

DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF PHARMACY
Bachelor of Pharmacy Program
Teaching & Examination Scheme (Semester System)

SEMESTER – I

Subject code	Subjects	Marks		Hours/ Week		Credits		
		Theory	Practical	Theory	Practical	TH	PR	Total
PH111	Pharmaceutics-I (Pharmaceutical Engineering-I)	100	100	3	3	3	2	5
PH112	Pharmaceutics-II (Unit Operation-I)	100	100	3	3	3	2	5
PH113	Pharmaceutical Chemistry-I (Inorganic)	100	100	3	3	3	2	5
PH114	Anatomy Physiology & Health Education – I	100	100	3	3	3	2	5
PH115	Applied Mathematics Biostatistics & Computer Application – I	100	100	3	3	3	2	5
PH116	Introduction to Yoga*	50	50	1	1	1	1	2
	Total	550	550	16	16	16	11	27

*Evaluation at the end of semester

SEMESTER – II

Subject code	Subjects	Marks		Hours/ Week		Credits		
		Theory	Practical	Theory	Practical	TH	PR	Total
PH211	Pharmaceutics-III (Pharmaceutical Engineering-II)	100	100	3	3	3	2	5
PH212	Pharmaceutics-IV (Unit Operation-II)	100	100	3	3	3	2	5
PH213	Pharmaceutical Chemistry-II (Organic)	100	100	3	3	3	2	5
PH214	Anatomy Physiology & Health Education – II	100	100	3	3	3	2	5
PH215	Applied Mathematics Biostatistics & Computer Application – II	100	100	3	3	3	2	5
PH216	Self Development*	50	--	2	--	2	-	2
	Total	550	500	17	15	17	10	27

*Evaluation at the end of semester

SEMESTER – III

Subject code	Subjects	Marks		Hours/ Week		Credits		
		Theory	Practical	Theory	Practical	TH	PR	Total
PH311	Pharmaceutics-V (Physical Pharmacy)	100	100	3	3	3	2	5
PH312	Dispensing Pharmacy	100	100	3	3	3	2	5
PH313	Pharmaceutical Chemistry- III (Organic)	100	100	3	3	3	2	5
PH314	Pharmaceutical Chemistry- IV (Biochemistry)	100	-	3	-	3	-	3
PH315	Pharmacognosy-I	100	100	2	3	2	2	4
PH316	Pharmacology-I	100	100	3	3	3	2	5
	Total	600	500	17	15	17	10	27

SEMESTER – IV

Subject code	Subjects	Marks		Hours/ Week		Credits		
		Theory	Practical	Theory	Practical	TH	PR	Total
PH411	Pharmaceutics-VI (Physical Pharmacy)	100	100	3	3	3	2	5
PH412	Hospital Pharmacy & Biopharmaceuticals	100	-	2	-	2	-	2
PH413	Pharmaceutical Chemistry- V (Organic)	100	100	3	3	3	2	5
PH414	Pharmaceutical Chemistry- VI (Biochemistry)	100	100	3	3	3	2	5
PH415	Pharmacognosy-II	100	100	3	3	3	2	5
PH416	Pharmacology-II	100	100	3	3	3	2	5
	Total	600	500	17	15	17	10	27

SEMESTER – V

Subject code	Subjects	Marks		Hours/ Week		Credits		
		Theory	Practical	Theory	Practical	TH	PR	Total
PH511	Pharmaceutical Technology – I	100	100	3	3	3	2	5
PH512	Pharmaceutical Microbiology	100	100	2	3	2	2	4
PH513	Medicinal Chemistry – I	100	-	3	-	3	-	3
PH514	Pharmaceutical Analysis – I	100	100	3	3	3	2	5
PH515	Pharmacognosy-III	100	100	3	3	3	2	5
PH516	Pharmacology-III	100	100	3	3	3	2	5
PH517	Pharmaceutical Jurisprudence – I	100	-	2	-	2	-	2
	Total	700	500	19	15	19	10	29

SEMESTER – VI

Subject code	Subjects	Marks		Hours/ Week		Credits		
		Theory	Practical	Theory	Practical	TH	PR	Total
PH611	Pharmaceutical Technology – II	100	100	3	3	3	2	5
PH612	Pharmaceutical Biotechnology	100	-	2	-	2	-	2
PH613	Medicinal Chemistry – II	100	100	3	3	3	2	5
PH614	Pharmaceutical Analysis – II	100	100	3	3	3	2	5
PH615	Pharmacognosy-IV	100	100	3	3	3	2	5
PH616	Pharmacology & Pathophysiology-I	100	100	3	3	3	2	5
PH617	Pharmaceutical Jurisprudence – II	100	-	2	-	2	-	2
	Total	700	500	19	15	19	10	29

SEMESTER – VII

Subject code	Subjects	Marks		Hours/ Week		Credits		
		Theory	Practical	Theory	Practical	TH	PR	Total
PH711	Dosage Form Design	100	100	3	3	3	2	5
PH712	Medicinal Chemistry – III	100	100	3	3	3	2	5
PH713	Pharmaceutical Analysis – III	100	100	3	3	3	2	5
PH714	Pharmacognosy-V	100	100	3	3	3	2	5
PH715	Pharmacology & Pathophysiology-II	100	100	3	3	3	2	5
PH716	Pharmaceutical Management	100	-	2	-	2	-	2
	Total	600	500	17	15	17	10	27

SEMESTER – VIII

Subject code	Subjects	Marks		Hours/ Week		Credits		
		Theory	Practical	Theory	Practical	TH	PR	Total
PH811	Biopharmaceutics & Pharmacokinetics	100	100	3	3	3	2	5
PH812	Medicinal Chemistry – IV	100	100	3	3	3	2	5
PH813	Pharmaceutical Analysis – IV	100	100	3	3	3	2	5
PH814	Pharmacognosy-VI	100	100	3	3	3	2	5
PH815	Clinical Pharmacy	100	-	3	-	3	-	3
PH816	Elective	-	100	-	3	-	2	2
	Total	500	500	15	15	15	10	25

Bachelor of Pharmacy Program

Semester I

Scheme of Teaching & Examination

Subject code	Subjects	Marks		Hours/ Week	
		Theory	Practical	Theory	Practical
PH111	Pharmaceutics-I (Pharmaceutical Engineering-I)	100	100	3	3
PH112	Pharmaceutics-II (Unit Operation-I)	100	100	3	3
PH113	Pharmaceutical Chemistry-I (Inorganic)	100	100	3	3
PH114	Anatomy Physiology & Health Education – I	100	100	3	3
PH115	Applied Mathematics Biostatistics & Computer Application – I	100	100	3	3
PH116	Introduction to Yoga*	50	50	1	1
	Total	550	550	16	16

*Evaluation at the end of semester

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY

PH111 Pharmaceutics-I (Pharmaceutical Engineering - I)

Theory

3 hours/Week

No.	Chapter	Hours
01	Pharmaceutical engineering and its significance, Unit Operation, Basic laws	02
02	Elementary knowledge of engineering drawing – Introduction to concept of orthographic and isometric views of elevation of third angle projection, notation and abbreviation used in engineering drawing.	02
03	Stoichiometry: Unit processes, material and energy balance, molecular unit, mole fraction, tie substance, gas laws, mole volume, primary & secondary quantities, equilibrium state, rate process, steady and unsteady state, dimensionless equations, dimensionless formula, dimensionless groups, types of graphic representation, mathematical problems, fuels and combustion, Limekiln performance, etc.	10
04	Fluid Flow: Types of flow, Reynolds's number, types of pressure, viscosity, concept of boundary layer, basic equation of fluid flow, valves, flow meter, manometer and measurement of flow and pressure.	11
05	Material of Construction: General study of composition, corrosion, resistance, properties and applications of the materials of construction with special reference to stainless steel, glass, plastics, rubber.	05
06	Industrial hazards and safety precautions: Mechanical, chemical, electrical, fire and dust hazards, industrial dermatitis and accidents records etc.	06
07	Corrosion and its prevention with reference to commonly used material in pharmaceutical plants.	04
08	Packaging of materials: Function and qualities of package, hazards encountered by package, protection to be given by package, containers, closures, foils, pressure packs for pharmaceutical products.	05

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested List of Practical:

1. Use of conversion Factors
2. To measure pressure in gas line using U tube manometers.
3. To measure pressure in gas line using inclined manometers.
4. To calibrate the given Orificemeter and to calculate its coefficient of discharge.
5. To calibrate the given Venturimeter and to calculate its coefficient of discharge.
6. Demonstration of Rotameter.
7. To determine possible chemical reaction of sodium bicarbonate using concept of material balance of stoichiometry.
8. Experiments of ejector pump
9. Calculation of frictional losses.

Books Recommended

1. Cooper and Gunn's Tutorial Pharmacy, Ed S.J. Charter, CBS Publishers, New Delhi
2. Introduction to Chemical Engineering by W.L. Badger and J.L. Banchero, McGraw Hill International Edition, New Delhi
3. Perry's Chemical Engineering, Perry and Green, McGraw Hill Inc., New York
4. Elementary Chemical Engineering, Max Peters, McGraw Hill Inc., New York
5. Unit Operations of Chemical Engineering, McCabe, Smith and Harriott, McGraw Hill Inc., New York
6. Theory & Practice of Industrial Pharmacy, Lachman, Lieberman & Kanig, Indian Edition, Varghese Publishing, Bombay
7. Pharmaceutics: The Science of Dosage Form Design, Aulton,
8. Pharmaceutical Engineering, K. Sambhamurty, New Age Pvt. Ltd., Delhi
9. Introduction to Pharmaceutical Engineering, A.R. Paradkar, Nirali Prakasan, Pune
10. Pharmaceutical Engineering, Subramanian et.al., Vallabh Prakasan, Delhi
11. Remington's Pharmaceutical Sciences, Ed. A.R.Gennaro, Mack Publishing Co.
12. Text Book of Engineering Drawing, P.J. Shah, Ahmedabad
13. Engineering Drawing, N. D. Bhatt, Charutar Publishing House, VV nagar

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH112 Pharmaceutics-II (Unit Operation-I)

Theory **3 hours/Week**

No.	Chapter	Hours
01	Drying: Moisture content and mechanism of drying, rate of drying and time of drying calculations, classification and types of dryers, dryers used in pharmaceutical industries and special drying methods, tray drying, fluidized bed drying, spray drying, freeze drying, Microwave drying, Mathematical problems on drying.	12
02	Size Reduction and size separation: definition, objectives of size reduction, factors affecting size reduction, laws governing energy and power requirements of a mill, types of mills including ball mill, hammer mill, fluid energy mill etc.	10
03	Mixing: Theory of mixing, solid-solid, solid-liquid and liquid-liquid mixing equipments.	07
04	Extraction: Principle, theory, types of extraction, solvents used for extraction, leaching and extraction equipments, small scale and large scale extraction methods, special extraction techniques, application in pharmaceutical industry.	06
05	Automated Process Control Systems: Process variable, temp., pressure, flow level, vacuum and their measurements. Elements of automatic process control.	04
06	Control charts and its application in pharmacy: elements of control charts and types of control charts, etc.,	06

Practical **3 hours/Week**

To illustrate the topics included under theory

Suggested List of Practical:

1. To study the effect of solid – solid mixing.
2. To study the effect of speed of mixing on rate of mixing using magnetic stirrer.(Solid – liquid mixing)
3. To study the effect of surface area on rate of drying of prepared sample.
4. To find out the rate of drying of sample containing different Moisture Content (MC) and to evaluate Critical Moisture Content (CMC), Equilibrium Moisture Content (EMC), Critical Free Moisture Content (CFMC).
5. Demonstration of double cone mixer, triple roller mill, planetary mixer, Ball mill, Sigma blade mixer, Spray dryer, colloid mill, multi mill, fluid bed dryer, Roller mill.
6. Experiment based on principles of extraction.

Books Recommended

1. Theory and practice of Industrial pharmacy by Lachman, Liberman and Kanig. Third edition.
2. Pharmaceutical dosage form: Tablets, Volume II Edited by Lieberman, Lachman and Schwartz. Second Edition.
3. Pharmaceutics: The science of dosage form designed by M.E. Aulton (1998 Edition).

4. Pharmaceutical Engineering by K. Sambamurthy.
5. Remington: The science and practice of pharmacy Vol-I & II 19th edition.
6. Elementary chemical engineering by Max S. Peters.
7. Unit operation of chemical engineering (5th edition) by McCabe, Smith and Harriott.
8. Perry's chemical engineer's Handbook by Robert Perry (6th edition).
9. Tutorial pharmacy: (Cooper and Gunn).

