of sulphur containing amino acids, Porphyrin biosynthesis, formation of bile pigments, hyperbilirubinemia, Purine biosynthesis and Pyrimidine biosynthesis. Brief study on metabolic disorders

Books Recommended

Note: Recent editions of the following books to be referred

1. Conn EE, Stumpf PK. Outlines of Biochemistry. New York: John Wiley & Sons.
2. Lehninger AL. Principles of Biochemistry. New Delhi: CBS Publishers.
3. Plumer DT. An Intoduction to Practical Biochemistry. New Delhi: Tata McGraw Hill.
4. Berg JM, Tymoczko JL, Stryer L. Stryer's Biochemistry. New York: WH Freeman & Co.
5. Jayaraman J. Laboratory Manual in Biochemistry. New Delhi: Wiley Eastern Ltd.
6. Murray RK, Granner DK, Mayes PA, Rodwell VW. Harper's Illustrated Biochemistry. New York:Lange / McGraw Hill.

BP 502 - MEDICINAL CHEMISTRY-I

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

Basic Principles of Medicinal Chemistry: History and development of Medicinal Chemistry, definition of hit, lead and drug. Effects of the following physicochemical properties of drug molecules on biological activity: Ionization, hydrogen bonding, solubility, partition coefficient, logP, logD, protein binding, chelation and polar surface area.

Drug-receptor Interactions: Theory of receptors, Structure of receptors, Drug-receptor interaction including transduction mechanisms.

Drug Metabolism: Metabolic pathways, metabolic reactions, phase I and II biotransformation, Concept of pro-drug synthesis, Applications of pro-drugs in pharmacy.

UNIT-II

Quantitative Structure-Activity Relationships (QSAR): Brief account of various descriptors, (Lipophilic, Electronics, Steric, Topological) Hansch and Free-Wilson approaches.

Computer-Aided Drug Designing: Fundamentals of computer-aided Drug Design (CADD) and Molecular modeling.Advantages of CADD, Software used for molecular modeling.

Drug Design: Introduction, Concept of lead compound, rational approaches for drug design – Quantum mechanical, molecular orbital, molecular connectivity, Methods of variation, Drug Design and development.

UNIT-III

Chemistry of Drugs: Classification, mode of action, uses, structure activity relationship of Drugs acting at Synaptic and neuro-effector junction sites andsynthesis of specified drugs

Drugs acting at Synaptic and neuro-effector junction sites:

Cholinergics	: Muscarine, Pilocarpine, Methacholine
Anticholinesterases	: Physiostigmine, Neostigmine, Endophanium
Adrenergic drugs	:Noradrenaline, Adrenaline, Salbutamol, Dopamine,
Antiadrenergic drugs	: Chloropromazine, Prazosin,
Neuromuscular blocking agents	: d-Tubocurrine, Succinylcholine,

Unit-IV

8. Chemistry of Drugs: Classification, mode of action, uses of specified drugs

Drugs acting on the Central Nervous System:

General Anesthetics	: Diazepam, Ketamine, Fenanyl, Propotol.
Local Anesthetics	: Lidocaine, Procaine, Benzocaine, Prilocaine
Hypnotics and Sedatives	: Chlordiazepoxide, Alprazolam, Diazepam,Lorazepam
Opioid analgesics	: Morphine,Pentazocine, Meperidine,
Aniconvulsants	: Phenobarbitone, Sodium valporate, Gabapentin,
Antiparkinsonism drugs	: Carbidope, Bromocriptine, Benzylhexal, Levodopa,
CNS stimulants	: Amphetamines, Xanthine derivatives,

Books Recommended

Note: Recent editions of the following books to be referred

1. Foye WC. Principles of Medicinal Chemistry. Philadelphia: Lea & Febiger.
2. Beale JM, Block JH. Wilson and Gisvold's Text book of Organic Medicinal and Pharmaceutical Chemistry. Philadelphia: Lippincott Williams and Wilkins.
3. Hansh C. Comprehensive Medicinal Chemistry -Quantitative Drug Design. Vol. IV. Oxford: Pergamon Press.
4. Jurs PC. Computer Software Application in Chemistry. New York: John Wiley & Sons.
5. Pops and Perruns. Computer Aided Drug Design. New York: Academic Press.
6. Wolff ME. Burger's Medicinal Chemistry. New York: John Wiley & Sons.

BP 503 - PHARMACOLOGY-I

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

General Pharmacology: Introduction to Pharmacology, Sources of drugs, Dosage forms and routes of administration, mechanism of action, Combined effect of drugs, Factors modifying drug action, tolerance and dependence, Pharmacogenetics. Absorption, Distribution, Metabolism and Excretion of drugs, Adverse Drug Reactions, drug interactions.

UNIT-II

Pharmacology of Peripheral Nervous System: Neurohumoral transmission (autonomic and Somatic), Parasympathomimetics, Parasympatholytics, Sympathomimetics, Adrenergic Receptor and neuron blocking agents, Ganglionic, stimulants and blocking agents, Neuromuscular blocking Agents, Local anesthetic Agents.

UNIT-III

Pharmacology of Central Nervous System: Neurohumoral transmission in the CNS, General Anesthetics, Alcohols and disulfiram, Sedatives, hypnotics, Anti-anxiety agents and Centrally acting muscle relaxants, Psychopharmacological agents (anti-psychotics) antidepressants antimaniacs and hallucinogens.

CNS Stimulants: Classification, mechanism of action, pharmacological action, adverse reactions and applications of CNS stimulants. Drug Addiction and Drug Abuse.

UNIT-IV

Analgesics / Antipyretics: Classification, mechanism of action, pharmacological action, adverse reactions and applications of Analgesics, Antipyretics, Anti-inflammatory and Anti-goutdrugs, Narcotic analgesics and antagonists.

Antiepileptic / Anti-Parkinsonian Drugs: Classification, mechanism of action, pharmacologicalaction, adverse reactions and applications of anti-epileptics drugs and anti-Parkinsonian drugs.

Regulatory guidelines for animal studies special reference to CPCSEA.

Books Recommended

Note: Recent editions of the following books to be referred

1. Rang MP, Dale MM, Riter JM. Pharmacology. New York: Churchill Livingstone.
2. Brunton LL, Lazo JS, Parker KL. Goodman and Gilman's The Pharmacological Basis of Therapeutics. New York: McGraw Hill.
3. Mycek MJ, Harvey RA, Champe PC. Lipponcott's Illustrated Reviews -Pharmacology. Philadelphia: Lippincott Williams & Wilkins.
4. Tripathi KD. Essential of medical Pharmacology, New Delhi: Jaypee Brothers Medical Publishers,
5. Ghosh MN. Fundamentals of Experimental Pharmacology. Kolkata: Scientific Book Agency.
6. Kulkarni SK. Handbook of Experimental Pharmacology. New Delhi: Vallabh Prakashan.
7. Joshi H,An alternative approach to experimental pharmacology, Himdeep publication

BP 504 - PHARMACEUTICAL BIOTECHNOLOGY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

Introduction to Biotechnology: Historical development of biotechnology, areas of biotechnology research, therapeutic and pharmaceutical applications of biotechnology.

Hybridoma Technology: Introduction to monoclonal antibodies, principle and production of monoclonal antibodies by hybridoma technology, medicinal applications of monoclonal antibodies, monoclonal antibody engineering.

UNIT-II

Genetic Engineering: Enzymes and other molecular tools used in genetic engineering, technique of gene cloning, medical and pharmaceutical applications. Introduction to recombinant DNA technology, tools and techniques of gene manipulation, production of recombinant insulin and hepatitis B vaccine.

UNIT-III

Fermentation Introduction to fermentation technology, design and operation of a fermenter, production of streptomycin Tetracycline, Penicillin, Alcohol, Vitamin $B_2$and vitamin B_{12}.

UNIT-IV

Microbial Biotransformations: Introduction, types of reactions mediated by microorganisms, design of biotransformation processes, selection of organisms, biotransformation process and its improvements with special reference to steroids.

Enzyme Immobilization: Advantages of immobilization, techniques of immobilization, factors affecting immobilized enzyme kinetics, applications of immobilized enzymes, immobilization of bacteria and plant cells.

Books Recommended

Note: Recent editions of the following books to be referred

1. Smith JE. Biotechnology. Cambridge: Cambridge University Press.
2. Trevan MD, Boffey S, Goulding KH, Stanbury P. (Eds). Biotechnology – The Biological Principles. New Delhi: Tata McGraw Hill.
3. Prescot LM, Harley JP, Klein DA. Microbiology. Oxford: WMCBrown Publications.
4. Crueger W, Crueger A. Biotechnology – A Textbook of Industrial Microbiology. New Delhi: PanimaPublishing.
5. Reed G. (Ed). Prescott & Dunn's Industrial Microbiology. New Delhi: CBS Publishers.
6. Stanbury P, Whitaker A. Principles of Fermentation Technology. Oxford: Pergamon Press.
7. Singh R,Kakar S. A concise book of pharmaceutical biotechnology, IJPMR Publishing press

BP 505 –PHARMACEUTICAL JURISPRUDENCE

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

UNIT-I

An elaborate study of the following

a) Pharmaceutical legislations - brief review.
b) Pharmacy Act 1948
c) Medicinal and toilet preparations (Excise Duties) Act 1955.
d) Narcotic drugs and psychotropic substances Act 1985 and rules.
e) Code of pharmaceutical ethics.

UNIT-II

An elaborate study of Drugs and cosmetic Act 1940 and rules 1945

UNIT-III

A brief study of the following with special reference to be main provisions

a) Drugs and magic remedies (Objectionable advertisements) Act 1954
b) Prevention of cruelty to animals Act 1960
c) Medical Termination of pregnancy Act 1971
d) Indian Patents Act 1970
e) DPCO 2013.