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH113 Pharmaceutical Chemistry-I (Inorganic)

Theory

3 hours/Week

No.	Chapter	Hours
01	Quality control of drugs and Pharmaceuticals: Importance of quality control, sources of impurities in pharmaceuticals. Test for purity including limit test for Arsenic, Iron, Chloride, Sulphate, Lead and Heavy metals.	04
02	An outline of methods of preparation, properties [Chemical and physical], test for purity, identity assay principle of the following class of compounds included in the latest edition of the Indian Pharmacopoeia. Their medicinal and pharmaceutical uses, storage and chemical incompatibility.	04
03	Pharmaceutical Necessities: a. Acid and bases: Acid -base theories, boric acid, hydrochloric acid, sulfuric acid, nitric acid, phosphoric acid, sodium hydroxide, strong ammonia solution, soda lime. b. Buffers: Theory and mechanism of buffers, official buffers c. Anti-oxidants: Theory of antioxidants, Hypo phosphorus acid, sodium bisulfite, sodium metabisulfite, sodium thiosulfate, sodium nitrite, Nitrogen d. Water: Purified water, Water for injection, sterile water for injection.	06
04	Gastro - intestinal agents: a. Acidifying agents: Dilute hydrochloric agents b. Antacids: Antacid therapy, sodium bicarbonate, Aluminum hydroxide gel, calcium containing antacids, Magnesium containing antacids. combination antacid preparation. c. Protective and adsorbents: Bismuth sub carbonate, bismuth sub gallate, kaolin, activated charcoal. d. Saline Cathartics: Sodium containing products, Magnesium containing products, Sodium potassium tartarate.	06
05	Major Intra and Extra cellular Electrolytes: a. Physiological ions b. Electrolytes used for replacement therapy c. Physiological acid base balance d. Electrolytes combination therapy.	04
06	Essential and trace ions: Transition elements and their compounds of pharmaceutical importance, Compounds of iron, Mineral supplements: Iodine, potassium iodide.	02
07	Topical agents: a. Protectives: Talc, zinc oxide, calamine, Titanium dioxide, silicone polymer b. Antimicrobials and astringents: Antimicrobial terminology and mechanism of action, Hydrogen peroxide, potassium permanganate, Iodine, Povidone iodine, Silver nitrate, mild silver protein, yellow mercuric oxide, ammoniated mercury antimony potassium tartarate, sublime sulphur, precipitated sulphur, Boric acid c. Astringents: Alum, zinc Sulphate.	05

08	Complexing and chelating agents (Disodium edetate, dimercaprol).	02
09	Dental products: Anticaries agents, Dentifrice.	02
10	Gases and vapors a. Inhalants - oxygen b. Anesthetics - nitrous oxide c. Respiratory stimulants: Ammonium carbonate, aromatic spirit of ammonia carbon dioxide.	02
11	Miscellaneous agents: a. Expectorants - ammonium chloride, potassium iodide b. Emetics - Antimony potassium tartarate c. Antidotes - sodium nitrite, sodium thiosulphate d. Pharmaceutical aids: Antioxidants, preservatives, filter aids, absorbents diluents, excipients, suspending agents colouring agents etc.	04
12	Radiopharmaceuticals: a. General theory regarding radio activity, Nomenclature units, radioactive decay, Biological effects of radiation, radio pharmaceutical preparation b. Measurement of radio activity, G. M. counter storage and handling c. Radio - opaque contrast media: Barium sulphate.	04

Practical

3 hours/week

To illustrate the topics included under theory

Volumetric analysis: Preparation and standardization of some standard solutions,

Volumetric analysis of some important compounds covered in theory.

Limit tests for Chloride, sulphate, iron, arsenic, lead and heavy metals along with few modifications.

All identification tests for pharmacopoeial inorganic pharmaceuticals. Qualitative tests inorganic pharmaceuticals. Qualitative tests for cat ions and anions should be covered.

Suggested Aim of practicals

1. Introduction of subject practical and safety requirements.
2. To prepare and standardize 0.1 N Hydrochloric acid and Sodium hydroxide solution.
3. To determine % purity of Boric acid.
4. A. To prepare and standardize 0.1 N Sodium thiosulphate solution.
B. To determine % purity of Copper sulfate.
5. Preparation and standardization of 0.1 N Potassium permanganate.
6. To determine % purity of Ferrous sulfate.
7. Limit tests of Chloride, Lead
8. Limit tests of Arsenic
9. Limit tests of Iron and Sulfate
10. To Study the scheme for systematic qualitative analysis of Inorg. Compound (Group I & II)
11. To Study the scheme for systematic qualitative analysis of Inorg. Compound (Group III & IV)
12. To Study the scheme for systematic qualitative analysis of Inorg. Compound (Group V and Anions)
13. Unknown Inorganic compounds
14. Unknown Inorganic compounds
15. Unknown Inorganic compounds

Books Recommended

1. Inorganic medicinal and pharmaceutical chemistry, By J.H. Block, E.B. Roche, T.O. Sonie, C.O. Wilson, Indian edition, Varghese publishing house, Bombay.
1. 2. The Indian Pharmacopoeia Latest edition
2. Bentley and driver text book of pharmaceutical chemistry, Oxford university press
3. Practical pharmaceutical chemistry edited by A.H. Beckett, J.B. Stenlake, CBS Publication Indian edition
4. Semi micro qualitative analysis, U.V. Nadkarny, A.N. Kothari, P.S. Fernandes Popular Pakistan Pharmaceutical
5. Modern Inorganic Pharmaceutical Chemistry by C.A. Discher, John Wiley and sons New York
6. Vogel's Qualitative Inorganic analysis revised by G. Svehla

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY

PH114 Anatomy Physiology & Health Education – I

Theory

3 hours/week

No.	Chapter	Hours
01	Scope of anatomy and physiology and basic terminology used in these subjects.	02
02	Structure of cell, its components and their functions.	03
03	Elementary tissues of the human body: Epithelial, connective, muscular and nervous tissues, their subtypes and characteristics.	03
04	Haemopoietic system: Composition and functions of blood and its elements, their disorders, blood groups and their significance, mechanism of coagulation, disorder of platelets and coagulation.	08
05	Lymph and lymphatic system: Composition, formation, circulation and disorders of lymph and lymphatic system. Basic physiology and functions of spleen.	05
06	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 disorders like hypertension, hypotension, arteriosclerosis, angina, myocardial infarction, congestive heart failure and cardiac arrhythmias.	10
07	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.	04
08	Osseous system: Structure, composition and functions of skeleton, classification of joints, type of movement at joints, disorders of bones and joints.	05
09	Skeletal muscles: Their gross anatomy, physiology of muscle contraction, physiological properties of skeletal muscles and their disorders.	05

Practical

3 hrs/week

To illustrate the topics included under theory

Suggested List of Practical:

1. Osteology: Study of Human skeleton.
2. Hematology: Determination of hemoglobin content in blood, RBC & WBC count, Differential leukocyte count, Erythrocyte sedimentation rate, Bleeding time, Clotting time, Blood group and osmotic fragility of RBC
3. Cardiovascular system: Determination of body temperature, pulse rate, blood pressure, listening to heart sounds, demonstration and understanding of electrocardiogram. PQRST waves and their significance.

Books Recommended

1. Mertini, F., Fundamentals of Anatomy and physiology (Prentice Hall), 2nd ed. 1992.
2. Seely, R.R. et al., Anatomy and physiology (Mosby). 3rd ed., 1995.

3. Guyton,A.C. and Hall,J.B., Textbook of Medical Physiology (W.B.Saunders Co., Philadelphia).
4. West J.B. Best and Taylor's physiological basis of medical practice (Williams and Wilkins, Baltimore).
5. Tortora G.J. and Anagnostikos, N.P. Principles of anatomy and physiology (Harper and Collins publishers, New York).
6. Gandhi T.P. et al.: Human anatomy, physiology and health education (B.S. Shah Prakasan, Ahmedabad).
7. Joshi, Vijay D. Preparatory manual for undergraduate physiology (B.I. Churchill Livingstone), 1995.
8. Chatterjee C.C., Human physiology (Medical Allied Agency, Calcutta), 10th ed. 1985.
9. Clancy, John and Macvicar, A.J. Physiology and Anatomy (Edward Arnold), 1995.
10. Chaurasia, B.D., Human Anatomy (6 vol.) (CBS Publishers, New Delhi), 1995.
11. Ross & Wilson's, Anatomy Physiology in health & illness (Churchill Livingstone), 8th ed. 1996
12. Goyal, R.K. et al., Practical Anatomy, Physiology and Biochemistry (B.S. Shah Publishers, Ahmedabad), 13. Garg, K. et. al., A Textbook of Histology (CBS Publishers, New Delhi), 2nd ed. 1991
13. Lesson, C.R. et al., Text book of Histology (W.B. Saunders and company). 5th ed.
14. Agur, Anne M.R., Atlas of anatomy (Williams and Wilkins) 9th ed.1991.
15. Von de Graff and Crowley, J.L., A photographic Atlas for Anatomy Physiology Laboratory (Modern Publishing Company). 1996. 3rd Ed.
16. Ghai, C.L.: A Text Book of Practical Physiology (Jaypee Bros. Medical Publisher (P) Ltd.) 4th ed. 1998.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY

PH115 Applied Mathematics, Biostatistics & Computer Application – I

Theory		3 hours/Week
No.	Chapter	Hours
01	Introduction to computers-definition, characteristics, history, hardware and software concepts, basic computer organization, computer classification, component of computers, introduction to input output devices, storage devices, computer peripherals, operating systems, binary conversion, computer viruses, etc., Windows: Desktop, star-menu, control panel, accessories, my computer, recycle bin, printer and mouse settings, maximizing, minimizing, restoring and closing of windows, window explorer.	12
02	Application of computers in pharmacy.	03
03	MS WORLD: Typing of text with stress on the following features: Typing of text With different fonts and different sizes, indentation, superscript, Greek terms such as alpha, beta, etc, spell checking, use of thesaurus, cut/paste and other features of edit, mail merge, preparation of tables for practical of pharmaceutical chemistry.	12
04	Study of MS Excel: Study of MS Excel screen, workbook, worksheets, Calculation in EXCEL-preparation of templates for application in pharmaceutical chemistry, Special attention must be given to study of logarithm, square root, sum, average, Study of drawing graphs in EXCEL-line graph, histogram, and pie chart., Ms PowerPoint: Creating & viewing a presentation and managing slide shows, etc.	12
05	Introduction to Pharmacy related Software like: Statistical software's, CHEM office, SPSS, SAS, WINNONLIN etc.	06

Practical **3 hrs/week**
To illustrate the topics included under theory

Books Recommended

1. Basic Computer Applications for Pharmacy - Parvez Faruki, Manij Parmar, Nandu Fatak
2. Introduction to Biostatistics & Computer Science, Shah YI, Paradkar AR, Dhayagude MG
3. Manuals provided with the license version of the software
4. HTML 4.0 (No Experience Required), By-E. Stephen Mack, Janan Platt. (BPB Publication)
5. MS-Office 98 -APTECH, TMH Publications
6. Working in Microsoft Office By RON MANSFIELD
7. PC for Window made simple
8. S. Bolton, Pharmaceutical Statistics.

Reference Books:

1. Internet an introduction', Compiled by Tata McGraw-Hill. (Cistems, Tata McGraw-Hill publication)
2. The Internet, By –Douglas E.Comer (Prentice Hall of India publication)

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY

PH116 Introduction to Yoga

Theory		1 hours/Week
No.	Chapter	Hours
01	YOGA & MEDITATION Concept/Introduction of Yoga Types of Yoga (1), Brief about different Yoga (1), Kundalini Yoga (5)-Subtle System, Energy centers & Channels, Sahaja Yoga – Unique revolution of modern time in yoga Concept/Introduction of Meditation: Definition, Thoughtless awareness (1), Levels of Consciousness (1), Practical session (1)	10
02	YOGA AND INNERPERSONALITY Stress Management, Holistic Healthcare, Addiction free life, General Health concept.	05

Practical **1 hrs/week**

PRACTICAL (Basic Asans)

TRAINING IN YOGIC ASANAS, PRANAYAMS AND MUDRAS

1. Kapalbhati, Anulom vilom, Pranayam, Omkar Pranayam, Bharmari, Pranayam, Body Roration, Shavasan, Suryanamaskar,
2. Asans for Meditaion: Padmasan, Swastikasan, Siddhasan, Bhadrasan, Vajrasan, Makarasan, Savasan.
3. Asans to be performed in Standing Position: Trikonasan, Pervatasan, Utkatukasan, Hastpadsan
4. Asans to be performed while lying in Supine position: Servangasan, Halasan, Savasan, Kosthavishramasan, Matshendrasan, Suptavajrasan
5. Asans to be performed while lying in Prone position: Uttanpadasan, Uttanadhasan, Serpasan, Bhujasan, Salabhasan, Dhanurasan, Makarasan
6. Asans to be performed in Sitting position: Pavanmuktasan, Hastapadasan, Vajrasan, Ardhamatshyendrasan, Shishuasan, Saptamudrasan, Gomukhasan.
7. Yoga Mudras (Seven Types)
8. Pranayam (Seven Types)

Bachelor of Pharmacy Program

Semester II

Scheme of Teaching & Examination

Subject code	Subjects	Marks		Hours/ Week	
		Theory	Practical	Theory	Practical
PH211	Pharmaceutics-III (Pharmaceutical Engineering-II)	100	100	3	3
PH212	Pharmaceutics-IV (Unit Operation-II)	100	100	3	3
PH213	Pharmaceutical Chemistry-II (Organic)	100	100	3	3
PH214	Anatomy Physiology & Health Education – II	100	100	3	3
PH215	Applied Mathematics Biostatistics & Computer Application – II	100	100	3	3
PH216	Self Development*	50	--	2	-
	Total	550	500	17	15

*Evaluation at the end of semester

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY

PH211 Pharmaceutics-III (Pharmaceutical Engineering – II)

Theory

3 hours/Week

No.	Chapter	Hours
01	Filtration and Centrifugation theory of filtration, filter aids, filter media, industrial filter including filter press, rotary filter, edge filter, etc., factors affecting filtration, mathematical problems on filtration, optimum cleaning cycle in batch filters.	11
02	Principle of centrifugation, industrial centrifugal filters, centrifugal sedimenters.	04
03	Heat transfer: Source and heat, Heat transfer, steam and electricity as heating media, determination of requirement of amount of steam/electrical energy, steam pressure, boiler capacity, mathematical problems on heat transfer, mode and laws of heat transfer.	10
04	Humidity, Ventilation and Air Conditioning: Basic concept and definition, wet bulb and Adiabatic saturation temp, psychrometric chart and measurement of humidity, application of humidity measurement in pharmacy, equipment's for dehumidification operations. Principles and application of refrigeration and air-conditioning. HVAC system design.	12
05	Material handling systems (a) Liquid Handling: Different types of pumps, (b) Gas handling: various types of fans, blowers and compressors (c) Solid handling: Bins, bunkers, conveyers, air transport.	08

Practical

3 hours/week

To illustrate the topics included under theory

Suggested List of Practical:

1. To study the effect of surface area on rate of filtration
2. To study the effect of thickness on rate of filtration
3. To study the effect of material on rate of filtration
4. To study effect of viscosity on rate of filtration
5. To study effect of temperature on rate of filtration
6. To study the effect of filter-aid on rate of filtration
7. To determine specific cake resistance and resistance of filter medium by filtering slurry of calcium carbonate in water using given funnel and filter papers.
8. Demonstration of Centrifuge.
9. To determine Humidity parameters by using dry bulb and wet bulb temperature method.
10. To determine Humidity parameters by using dew point method.
11. Heat transfer coefficient determination, lagging and insulation.