UNIT-IV

A brief study of the following

a) Poison Act 1919
b) Factories Act 1948
c) Right to information Act 2005
d**)** Pharmaceutical policy 2002.
e)New Drug Application, Abbreviated new drug application (ANDA)

Books Recommended

Note: Recent editions of the following books to be referred

1. Jain, NK. Textbook of Forensic Pharmacy. New Delhi: Vallabh Prakashan.
2. Mithal BM. Textbook of Forensic Pharmacy. Kolkatta: National Book Depot.
3. Bharti HK. Drugs & Pharmacy Laws in India. Indore: Sadhna Mandir.
4. Wadedhra BL. Law Relating to Patents, Trademarks, Copyright Design and Geographical Indications. New Delhi: Universal Law Publishing.
5. Bansal P. IPR Handbook for Pharma Students and Researchers. Hyderabad: Pharma Book Syndicate.
6. Trivedi PR. Encylcopedia of Intellectual Property Rights. New Delhi: Jnanada Prakashan.
7. Acts related to Pharmacy Education and Practice: AICTE Act 1987, Drug and Cosmetics Act, 1940 and Rules 1945, Drugs and Magic Remedies (Objectionable Advertisements) Act 1954, Drugs Price Control Order (DPCO), Factories Act 1948, Insecticides Act 1968, Medicinal & ToiletPreparations (Excise Duties) Act 1955, Medical Termination of Pregnancy Act (MTPA) 1970 &Rules 1975, Narcotic Drugs & Psychotropic Substances Act 1985 &Rules, Pharmacy Act 1948, Poisons Act 1919.

BP 506 - PHARMACOGNOSY-III

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40Hrs: 3 Hrs / Week)

UNIT-I

Volatile Oils: Introduction & Classification and identification test of volatile oils. Detailed study of following drugs:

- **Alcohol:** Coriander, Sandal wood,Mentha
- **Aldehyde:**Cinnamon, Cassia, Lemon peel, Orange peel, Lemon grass, Eucalyptus
- **Ketone:** Caraway, Dill
- **Phenol:** Clove
- **Ether:** Fennel, Nutmeg, Cardamom

UNIT-II

Resins and Resin Combinations: Introduction & Classification and identification test of Resins.

Detailed study of following drugs:

- **Acid resin:** Colophony
- **Resin Alcohol & Phenols:** Balsam, Cannabis
- **Ester Resin:** Benzoin,Storax
- **Oleo gum resin:** Asafoetida, Myrrh
- **Oleo-resin:** Ginger, Turmeric
- **Glyco-resin:** Podophyllum,Jalap
- **Others:** Capsicum

UNIT-III

Glycosides: Study of the biological sources, cultivation, collection, commercial varieties, chemical constituents, substitutes, adulterants, uses, diagnostic macroscopic and microscopic

features and specific chemical tests of following groups of drugs containing glycosides:

- **Saponins** **:** Liquorice, Ginseng, Dioscorea, Senega
- **Cardioactive sterols** **:** Digitalis, Squill, Strophanthus, Thevetia
- **Anthraquinone cathartics** **:** Aloe, Senna, Rhubarb,Cascara
- **Others** **:** Psoralea, Saffron, Quassia, Gymnema

UNIT-IV

Phytochemical Screening: Screening of alkaloids, saponins, cardenolides and bufadienolides, flavonoids, tannins, anthraquinones, cynogenetic glycosides, amino acids in plant extracts.

Enzymes: Introduction & Classification of enzymes. Biological sources, preparation and uses of the following enzymes: Diastase, Papain, Pepsin, Trypsin, Pancreatin.

Plant Bitters and Sweetners: Plant bitters (Chirata, Gentian, Kalmegh, Piccorhiza) and Plant Sweeteners

Books Recommended

Note: Recent editions of the following books to be referred

1. Harborne JB. Phytochemical Methods. London: Chapman & Hall.
2. Trease GE, Evans WC. Pharmacognosy. UK: Baillier&Tindall.
3. Wallis TE. Textbook of Pharmacognosy. London: J &AChurchill Ltd.
4. Kokate CK. Practical Pharmacognosy. New Delhi: VallabhPrakashan.
5. Iyengar MA. Pharmacognosy of Powdered Crude Drugs.Manipal.
6. Khandelwal KR. Practical Pharmacognosy. Pune: NiraliPrakashan.
7. Kokate CK, Purohit AP, Gokhale SB. Pharmacognosy. Pune: NiraliPrakashan.

BP 511- BIOCHEMISTRY LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. Identification of carbohydrates (Scheme and identification)
   (glucose, fructose, lactose, maltose, sucrose)
2. Identification of proteins (Scheme and identification)
   (casein, albumin, gelatin, peptone)
3. Qualitative estimation of carbohydrates (any one method)
   - DNS reagent
   - Anthrone Reagent
4. Qualitative estimation of proteins (any one method): Biuret Reagent, Lowry's Reagent
5. Qualitative analysis of Urine For Normal constituents
6. Qualitative analysis of Urine For Abnormal constituents
7. Quantitative Urine analysis
   a. Titrable acidity and ammonia
   b. Estimation of reducing sugars in urine (Benedict's method)
   c. Estimation of chlorides in urine
   d. Estimation of Creatinine in urine
   e. Estimation of calcium in urine
8. Quantitative analysis of blood
9. To carry out qualitative analysis of milk.
10. To perform the effect of temperature on the activity of alpha - amylase.

BP 512- MEDICINAL CHEMISTRY – I LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To carry out the synthesis of aspirin from salicylic acid.
2. To carry out the synthesis of paracetamol from para amino phenol.
3. To carry out the synthesis of 2,3-diphenylquinoxaline from *o*-phenylenediamine .
4. To carry out the synthesis of acetanilide from aniline.
5. To carry out spectral analysis of aspirin.
6. To carry out the spectral analysis of paracetamol drug from formulation.
7. To carry out pharmacopoeial standards of ibuprofen.
8. To carry out pharmacopoeial standards of caffeine.
9. To determine the partition coefficient of benzoic acid.
10. To carry out the synthesis of 7-hydroxy-4-methyl coumarin from resorcinol.

BP 513- PHARMACOLOGY – I LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. Protocol design for animal studies with special reference to CPCSEA guidelines.
2. Study of laboratory animals and their handling
3. Study of physiological salt solutions used in experimental pharmacology
4. Study of laboratory appliances used in experimental pharmacology
5. To Study the different routes of drugs administration in mice/rats.
6. To study theeffects of autonomic drugs on rabbit's eye
7. To study some common and standard techniques of bleeding.
8. To Study the anesthetics agents used in animal studies. .)
9. Experiments on central nervous system and muscle relaxant activity of drugs
10. To study the various procedures for rendering animals unconscious stunning of rodents, pithing of frogs, chemical euthanasia.
11. To study the student organ bath assembly in P'cology lab.
12. To record the concentration response curve of acetylcholine using cock ileum preparation

BP 514 - PHARMACEUTICAL BIOTECHNOLOGY LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To perform the Sterilization of non-living material.
2. To perform the Sterilization of plant and animal material.
3. To prepare different media for the production of Antibiotics.
4. To prepare different media for the production of Alcohol.
5. To prepare different media for the production of Enzyme.
6. To isolate and purify alcohol by distillation technique.
7. To Produce Enzymes from microbes by fermentation Method.
8. To determine the sensitivity of Antibiotic (Antibiotic sensitivity test).
9. To immobilize the given enzyme by membrane confinement method.
10. To immobilize the given enzyme by membrane entrapment method.
11. Demonstration by videography/Chats/PowerPoint etc of
    - Production of Monoclonal Antibodies.
    - Genetic Engineering Technique
    - Fermentation Plant
12. Estimation of DNA / RNA by spectroscopic method

.BP 515 - PHARMACOGNOSY – III LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. Demonstration of methods for isolation of volatile oil from crude drugs. (1 Exp)
2. To study the morphology and microscopy (T.S. and Powder) of Volatile oil containing following drugs: (5 Exp)
   Leaf drugs: Mentha/ Eucalyptus,
   Bark: Cinnamon,
   Umbelliferous fruits: Fennel, Coriander/ Dill, Caraway,
   Flower drugs: Clove.
3. To study morphology of Asafoetida/Turmeric/ Ginger. (1 Exp)
4. To study morphology and microscopy of following crude drugs: (T.S. and Powder): (4 Exp)
   Anthraquinone: Senna/ Rhubarb
   Cardioactive Sterols: Digitalis (Powder),
   Saponin glycosides: Liquorice/ Satavari,
   Bitter glycosides: Gentian/ Chirata/ Quassia
5. To perform chemical tests for Alkaloids and Flavonoids. (1 Exp)
6. To perform chemical tests for Cardiac glycosides, Saponins and Anthraquinone glycosides. (1 Exp)

6TH SEMESTER DETAILED SYLLABUS

BP 601 -MEDICINAL CHEMISTRY-II

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

Cardiovascular Agents: Classification, mode of action, uses, structure activity relationship and synthesis of selected cardiovascular drugs like cardiac glycosides (digitalis glycosides), antihypertensives (indapamide, furosemide, spironolactone, captopril, enalapril, losartan, amlodipine, propranolol, prazosin, methyldopa, minoxidil) antianginal drugs (glyceryltrinitrate, propranolol, atenolol, nifedipine, amlodipines), antiarrhythmics (quinidine, esmolol, amiodarone, verapamil, dilteazam) and vasodilators.

Autocoids: Classification, mode of action, uses, structure activity relationship and synthesis of selected antihistaminic drugs (triplenamine, diphenhydramine, doxylamine, chloorpheniramine, promethazine, azatadine, cetirizine, cromolyn sodium), eicosanoids (cox pathway, lox pathway, synthetic drugs of prostaglandins).

UNIT-II

Drugs Acting on Urinary System: Classification, mode ofaction, uses, structure activity relationship and synthesis of selected diuretic drugs (hydrochlorothiazide, benzthiazide, furosemide, acetazolamide, spironolactone, triameteremne, mannitol)**.**

Anti-inflammatory Drugs: Classification, mode ofaction, uses, structure activity relationship and synthesis of selected opoid analgesics (morphine, thebaine, pethidine, fentanyl citrate, methadone, tramadol) and non-steroidal anti-inflammatory agents (aspirin, paracetamol, phenyl butazone, indomethacin, sulindac, tolmetin, ibuprofen, diclofenac, naproxen, piroxicam, nimmeseulide).

UNIT-III

Steroids and Related Drugs: Nomenclature of steroids, Classification, mode ofaction, uses, structure activity relationship and synthesis of selected androgens (testosterone, methyl testosterone), anabolic steroids, estrogens (oestradiol, stilbesterol,), progestational agents (progesterone, nortisterone), adrenocorticoids (cortisone, aldosterone, prednisolone).

Drugs acting on Hemopoietic System: Classification, mode ofaction, uses, structure activity relationship and synthesis of selected anticoagulants drugs (warfarin, bishydroxycoumarin, phenindione) and antiplatelet drugs (dipyridamole, ticlodipine, clopidogrel).

UNIT-IV

Drugs Affecting Uterine Motility: Classification, mode of action, uses, structure activity relationship and synthesis of selectedOxytocics (oxytocin, ergot alkaloids,prostaglandins).

Antidiabetic Drugs: Classification, mode ofaction, uses, structure activity relationship and synthesis of selected oral hypoglycaemic agents (carbutamide, tolbutamide, glibenclamide, metformin, pioglitazone, meglinitide) and insulin.

Books Recommended

Note: Recent editions of the following books to be referred

1. Foye WC. Principles of Medicinal Chemistry. Philadelphia: Lea &Febiger.
2. Beale JM, Block JH. Wilson and Gisvold's Text book of Organic Medicinal and Pharmaceutical Chemistry. Philadelphia: Lippincott Williams and Wilkins.
3. Hansh C. Comprehensive Medicinal Chemistry - Quantitative Drug Design.Vol. IV. Oxford: Pergamon Press.
4. Wolff ME. Burger's Medicinal Chemistry. New York: John Wiley & Sons.
5. Nogrady T. Medicinal Chemistry – A Biochemical Approach. Oxford: Oxford University Press.

BP 602 - CHEMISTRY OF NATURAL PRODUCTS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

Terpenoids: Chemistry, and pharmacological activity of medicinally important monoterpenes (Citral, Camphor, Menthol), sesquiterpenes (Faniol), diterpenes (Abietic Acid), and triterpenoids (Amyrins).

UNIT-II

Carotenoids: α-carotenoids, β-carotenes, vitamin A, and xanthophylls of medicinal importance.
Glycosides: Chemistry, pharmacological activity of digitoxin, digoxin, sennosides and diosgenin.

UNIT-III

Alkaloids: Chemistry, and pharmacological activity of atropine and related compounds, quinine, reserpine, morphine, papaverine, ephedrine, ergot and vinca alkaloids.

UNIT-IV

Antibiotics: Chemistry and therapeutic activity of penicillin, streptomycin and tetracycline.
Flavonoids: Chemistry and pharmacological activity of medicinally important flavonoids such as flavones, flavonols, quercetin, isoflavones.

Books Recommended

Note: Recent editions of the following books to be referred

1. Finar IL. Organic Chemistry.Vol.II. London: ELBS/Longman.
2. Harborne JB. Phytochemical Methods. London: Chapman & Hall.
3. Manitto P. The Biosynthesis of Natural Products.Chichester: Ellis Horwood.
4. De Mayo P. The Chemistry of Natural Products. New York: Wiley Interscience.
5. Pridham JB. Terpenoids in Plants. New York: Academic Press.
6. Pridham JB, Swain T. Biosynthetic Pathways in Higher Plants. New York: Academic Press.
7. Rabinson T. The Biochemistry of Alkaloids, Springer Verlag, New York.

BP 603 - PHARMACOGNOSY-IV

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

Alkaloids: Systematic study of source, cultivation, collection, processing, commercial varieties, chemical constituents, substitutes, adulterants, uses, diagnostic macroscopic and microscopic features and specific chemical tests of following drugs:

- **Pyridine – piperidine:** Tobacco, Areca, Lobelia, Piper
- **Tropane:** Belladonna, Hyoscyamus, Datura, Duboisia, Coca, Withania
- **Quinoline and isoquinoline:** Cinchona, Ipecac, Opium
- **Indole :** Ergot, Rauwolfia, Catharanthus, Nux-vomica, Physostigma
- **Imidazole :**Pilocarpus
- **Steroidal :**Veratrum, Kurchi
- **Alkaloidal amine :** Ephedra, Colchicum
- **Glycoalkaloid:** Solanum.
- **Purines:** Coffee, Tea, Cola

UNIT-II

Biosynthesis of Phyto-constituents: General techniques of biosynthetic studies for formation of primary and secondary plant metabolites and basic metabolic pathways like Shikimic acid pathway, Mevalonate pathway, Acetate pathway. General biosynthetic pathways of natural products like alkaloids andterpenoids.

UNIT-III

Traditional Crude Drugs: Studies of traditional drugs, common vernacular names, botanical sources, morphology, chemical nature of chief constituents, pharmacology, categories and common uses and marketed formulations of following indigenous drugs:

Amla, Satavari, Giloe, Bhilawa, Kalijiri, Bach, Rasna, Punarnava, Chitrack, Apamarg, Gokhru, Shankhapushpi, Brahmi, Adusa, Methi, Lahsun, Palash, Shilajit, Nagarmotha, Neem, Tulsi, Vidang, Banafsha.

UNIT-IV

Basic Principles of Alternative System of Medicine: Ayurveda, Siddha, Unani, Chinese, and Homeopathy. Introduction to ayurvedic preparations like Arishtas, Asvas, Gutikas, Tailas, Churnas, Lehyas and Bhasmas.

Books Recommended

Note: Recent editions of the following books to be referred

1. Harborne JB. Phytochemical Methods. London: Chapman & Hall.
2. Trease GE, Evans WC. Pharmacognosy. UK: Baillier&Tindall.
3. Wallis TE. Textbook of Pharmacognosy. London: J &AChurchill Ltd.
4. Kokate CK. Practical Pharmacognosy. New Delhi: VallabhPrakashan.
5. Iyengar MA. Pharmacognosy of Powdered Crude Drugs.Manipal.
6. Khandelwal KR. Practical Pharmacognosy. Pune: NiraliPrakashan.
7. Kokate CK, Purohit AP, Gokhale SB. Pharmacognosy. Pune: NiraliPrakashan.

BP 604 – PHARMACEUTICS VI (PHARMACEUTICAL TECHNOLOGY-II)

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

Tablets: Types of tablets. Processing of tablets: Formulation, granulation methods, compression and defects of tablets. Equipment's and tablet tooling.Tablet coating: Types of coating, coating materials, formulation of coating materials, method of coating, equipment employed and defects in coating. In process quality control, evaluation of tablets and packaging

UNIT-II

Capsules: Hard gelatin capsules: Extraction of gelatin and production of hard gelatin capsule shells. Filling, finishing and special techniques of formulation of hard gelatin capsules. Quality control tests for capsules, Soft gelatin capsules: Nature of shell and capsule content, importance of base adsorption and minimum/gram factors, production, in process and final product quality control tests.

UNIT-III

Parenteral Products: Routes of administration, water for injection, pyrogenicity, non-aqueous vehicles, isotonicity and methods of its adjustment; Formulation considerations, Selection of containers and closures, prefilling treatment, washing, preparation of solution and suspensions, filling and sealing of ampoules, vials, intravenous infusion fluids. Lyophillization and preparation of sterile powders, equipment for large scale manufacture and evaluation of parenteral products; Aseptic techniques-source of contamination and methods of prevention, design of aseptic area, laminar flow bench services and maintenance; Sterility testing of parenterals. Packaging & labeling requirements of paerentrals

Unit-IV

Ophthalmic Preparations: Requirements for opthalmics, formulation of eye drops, eye lotion and eye ointments, containers and evaluation, Packaging & labeling requirements of ophthalmic.

Cosmetics: Formulation and preparation of the following cosmetic preparations. Lipsticks, dental preparation, Shampoos, Face and Talcum powders, Nail lacquers, cold cream and vanishing cream, tooth pastes, and hair dyes and sunscreens.

Books Recommended

Note: Recent editions of the following books to be referred

1. Aulton ME. Pharmaceutics: The Science of Dosage Form Design.London: ELBS/Churchill Livingstone.
2. Lachman L, Lieberman HA, Kanig JL. The Theory and Practice of Industrial Pharmacy. Philadelphia: Lea &Febiger.
3. Ansel HC. Introduction to Pharmaceutical Dosage Forms. Mumbai: VM Verghese& Co.
4. Banker GS, Rhodes CT. Modern Pharmaceutics. New York: Marcel Dekker.
5. Carter SJ. Cooper & Gunn's Tutorial Pharmacy. New Delhi: CBS Publishers.
6. Rawlins EA. Bentley's Textbook of Pharmaceutics. London: Churchill Livingstone / ELBS.

BP 605 - CLINICAL PHARMACY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 4 Hrs / Week)

UNIT-I

Introduction: Introduction to Clinical Pharmacy, drug-drug and drug-food interactions.

Basic Concepts of Pharmacotherapy: Clinical Pharmacokinetics and individualization of DrugTherapy; Drug Delivery Systems and their Biopharmaceutic& Therapeutic Considerations; DrugUse During Infancy and in the Elderly (Pediatries& Geriatrics); Drug use during Pregnancy; Druginduced Diseases; The Basics of Drug Interactions; General Principles of Clinical Toxicology; Interpretation of Clinical Laboratory Tests.

UNIT-II

Cardiovascular and Hematopoietic Disorders: Management of Hypertension, Congestive HeartFailure, Angina, Acute Myocardial Infarction, Cardiac arrhythmias, different types of anemias.

Management of CNS Disorders: Epilepsy, Parkinsonism, Schizophrenia, Depression.

Management of Respiratory Diseases: Asthma, tuberculosis

UNIT-III

Management of disorders& infection

Gastrointestinal Disorders: Pepticulcer, Hepatitis, Cirrhosis

Endocrine Disorders: Diabetes mellitus, Thyroid Disorders.

Urinogenital Infections: Management of Urinary Tract Infections.

Joint and Connective Tissue Disorders: Rheumatic Diseases, Gout.

UNIT-IV

Management of Neoplastic Diseases: Acute Leukaemias, Hodgkin's disease.

Therapeutic Drug Monitoring: Introduction to therapeutic drug monitoring, its significance and methods of monitoring.

Essential Drugs and Rational Drug Use: Definitions, Concept of essential drugs and rational use of drugs, List of essential drugs by WHO, WHO guidelines on rational use of drugs and their combinations.

Books Recommended

Note: Recent editions of the following books to be referred

1. Herfindel ET, Hirshman JL. Clinical Pharmacy and Therapeutics.New York: Lippincott Williams & Wilkins.
2. Gennaro AD. Remington's: The Science and Practice of Pharmacy. Pennsylvania: Mack Publishing Co.
3. Dipiro JL. Pharmacotherapy: A Pathophysiological Approach. Elsevier.
4. Katzung BG. Basic and Clinical Pharmacology.New York: Prentice Hall.
5. Laurence DR, Bennet PN. Clinical Pharmacology.London: Churchil Livingstone.
6. Rowland M, Tozer TN. Clinical Pharmacokinetics.New York: Lea and Febiger.
7. Winter M.E. Basic Clinical Pharmacokinetics.San Francisco: Applied Therapeutics Inc.