Books Recommended

1. Cooper and Gunn's Tutorial Pharmacy, Ed S.J. Charter, CBS Publishers, New Delhi
2. Introduction to Chemical Engineering by W.L. Badger and J.L. Banchero, McGraw Hill International Edition, New Delhi
3. Perry's Chemical Engineering, Perry and Green, McGraw Hill Inc., New York

4. Elementary Chemical Engineering, Max Peters, McGraw Hill Inc., New York
5. Unit Operations of Chemical Engineering, McCabe, Smith and Harriott, McGraw Hill Inc., New York
6. Theory & Practice of Industrial Pharmacy, Lachman, Lieberman & Kanig, Indian Edition, Varghese Publishing, Bombay
7. Pharmaceutics: The Science of Dosage Form Design, Aulton,
8. Pharmaceutical Engineering, K. Sambhamurty, New Age Pvt. Ltd., Delhi
9. Introduction to Pharmaceutical Engineering, A.R. Paradkar, Nirali Prakasan, Pune
10. Pharmaceutical Engineering, Subramanian et.al., Vallabh Prakasan, Delhi
11. Remington's Pharmaceutical Sciences, Ed. A.R.Gennaro, Mack Publishing Co.
12. Text Book of Engineering Drawing, P.J. Shah, Ahmedabad
13. Engineering Drawing, N. D. Bhatt, Charutar Publishing House, VV nagar

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH212 Pharmaceutics-IV (Unit Operation-II)

Theory		3hours/Week
No.	Chapter	Hours
01	Evaporation: Basic concept of phase equilibria, factor affecting evaporation, evaporators, film evaporators, single effect and multiple effect evaporators, Mathematical problems on evaporation	10
02	Crystallization: Characteristics of crystals like; purity, size, shape, geometry, habit, forms size and factors affecting them. Solubility curves and calculation of and heat balance around Swenson Walker crystallizer, Supersaturation theory and its limitations, Nucleation mechanism, crystal growth. Study of various types of Crystallizer, tanks, Crystallizer, Caking of crystals and its prevention. Numerical problems on yields.	10
03	Distillation: Rault's law, phase diagrams, volatility, simple, steam and flash distillations, principles of rectification, McCabe Thiele method for calculations of number of theoretical plates, Azeotropic and extractive distillation, Mathematical problems on distillation.	12
04	Extrusion and pelletization: Factgors affecting pellet properties, Cold extrusion, Melt extrusion, Applications of extrusion in pharmacy (including preparation of solid solution), selective equipments used for extrusion and pelletization, Use of polyethylene oxide and Eudragit in melt extrusion, Use of MCC in pelletization	08
05	Super critical Fluids: Introduction to supercritical fluids, Pharmaceutical applications of supercritical fluids in extraction, size reduction, preparation of inclusion complexes, preparation of solid dispersions, etc., Equipments.	05

Practical

3 hrs/week

To illustrate the topics included under theory

Suggested List of Practical:

1. To find out % yield of the given sample and submit their yield in suitable packet with result.
2. To find out the % yield of the given sample and to study the effect of volume on the rate of crystallization.
3. To find out the % yield Crystals of the given sample from its saturated solution with seeding and without seeding.
4. To plot Mier's supersolubility curve for given substance.
5. To determine effect of Degree of super saturation, Presence of impurities, Viscosity on yield of crystallization.
6. To determine the boiling point elevation or boiling point rise of the given sample of NaOH in water and find out the unknown concentration of given sample
7. To study the effect of solute sodium hydroxide concentration on boiling point elevation to find out the unknown concentration of sodium hydroxide solution using during's plot.

8. To study the effect of solute concentration on boiling point elevation and to find out the unknown concentration of solute concentration using graph.
9. To study the effect of solute concentration on boiling point depression and to find out the unknown concentration of solute concentration using graph.
10. Experiment based on steam, extractive and azeotropic distillation.

Books Recommended

1. Theory and practice of Industrial pharmacy by Lachman, Liberman and Kanig. Third edition.
2. Pharmaceutical dosage form: Tablets, Volume II Edited by Lieberman, Lachman and Schwartz. Second Edition.
3. Pharmaceutics: The science of dosage form designed by M.E. Aulton (1998 Edition).
4. Pharmaceutical Engineering by K. Sambamurthy.
5. Remington: The science and practice of pharmacy Vol-I & II 19th edition.
6. Elementary chemical engineering by Max S. Peters.
7. Unit operation of chemical engineering (5th edition) by McCabe, Smith and Harriott.
8. Perry's chemical engineer's Handbook by Robert Perry (6th edition).
Tutorial pharmacy: (Cooper and Gunn).

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH213 Pharmaceutical Chemistry-II (Organic)

Theory		3 hours/Week
No.	Chapter	Hours
01	Structure and Properties: <ul style="list-style-type: none">• Classification and sources of organic functional groups• Atomic structure, atomic orbitals, molecular orbitals, wave equation, Bonding & Antibonding orbitals• Hybrid orbitals and hybridization• Types of Bond, Bond dissociation energy, Bond polarization• Concept of Electronegativity, Inductive effect, Steric effect, Resonance and Hyperconjugation, Physical properties• Inter- and Intramolecular forces, Fission of Bond, Bond length, bond angles and bond energies• Acidity and basicity	12
02	Nomenclature of Organic compounds based on IUPAC system.	03
03	Structure, Nomenclature, physical properties, preparations and reactions of : Alkanes, Alkenes, Alkynes, Cycloalkanes, Dienes, Alcohol, Ether	27
04	Aromaticity, Huckel's rule and criteria for determine aromaticity of a compound. Structure, aromatic character and stability of benzene.	03

Practical **3 hrs/week**

To illustrate the topics included under theory

Systematic qualitative analysis of organic compound and preparations of their derivatives.

(Organic compound of all functional groups should be covered).

Books Recommended

1. Organic Chemistry by Morrison & Boyd, 6th edition, Pearson Education.
2. Advanced Organic Chemistry: Reaction, Mechanism and Structure by Jerry March 4th edition, A Wiley-Interscience Publication.
3. Vogl's Text Book of Practical Organic Chemistry- Brian Furniss, Antony Hannaford, Peter Smith, Austrin (Eds), 5th edition, ELBS Publication, Singapore, 1997.
4. Experimental Pharmaceutical Organic Chemistry, A Becnchttop Manual by K. S. Jain, P. B. Miniyar & T. S. Chitre, 2nd Edition Carrier publications,.
5. Organic Chemistry by I. A. Finar
6. A Guidebook to Mechanism in Organic Chemistry by Peter Sykes
7. Organic Chemistry, G. Marc Loudon, 4th Ed., Oxford University Press, 2004.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY

PH214 Anatomy Physiology & Health Education – II

Theory **3 hours/Week**

No.	Chapter	Hours
01	Neurohumoral transmission in the CNS, reflex action, electroencephalogram, specialized functions of the brain, cranial nerves and their functions.	10
02	Autonomic nervous system: Physiology and functions of the autonomic nervous system. Mechanism of the neurohumoral transmission in the A.N.S.	03
03	Endocrine system: Basic anatomy and physiology of Pituitary, Thyroid, Parathyroid, Adrenals, Pancreas, Testes and Ovary, their hormones and functions.	05
04	Respiratory system: Anatomy of respiratory organs, functions of respiration, mechanism and regulation of respiration, respiratory and vital capacity.	05
05	Urinary system: Structures and functions of the kidney and urinary tract. Physiology of urine formation and acid base balance. Diseases of urinary system.	05
06	Reproductive system: Male and female reproductive systems and their hormones, physiology of menstruation, coitus and fertilization. Sex differentiation, spermatogenesis and oogenesis. Pregnancy, its maintenance and parturition.	05
07	Sense organs: Basic anatomy and physiology of the eye (vision), ear (hearing), taste buds, nose (smell) and skin (superficial receptors).	03
08	Health Education: <ul style="list-style-type: none"> • Concepts of health education and disease, causative agent and prevention of disease. • Demography and family planning: Medical termination of pregnancy. • Brief outline of communicable diseases, their causative agents, modes of transmission and prevention (chicken pox, measles, influenza, diphtheria, whooping cough, tuberculosis, poliomyelitis, malaria, rabies, syphilis, gonorrhoea and AIDS). • First aid: Emergency treatment of shock, snake bites, burns, poisoning, fractures and resuscitation methods. 	09

Practical

3 hrs/week

To illustrate the topics included under theory

Suggested Practical:

1. Histology: Microscopy of different types of tissues & organs from permanent slides.
2. Physiological experiments on nerve-muscle preparation and demonstration of the working of the student physiograph.
3. Respiratory system: Determination of vital capacity, experiments on spirometry.
4. Urine analysis: Simple experiments involved in the analysis of normal and abnormal urine, appearance, determination of PH, sugars, protein, urea and creatinine.

5. Study of various museum specimen, chart, models, contraceptives & first aid measures.

Books Recommended

1. Mertini, F., Fundamentals of Anatomy and physiology (Prentice Hall), 2nd ed. 1992.
2. Seely, R.R. et al., Anatomy and physiology (Mosby). 3rd ed., 1995.
3. Guyton, A.C. and Hall, J.B., Textbook of Medical Physiology (W.B. Saunders Co., Philadelphia).
4. West J.B. Best and Taylor's physiological basis of medical practice (Williams and Wilkins, Baltimore).
5. Tortora G.J. and Anagnostikos, N.P. Principles of anatomy and physiology (Harper and Collins publishers, New York).
6. Gandhi T.P. et al.: Human anatomy, physiology and health education (B.S. Shah Prakashan, Ahmedabad).
7. Joshi, Vijay D. Preparatory manual for undergraduate physiology (B.I. Churchill Livingstone), 1995.
8. Chatterjee C.C., Human physiology (Medical Allied Agency, Calcutta), 10th ed. 1985.
9. Clancy, John and Macvicar, A.J. Physiology and Anatomy (Edward Arnold), 1995.
10. Chaurasia, B.D., Human Anatomy (6 vol.) (CBS Publishers, New Delhi), 1995.
11. Ross & Wilson's, Anatomy Physiology in health & illness (Churchill Livingstone), 8th ed. 1996
12. Goyal, R.K. et al., Practical Anatomy, Physiology and Biochemistry (B.S. Shah Publishers, Ahmedabad), 13. Garg, K. et. al., A Textbook of Histology (CBS Publishers, New Delhi), 2nd ed. 1991
13. Lesson, C.R. et al., Text book of Histology (W.B. Saunders and company). 5th ed.
14. Agur, Anne M.R., Atlas of anatomy (Williams and Wilkins) 9th ed. 1991.
15. Von de Graff and Crowley, J.L., A photographic Atlas for Anatomy Physiology Laboratory (Modern Publishing Company). 1996. 3rd Ed.
16. Ghai, C.L.: A Text Book of Practical Physiology (Jaypee Bros. Medical Publisher (P) Ltd.) 4th ed. 1998.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY

PH215 Applied Mathematics, Biostatistics & Computer Application – II

Theory		3 hours/Week
No.	Chapter	Hours
01	Basic concepts of statistics: Data, Data Graphic, frequency distribution, measures of central tendency (Mean, Median, Mode, Harmonic mean, Geometric mean (application in LAL test) and scattering of data (Range, Mean, Deviation, Standard deviation, RSD and SEM etc-Application in Pharmaceutical Validation).	11
02	Sample and sampling method: Sample size and its significance. Sampling techniques and their application in pharmacy. Selection of sample size and selection of method in BA/BE study.	06
03	Hypothesis testing: t-statistics, f-test, z-test, chi-square (application in dissolution Testing of solid dosage forms), chi-square test for significant comparison. (for two group)	07
04	Correlation analysis: Types of correlation, correlation coefficient, Spearman's rank correlation coefficient.	03
05	Regression analysis: Types, lines of regression, application in Beer's Lamberts Curve, stability study.	03
06	Analysis of Variance: Introduction, Assumption, one way ANOVA with examples.	05
07	Equation: Introduction to an equation (Linear, Quadratic, Cubic, Quadrupal, Polynomial), methods to solve linear equations and reproducible to linear equation, types of quadratic equations, methods to find roots for quadratic equation and reproducible to quadratic equation, formation of quadratic equation.	06
08	Introduction of matrices: matrix operations in excel	03
09	Applications of integration: Area under the curve (Trapezoidal rule only)	01

Practical **3 hrs/week**

To illustrate the topics included under theory

Books Recommended

1. Basic Computer Applications for Pharmacy - Parvez Faruki, Manij Parmar, Nandu Fatak
2. Introduction to Biostatistics & Computer Science, Shah YI, Paradkar AR, Dhayagude MG
3. Manuals provided with the license version of the software
4. HTML 4.0 (No Experience Required), By-E. Stephen Mack, Janan Platt. (BPB Publication)
5. MS-Office 98 -APTECH, TMH Publications
6. Working in Microsoft Office By RON MANSFIELD
7. PC for Window made simple
8. S. Bolton, Pharmaceutical Statistics.