BP 606– PHARMACEUTICAL MICROBIOLOGY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

Introduction: Concept of microbiology, a brief history of microbiology (spontaneous generation, theory of biogenesis, germ theory of disease, contributions of Antony Van Leeuwenhoek, Edward Jenner, Robert Koch, Louis Pasteur and Alexander Fleming), pharmaceutical importance of microorganisms.

Microbial Structure: Classification of microorganisms**,** Structure of bacteria, fungi, and viruses.

UNIT-II

Microbial Taxonomy: Classification and taxonomy of bacteria, fungi and viruses.

Identification of Microbes: Microscopy and staining techniques, colony characterization, electron microscopy.

UNIT-III

Microbial Cultivation: Nutrition requirements, isolation and cultivation of bacteria, fungi and viruses.

Microbial Genetics: Introduction to genes, transformation, transduction, conjugation, gene mutation and mutagenesis.

Immunology: Antigens, haptens, immunoglobulins, humoral and cellular immunity, antigenantibody reactions, hypersensitivity, Active and passive immunity, primary and secondary defensive mechanisms of body.

UNIT-IV

Microbial Assays: Principles and methods of microbiological assays with reference to streptomycin and vitamin B_{12} .

Disinfection and Sterilization: Disinfection, factors influencing disinfectant action, dynamics of disinfection, disinfectants and antiseptics and their evaluation, sterilization methods, sterility testing of pharmaceutical products.

Books Recommended

Note: Recent editions of the following books to be referred

1. Hugo and Russel. Pharmaceutical Microbiology. Oxford: Balckwell.
2. Pelczar PC. Microbiology. New Delhi: Tata McGraw Hill.
3. Ananthanarayan A, Panickar J. Textbook of Microbiology. Hyderabad: Orient Longman.
4. Prescott LM, Harley GP, Klein DA. Microbiology. Oxford: VC Brown Publishers.
5. Indian Pharmacopoeia. New Delhi: Controller of Publications.
6. Stainer RY, Adelberg EA, Ingraham JL. General Microbiology. London: Macmillan Press.
7. Rawlins. Bentley's Pharmaceutics. New Delhi: CBS Publishers.

BP 611- MEDICINAL CHEMISTRY – II LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To carry out the synthesis of sulfanilic acid from aniline.
2. To carry out the synthesis of diketopiperazine from glycine.
3. To carry out the synthesis of benzilfrom benzoin.
4. To carry out the synthesis of 5,5-biphenyl hydantoin from benzil.
5. To carry out IR spectral analysis of diketopiperazine.
6. To carry out the synthesis of 2,5-dimethylpyrrole from hexane 2,5-dione.
7. To carry out the spectral analysis of 5,5-biphenyl hydantoin.
8. To carry out spectral studies of sulfanilic acid.
9. To carry out pharmacopoeial standards of phenytoin.
10. To determine the partition coefficient of paracetamol.

BP 612- PHARMACOGNOSY – IV LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To study morphology and microscopy of following crude drugs (T.S. and Powder): (4 Exp)
   Leaf: Datura/ Catharanthus,**Root:**Withania/ Rauwolfia, **Bark:** Cinchona/ Kurchi,
   Stem: Ephedra.
2. To study morphology of Colchicum and Nux vomica. (1 Exp)
3. Preparation and evaluation of Ayurvedic formulation like churna, kwath, lehya and gutika. (3 Exp)
4. To study morphology of Palash, Garlic, Kantakari, Vidang. (2 Exp)
5. To study morphological characters and enlist the various formulation in the market of Amla/ Bach/ Rasna. (1 Exp)
6. To study morphological characters and enlist the various formulation in the market of Punarnava/ Gokhru/ Shankhpusphi/ Bramhi. (1 Exp)
7. To study morphology and microscopy of Adusa/ Methi/ Neem. (1 Exp)

BP 613- PHARMACEUTICS-VI (PHARMACEUTICAL TECHNOLOGY – II) LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To formulate and evaluate the paracetamol tablets by wet granulation method.
2. To formulate and evaluate the paracetamol tablets by direct compression method.
3. To formulate and evaluate a capsule dosage form.
4. To formulate and evaluate ascorbic acid injection I.P.
5. To formulate and evaluate an ophthalmic formulation.
6. To prepare a lather shaving cream.
7. To prepare anti-dandruff shampoo.
8. To prepare a compact face powder.
9. To prepare a hair setting lotion.
10. To prepare a lipstick formulation.

BP 614- PHARMACEUTICAL MICROBIOLOGY LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. Preparation of glassware for Microbiological work by Hot air oven.
2. Preparation of glassware for Microbiological work by Autoclaving.
3. To prepare and sterilize the media used for the growthof micro-organisms.
4. To prepare the aseptic area using Laminar air flow and perform the aseptic transfer of microbial culture.
5. To prepare Nutrient agar plates, Nutrient agar slants and Nutrient agar stabs and inoculate with the given micro-organisms.
6. To carry out Simple staining of given micro-organisms.
7. To carry out Gram's staining of Bacteria.
8. To observe the motility of micro-organisms by Hanging drop slide preparation.
9. To carry out the isolation of a pure culture.
10. To study the environmental microflora of the different areas and carry out the colony characterization.
11. To perform the microbiological assay of antibiotics or vitamins.
12. To perform sterility test on a pharmaceutical product as per I.P. requirements.
13. To determine the phenol coefficient of the given disinfectant.

7TH SEMESTER DETAILED SYLLABUS

BP- 701 - MEDICINAL CHEMISTRY-III

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 4 Hrs / Week)

UNIT-I

Anticancer Chemotherapy: Classification, mode of action, uses, structure activity relationship of anticancer agents including synthesis of specified drugs (cyclophosphamide, chlorambucil, Lomustine, thiotepa,5-Fluorouracil, methotrexate, Diethylstilbesterol, cisplatin).

Antiviral Drugs: Classification, mode of action, uses, structure activity relationship of anti-viral agents including anti-HIV drugs including synthesis of specified drugs (Acyclovir, Idoxuridine, amantadine,nevirapine, zidovudine,methisazone).

UNIT-II

Anti-infective Agents: Classification, mode of action, uses, structure activity relationship of antibiotics and antibacterial including synthesis of specified drugs (Penicillin-V, Cephalexin, Doxycyclin, Chloramphenicol, Sulphamethoxazole, prontosil, Ciprofloxacin), Antimalarial drugs Chloroquine, Artemether), Antitubercular drugs (Isoniazid, ethambutal), Antilaprotic Drugs (Dapson), Antiamoebic drugs (Metronidazole, Diloxanidefuroate) and Antihelmenthic (Albendazole,pyrantel).

Immunomodulators: Classification,mode of action, uses, structure activity relationship of Immunosuppressives (azathioprine) and immunostimulants (Thalidomide) and synthesis of specified drugs.

UNIT-III

Amino Acids, Peptide, Nucleotides and Related Drugs: Classification,mode of action, uses, structure activity relationship of thyroid and anti-thyroid drugs (Propylthiouracil, Methimazole) including synthesis of specified drugs, peptidomimetics and nucleotidomimetics.

Drugs Acting on GIT: Classification, mode of action, uses, structure activity relationship of antiulcer agents (pantoprazole, cimetidine) emetics and anti-emetics (domperidone,

metoclopramide, ondansetron) including synthesis of specified drugs.

UNIT-IV

Drugs acting on Respiratory System: Classification,mode of action, uses, structure activity relationship of anti-asthmatics (turbutaline, theophylline, montelukast sodium, hydrocortisone)expectorants (bromhexine) and antitussives (dextromethorphan, codeine phosphate) including synthesis of specified drugs.

Diagnostic agents and Pharmaceutical Aids: Classification,mode of action, uses, structure activity relationship of radiographic contrast media, iodinated organic compounds, diagnostic dyes, miscellaneous diagnostic agents, coloring agents, flavoring agents and antioxidants including synthesis of specified drugs (propylidone, iopanoic acid, amino hippuric acid, methylparaben,butylatedhydroxyanisol, eosine, vanillin).

Books Recommended

Note: Recent editions of the following books to be referred

1. Foye WC. Principles of Medicinal Chemistry. Philadelphia: Lea &Febiger.
2. Beale JM, Block JH. Wilson and Gisvold's Text book of Organic Medicinal and Pharmaceutical Chemistry. Philadelphia: Lippincott Williams and Wilkins.
3. Hansh C. Comprehensive Medicinal Chemistry -Quantitative Drug Design.Vol. IV. Oxford: Pergamon Press.
4. Jurs PC. Computer Software Application in Chemistry. New York: John Wiley & Sons.
5. Pops and Perruns. Computer Aided Drug Design. New York: Academic Press.
6. Wolff ME. Burger's Medicinal Chemistry. New York: John Wiley & Sons.
7. A. Kleemann, J. Engel, B. Kutscher, D. Reichert,Pharmaceutical Substances, 4th edition, Thieme Publishing Group

BP- 702 - PHARMACOLOGY-II

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 4 Hrs / Week)

UNIT-I

Pharmacology of Cardiovascular System: Digitalis and cardiac glycosides, Antihypertensive drugs, Antianginal and Vasodilator drugs including calcium channel blockers and beta adrenergic antagonists, Antiarrhythmic drugs, Antihyperlipedemic drugs, Drugs used in the therapy of shock.

UNIT-II

Drugs Acting on Hemopoietic System: Hematinics, Anticoagulants, Vitamin K and hemostatic agents, Fibrinolytic and anti-platelet drugs, Blood and plasma volume expanders.

Drugs Acting on Urinary System: Fluid and electrolyte balance, Diuretics.

UNIT-III

Autocoids: Histamine, 5-HT and their antagonists, Prostaglandins, thromboxanes and leukotrienes, Pentagastrin, Cholecystokinin, Angiotensin, Bradykinin.

Pharmacology of Endocrine System: Hypothalamic and pituitary hormones, Thyroid hormones and anti-thyroid drugs, parathormone, calcitonin and Vitamin D.

UNIT-IV

Antidiabetic Agents: Insulin, oral hypoglycaemic agents and glucagon.

Steroids and Related Drugs: ACTH, corticosteroids, Androgens and anabolic steroids, Estrogens, progesterone and oral contraceptives, Drugs acting on the uterus.