Reference Books:

1. Internet an introduction', Compiled by Tata McGraw-Hill. (Cistems, Tata McGraw-Hill publication)
2. The Internet, By –Douglas E.Comer (Prentice Hall of India publication)

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY

PH216 Self Development

Theory

2 hours/Week

No.	Chapter	Hours
01	Section – I – Paradigms and Principles of a Individual – Production and Production Capability of Individual – Principles of Personal Vision – Principles of Personal Leadership – Principles of Personal Management – Paradigms of Interdependence in life – Principles of Interpersonal Leadership – Principles of Empathic Communication – Principles of Creative Cooperation – Principles of Balanced Self-Renewal	15
02	Section – I Personality Development Building a positive attitude Verbal Communication Non-verbal Communication Personal Branding Motivation Self – Esteem Success Goal Setting Team Building	15

Books Recommended

- 7 Habits of highly effective people by Stephen Covey
- You Can Win by Khera Shiv
- The RPM Philosophy by Anthony Robbins
- Principles of Management by James Stoner
- Management by Stephen Robbins

Bachelor of Pharmacy Program

Semester III

Scheme of Teaching & Examination

SEMESTER – III

Subject code	Subjects	Marks		Hours/ Week	
		Theory	Practical	Theory	Practical
PH311	Pharmaceutics-V (Physical Pharmacy)	100	100	3	3
PH312	Dispensing Pharmacy	100	100	3	3
PH313	Pharmaceutical Chemistry- III (Organic)	100	100	3	3
PH314	Pharmaceutical Chemistry- IV (Biochemistry)	100	-	3	-
PH315	Pharmacognosy-I	100	100	2	3
PH316	Pharmacology-I	100	100	3	3
	Total	600	500	17	15

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH311 Pharmaceutics - V (Physical Pharmacy-I)

Theory

3 hours/Week

No.	Chapter	Hours
01	State of Matter: Properties of matter, Binding forces between molecules, State of matter, gaseous, liquid, liquefaction of gases, liquefaction, aerosols, Change in state of matter, latent heats and vapor pressure, sublimation-critical point, eutectic mixtures, gases, aerosols inhalers, relative humidity, liquid complexes, liquid crystals, glassy state, solid crystalline and amorphous, polymorphism. System containing one, two and three components.	10
02	Micromeritics and Powder Rheology: Introduction and significance, Particle size and distribution, average particle size, number and weight distribution, particle number, methods of determining area, permeability, adsorption, derived properties of powders, porosity, packing arrangement densities, bulkiness and flow properties, rheological parameter of powders	12
03	Compaction, Compression, Consolidation and Granulation of powdered solids	04
04	Solutions of non-electrolytes and electrolytes: Types of solutions, True, ideal and real solutions, Properties of solutions, lowering of vapor pressure, determination of v. p., depression of F.P., determination of F. P. lowering, elevation of B.P., determination of B.P. elevation	08
05	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, HLB classification, solubilization, detergency, adsorption at solid interfaces, solid gas and solid liquid interfaces, complex film, electrical properties of interface	11

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

- Determination of latent heat, vapor pressure, critical point.
- Studies on polymorphs, their identification and properties.
- Determination of particle size, particle size distribution and surface areas using various methods of particle size analysis.
- Determination of derived properties of powders: density, porosity, compressibility, angle of repose etc.
- Determination of surface/interfacial tension, HLB value and critical micellar concentration of surfactants.

Books Recommended

1. Martin's Physical pharmacy by Patrick J. Sinko, Lippincott Williams & Wilkins, New York,

2. *Pharmaceutics: The Science of Dosage Form Design*, Aulton, Michael E., Churchill Livingstone.
3. *Remington: The Science and Practice of Pharmacy*, Vol-I & II, Gennaro, Alfonso R., Lippincott Williams & Wilkins, New York.
4. *Physicochemical Principles of Pharmacy*, Florence, A. T. Atwood, D. Macmillan Press Ltd., London .
5. *Pharmaceutical Dosage Forms and Drug Delivery Systems*, Ansel, Howard. C., Allen, Loyd V., Popovich, Nicholas G. Lippincott Williams & Wilkins, New York.
6. *Cooper and Gunn's Tutorial Pharmacy*, ed. Carter, S. J., CBS Publishers & Distributors, Delhi, .
7. *Bentley's textbook of Pharmaceutics* by E. A. Rawlins.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH312 Dispensing Pharmacy

Theory

3 hours/Week

No.	Chapter	Hours
01	Definition and scope	01
02	The prescription: Handling of prescription, source of errors in prescription, care required in dispensing procedures including labeling at dispensed products.	04
03	Dispensing techniques: Compounding and dispensing procedures, packaging, storage and stability of medicines, labeling of dispensed product.	04
04	Pharmaceutical calculations: Posology, Calculation of doses for infants, adults and elderly patients, enlarging and reducing recipes, percentage solutions, allegation, alcohol dilution, proof spirit, isotonic solutions, displacement value etc.	08
05	Principles involved and procedures adopted in dispensing of Mixtures, solutions, emulsions, external preparations, suppositories & pessaries, powders and granules, oral unit dosage forms, inhalations.	16
06	Incompatibilities: Physical, chemical and therapeutic incompatibilities observed in prescriptions of above products: - Identification and correction of incompatibilities. - Inorganic incompatibilities including incompatibility of metals and their salts, non metals, acids, alkalis. - Organic incompatibilities: purine bases, alkaloids, ammonium compounds, carbohydrates, glycosides, anaesthetics, surface active agents	12

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

- Dispensing of prescription falling under the categories: Mixtures, solutions, emulsions, external preparations, powders, suppositories, oral unit dosage forms, inhalations.
- Dispensing procedures involving pharmaceuticals calculations, pricing of prescriptions and dosage calculations for pediatric and geriatric patients.
- Dispensing of prescriptions involving adjustment of tonicity.
- Identification of various types of incompatibilities in prescription, correction and dispensing.

Books Recommended

1. Dispensing for Pharmaceutical students by Cooper and Gunn By S.J. carter, 12Th Edn. CBS Publishers.
2. Pharmaceutical Dosage form and Drug delivery system by Howard C. Ansel, Lippincot Williams & Wilkins.

3. Pharmaceutical Calculations by Mitchell J. Stoklosa and Howard C. Ansel By B.I. Waverly Pvt. Ltd., New Delhi.
4. Pharmaceutical Practice Edited by A.J. Winfield& R.M.E. Richards.
5. Hospital Pharmacy by William E Hassan, Henry Kimpton Publisher, London.
6. Hospital Organization and Management by Kurt Dan Jonathan S. Ratich, 4 th Edn. CBS Publishers.
7. Remington: The science and Practice of Pharmacy, Latest Edn., By Mack Publishing company.
8. Drug and Cosmetic Act. And Rules by Vijay Malik.
9. Pharmaceutical Practice By Diana M. Collett and Michale E. Aulton ELBS Publishers.
10. "Dispensing Pharmacy (Pharmaceutics-II)" By Dr. G.K. Jani, B.S. Shah Publication.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH313 Pharmaceutical Chemistry-III (Organic)

Theory

3 hours/Week

No.	Chapter	Hours
01	Structure, Nomenclature, physical properties, preparations and reactions of <ul style="list-style-type: none">- Alkyl halides [6],- Aldehydes and Ketones [10],- Carboxylic acids and its derivatives (acid chlorides, acid anhydrides, esters, amides) [7], Benzene [5],- Polynuclear aromatic compounds (Naphthalene & Anthracene) [2],- Arenes [3],- Amines [4],- Phenols [4]	41
02	Reactive intermediates of carbon: Free radical, Carbocation, Carbanion, carbenes	04

Practical

3 hours/Week

Systematic qualitative analysis of organic compounds and preparation of their derivatives (Organic compounds of all types of functional groups should be cover).

Books Recommended

1. Organic Chemistry by Morrison & Boyd, 6th edition, Pearson Education.
2. Advanced Organic Chemistry: Reaction, Mechanism and Structure by Jerry March 4th edition, A Wiley-Interscience Publication.
3. Vogl's Text Book of Practical Organic Chemistry- Brian Furniss, Antony Hannaford, Peter Smith, Austrin (Eds), 5th edition, ELBS Publication, Singapore, 1997.
4. Experimental Pharmaceutical Organic Chemistry, A Becnhtop Manual by K. S. Jain, P. B. Miniyar & T. S. Chitre, 2nd Edition Carrier publications,.
5. Organic Chemistry by I. A. Finar
6. A Guidebook to Mechanism in Organic Chemistry by Peter Sykes
7. Organic Chemistry, G. Marc Loudon, 4th Ed., Oxford University Press, 2004.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH314 Pharmaceutical Chemistry-IV (Biochemistry)

Theory

3 hours/Week

No.	Chapter	Hours
01	Biochemical organization of the cell and transport processes across cell membrane	04
02	The concept of free energy, determination of change in free energy from equilibrium constant and reduction potential, bioenergetics, production of ATP and its biological significance	05
03	Biological Oxidation, Redox-Potential, enzymes and co-enzymes involved in oxidation reduction & its control. The respiratory chain, its role in energy capture and its control, Energetics of oxidative phosphorylation, Inhibitors of respiratory chain and oxidative phosphorylation, Mechanism of oxidative phosphorylation	06
04	Enzymes: Nomenclature, enzyme kinetics and its mechanism of action, mechanism of inhibition, enzymes and iso-enzymes in clinical diagnosis. Co-enzymes: Vitamins as co-enzymes and their significance. Metals as co-enzymes and their significance.	08
05	Introduction to Lipids & Lipids metabolism: Oxidation of fatty acids, Beta-oxidation & energetics, alpha oxidation, omega-oxidation, Biosynthesis of ketone bodies and their utilization, Biosynthesis of saturated and unsaturated fatty acids, Control of lipid metabolism, Essential fatty acids & eicosanoids (prostaglandins, thromboxanes) phospholipids, and sphingolipids.	12
06	Techniques used in Biochemistry: Spectrophotometry, Centrifugation, Electrophoresis, Chromatography, Extraction & purification of nucleic acids.8. Complexing and chelating agents (Disodium edetate, dimercaprol).	05
07	Water and Mineral Metabolism - A brief introduction	05

Books Recommended

1. E.E. Conn and P.K. Stumpf, Outlines of Biochemistry, John Wiley & Sons, New York.
2. A.L. Lehninger, Principles of Biochemistry, CBS Publishers and Distributors.
3. R.K. Murray, D.K. Granner, P.A. Mayes, V.W. Rodwell,
4. Harper's Biochemistry, Prentice Hall International Inc., Latest Edition.
5. S.C. Rastogi, Biochemistry, Tata McGraw Hill, New Delhi, Latest Edition.
6. M.Cohn, K.S. Roth, Biochemistry and Disease, William and Wilkins Co., Baltimore, Latest Edition.
7. U. Satyanarayana, Biochemistry, Books and Allied (P) Ltd., Calcutta, Latest Edition.
8. G.F. Zubay, W.W. Parson, D.E. Vance, Principles of Biochemistry, WCB Publishers, England, Latest Edition.
9. S. Ramakrishnan, K.G. Prasannan, R. Rajan, Textbook of
10. Medical Biochemistry, Orient Longman, Madras, Latest Edition.
11. S.K. Sawhney, Randhir Singh Eds, Introductory Practical Biochemistry, Narosa Publishing House, New Delhi.
12. D.T. Plummer, An Introduction to Practical Biochemistry, Tata McGraw Hill, New Delhi.
13. J. Jayaraman, Laboratory Manual in Biochemistry, Wiley Eastern Limited, New Delhi.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH315 Pharmacognosy – I

Theory

2 hours/Week

No.	Chapter	Hours
01	Plant cell, living and non-living inclusion; plant tissues and their functions.	04
02	Definition, History and Scope of Pharmacognosy.	01
03	Classification of drugs.	01
04	Sources of drugs.	01
05	Morphology and histology of root, stem, bark, wood, leaf, flower, fruit and seed. Modification of root and stem.	11
06	Cultivation, collection, processing and storage of crude drugs. Factors influencing cultivation of medicinal plants. Types of soils and fertilizers of common use. Plant hormones and their applications. Polyploidy, Mutation and Hybridization with reference to medicinal plants.	05
07	Systemic Pharmacognostic study of Carbohydrates and derived products: - Agar, Guar gum, Acacia, Honey, Isabgol, Pectin, Starch, Sterculia, Tragacanth and sodium alginate	04
08	Systemic Pharmacognostic study of Lipids:- Beeswax, Castor oil, Cocoa butter, Cod liver oil, sesame oil, and Wool fat, Linseed oil.	03

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

- Morphology of plant parts indicated in theory.
- Microscopy of monocot and dicot root, stem and leaf.
- Microscopic measurements of cell and cell contents: starch grains, calcium oxalate crystals and phloem fibers.
- Identification of crude drugs belonging to carbohydrates and lipids.
- Preparation of herbarium sheets.

Books Recommended

1. Pharmacognosy; C. K. Kokate, A. P. Purohit, S. B. Gokhale; Nirali prakashan, Pune; 39th Edition; 2007.
2. Botany for degree students; A. C. Dutta; Calcutta Oxford university press, New Delhi; 15 impressions; 1994.
3. A textbook of Pharmacognosy; Mamta Shah, Urvashi Shah, Sangita Marfatia; Nirav and Roopal Prakashan; 2008-09.
4. Pharmacognosy; J. S. Quadry; B. S. Shah Prakashan, Ahmedabad; 14th edition; 2008-09.
5. Pharmacognosy; V. E. Tylar, L. R. Brady, J. E. Hadders; Lea and Febgir Philadelphia; 8th edition; 1981.
6. Trease and Evan's Pharmacognosy; W. C. Evans; W. B. Saunders Co., Singapore; 15th, Edition; 2008.
7. Text Book Pharmacognosy; T.E. Wallis; CBS Publishers and Distributors, Delhi; 5th Edition; Reprint-2005.
8. Practical Pharmacognosy by C. K. Kokate, Vallabh Prakashan, Delhi, 4th edition, 1997.
9. Practical Pharmacognosy, Technique and Experiment by C. K. Kokate and S. B. Gokhale, Nirali Prakashan, Pune, 3rd edition, 1996.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH316 Pharmacology – I

Theory

3 hours/Week

No.	Chapter	Hours
01	General pharmacology: A. Introduction to pharmacology, sources of drug, dosage forms and routes of administration, mechanism of drug action, drug receptor interactions, combined effects of drugs, factors modifying drug action, tolerance, dependence, pharmacogenetics. B. Absorption, Distribution, Metabolism and Excretion of drugs, principles of basic and clinical pharmacokinetics, adverse drug reactions and ADME drug interactions, treatment of poisoning C. General principles of bioassay and biostandardization, evaluation of drug in man(clinical trials).Measurement of toxicity, discovery and development of new drugs.	25
02	Pharmacology of peripheral nervous system: A. Neurohumoral transmission (autonomic and somatic). B. Parasympathomimetics, parasympatholytics, sympathomimetics including bronchodilators and antiasthamtics, adrenergic receptors and neuron blocking agents, ganglionic stimulants and blocking agents. C. Neuromuscular blocking agents. D. Local anaesthetic.	20

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

1. Introduction to experimental pharmacology: preparation of different solutions for experiments. Drug dilutions, use of molar and W/V solutions in experimental pharmacology, common laboratory animals, Legal regulations for the use of experimental animals, anesthetics used in animal studies, commonly used instruments in experimental pharmacology. Some common and standard techniques for drug administration (intravenous injection, intra gastric administration) and collection of blood samples. Euthanasia of laboratory animals.

2. To study the effects of various agonists (pD2) using isolated preparations.

- a) To record the concentration response curve (CRC) of acetylcholine using rat/chicken ileum preparation.
- b) To record the concentration response curve (CRC) of Histamine on rat/chicken ileum.
- c) To study the effects of acetylcholine, Histamine, BaCl₂, physostigmine, atropine, mepyramine and papaverine using rat/guinea pig/chicken ileum preparation.

3. Demonstration Experiments

- a) To study the effects of autonomic drugs on rabbits eye.

- b) To study the effects of various drugs on rat fundus preparation.
- c) To study the effects of various drugs on rat anococcygeus muscle preparations.
- d) To study the effects of various drugs on rat vas deference preparations.
- e) To study the effects of various drugs on rat tracheal chain preparations.

Books Recommended

1. Goyal R.K.-Practicals in pharmacology (1994-95) 1st Edn. M/s B.S.Shah Prakashan, Ahmedabad.
 2. Sheth U.K. et al-Selected topics in experimental pharmacology (1972) 1st Edn. The Kothari Book Depot, Mumbai.
 3. Kulakarni S.K.- handbook of experimental pharmacology (1993) 2nd Edn.Vallabh Prakashan, New Delhi.
 4. Ghosh M.N-Essentials of experimental pharmacology scientific book agency, Calcutta, 1984,
 5. Rang h.P., dale M.M., etal-Pharmacology (1995) 3rd Edn. Churchill livingstone USA.
 6. Satoskar R.S., etal-Pharmacology and pharmacotherapeutics (1999)16th Edn. Popular Prakashan, Mumbai.
 7. Harvel, R.A., Champe P.C. etal –Pharmacology (1997) 2nd Edn. Lippincott-Raven Company, Philadelphia, New York.
 8. Craig C.R., Stitzel, R.E-Modern pharmacology (1994) 4th Edn. Little brown and Company, USA.
 9. Goodman and Gilman's –the pharmacological basis of therapeutics (1996) 9th Edn. Pergamon Press, Singapore.
- Seth,S.D. text Book of pharmacology,B.I.Churchill,1997.

Bachelor of Pharmacy Program

Semester IV

Scheme of Teaching & Examination

Subject code	Subjects	Marks		Hours/ Week	
		Theory	Practical	Theory	Practical
PH411	Pharmaceutics-VI (Physical Pharmacy)	100	100	3	3
PH412	Hospital Pharmacy & Biopharmaceuticals	100	-	2	-
PH413	Pharmaceutical Chemistry- V (Organic)	100	100	3	3
PH414	Pharmaceutical Chemistry- VI (Biochemistry)	100	100	3	3
PH415	Pharmacognosy-II	100	100	3	3
PH416	Pharmacology-II	100	100	3	3
	Total	600	500	17	15

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH411 Pharmaceutics-VI (Physical Pharmacy-II)

Theory

3 hours/Week

No.	Chapter	Hours
01	Viscosity and Rheology: Newtonian systems, law of flow, kinematic viscosity, effect of temperature, Non-Newtonian systems, pseudoplastic, dilatant, plastic, thixotropy measurement and applications in formulation, determination of viscosity by capillary, falling ball, rotational viscometers, Brookfield viscometer, applications of rheology in pharmacy	12
02	Dispersion systems: (a) Colloidal Dispersions: Definition types, properties of colloids, protective colloids, application of colloids in pharmacy.(b) Suspension and emulsions: Interfacial properties of suspended particles, settling in suspensions, theory of sedimentation, effect of Brownian movement, sedimentation of flocculated particles, sedimentation parameters, wetting of particles, control flocculation, flocculation in structured vehicles, rheological considerations, emulsions, types, theories, physical stability	14
03	Complexation: Classification of complexes, methods of preparation and analysis, applications, protein binding	04
04	Kinetics: Rates and orders of reaction, determination of order, Influence of temperature and other factors on reaction rates, decomposition and stabilization of medicinal agents, kinetics in solid state, accelerated stability study, expiration dating	08
05	Buffer equations and buffer capacity in general, buffer in pharmaceutical systems, preparations, stability, buffered isotonic solutions, measurements of tonicity calculations and methods of adjusting isotonicity	07

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

- Study of rheological properties of various types of systems using different Viscometers.
- Studies of different types of colloids and their properties.
- Preparation of various types of suspensions and determination of their sedimentation parameters.
- Preparation and stability studies of emulsions.
- Studies on different types of complexes and determination of their stability constants.
- Preparation of pharmaceutical buffers and determination of buffer capacity.
- Preparation involving tonicity adjustments.
- Determination of C.S.T and partial or mutual solubility.

Books Recommended

1. Martin's Physical pharmacy by Patrick J. Sinko, Lippincott Williams & Wilkins, New York,
2. Pharmaceutics: The Science of Dosage Form Design, Aulton, Michael E., Churchill Livingstone.
3. Remington: The Science and Practice of Pharmacy, Vol-I & II, Gennaro, Alfonso R., Lippincott Williams & Wilkins, New York.
4. Physicochemical Principles of Pharmacy, Florence, A. T. Atwood, D. Macmillan Press Ltd., London .
5. Pharmaceutical Dosage Forms and Drug Delivery Systems, Ansel, Howard. C., Allen, Loyd V., Popovich, Nicholas G. Lippincott Williams & Wilkins, New York.
6. Cooper and Gunn's Tutorial Pharmacy, ed. Carter, S. J., CBS Publishers & Distributors, Delhi, .
7. Bentley's textbook of Pharmaceutics by E. A. Rawlins.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY

PH412 Hospital Pharmacy & Biopharmaceuticals

Theory

2 hours/Week

No.	Chapter	Hours
01	<p>Hospital Pharmacy:</p> <ul style="list-style-type: none"> - Organization and Structure: Organization of hospital and hospital pharmacy, responsibility of hospital pharmacist, Pharmacy and Therapeutic Committee, budget preparations and implementation. - Hospital formulary: contents, preparation and revision of hospital formulary. - Drug store management and inventory control. Organization of drug store, types of material stocked, storage conditions. Purchase and inventory control – principles purchase procedures – purchase orders – procurement and stocking. - Drug distribution system in hospitals. Outpatient dispensing – methods adopted. Inpatient dispensing – methods adopted Ambulatory patient dispensing – methods adopted. Dispensing of controlled drugs - Drug information services: Sources of information on drugs, disease treatment schedules, procurement of information, computerized services, retrieval of information, medication error. - Records and reports: Prescription filling, drug profile, patient medication profile, cases on drug interaction and adverse reactions, idiosyncratic cases etc. 	15
02	<p>Community Pharmacy:</p> <ul style="list-style-type: none"> - Organization and structure of retail and wholesale drug-store, types of drug store and design, legal requirements for establishment, maintenance of drug store, dispensing of proprietary products, maintenance of records of retail and wholesale. - Patient counseling. Role and contribution of pharmacist in community health care and education. 	05
03	<p>Biopharmaceuticals:</p> <ul style="list-style-type: none"> - Blood products and plasma substitutes: Collection, processing labeling and storage of whole human blood, concentrated human RBC, dried human plasma, human fibrinogen, human thrombin, human normal immunoglobulin, human fibrin foam, plasma substitutes-ideal requirements, PVP, dextran etc., control of blood products as per I.P and B.P. - Surgical Products: Definition, primary wound dressing, absorbent surgical cotton, surgical gauzes, bandages, adhesive tape, protective cellulosic hemostastics, official dressing, absorbable and nonabsorbable sutures, catgut. Standardization of surgical products, Packaging and labeling of surgical products in general. Medical prosthetics and organ replacement materials 	10

Books Recommended

1. Dispensing for Pharmaceutical students by Cooper and Gunn By S.J. carter, 12Th Edn. CBS Publishers.
2. Pharmaceutical Dosage form and Drug delivery system by Howard C. Ansel, Lippincot Williams & Wilkins.
3. Pharmaceutical Calculations by Mitchell J. Stoklosa and Howard C. Ansel By B.I. Waverly Pvt. Ltd., New Delhi.
4. Pharmaceutical Practice Edited by A.J. Winfield& R.M.E. Richards.
5. Hospital Pharmacy by William E Hassan, Henry Kimpton Publisher, London.
6. Hospital Organization and Management by Kurt Dan Jonathan S. Ratich, 4 th Edn. CBS Publishers.
7. Remington: The science and Practice of Pharmacy, Latest Edn., By Mack Publishing company.
8. Drug and Cosmetic Act. And Rules by Vijay Malik.
9. Pharmaceutical Practice By Diana M. Collett and Michale E. Aulton ELBS Publishers.
10. "Dispensing Pharmacy (Pharmaceutics-II)" By Dr. G.K. Jani, B.S. Shah Publication.
11. Indian Pharmacopoeia 2007, Indian Pharmacopoeial Commission, Ghaziabad.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH413 Pharmaceutical Chemistry-V (Organic)

Theory

3 hours/Week

No.	Chapter	Hours
01	Stereochemistry: Isomerism and nomenclature and associated physicochemical properties, optical activity, stereoisomerism, specification of configuration, Reactions involving stereoisomers, Stereoselective and Stereospecific reactions, conformations, chirality, chiral reagents, stereochemistry of Biphenyls, Allenes, Spirans and Decalins	25
02	Nucleophilic aromatic substitutions, alpha, beta-unsaturated carbonyl compounds conservation of orbital symmetry and rules	06
03	Electrocyclic cycloaddition and Sigmatropic reactions, Neighboring group effects catalysis by transition, metal complexes	06
04	Name Reactions: General reaction, reaction mechanism, factor affecting and synthetic importance of followings. Friedel-Crafts alkylation, Friedel-Crafts acylation, Hofmann Rearrangement/ Hofmann degradation of amides, Gabriel synthesis of primary Amine, Hofmann Elimination, Sandmeyer Reaction, Fries Rearrangement, Reimer-Tiemann Reaction, Williamson ether synthesis, Kolbe Reaction, Malonic ester synthesis, Acetoacetic ester synthesis, Nitrile synthesis, Hell-Volhard-Zelinsky Reaction, Fischer Esterification, Schotten-Boumann Reaction, Claisen Condensation, Aldol condensation, Cannizzaro reaction, Wittig reaction, Clemmensen reduction, Wolff kishner reduction, Michal addition, Diels elder reaction	06
05	Introduction to Nanochemistry, Microwave synthesis and green chemistry.	02

Practical

3 hours/Week

Synthesis of Organic compounds as per theory including various chemical reactions like oxidation, reduction, hydrolysis, nitration, bromination, etc.