Bioassays: Defination, Principal, Classification, Advantages and Disadvantages, Bioassays of certain drugs viz., Insulin, heparin &Digitoxin

Books Recommended

Note: Recent editions of the following books to be referred

1. Rang MP, Dale MM, Riter JM. Pharmacology. New York: Churchill Livingstone.
2. Brunton LL, Lazo JS, Parker KL. Goodman and Gilman's The Pharmacological Basis of Therapeutics. New York: McGraw Hill.
3. Mycek MJ, Harvey RA, ChampePC.Lipponcott's Illustrated Reviews - Pharmacology. Philadelphia: Lippincott Williams & Wilkins.
4. Tripathi KD. Essential of medical Pharmacology, New Delhi: Jaypee Brothers Medical Publishers.
5. Ghosh MN. Fundamentals of Experimental Pharmacology.Scientific Book Agency, Kolkatta.
6. Kulkarni SK. Handbook of Experimental Pharmacology.VallabhPrakashan, Delhi

BP 703–- PHARMACEUTICAL INDUSTRIAL MANAGEMENT

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks

Theory (40 Hrs: 3Hrs / Week)

UNIT-I

Concept of Management: Administrative Management (Planning, Organizing, Staffing, Directing and Controlling), Entrepreneurship development, Operative Management (Personnel, Materials, Production, Financial, Marketing, Time/space, Margin/Morale). Principles of Management (Co-ordination, Communication, Motivation, Decision-making, leadership, Innovation, Creativity, Delegation of Authority / Responsibility, Record Keeping).Identification of key points to give maximum thrust for development and perfection.

Accountancy: Principles of Accountancy, Ledger posting and book entries, preparation of trial balance, columns of a cash book, Bank reconciliation statement, rectification of errors, Profits and loss account, balance sheet, purchase, keeping and pricing of stocks, treatment of cheques, bills of exchange, promissory notes and hundies, documentary bills.

UNIT-II

Economics: Principles of economics with special reference to the laws of demand and supply, demand schedule, demand curves, labor welfare, general principles of insurance and inland and foreign trade, procedure of exporting and importing goods.

Pharmaceutical Marketing: Functions, buying, selling, transportation, storage, finance, feedback, information, channels of distribution, wholesale, retail, departmental store, multiple shop and mail order business.

UNIT-III

Market Research: Measuring & Forecasting Market Demands-Major concept in demand measurement, Estimating current demand, Geodemographic analysis, Estimating industry sales, Market share & Future demand, Market Segmentation & Market Targeting.

Materials Management: A brief exposure or basic principles of materials management- major areas, scope, purchase, stores, inventory control and evaluation of materials management.

UNIT-IV

Salesmanship: Principles of sales promotion, advertising, ethics of sales, merchandising, literature, detailing. Recruitment, training, evaluation, compensation to the pharmacist.

Production Management: A brief exposure of the different aspects of Production Management- Visible and Invisible inputs, Methodology of Activities, Performance Evaluation.

Books Recommended

Note: Recent editions of the following books to be referred

1. Koontz, O'Donnel. Principles of Management. New Delhi: Tata McGraw Hill.
2. Kotler P. Marketing Management. New Delhi: Pearson Hall.
3. Kotler P, Armstrong. Principles of Marketing. New Delhi: PHI Learning Pvt Ltd.
4. Gennaro AD. Remington's: The Science & Practice of Pharmacy, New York: Mack Publishing.
5. Subrahmanyam CVS. Pharmaceutical Production and Management. New Delhi: Vallabh Prakashan.
6. Mehta RM. Pharmaceutical Production Management. New Delhi: VallabhPrakashan.

BP 704– PHARMACEUTICS-VII (BIO PHARMACEUTICS & PHARMACOKINETICS)

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks

Theory (50Hrs: 4 Hrs / Week)

UNIT-I

Absorption of Drugs: Introduction to biopharmaceutics and pharmacokinetics. Passage of drugs across biological barrier (passive diffusion, active transport, facilitated diffusion and pinocytosis), factors influencing absorption –physicochemical, physiological and pharmaceutical.

UNIT-II

Drug Distribution: Drug distribution in the body, apparent volume of distribution, plasma protein binding, kinetics of plasma protein binding.

Drug Metabolism: Brief introduction to Phase I and Phase II reactions, Factors affecting biotransformation

Drug Excretion: Concept of clearance, mechanism of renal clearance, clearance ratio, determination of renal clearance, extraction ratio, hepatic clearance, biliary excretion, extra hepatic circulation.

UNIT-III

Compartment Modelling: Significance of plasma drug concentration measurement. Compartment model – definition and scope. One compartment and two compartment models, determination of pharmacokinetic parameters from plasma and urine data after drug administration by intravascular and oral route, curve fitting, method of residuals, regression procedures. Wagner-Nelson and Loo-Reigelman method.

UNIT-IV

Non-Linear Pharmacokinetics: Causes of non-linearity, Michaelis-Menten equation, determination of Vmax and Tmax, detection of non-linearity (saturation mechanism).

Clinical Pharmacokinetics: Definition and scope, dose adjustment in patient with and without renal and hepatic failure.

Bioavailability and Bioequivalence: Biopharmaceutical classification systems. Introduction to Bioavailability & Bioequivalence. Determination of bioavailability.Design of single dose bioequivalence studies and relevant statistics.

Books Recommended

Note: Recent editions of the following books to be referred

1. Rowland M and Tozer TN. Clinical Pharmacokinetics: Concept& Application. New York: Lea & Febiger.
2. Shargel L. Applied Biopharmaceutics& Pharmacokinetics. Singaproe: McGraw Hill.
3. Gibaldi M. Biopharmaceutics& Pharmacokinetics. New York: Lea &Febiger.
4. Swarbrick J. Biopharmaceutics. New York: Lea &Febiger.
5. Brahmankar DM, Jaiswal SB. Biopharmaceutics and Pharmacokinetics - A Treatise. New Delhi: VallbahPrakashan.
6. Shobha Rani R Hiremath. Textbook of Biopharmaceutics & Pharmacokinetics. Prism Book Pvt. Ltd.

BP 705 - INDUSTRIAL PHARMACOGNOSY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (50 Hrs: 4Hrs / Week)

UNIT-I

Chemotaxanomy: Chemotaxonomy of medicinal plants.

Aromatic Plants: Utilization of aromatic plant and derived products with special reference to sandalwood oil, mentha oil, lemongrass oil, vetiver oil, geranium oil and eucalyptus oil.

UNIT-II

Herbal Cosmetics: Role of following herbs in cosmetics

i) Skin Care: Aloe vera, Neem, Turmeric, Saffron, Sandalwood

ii) Hair Care: Soapnut, Amla, Henna, Hybiscus, Bringaraj

Study of Natural Pesticides: Pyrethrum, Neem and Tobacco

Plant Biotechnology: Polyploidy and Hybridization and their applications in improving the quality of medicinal plants. Tissue Culture: Types, techniques and applications, Methods for enhancing the production of secondary metabolites. Transgenic plants and their applications

UNIT-III

Natural allergens, photosensitizing agents and fungal toxins.

Nutraceuticals: Source and importance of antioxidants, probiotics and polyunsaturated fatty acids. Study of nutritional value of Spirulina and Garlic

Herbal Industries: A Brief account of plant based industries involved in work on Medicinal and Aromatic Plants in India. Utilization and production of phytoconstituents such as quinine, calcium sennosides, podophyllotoxin, diosgenin, solasodine, and tropane alkaloids.

UNIT-IV

Worldwide Trade of Medicinal Plants: World-wide trade in medicinal plants and derived products with special reference to diosgenin (disocorea), taxol (taxussps) digitalis, tropane alkaloid containing plants, papain, cinchona, ipecac, liquorice, ginseng, aloe, valerian, rauwolfia and plants containing laxatives.

Marine Pharmacognosy: Novel medicinal agent from marine sources

Books Recommended

Note: Recent editions of the following books to be referred

1. Kalia AN. Textbook of Industrial Pharmacognosy. New Delhi: CBS Publishers.
2. Wealth of India - Raw Materials. New Delhi: NISCAIR.
3. Namdeo A. Medicinal Plant Biotechnology, New Delhi: Career Publications.
4. Veersham C. Medicinal Plant Biotechnology. New Delhi: CBS Publishers.
5. Vyas SP, Dixit VK. Pharmacetical Biotechnology. New Delhi: CBS Publishers.
6. Ramawat KG. Plant Tissue Culture.New Delhi: S Chand & Co.

ELECTIVE THEORY: -BP-475-1 -PHARMACEUTICAL MARKETING AND MANAGEMENT

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory 40 hours; 3 hours/week

UNIT-I

Marketing: a) The meaning and scope of marketing. b) The pharmaceutical market- quantitative and qualitative aspects, size and composition of the market, demographic descriptions and socio-psychological characteristics of the consumer, market segmentation. c) Analyzing the market-role of market research. d) Consumer profile- Motivation and prescribing habits of the physician, patients' choice of physician and retail pharmacist.

UNIT-II

The Organization: Manufacturer- company objectives, influence of internal controls such as company policy on the company's operation, effects of government regulations and controls on marketing practices.

The Pharmaceutical Product: a) Market consideration in product development, marketing mix, product life cycle(PLC), effects of different elements of marketing mix at different stages of PLC, product classification, product planning, product differentiation, me- too products, modification of existing product. b) New product development- all stages from the new product idea to the stage of marketing in developed product (Bulk drugs and formulations). c) Branding-concept of brand, different types of brand, importance and reasons for branding, packaging.

Competitive Practices in the Pharmaceutical Industries: a) Price competition-Pricing, objectives, basis and strategies. Rate contracts. b) Non-price competition: all types of non-price competition with special emphasis on competition through research and development, competition through quality.

UNIT-III

Promotions: a) Communication and its importance b) Different ways of promotion- Advertising, direct mail, professionals, journals, sampling, retailing, medical exhibition, public relations, Online Promotional Techniques for OTC Products. c) Professional sales representative- duties of PSR, purpose of detailing, selection and training, compensation and future prospects of the PSR.

Quality Management: Introduction to Statistical Methods, Statistical Quality Control Tools, Statistical Tools for Decision Making, Total Quality Management/Kaizen: Six Sigma, Quality Circle and CPM (Critical Path Method)

UNIT-IV

Management: a) Concepts of management, Nature of management, principles of management. b) Primary functions of management- planning, organizing, staffing, directing and controlling, motivation, and entrepreneurship development. c) Secondary functions of management: Decision- making, Leadership, innovation, delegation of authority/ responsibility.

REFERENCE BOOKS

1. Ashwathappa K. Production management. Mumbai:Himalaya Publishing House;2010.
2. Chary SN. Production and operation management. 2nd ed. Delhi:Tata McGraw Hill Publishing Co;2009.
3. Ghosh SK. Introduction to ISO 9000 & total quality management. Calcutta:Oxford Publishing House.
4. Harold TA, John AR, Oliver S. Manufacturing organization and management. 4thed. New Delhi:Prentice Hall of India Pvt Ltd.
5. Heinz W, Harold K, Management: A global perspective. 10th ed. McGraw Hill International Edition;2007.
6. Mehra ML. GMP. 1st ed. Allahabad:University Book Agency.
7. Mickey CS. Pharmaceutical marketing in the 21st century. New Delhi;Viva Books Pvt Ltd;2001.
8. Mickey CS. Principles of pharmaceutical marketing. 3rded. New Delhi;CRS Publishers and Distributors;2004.
9. Patani A. Drug & Cosmetics Act 1940. Lucknow:Eastern Book Co.
10. Quality Assurance of Pharmaceuticals, Compendium of guidelines and related materials, vol. I, WHO Publications, Geneva.
11. Subbarao. Pharmaceutical marketing in India. Hyderabad;Asian Institute of Pharmaceutical Marketing;1998.
12. Tripati PC, Reddy PN. Principles of management. 3rded. New Delhi:Tata McGraw Hill Publishing Co Ltd;2006.
13. Varma MM, Agarwal RK. Production management. Delhi:King Books Educational Publishers.
14. WHO Experts Committee on "Specifications for Pharmaceutical Preparation" 13th, 22nd, 23rd, 24th, 34th Reports.

Websites

1. www.ich.org
2. www.ifpma.org/ich 5
3. www.fda.gov
4. www.health.gov.au/tga/
5. www.mca.gov.uk

ELECTIVE THEORYBP- 475-2 TOTAL QUALITY MANAGEMENT

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory 40 hours; 3 hours/week

UNIT I

Introduction: Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM – TQM Framework - Contributions of Deming, Juran and Crosby – Barriers to TQM.

UNIT II

TQM Principles: Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen – Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III

Tqm Tools & Techniques: The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing. Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function

UNIT IV

Quality Systems : Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits

Reading Books

1. Pharmaceutical Dosage Forms: Tabletsvol 1-3 by Leon Lachmann
2. Text book of Remington's Pharmaceutical sciences Vol I and II, 21st edition
3. Physical Pharmaceutics by Alfred Martin, 4th edition
4. Bentley's textbook of Pharmaceutics-Rawbins
5. ISO 9000-Norms and explanations
6. GMP for pharmaceuticals- Willing S.H. Marcel and Dekker
7. Pharmaceutical powder compaction technology by GoranAlderborn, 1996. Marcel
8. and Dekker
9. D and C act by Vijay Malik,Latest edition, Eastern book company, Lucknow

ELECTIVE THEORY BP-475-3 CLINICAL TRIAL & RESEARCH

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory 40 hours; 3 hours/week

UNIT-I

Introduction to daily activities of a clinical pharmacist & clinical Trials

Drug therapy monitoring (medication chart review, clinical review, pharmacist interventions), Ward round participation, Adverse drug reaction management, Drug information and poisons information, Medication history ,Patient counseling, Drug utilisation evaluation (DUE) and review (DUR), Quality assurance of clinical pharmacy services, Medical terminologies and Clinical Research terminologies. Introduction to Clinical trials, Phases of Clinical Trials, Types of Clinical Trials- Randomized Clinical Trial, Non Experimental clinical trials, Superiority trials.

UNIT-II

Site selection, site initiation, monitoring and site closeout:

Site Selection Visit: Introduction to Site Selection Visit, Flow of Events Prior to SSV, Feasibility Study, SSV Checklist, On Site visit, Elements of Discussion during the SSV, Documentation and Reporting.

Site initiation Visit: Introduction, Trials, Initiating the Study, Site initiation process & Procedure Site Monitoring and Site Close Out: Monitor, Responsibility of the Monitor, Aims of Monitoring, Monitoring Plan, Preparation for Monitoring Visits, Monitoring activities, Documenting the Monitoring Visit, Follow-up of Persistent Non-Compliance at site, Site Close Out, Flow of Events Prior to Site Close Out Visit, On Site Close Out visit

Drug & Poison information: Introduction to drug information resources available, Systematic approach in answering DI queries, Critical evaluation of drug information and literature,. Preparation of written and verbal reports. Establishing a Drug Information Centre ,Poisons information- organization & information resources

UNIT-III

Introduction to Clinical Data Management and SOPs : Introduction to CDM, Computer system validation (CSV), Clinical Data Management flow, Data Management team, Roles and

responsibilities of key team members and sponsor, SOPs of data management, review and authorization. CRF design , Procedure for CRF design, elements of CRF, data points to be captured in individual CRFs.

Pharmacovigilance: Scope, definition and aims of pharmacovigilance, Adverse drug reactions - Classification, mechanism, predisposing factors, causality assessment [different scales used], Reporting, evaluation, monitoring, preventing & management of ADRs , Role of pharmacist in management of ADR

Reference books:

1. Practice Standards and Definitions - The Society of Hospital Pharmacists of Australia.
2. Basic skills in interpreting laboratory data - Scott LT, American Society of Health System Pharmacists Inc.
3. Biopharmaceutics and Applied Pharmacokinetics - Leon Shargel, Prentice Hall publication.
4. A text book of Clinical Pharmacy Practice; Essential concepts and skills, Dr.G.Parthasarathietal, Orient OrientLangramPvt.Ltd. ISSBN8125026
5. Australian drug information -Procedure manual. The Society of Hospital Pharmacists of Australia.
6. Clinical Pharmacokinetics - Rowland and Tozer, Williams and Wilkins Publication.
7. Pharmaceutical statistics. Practical and clinical applications. Sanford Bolton, Marcel Dekker, Inc.

ELECTIVE THEORY BP-475-4 HERBAL COSMETIC TECHNOLOGY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory 40 hours; 3 hours/week

UNIT I

Chronology of Cosmetics: History of Cosmetic formulations, Cosmetic Classifications, Skin and Cosmetics, Structure and Anatomy of skin. Properties of skin, Types of Skin, Ageing of Skin, Direct Manipulation of the Melanogenic Path, Hair and cosmetics, Structure and anatomy of Hair, Chemistry of hair, Hair growth biology and Hair disorder**.**

UNIT II

Herbal cosmetics Strategies: Skin care, UV care, Natural extractives, Cosmeceuticals, Need of herbal cosmetic ingredients Benefits and Limitation of herbal cosmetics, Recompense of herbal cosmetics, Intention of Herbal cosmetics, Plant Cosmetic Protectants: Chemistry Overview. Natural and Synthetic photoprotectant, Mechanism of Photoprotectives, Side effects of synthetic photoprotectives, Photo protection via antioxidants, enzymes and vitamins. Natural Extractives; cosmetically active plant extracts and oils, their biological sources and their activities.

UNIT-III

Plant Cosmetic Protectants: Chemistry Overview, Plants sterols, hormones, Isoflavons, Traditional formulations, Extraction of photoactive. Natural nourishing preparations, moisturizing preparations, creams for dry skin, cleanser lotions masks and scrubs, for all kind of skin, pimples.

Skin Preparations: Cream, lotions, gels formulations, manufacturing aspects and quality control test, Introduction, Nail preparations.

Hair preparations: Shampoo formulations, manufacturing aspects and quality control test, Introduction to hair tonics, hair bleaches, hair colorants, hair fixers and hair conditioners.

UNIT-IV

Miscellaneous preparations: Dental powders and pasts, Nail lacquers, face powders, Foot preparations, Eye Preparations.

Quality Control and Evaluation: Formulation Evaluations includes Psychometric, Physicochemical, Microbiological Safety evaluation, Basic Characteristics testing of Sunscreens, antiperspirants, deodorants.

Activity evaluation; Skin Properties, Skin Surface evaluation, Skin Mechanical evaluations, Skin Electric properties.

Books recommended:

1. Leonie Tait, Natural ingredients drive growth in cosmetics and toiletries. 27 Sep 2005.
2. Benefits predicted under a more regulated natural cosmetics category Author: Diana Dodson Date published:, 2007 Euromonitor International (Shanghai) Co., Ltd India

ELECTIVE THEORY BP-475-5 PHARMACEUTICAL PRODUCTION MANAGEMENT

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 4 Hrs / Week)

UNIT-I

Inventory Management: Costs in inventory, inventory categories- special considerations, selective inventory control, reorder quantity methods and EOQ, inventory models, safety stock – stock out, lead time – reorder time methods, modern inventory management systems, inventory evaluation.

Material Management: Materials–quality and quantity, value analysis, purchasing–centralized and decentralized, vendor development, buying techniques, purchasing cycle and procedures, stores management, salvaging and disposal of scrap and surplus. Selection of material handling systems, maintenance of material handling equipment, unit-load, pelletization and containerization, types of material handling systems.

UNIT-II

Pilot Plant Scale up Techniques: Scale up of batches for product development, layout of pharmaceutical pilot plant, organization structure, personnel, and activities. Pilot plant of tablets, capsules, solutions, dispersions, semisolids, and parenteral. Protocols for technology transfer.Processautomation technology (PAT) in Pharmaceutical manufacturing.Introduction to SUPAC guidelines.

UNIT-III

IPR and Regulatory Guidelines: Definition, Need for patenting, Types of Patents, Conditions to be satisfied by an invention to be patentable, Introduction to patent search. Parts of patents.Filling of patents.The essential elements of patent; Guidelines for preparation of laboratory note book, Non-obviousness in Patent.Brief introduction to Trademark protection and WHO Patents. IPR's and its types, Major bodies regulating

Indian Pharmaceutical sector, CDSCO. WHO, USFDA, EMEA, TGA, MHRA, MCC, ANVISA regulatory requirements for contract research organization.Regulations for Biosimilars. Role of GATT, TRIPS, and WIPO.

UNIT-IV

Industrial Hazards And Plant Safety: Industrial accidents, mechanical hazards, electrical hazards, chemical hazards, gas hazards, dust explosion, fire and explosion hazards, prevention and control of all these hazards, safety management. Industrial pollution and Control measurements.