Introductions to stereo models

Books Recommended

1. Organic Chemistry by Morrison & Boyd, 6th edition, Pearson Education.
2. Advanced Organic Chemistry: Reaction, Mechanism and Structure by Jerry March 4th edition, A Wiley-Interscience Publication.
3. Vogl's Text Book of Practical Organic Chemistry- Brian Furniss, Antony Hannaford, Peter Smith, Austrin (Eds), 5th edition, ELBS Publication, Singapore, 1997.
4. Experimental Pharmaceutical Organic Chemistry, A Becnchttop Manual by K. S. Jain, P. B. Miniyar & T. S. Chitre, 2nd Edition Carrier publications,.
5. Organic Chemistry by I. A. Finar
6. A Guidebook to Mechanism in Organic Chemistry by Peter Sykes
7. Organic Chemistry, G. Marc Loudon, 4th Ed., Oxford University Press, 2004.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH414 Pharmaceutical Chemistry-VI (Biochemistry)

Theory

3 hours/Week

No.	Chapter	Hours
01	Introduction to Carbohydrates & Proteins.	06
02	Carbohydrate metabolism: Conversion of polysaccharide to glucose-1-phosphate, Glycolysis and fermentation and their regulation, Gluconeogenesis and glycogenolysis, Metabolism of galactose and galactosemia, Role of sugar nucleosides in biosynthesis, and Pentosephosphate pathway. The Citric Acid Cycle: Significance, reactions and energetics of the cycle, Amphibolic role of the cycle, and Glyoxalic acid cycle.	15
03	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, Purine nucleotide interconversion, Pyrimidine biosynthesis and Formation of deoxyribonucleotides.	12
04	Biosynthesis of Nucleic Acids. Brief introduction of genetic organization of the mammalian genome, alteration and rearrangements of genetic material, Biosynthesis of DNA and its replication, DNA repair mechanism, Biosynthesis of RNA.	07
05	Genetic code and protein synthesis: Genetic code, components of Protein Synthesis, and Inhibition of protein synthesis. Brief account of genetic engineering and polymerase chain reactions. Regulation of gene expression	05

Note: Abnormal metabolism & genetic diseases should be referred to wherever necessary throughout the syllabus.

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

- Qualitative estimation of Carbohydrates & proteins
- Qualitative & Quantitative analysis of biological samples

Books Recommended

1. E.E. Conn and P.K. Stumpf, Outlines of Biochemistry, John Wiley & Sons, New York.
2. A.L. Lehninger, Principles of Biochemistry, CBS Publishers and Distributors.
3. R.K. Murray, D.K. Granner, P.A. Mayes, V.W. Rodwell,
4. Harper's Biochemistry, Prentice Hall International Inc., Latest Edition.
5. S.C. Rastogi, Biochemistry, Tata McGraw Hill, New Delhi, Latest Edition.
6. M.Cohn, K.S. Roth, Biochemistry and Disease, William and Wilkins Co., Baltimore, Latest Edition.
7. U. Satyanarayana, Biochemistry, Books and Allied (P) Ltd., Calcutta, Latest Edition.

8. G.F. Zubay, W.W. Parson, D.E. Vance, Principles of Biochemistry, WCB Publishers, England, Latest Edition.
9. S. Ramakrishnan, K.G. Prasannan, R. Rajan, Textbook of
10. Medical Biochemistry, Orient Longman, Madras, Latest Edition.
11. S.K. Sawhney, Randhir Singh Eds, Introductory Practical Biochemistry, Narosa Publishing House, New Delhi.
12. D.T. Plummer, An Introduction to Practical Biochemistry, Tata McGraw Hill, New Delhi.
13. J. Jayaraman, Laboratory Manual in Biochemistry, Wiley Eastern Limited, New Delhi.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH415 Pharmacognosy – I

Theory

3 hours/Week

No.	Chapter	Hours
01	Quality control of crude drugs: Adulteration of crude drugs and their detection by organoleptic, microscopic, physical, chemical, biological and other methods of evaluation.	03
02	Systemic Pharmacognostic study Resins and resin containing drugs:- Podophyllum, Jalap, Capsicum, Myrrh, Asafoetida, Benzoin, Turmeric and Ginger	05
03	Systemic Pharmacognostic study of tannins and tannin containing drugs like Gambir, Black catechu, Gall, Myrobalan and Harde.	03
04	Systemic Pharmacognostic study volatile oil and Volatile oils containing drugs:-Mentha, Corainder, Caraway, Dill, Fennel, Cinnamon, Cassia cinnamon , Lemon peel, Lemon grass, Clove, Nutmeg, Eucalyptus, Chenopodium, Cardamom, Valerian, sandalwood.	08
05	General introduction to plant metabolites. General techniques for basic metabolic pathways. Brief introduction to biogenesis of secondary metabolites of pharmaceutical importance.	10
06	Biological source, preparation, identification tests and uses of following enzymes: Diastase, papain, pepsin, trypsin, pancreatin.	03
07	Study of fibers used in pharmacy such as cotton, silk, wool, nylon, and glass wool.	02
08	Study of pharmaceutical aids like talc, diatomite, kaolin, bentonite, gelatin and natural colors.	03
09	Natural allergens and photosensitizing agents and fungal toxins.	08

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

- Identification of crude drugs mentioned in theory
- Microscopic study of characters of selected drugs given in the theory in entire and powdered form.
- Chemical evaluation of powdered drugs.
- Laboratory experiments on isolation, separation, purification of various groups of chemical constituents of pharmaceutical significance.
- Study of fibers and pharmaceutical aids.

Books Recommended

1. Pharmacognosy: C.K.Kokate, A.P.Purohit, S.B.Gokhale, Nirali prakashan, Pune, 39th Edition, 2007.
2. Pharmacognosy and pharmacobiotechnology, Ashutosh Kar, New Age International (P) Ltd, Publishers, 2nd edition 2007.
3. A Text Book of Pharmacognosy: C. S. Shah, J. S. Quadry, B. S. Shah Prakashan, Ahemedabad, 8th edition, 1990

4. Trease and Evan's Pharmacognosy: W. C. Evans, W.B.Saunders Co., Singapore, 15th Edition, 2008.
5. Text Book Pharmacognosy: T.E. Wallis, CBS Publishers and Distributors Delhi- 5th Edition, Reprint, 1997.
6. Pharmacognosy and Phytochemistry, Part I and II and Vinod D. Rangari, Carrier Publications, 1st Edition, Reprint, 2007,.
7. Pharmacognosy: V. E. Tylar, L. R. Brady, J. E. Habbers, Lea and Febgir Philadelphia, 8th Edition, 1981.
8. Cultivation and Utilization of Aromatic Plants, Handa S.S. and Kaul M.K., Regional Research Laboraotry, Jammu, 1st Edition, 1997.
9. Pharmacognosy of powdered crude drugs: M. A. Iyenger, Manipal Power Press, 1st Edition,1974.
10. Mukherji P. K., Quality Control of Herbal Drugs, Business Horizon Pharma. Publishers, 1stEdition, 2002.
11. Herbal drug technology, S. S. Agrawal and M. Paridhavi, Univeristies Press, 1st Edition, 2007.
12. Essentials of Pharmacognosy, S. H. Ansari, Birla Publications Pvt. Ltd., 1st edition, 2005-2006.
13. Microscopic profile of powdered drugs used in Indian systems of medicine, Malti G. Chauhanand Pillai A.P.G., volume 1, Leaf drugs, (2005), Gujarat Ayurved University, Jamnagar.
14. Microscopic profile of powdered drugs used in Indian systems of medicine, Malti G. Chauhan and Pillai A.P.G., volume 2, bark drugs, (2007), Gujarat Ayurved University, Jamnagar

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH416 Pharmacology – II

Theory

3 hours/Week

No.	Chapter	Hours
01	Pathophysiology of Cardiovascular disorders: Hypertension, Angina, Congestive Heart Failure, Myocardial Infarction, Cardiac Arrhythmias and Atherosclerosis.	15
02	Drugs acting on Cardiovascular System: A. Digitalis and cardiac glycosides and other cardiotonics B. Antihypertensive drugs C. Anti-anginal and vasodilator drugs including calcium antagonist and β -adrenergic antagonist D. Anti-arrhythmic drugs A. Drug used in coronary artery disease and hyperlipoproteinemia: Antihyperlipidemic agents, Anticoagulants, Vitamin K and haemostatic agents, Fibrinolytic and anti-platelets drug, E. Drug used in the therapy of shock	20
03	Drug acting on urinary system: A. Fluids and electrolyte balance B. Diuretics	05
04	Drugs acting on endothelial cells.	05

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

- a) To calculate the PA_2 value of Atropine using acetylcholine as an agonist on rat/chicken ileum.
- b) To calculate the PA_2 value of mepyramine using histamine as an agonist on rat/chicken ileum preparation & rat fundus Preparation.
- c) To study non competitive antagonism of papaverine using acetylcholine as an agonist on rat/ chicken ileum.
- d) Pharmacology of cardiovascular system:
 - a. To study the effect of various drugs on frog's heart using simulated software.
 - b. To demonstrate the effects of various drugs on the rat B.P. and respiration include the Vasomotor Reversal of Dale and Nicotinic action of acetylcholine using simulated software.

Books Recommended

1. Goyal R.K.-Practicals in pharmacology (1994-95) 1st Edn. M/s B.S.Shah Prakashan, Ahmedabad.
2. Sheth U.K. et al-Selected topics in experimental pharmacology (1972) 1st Edn. The Kothari Book Depot, Mumbai.
3. Kulakarni S.K.- handbook of experimental pharmacology (1993) 2nd Edn.Vallabh Prakashan, New Delhi.

4. Ghosh M.N-Essentials of experimental pharmacology scientific book agency, Calcutta, 1984,
 5. Rang h.P., dale M.M., etal-Pharmacology (1995) 3rd Edn. Churchill livingstone USA.
 6. Satoskar R.S., etal-Pharmacology and pharmacotherapeutics (1999)16th Edn. Popular Prakashan, Mumbai.
 7. Harvel, R.A., Champe P.C. etal –Pharmacology (1997) 2nd Edn. Lippincott-Raven Company, Philadelphia, New York.
 8. Craig C.R., Stitzel, R.E-Modern pharmacology (1994) 4th Edn. Little brown and Company, USA.
 9. Goodman and Gilman’s –the pharmacological basis of therapeutics (1996) 9th Edn. Pergamon Press, Singapore.
- Seth,S.D. text Book of pharmacology,B.I.Churchill,1997.

Bachelor of Pharmacy Program

Semester V

Scheme of Teaching & Examination

Subject code	Subjects	Marks		Hours/ Week	
		Theory	Practical	Theory	Practical
PH511	Pharmaceutical Technology – I	100	100	3	3
PH512	Pharmaceutical Microbiology	100	100	2	3
PH513	Medicinal Chemistry – I	100	-	3	-
PH514	Pharmaceutical Analysis – I	100	100	3	3
PH515	Pharmacognosy-III	100	100	3	3
PH516	Pharmacology-III	100	100	3	3
PH517	Pharmaceutical Jurisprudence – I	100	-	2	-
	Total	700	500	19	15

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY

PH511 Pharmaceutical Technology – I

Theory

3 hours/Week

No.	Chapter	Hours
01	<p>Tablet: Definition, Advantages and disadvantages, Introduction to types of tablets, formulation of different types of tablets; excipients, granulation techniques, machinery for large scale granulation and compression, physics of tablet making, In process controls, processing problems and remedies, Evaluation (Pharmacopoeial and nonpharmacopoeial test) and equipments., Brief outline on manufacturing method and evaluation of mouth dissolving tablets, buccal tablets, floating tablets, tablets of colon drug delivery, matrix tablets.</p> <p>Coating Of Tablets: objectives, types of coating, film forming materials, formulations of coating solution, equipments for coating, coating process, evaluation of coated tablets , coating defects, specialized coating processes.</p>	15
02	<p>Capsules Hard Capsules: Definitions, Advantages, disadvantages, Ideal requirements, Production of Hard capsules (Gelatin and nongelatin e.g. vegetable), Capsule storage, size of capsules, formulation and methods of capsule filling, problems and remedies, quality control, climatic control in capsule department, I.P capsules.</p> <p>Soft Gelatin Capsules: Formulation of shell and capsule coat, quality control with special emphasis on current dissolution testing.</p>	12
03	<p>Microcapsules/Microspheres: Importance of microcapsule and microsphere in pharmacy, methods of preparation: Phase separation, coacervation, multiorifice centrifugal methods, spray congelling, polymerisation, complex emulsion, Air suspension technique, coating pan and other techniques, evaluation of microcapsules, Applications of biodegradable and nonbiodegradable polymers in Microcapsules/Microspheres.</p>	05
04	<p>Semisolid dosage forms: Definition, Advantages and disadvantages, types, mechanisms of drug penetration through skin, factors influencing penetration, semisolid bases, their selection and ideal requirements of bases. General formulation of semisolids, clear gels, suppositories; Manufacturing procedure, evaluation and packaging. I.P. products.</p>	08
05	<p>Suppositories: Ideal requirements, Bases, Manufacturing procedure, Packaging and evaluation.</p>	05