Brief study on effluent treatment& its management in pharmaceutical industries, Concept of ISO 9000& GLP.

Reading Books:

1. Theory and Practice of Industrial Pharmacy By Lachmann and Libermann , Latest edition.
2. Modern Pharmaceutics by Gillbert and S. Banker 4thEdition .
3. Pharmaceutical Process Validation: By Fra R. Berry and Robert A. Nash, Vol 57, 2nd edition
4. Applied Production and Operation Management By Evans, Anderson and Williams GMP for pharmaceuticals Material Management by K.K. Ahuja Published by CBS publishers
5. Pharmaceutical Preformulations by J.J Wells
6. Pharmaceutical Dosage Forms: Tabletsvol 1-3 by Leon Lachmann
7. Text book of Remington's Pharmaceutical sciences Vol I and II, 21st edition
8. Physical Pharmaceutics by Alfred Martin, 4th edition
9. Bentley's textbook of Pharmaceutics-Rawbins
10. ISO 9000-Norms and explanations
11. GMP for pharmaceuticals- Willing S.H. Marcel and Dekker
12. Pharmaceutical powder compaction technology by GoranAlderborn, 1996. Marcel and Dekker
13. D and C act by Vijay Malik,Latest edition, Eastern book company, Lucknow

ELECTIVE BP-475-6 QUALITY CONTROL AND QUALITY ASSURANCE

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

Introduction: An understanding of the concepts of quality assurance, good manufacturing practice and quality control as applied to the pharmaceutical Industry.

Raw Materials Control: Raw material, purchase specifications, vendor selection criteria, control of raw materials.

Manufacturing Quality Control: Manufacturing controls on dosage forms, manufacturing documents, master formula record, batch formula records, batch packaging records, quality audits of manufacturing processes and facilities.

UNIT-II

In-process Quality Control: In-process quality controls on various sterile and non-steriledosage forms, standard operating procedures (SOP) for various operations like cleaning, filling, drying, compression, disinfection, fumigation, sterilization, etc.

Packaging and Labeling Control: Packaging and labeling controls, line clearance, reconciliation of labels, cartons and other packaging material.

UNIT-III

Validation: Introduction to validation – concurrent validation, prospective validation and retrospective validation, design, development and process validation methods for pharmaceutical operations involved in production with special reference to tablets, cleaning validation, validationof production equipment and analytical instruments.

Performance Evaluation of Pharmaceutical Products: Federal perspectives on *in vitro* dissolution of immediate release and extended releaseproducts, federal perspectives on bioavailability and bioequivalence, *in vitro – in vivo* correlationsand bio-waiver.

UNIT-IV

Drug Regulatory Affairs: Regulation on manufacture of drugs in India, drug regulatory controls and authorities, requirements of GMP, cGMP, GLP, ISO 9000 series, submission of marketing application for India, US and European markets.

Quality Audit: Quality control documentation, retention of samples and records, quality audits and quality review.

Books Recommended

Note: Recent editions of the following books to be referred

1. Weinberg S. Good Laboratory Practice Regulations. New York: Marcel and Dekker.
2. SwarbrickJ. Encyclopedia of Pharmaceutical Technology. New York: Marcel Dekker.
3. Berry JR, Nash RA. Pharmaceutical Process Validation. New York: Marcel Dekker.
4. Will SH, Stoker JR. Good Manufacturing Practices for Pharmaceutics. New York: Marcel Dekker.
5. Brewer RF. Design of Experiments for Process Improvement and Quality Assurance. New Delhi:Narosa.

Regulatory Guidelines

1. FDA Guidelines. Website: www.fda.gov/cder/guidance/index.htm.
2. Orange Book. Website: www.fda.gov/cder/ob/default.htm.

ELECTIVE BP-475-7 HERBAL DRUG TECHNOLOGY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	0	0	3	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

Introduction: Definition of Herbal drug, Importance of Herbal therapies, Herbal versus conventional drugs, Efficacy and Safety in herbal drugs, Toxicity in Herbals and their interactions. Adverse reactions and safety in herbal medicine, Herbal drugs regulations in India.

Extraction Techniques: Extraction of Plant Material, Soxhlet extraction, Supercritical fluid extraction, Preparation and type of extracts.

UNIT-II

Chromatography of Herbal Drugs: Application of chromatographic techniques such as Paper, TLC, HPTLC, GLC, HPLC, Column, in the isolation, purification and evaluation of herbal drugs.

UNIT-III

Phytochemical Screening of Crude Drugs: Extraction, isolation, purification, analytical profiles of phytoconstituents obtained from; Vasaka, Kalmegh, Aswagandha, Ginger, Liquorice, Brahmi, Turmeric and Gymnema.

UNIT-IV

Standardization and Quality control of Herbal Drugs: Definition of the terms: evaluation, quality control and standardization. Importance of standardization of raw materials, extracts and formulations with suitable examples. Quality control methods for Herbal drugs as per WHO guidelines. Monographic analysis of Gokhru, Guduchi&Guggullipid for Standardization. Role of marker compounds in evaluation and chromatographic finger printing analysis.

Intellectual Property Rights: Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy. Patenting aspects of Traditional Knowledge and Natural Products. Case study of Turmeric&Neem.WHO guidelines for regulation of herbal medicines in South-East Asian region. Regulatory control for import and export of herbal products

Books Recommended :

Note: Recent editions of the following books to be referred

1. Chaudhari RD. Herbal Drug Industry. New Delhi: Eastern publication
2. Mukherjee PK. Quality control Herbal Drugs. New Delhi: Business Horizons,
3. Mukherjee PK, Verpoorte R. GMP for Botanicals. New Delhi: Business Horizons.
4. Rajpal V. Standardization of Botanicals. New Delhi: Eastern Publications.
5. Wagner H, Bladt S. Plant Drug Analysis – A Thin Layer Chromatography Atlas. New York: Springer.
6. WHO. Quality Control Methods for Medicinal Plant Materials. Geneva: World Health Organization.

BP 711- MEDICINAL CHEMISTRY – III LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To carry out the synthesis of benzimidazole from *o*-phenylenediamine.
2. To carry out the synthesis of benzotriazole*o*-phenylenediamine.
3. To carry out the synthesis of picric acid from phenol.
4. To carry out the synthesis dithizone from phenylhydrazine.
5. To carry out the synthesis of 1,3,4-thiadiazole nucleus from benzoic acid.
6. To carry out IR spectral analysis of benzimidazole.
7. To carry out the IR spectral analysis of benzotriazole.
8. To carry out pharmacopoeial standards of ascorbic acid.
9. To carry out pharmacopoeial standards of ranitidine.
10. To carry out the synthesis of methyl orange.

BP 712- PHARMACOLOGY –II LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practical's assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To Study commonly used instruments in experimental pharmacology lab. **(1 Expt)**
2. To Study on different tissues, agonists, antagonists and receptors employed in *in vitro* evaluation. **(1 Expt)**
3. Anticoagulants studies using goat/ sheep blood . **(1 Expt)**
4. To estimate the strength of the test sample of Acetylcholine using a suitable isolated muscle preparation employing matching bioassay. **(1 Expt)**
5. To estimate the strength of the test sample of Acetylcholine using a suitable isolated muscle preparation interpolation bioassay. **(1 Expt)**
6. To estimate the strength of the test sample of Acetylcholine using a suitable isolated muscle preparation three point bioassay. **(1 Expt)**
7. To estimate the strength of the test sample of Acetylcholine using a suitable isolated muscle preparation three point bioassay. **(1 Expt)**
8. To estimate the strength of the test sample of Histamine using a suitable isolated muscle preparation matching bioassay. **(1 Expt)**
9. To estimate the strength of the test sample of Histamine using a suitable isolated muscle preparation interpolation bioassay. **(1 Expt)**
10. To estimate the strength of the test sample of histamine using a suitable isolated muscle preparation three point bioassay. **(1 Expt)**

BP 714- PHARMACEUTICS-VII (BIOPHARMACEUTICS AND PHARMACOKINETICS) LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To construct calibration curve for Paracetamol/ Diclofenac using UV/Visible Spectrophotometer
2. To study the dissolution time profile of Paracetamol tablets
3. To study the comparative dissolution profile of Ofloxacin /Paracetamol tablet using dissolution test apparatus.
4. To study the effect of surfactant in enhancement of bioavailability of Diclofenac sodium using dissolution test apparatus
5. To determine the pH partition profile of Diclofenac sodium and theoretical estimation of its apparent volume of distribution.
6. To determine the percentage protein binding of ciprofloxacin hydrochloride/Paracetamol using semi permeable membrane
7. To study the plasma concentration profile and pharmacokinetic parameters of given drug plasma concentration data.
8. To calculate the AUC (area under the curve) for given data using counting square method.
9. To calculate the AUC (area under the curve) for given data using Trapezoidal method.
10. To calculate the AUC (area under the curve) for given data using cutting and weighing method.
11. To determine the absorption rate constant from the given plasma concentration time profile.
12. To determine the pharmacokinetic parameters of given plasma time profile.

BP 715- INDUSTRIAL PHARMACOGNOSY LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3Hrs/ Week)

1. To study the basic laboratory requirements and maintenance of plant tissue culture.
2. To extract total Cinchona alkaloids from powdered Cinchona bark.
3. To perform TLC study of extracted Cinchona alkaloid.
4. To isolate Caffeine from Tea powder.
5. To perform TLC study of isolated Caffeine.
6. To extract volatile oil from Fennel/Eucalyptus.
7. To perform TLC study of extracted oil from Fennel/Eucalyptus.
8. To extract volatile oil from Clove/Caraway.
9. To perform TLC study of extracted oil from clove/Caraway.
10. To prepare a herbal cosmetic preparation (cold cream/shaving cream/moisturizing cream etc).
11. To isolate calcium citrate from Lemon juice.
12. To isolate Pectin from Orange peel.
13. To prepare an elaborated report on
    a. World-wide trade of medicinal plants viz. Digitalis, Cinchona, Liquorice, Rauwolfia, Aloe and discuss their economic status at Indian perspective.
    b. The utilization of aromatic plants and name some plant based industries.
    c. Significance of chemotaxonomy of medicinal plants.
    d. Nutraceuticals
    e. Herbal Cosmetics

8TH SEMESTER DETAILED SYLLABUS

BP 801 - INSTRUMENTAL METHODS OF ANALYSIS

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

1. **UV-Visible Spectroscopy:** Brief review of electromagnetic spectrum, UV-Visual range,Interaction of electro-magnetic radiation (UV-Vis) and matter and its effects, Instrumentation,Pharmaceutical applications.
2. **Infra-Red Spectroscopy:** Nature of Infra-red radiation, Interaction of IR radiation with organicmolecules and effects on bonds, principle, brief outline of classical IR instrumentation, applications.