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

Books Recommended

1. The Theory and Practice of Industrial Pharmacy by L Lachman, H Lieberman and J Kanig.
2. Pharmaceutical Dosage Forms and Drug Delivery Systems by Ansel & others.
3. Pharmaceutics: The Science of Dosage Form Design by Michael E. Aulton Gennaro, Alfonso R., Remington: The Science and Practice of Pharmacy, Vol-I & II, Lippincott Williams & Wilkins, New York.
4. Pharmaceutical Dosage Forms: Disperse systems: Vol.1, Vol. 2 and Vol.3, Ed. By Lieberman, Leon Lachman and Joseph B. Schwartz, Marcel Dekker Inc., New York.
5. Pharmaceutical Dosage Forms: Parenteral Medication: Vol.1, Vol. 2 and Vol.3, Ed. by Lieberman, Leon Lachman and Joseph B. Schwartz, Marcel Dekker Inc., New York.
6. Modern Pharmaceutics by Gilbert S. Banker and Christopher T. Rhodes, Marcel Dekker, Inc., New York.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH512 Pharmaceutical Microbiology

Theory

2 hours/Week

No.	Chapter	Hours
01	Introduction to the science of microbiology Ancient theories concerning the origin of life contribution of great scientists to this science	1
02	General microbiology: – Structure and Bacterial Cell, Classification and taxonomy of Actinomycetes, Bacteria, Spirochetes, Rickettsia and Viruses – Identification: Electron microscopy and Staining Technique – Nutrition, Cultivation and Isolation of Microbes	10
03	Control of microbes: – Disinfection: Factor affecting Disinfection, Dynamics of Disinfection, Evaluation of Disinfection. – Sterilization: Methods of Sterilization, Validation of Sterilization Methods and Equipment.	10
04	Analytical microbiology: – Bacterial Counts – Sterility of Pharmaceuticals – Microbiological Assay of Vitamins and Antibiotics and Amino acids	09

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

- Preparation of Various Media
- Subculturing of Common Bacteria (Aerobic and Anaerobic)
- Staining of Microorganism
- Methods of Isolation
- Study of Sterilization and Their Validation
- Sterility Testing of Pharmaceuticals as per IP
- Bacterial Counts

Books Recommended

1. Textbook of Microbiology by Tortora.
2. Pharmaceutical Microbiology, sixth edn, edited by W. B. Hugo and A. D. Rusell Blackwell science.
3. Principles of Microbiology, Ronald M. Atlas. Second edn. W. C. Brown Publishers.
4. Bergeys manual of Systematic Bacteriology, Williams and Wilkins- A Waverly company.
5. Disinfection, Sterilization and Preservation. Fourth edn, Seymour S. Black. Lea and Febiger Philadelphia, London.
6. Industrial Microbiology. Fourth edn, Prescott and Dunn. CBS Publishers and Distributors.
7. Principles of Fermentation Tehchnology. Second edn. P. F. Stanbury, A. Whiteshaker and S. J. Hall Aditya Books Pvt Ltd. New Delhi.

8. Microbiology, Pelczar/Chan Kreig Tata McGraw Hill edn.
9. Industrial Microbiology L.E. Casida, Jr. New age International Publishers.
10. Fundamental Principles of Bacteriology. A. J. Sale, Tata McGraw Hill Publishing Company Ltd.
11. Fundamentals of Microbiology by Forbischer.
12. Bentley's Text book of Pharmaceutics.
13. Dispensing Pharmacy by Cooper and Gunn, Twelfth edn.
14. Remington Pharmaceutical Science, Latest edn.
15. Microbiology by Ronald Atlas.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH513 Medicinal Chemistry – I

Theory

3 hours/Week

No.	Chapter	Hours
01	Heterocyclic Compounds: Chemistry, preparations and properties of some important heterocyclics containing 5 and 6 atoms with 1 or 2 hetero atoms like O,N,S and their condensed derivatives (bicyclic only).	17
02	Basic principles of Medicinal Chemistry: Physico-Chemical aspects (Optical, geometrical and bioisosterism) of drug molecules and biological action, Drug-receptor interaction including transduction mechanisms	10
03	Drugs acting on Respiratory tract: Anti-asthmatics, Anti-tussives, Expectorants, Analeptics (Respiratory stimulants)	10
04	Drugs acting on Gastro-intestinal tract: Anti-ulcers and Antacids, Anti-Emetics, Pro-Kinetic agents, Anti-diarrheals, Laxatives	08

Books Recommended

1. Wilson and Gisvold's Text Book of Organic Medicinal and Pharmaceutical Chemistry. Edited by J.N. Delgado and William A. Remers, J.B. Lippincott Company Philadelphia.
2. Principles of Medicinal Chemistry by W.C. Foye, Lea and Febiger Philadelphia.
3. Bergers Medicinal Chemistry – H.E. Wolf, Jhon Wiley and Sons New York Oxford University Press, Oxford.
4. The Organic Chemistry of Drug Synthesis Volume 1-6 by Deniel Lednocer, John Wiley and sons, Inc. New York.
5. Pharmaceutical Substances Synthesis (two parts), patents, applications by A. Kleemann, J.Engel by Thieme Stuttgart New York.
6. Organic Chemistry volume 1 & 2 by I.L. Finar publishers ELBS/Longman London.
7. Principles of Medicinal Chemistry by Dr. S. S. Kadam, K.G. Bothara, Nirali Prakashan Pune.
8. Medicinal and Pharmaceutical Chemistry by Harkishan Singh, V.K.Kapoor, Vallabh Prakashan New Delhi.
9. Fundamentals of Drug Metabolism and Disposition by H.N. Ladu, H. G. Mandal and E.L. Way Williams and Wi;kins Co. Baltimore.
10. Vogale's Text Book of Practical Organic Chemistry, ELBS / Longman, London.
11. Practical Organic Chemistry BY Mann and Saunder. Orient Longman, UK.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH514 Pharmaceutical Analysis – I

Theory

3 hours/Week

No.	Chapter	Hours
01	Significance of quantitative analysis in quality control, Different techniques of analysis, Preliminaries and definitions, Significance figure, Rules for retaining significant digits, Types of errors, Mean data sets, Selection of sample, Precision and accuracy, Fundamentals of volumetric analysis, methods of expressing concentration, primary and secondary standards. USP parameters for method validation, rejection criteria, Q test.	06
02	Theoretical considerations, principle, instrumentation, and applications in drug analysis and quality control of the following analytical techniques will be discussed: Non-aqueous titrations, Complexometric titrations, Miscellaneous methods of analysis such as: Diazotization titrations, kjeldahl method of nitrogen estimation, Karl -Fisher titration, Oxygen flask combustion, gasometry.	10
03	Acid Base Titrations: Acid base concepts, Role of solvent, Relative strengths of acids and bases, Law of mass action, Common- ion effect, Ionic product of water, pH, hydrolysis of salts, Henderson-Hasselbach equation, Buffer solutions, Buffer capacity, Neutralization curves, Acids-base indicators, Theory of indicators, Choice of indicators, mixed indicators, Polyprotic system, applications in assays.	12
04	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, cell representations, Measurement of electrode potential, Oxidation-reduction curves, iodimetry and iodometry, Titrations involving Ceric sulphate, potassium iodate, potassium bromate, potassium permanganate and sodium 2,6 dichlorophenol.	07
05	Precipitation titrations: Precipitation reactions, solubility products, effect of acids, temperature and solvent etc. upon the solubility of a precipitate. Argentometric titrations and titrations involving Ammonium or potassium thiocyanate, mercuric nitrate, and barium sulfate indicators, Gay-lussac Method; Mohr's method, Volhard's method and Fajan's method	05
06	Gravimetric analysis: Precipitation techniques, Solubility products; the crucibles state, supersaturation co-precipitation, Post-precipitation, Digestional washing of the precipitate, Filtration, Filter papers and crucibles, Ignition. Applications of gravimetry. Brief introduction of thermogravimetric methods, Thermogravimetric curves	05

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

1. Acid base Titration: Preparation and standardization of acids and bases; some exercises related with determination of acids and bases separately or in mixture form, some official assay procedures e.g. boric acid should also be covered.

2.Oxidation-reduction Titrations: Preparation and standardization of some redox titrants e.g. potassium permanganate, potassium dichromate, iodine, sodium thiosulphate etc., some exercises related to determination of oxidizing and reducing agents in the sample shall be covered. Exercises involving potassium iodate, potassium bromate, iodine solution, and ceric ammonium sulphate.

3.Precipitation titrations: preparation and standardization of titrants like silver nitrate and ammonium thiocyanate, titrations according to Mohr's, Volhard's and Fajan's methods.

4.Gravimetric analysis: preparation of Gooch crucible for filtration and use of sintered glass crucible, determination of water of hydration, some exercises related to gravimetric analysis should be covered.

5.Non aqueous titration: preparation and standardization of perchloric acid and estimation of some pharmacopoeial products.

6.Complexometric titrations: preparation and standardization of EDTA solution, some exercises related to pharmacopoeial assays by complexometric titrations.

7.Miscellaneous determination: exercises involving diazotization, Karl-Fischer titration..

Books Recommended

1. Pharmaceutical Analysis: Modern Methods, James W. Munson, Marcel Dekker, Inc.
2. Practical Pharmaceutical Chemistry-I, A.H. Beckett and J.B. Stenlake, CBS Publishers.
3. Indian Pharmacopoeia.
4. British Pharmacopoeia.
5. United States Pharmacopoeia.
6. Textbook of quantitative chemical analysis, 6th edition, Pearson publication.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH515 Pharmacognosy – III

Theory

3 hours/Week

No.	Chapter	Hours
01	Extraction and phytochemical screening. Introduction and classification of Extraction. Phytochemical screening of Alkaloids, Glycosides, Tannins, Polyphenols, Phytosterols and Flavonoids in the plant extract by using advanced analytical methods.	07
02	Glycoside containing drugs: Biological sources, cultivation, collection, commercial varieties, diagnostic macroscopic & microscopical features, chemical constituents, uses, substitutes, adulterants, and specific chemical tests. (a) Saponins glycoside: Liquorice, Ginseng, Dioscorea, Sarsaparilla, Senega. (b) Cardiac glycoside: Digitalis, Squill, Strophanthus, Thevetia, Ouabain. (c) Anthraquinone glycoside: Aloe, Senna, Cassia pod, Rhubarb and Cascara. (d) Bitter glycoside: Chirata, Quassia, Kalmegh, Picrorrhiza, Gentian. (e) Coumarine glycoside: Psoralea, Ammi visnaga, Ammi majus. (f) Isothiocynate glycoside: Mustard, Black mustard. (g) Cyanogenetic glycoside: Bitter almond, Linseed. (h) Flavanoids: Ruta graveolens.	28
03	Glycosidal Phytoconstituents: Chemistry, biosynthetic pathway, isolation, estimation and Pharmacological action of Diosgenin, Sennosides, Digoxin, digitoxin, Andrographolides, Glycyrrhithinic acid and Ginsenoside.	06
04	Chromatography: Introduction, classification and study of different chromatographic methods and their applications in evaluation of herbal drugs.	04

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

- Identification of crude drugs mentioned in theory.
- Microscopical study of characters of selected drugs given in the theory in entire and powdered form.
- Chemical evaluation of powdered drugs.
- Laboratory experiments on extraction, isolation, separation, purification of various groups of chemical constituents of pharmaceutical significance.