UNIT-II

3. **Nuclear Magnetic Resonance Spectroscopy (NMR):** Principles of NMR, Instrumentation, Applications.
4. **Mass Spectrometry:** Principle, instrumentation, mass spectrum, types of peaks and itscharacteristics, applications of mass spectrometry.

UNIT-III

5. **Emission Spectroscopy:** Principle, basic instrumentation, interpretation of spectra andpharmaceutical applications of fluorimetry and flame photometry.
6**. Atomic Absorption Spectroscopy:** The theoretical aspects, instrumentation, interpretation of spectra, and applications of atomic absorption spectroscopy.
7. **X-Ray Diffraction:** The theoretical aspects, instrumentation, interpretation of spectra, and applications of X-ray diffraction in pharmacy.

UNIT-IV

8. **Radio Immuno Assay (RIA):** The theoretical aspects, instrumentation, and diagnostic, medicaland pharmaceutical applications of RIA.

9. **Analytical Validation and Quality Management:** Interpretation of analytical data, validation of analytical procedures, TQM, quality review, regulatory control.

Books Recommended

Note: Recent editions of the following books to be referred

1. Lee, DC. Pharmaceutical Analysis. London: Blackwell.
2. Indian Pharmacopoeia. New Delhi: Ministry of Health and Family Welfare.
3. Willard HH, Merritt LL, Dean JA. Instrumental Methods of Analysis. New Delhi: CBS Publishers.
4. Ewing GW. Instrumental Methods of Chemical Analysis. Singapore: McGraw Hill.
5. Schirmer RE. Modern Methods of Pharmaceutical Analysis. Vol 1 & 2. Pennsylvania: FranklinBook Co.
6. Kemp W. Organic Sepctroscopy: London: ELBS / WH Freeman & Co.
7. Munson JW. Pharmaceutical Analysis: Modern Methods. Part A & B. New York: Marcel Dekker.

BP 802–PHARMACEUTICS-VIII (NOVEL DRUG DELIVERY SYSTEMS)

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which is compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

Introduction: Principle, advantages, disadvantages, selection of drug candidates. Approaches to design controlled release formulations based on diffusion, dissolution and ion exchange principles

Microencapsulation: Definition, applications, air suspension, coacervation and phase separation techniques.

UNIT-II

Novel drug delivery systems: Concepts, advantages and disadvantages, types of drug delivery systems such as nasal, ocular, buccal, depot and implants with suitable examples.

UNIT-III

Targeted drug delivery systems: Concepts and approaches, advantages and disadvantages, applications of microspheres, reseal erythrocytes, phytosomes, liposomes, niosomes, nanoparticles, metallic nanoparticles.

UNIT-IV

T**ransdermal Drug Delivery:** Permeation through skin, physicochemical factors in drug permeation, permeation enhancers, approaches and technologies for developing transdermal drug delivery systems.

Pilot Plant scale up: General considerations - including significance of personnel requirements, space requirements, raw materials and development of Master Formula Records and Batch

Manufacturing Records. Pilot plant scale up considerations for tablets& liquid orals. Introduction to the concepts of Quality by Design (QbD**).**

Books Recommended

Note: Recent editions of the following books to be referred

1. Osborne DW, Amann AH. Topical Drug Delivery Formulations. New York: Marcel Dekker.
2. Tyle P. Drug Delivery Devices: Fundamental Applications, New York: Marcel Dekker.
3. Robinson R, Lee VHL. Novel Drug Delivery Systems. New York: Marcel Dekker.
4. Jain NK. Novel and Drug Delivery Systems, New Delhi: CBS Publishers.
5. Bean HS, Becket AH, Carless JE. Advances in Pharmaceutical Sciences. Vol. 5.London: Academic Press.
6.Roseman TJ, Mansdorf SZ. Controlled Release Delivery Systems. New York: Marcel Dekker.

BP 803 -PHARMACOLOGY-III

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
3	1	0	4	40	60	100	3 hours

Note: The paper setter will set two questions from each Section/Unit and one question (Q. No. 9) covering all Sections/Units which are compulsory and of short answer type of one mark each. A candidate is required to attempt 5 questions selecting one question from each section. All questions carry equal marks.

Theory (40 Hrs: 3 Hrs / Week)

UNIT-I

Drugs Acting on Gastrointestinal Tract: Peptic Ulcer,Anti Secretory and Anti-ulcer drugs; Laxatives and anti-diarrhoeal drugs; Appetite Stimulants and Suppressants; Emetics and antiemetics, Miscellaneous-Carminatives, demulcents, protective's, adsorbents, astringents, digestants, enzymes and mucolytics.

Chemotherapy: Introduction and General Principles of Chemotherapy. Antimetabolites like Sulfonamides.

UNIT-II

Chemotherapy Using Antibiotics: Introduction to antibiotics, Penicillins, Cephalosporins, Chloramphenicol, Erythromycin, Quinolones and Miscellaneous Antibiotics.

Chemotherapy of Urinogenital Infections: Urinary tract infections, sexually transmitted diseases.

UNIT-III

Chemotherapy of Fungal / Viral Infections: Fungal diseases, clotrimoxazole, viral diseases and antiviral drugs.

Chemotherapy of Mycobacterial Infections: Chemotherapy of tuberculosis and leprosy.

Chemotherapy of Cancer: Drugs used for the chemotherapy of different types of cancers.

Immunomodulators: Immunosuppressive agents and immunostimulants.

UNIT-IV

Drugs acting on Respiratory System: Anti-asthmatic drugs including bronchodilators; Antitussives and expectorants, Respiratory stimulants.

Toxicology: Definition and Principle of toxicology, general principles and types of poisons, treatment of poisoning withparticular reference to barbiturates, opioids, organophosphorous and atropine poisoning.Heavymetals and heavy metal antagonists.

Books Recommended

Note: Recent editions of the following books to be referred

1. Rang MP, Dale MM, Riter JM. Pharmacology. New York: Churchill Livingstone.
2. Brunton LL, Lazo JS, Parker KL. Goodman and Gilman's The Pharmacological Basis of Therapeutics. New York: McGraw Hill.
3. Mycek MJ, Harvey RA, Champe PC. Lipponcott's Illustrated Reviews -Pharmacology. Philadelphia: Lippincott Williams & Wilkins.
4. Tripathi KD. Essential of medical Pharmacology, New Delhi: Jaypee Brothers Medical Publishers.
5. Ghosh MN. Fundamentals of Experimental Pharmacology. Kolkata: Scientific Book Agency.
6. Kulkarni SK. Handbook of Experimental Pharmacology. Vallabh Prakashan, Delhi.

BP 811- INSTRUMENTAL METHODS OF ANALYSIS LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner
b. Viva-voce examination
c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. To calibrate UV-visible spectrophotometer
2. To determine wavelength of maximum absorbance using UV spectrophotometer & validity of Lambert Beer‟s law.
3. To study the effect of solvent & pH on UV spectrum of a given compound.
4. To perform the assay of paracetamol tablets using UV Spectrophotometer.
5. To perform the assay of metformin tablets using UV Spectrophotometer.
6. To perform the assay of aspirin tablets using UV Spectrophotometer.
7. To demonstrate IR spectrometer.
8. To study IR spectra of given compound (Phenol).
9. Tostudy IR spectra of given compound (Paracetamol)
10. To perform quantitative estimation of Na^+/K^+ ions in given sample by using flame photometry.
11. To interpret the structure of 3-4 simple organic compounds using Mass Spectrum.
12. To estimate the amount of diclofenac sodium in given formulation.

BP 812- PHARMACEUTICS- VIII (NOVEL DRUG DELIVERY SYSTEMS) LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practicals assigned by the examiner

b. Viva-voce examination

c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate during the semester:

List of Experiments (3 Hrs/ Week)

1. Preparation and evaluation of sustained release oral matrix tablet. **(1 Expts)**
2. Study of *in-vitro* dissolution of various sustained release products in market. **(2 Expts)**
3. Preparation and evaluation of microspheres using egg albumin as polymer. **(1 Expt)**
4. Preparation and evaluation of buccal mucoadhesive tablets. **(1 Expt)**
5. Formulation and evaluation of transdermal film. **(1 Expt)**
6. Preparation and evaluation of pH controlled release system using different grades of Eudragits. **(2 Expts)**
7. Preparation and evaluation of enteric coated pellets/ tablets. **(1 Expt)**
8. Preparation and evaluation of cross-linked alginate based microspheres. **(1 Expt)**
9. Preparation and evaluation of nasal Gel.
10. Preparation and evaluation of Ocular implants.

BP 813- PHARMACOLOGY –III LABORATORY

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P	C	Sessional	End Semester Exam	Total	
0	0	3	1	50	50	100	3 hours

INSTRUCTIONS

Laboratory examination will consist of three parts:

a. Performing practical's assigned by the examiner

b. Viva-voce examination

c. Writing synopsis regarding principles / theory behind the experiments

Viva-voce examination will be related to the practicals performed / project undertaken by the candidate related to the subject during the semester. Following is the suggested list of experiments out of which 8-10 experiments must be performed by the candidate on the **software** during the semester:

List of Experiments (3 Hrs / Week)

1. To study animal house and its facilities as per CPCSEA guideline.
2. To study the effect of drugs on GIT motility.
3. To study the effect of 5-HT on rat fundus preparation.
4. To demonstrate the competitive antagonism between acetylcholine and d- tubocuracine on rectus abdominis muscle of frog and to determine the pA2 value of d-tubocuracine.
5. To demonstrate non-competitive antagonist between atropine and acetylcholine on isolated rat ileum preparation.
6. To find out the action of drug/s on the isolated heart preparation of frog.
7. To find out the concentration of given sample of oxytocin using on rat uterus by four point method.
8. To find out the concentration of given sample of Acetylcholine using guinea pig ileum by Four point method.
9. To find out the concentration of given sample of histamine using guinea pig ileum by Four point method.
10. To study the antiulcer activity by pylorus ligation method.
11. To find out action of drug/s on the dog blood pressure and heart rate.