Books Recommended

1. Pharmacognosy: C.K.Kokate, A.P.Purohit, S.B.Gokhale, Nirali prakashan, Pune, 39th Edition, 2007.

2. Pharmacognosy and pharmacobiotechnology, Ashutosh Kar, New Age International (P) Ltd, Publishers, 2nd edition 2007.
3. A Text Book of Pharmacognosy: C. S. Shah, J. S. Quadry, B. S. Shah Prakashan, Ahemedabad, 8th edition, 1990
4. Trease and Evan's Pharmacognosy: W. C. Evans, W.B.Saunders Co., Singapore, 15th Edition, 2008.
5. Text Book Pharmacognosy: T.E. Wallis, CBS Publishers and Distributors Delhi- 5th Edition, Reprint, 1997.
6. Pharmacognosy and Phytochemistry, Part I and II and Vinod D. Rangari, Carrier Publications, 1st Edition, Reprint, 2007,.
7. Pharmacognosy: V. E. Tylar, L. R. Brady, J. E. Habbers, Lea and Febgir Philadelphia, 8th Edition, 1981.
8. Cultivation and Utilization of Aromatic Plants, Handa S.S. and Kaul M.K., Regional Research Laboraotry, Jammu, 1st Edition, 1997.
9. Pharmacognosy of powdered crude drugs: M. A. Iyenger, Manipal Power Press, 1st Edition,1974.
10. Essentials of Pharmacognosy, S. H. Ansari, Birla Publications Pvt. Ltd., 1st edition, 2005-2006.
11. Microscopic profile of powdered drugs used in Indian systems of medicine, Malti G. Chauhanand Pillai A.P.G., volume 1, Leaf drugs, (2005), Gujarat Ayurved University, Jamnagar.
12. Microscopic profile of powdered drugs used in Indian systems of medicine, Malti G. Chauhan and Pillai A.P.G., volume 2, bark drugs, (2007), Gujarat Ayurved University, Jamnagar

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH516 Pharmacology – III

Theory

3 hours/Week

No.	Chapter	Hours
01	Chemotherapy	28
02	Autacoids	05
03	Pathophysiology of various diseases including: – Infectious diseases: Tuberculosis, urinary tract infection, enteric infections, upper respiratory infections. – Neoplastic Diseases: Acute leukemias, Hodgkin's disease, Prostate cancer, Breast Cancer.	10
04	Gene therapy	02

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

1. Pharmacology of the gastrointestinal tract:
 - a) To study the spasmodic and spasmolytic effect of various drugs on ileum preparation of rat/guinea pig/chicken.
 - b) To find out the unknown drug on ileum preparation of rat/guinea pig/chicken.

Books Recommended

1. Goyal R.K.-Practicals in pharmacology (1994-95) 1st Edn. M/s B.S.Shah Prakashan, Ahmedabad.
 2. Sheth U.K. et al-Selected topics in experimental pharmacology (1972) 1st Edn. The Kothari Book Depot, Mumbai.
 3. Kulakarni S.K.- handbook of experimental pharmacology (1993) 2nd Edn.Vallabh Prakashan, New Delhi.
 4. Ghosh M.N-Essentials of experimental pharmacology scientific book agency, Calcutta, 1984,
 5. Rang h.P., dale M.M., etal-Pharmacology (1995) 3rd Edn. Churchill livingstone USA.
 6. Satoskar R.S., etal-Pharmacology and pharmacotherapeutics (1999)16th Edn. Popular Prakashan, Mumbai.
 7. Harvel, R.A., Champe P.C. etal –Pharmacology (1997) 2nd Edn. Lippincott-Raven Company, Philadelphia, New York.
 8. Craig C.R., Stitzel, R.E-Modern pharmacology (1994) 4th Edn. Little brown and Company, USA.
 9. Goodman and Gilman's –the pharmacological basis of therapeutics (1996) 9th Edn. Pergamon Press, Singapore.
- Seth,S.D. text Book of pharmacology,B.I.Churchill,1997.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH517 Pharmaceutical Jurisprudence – I

Theory

2 hours/Week

No.	Chapter	Hours
01	Introduction to a. Pharmaceutical Legislation- A brief review b. Drug and Pharmaceuticals Industry – A brief review c. Pharmaceutical Education – A brief review	3
02	An elaborate (practical oriented) study of the following: a. Pharmaceutical Ethics b. Pharmacy Act-1948 c. Medicinal and Toilet preparations (Excise Duties) Act- 1955	12
03	A brief study of the following with special references to the main provisions: a. Drugs and Magic Remedies (Objectionable Advertisements) Act-1954 b. Medical Termination of Pregnancy Act-1970 and Rules-1975 c. Prevention of Cruelty to Animals Act-1960 d. States Sops and Establishment Act and Rules e. Insecticides Act-1968 f. AICTE Act-1987	15

Books Recommended

1. A Text Book of Forensic Pharmacy by B. M. Mithal, 8th edition.
2. A Text Book of Forensic Pharmacy by N. K. Jain, Vallabh Prakashan
3. The Patent Act-1970 with Patens Rules –1972
4. The Narcotic and Psychotropic Substances Act-1985 with the prevention of illicit traffic in narcotic drugs and psychotropic substances act-1988 along with allied rules and orders-1993.
5. The Medical Termination of Pregnancy Act-1971, along with the medical termination of pregnancy rules-1975
6. Insecticides Act-1963 to gather with insecticide rule 1971 and insecticide (Price, Stock, Display and Submission of reports) order-1986 along with selected notifications (5th edition, 1998)
7. The Drugs (Price Control) Order-1987 along with new drug policy-1994 and drugs (Price Control) order-1995
8. The Opium Act-1857 with opium act-1878 and opium and revenue laws act-1950
9. The Standards of Weight and Measures Act-1976
10. The Pharmacy Act-1998

Bachelor of Pharmacy Program

Semester VI

Scheme of Teaching & Examination

Subject code	Subjects	Marks		Hours/ Week	
		Theory	Practical	Theory	Practical
PH611	Pharmaceutical Technology – II	100	100	3	3
PH612	Pharmaceutical Biotechnology	100	-	2	-
PH613	Medicinal Chemistry – II	100	100	3	3
PH614	Pharmaceutical Analysis – II	100	100	3	3
PH615	Pharmacognosy-IV	100	100	3	3
PH616	Pharmacology & Pathophysiology-I	100	100	3	3
PH617	Pharmaceutical Jurisprudence – II	100	-	2	-
	Total	700	500	19	15

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH611 Pharmaceutical Technology – II

Theory

3 hours/Week

No.	Chapter	Hours
01	Sterile dosage forms: Definitions, Advantages, Disadvantages, Ideal requirements and Formulation of sterile dosage forms, Water for injection-Preparation and quality control, Design and requirements for production area- Aseptic techniques, sources of contamination and methods of prevention, design of aseptic area, laminar flow benches, services and maintenance, containers and closures, methods of filling including form fill and seal technology. Evaluation of sterile dosage forms, Parenteral suspensions, Prefilled syringes, Parenteral nutrients, Freeze dried products, Nanosuspensions etc, I.P. Products. Ophthalmic preparations: Requirements, formulations, methods of preparations, containers and evaluation. I.P. Products.	12
02	Liquid dosage forms: Introduction, advantages and disadvantages, types of additives used vehicles, stabilizers, preservatives, suspending agents, emulsifying agents, solubilizers, colors, flavors, etc; manufacturing, packaging and evaluation of clear liquids, suspensions and emulsions (including microemulsion and multiple emulsion) and brief outline of other liquid products such as extracts, tincture, infusion etc., I.P. Products.	09
03	Cosmeticology and cosmetic preparations Fundamentals of cosmetic science, structure and functions of skin and hair, formulation, preparation and packaging of cosmetics for skin - Sunscreen, moisturizers, cold cream, and vanishing cream, hair - Shampoo and conditioners, dentifrice- powders, gels, paste and manicure preparations like- nail polish, lipsticks, eye lashes, brief introduction to cosmaceuticals, baby care products, shaving cream, hygienic products	10
04	Pharmaceutical aerosols: Definition, propellants, general formulation of aerosols, containers, manufacturing (cold filling and pressure filling technique) and packaging methods, pharmaceutical applications, evaluation of aerosol.	07
05	Good Manufacturing Practice for Pharmaceuticals and validation Brief Introduction to GMP (schedule M) and quality assurance, practice of GMP Procedure (SOPs), Building, Equipment, Personnel, Components, Documentation, Containers, Labeling, Laboratory Control, Distribution Records, Recovery & Reprocessing. Introduction to validation, validation of selective unit operations (e.g. granulation, compression) used in tablet manufacturing and steam sterilizer.	07

Practical

3 hours/Week

To illustrate the topics included under theory

Books Recommended

1. The Theory and Practice of Industrial Pharmacy by L Lachman, H Lieberman and J Kanig.
2. Pharmaceutical Dosage Forms and Drug Delivery Systems by Ansel & others.
3. Pharmaceutics: The Science of Dosage Form Design by Michael E. Aulton Gennaro, Alfonso R., Remington: The Science and Practice of Pharmacy, Vol-I & II, Lippincott Williams & Wilkins, New York.
4. Pharmaceutical Dosage Forms: Disperse systems: Vol.1, Vol. 2 and Vol.3, Ed. By Lieberman, Leon Lachman and Joseph B. Schwartz, Marcel Dekker Inc., New York.
5. Pharmaceutical Dosage Forms: Parenteral Medication: Vol.1, Vol. 2 and Vol.3, Ed. by Lieberman, Leon Lachman and Joseph B. Schwartz, Marcel Dekker Inc., New York.
6. Modern Pharmaceutics by Gilbert S. Banker and Christopher T. Rhodes, Marcel Dekker, Inc., New York.
7. Cosmetics by Poucher

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH612 Pharmaceutical Biotechnology

Theory

2 hours/Week

No.	Chapter	Hours
01	Introduction to biotechnology	01
02	Microbial genetics and variation	04
03	Genetic recombination: transformation conjugation Protoplast fusion, gene cloning and their applications, monoclonal antibodies b. Study of drug produced by biotechnology, viz. activase, humulin, Hb tec.	06
04	Immunology and Immunological Preparation: a. Immunity, primary and secondary defense mechanism, interferon b. Principles of immunology, antigen antibody reactions and application, preparations of vaccines, toxoids. Standardization and storage	08
05	Fermentation Techniques: a. Screening of organism, preparation and preservation of master culture, design of fermentor, various parameters and media used for fermentation b. Recovery of fermentation products Flowsheets penicillin, streptomycin, Vit. B2, Vit. B12	08
06	Immobilization of Enzymes: a. Techniques of immobilization b. Factors affecting enzyme kinetics c. Applications	03

Books Recommended

1. Textbook of Microbiology by Tortora.
2. Pharmaceutical Microbiology, sixth edn, edited by W. B. Hugo and A. D. Rusell Blackwell science.
3. Principles of Microbiology, Ronald M. Atlas. Second edn. W. C. Brown Publishers.
4. Bergeys manual of Systematic Bacteriology, Williams and Wilkins- A Waverly company.
5. Disinfection, Sterilization and Preservation. Fourth edn, Symour S. Black. Lea and Febiger Philadelphia, London.
6. Industrial Microbiology. Fourth edn, Prescott and Dunn. CBS Publishers and Distributors.
7. Principles of Fermentation Tehchnology. Second edn. P. F. Stanbury, A. Whiteshaker and S. J. Hall Aditya Books Pvt Ltd. New Delhi.
8. Microbiology, Pelczar/Chan Kreig Tata McGraw Hill edn.
9. Industrial Microbiology L.E. Casida, Jr. New age International Publishers.
10. Fundamental Principles of Bacteriology. A. J. Sale, Tata McGraw Hill Publishing Company Ltd.
11. Fundamentals of Microbiology by Forbischer.

12. Bentley's Text book of Pharmaceutics.
13. Dispensing Pharmacy by Cooper and Gunn, Twelfth edn.
14. Remington Pharmaceutical Science, Latest edn.
15. Microbiology by Ronald Atlas.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH613 Medicinal Chemistry – II

Theory

3 hours/Week

No.	Chapter	Hours
01	Drugs acting on Autonomic Nervous System: Cholinergics, Anti-cholinergics and Anti-cholinesterases, Adrenergics, Sympatholytics, Neuro-muscular junction blocking agents	10
02	Drugs acting on Central Nervous System: General Anesthetics, Local Anesthetics, Hypnotics & Sedatives, Opioid analgesics, anti-convulsants, Antiparkinsonism drugs, CNS stimulants Psycho-pharmacological agents (neuroleptics, anti-depressants, anxiolytics).	22
03	Drugs acting on Autocoids: Eicosanoids and their Synthesis, inhibitors, NSAID'S., Anti-Allergic drugs (H1-receptorantagonists)	06
04	Diagnostic agents.	03
05	Pharmaceutical aids	04

Practical

3 hours/Week

Qualitative analysis of Binary Organic mixture and Synthesis of Compounds

Books Recommended

1. Wilson and Gisvold's Text Book of Organic Medicinal and Pharmaceutical Chemistry. Edited by J.N. Delgado and William A. Remers, J.B. Lippincott Company Philadelphia.
2. Principles of Medicinal Chemistry by W.C. Foye, Lea and Febiger Philadelphia.
3. Bergers Medicinal Chemistry – H.E. Wolf, Jhon Wiley and Sons New York Oxford Univwrsity Press, Oxford.
4. The Organic Chemistry of Drug Synthesis Volume 1-6 by Deniel Lednocer, John Wiley and sons, Inc. New York.
5. Pharmaceutical Substances Synthesis (two parts), patents, applications by A. Kleemann, J.Engel by Thieme Stuttgart New York.
6. Organic Chemistry volume 1 & 2 by I.L. Finar publishers ELBS/Longman London.
7. Principles of Medicinal Chemistry by Dr. S. S. Kadam, K.G. Bothara, Nirali Prakashan Pune.
8. Medicinal and Pharmaceutical Chemistry by Harkishan Singh, V.K.Kapoor, Vallabh Prakashan New Delhi.
9. Fundamentals of Drug Metabolism and Disposition by H.N. Ladu, H. G. Mandal and E.L. Way Williams and Wi;kins Co. Baltimore.
10. Vogale's Text Book of Practical Organic Chemistry, ELBS / Longman, London.
11. Practical Organic Chemistry BY Mann and Saunder. Orient Longman, UK.
12. The Systematic Identification of Organic Compounds byshriner, Hermann,Morrill, Curtin & Fuson, John Wiley and sons, USA.
13. An Introduction to the cChemistry of heterocyclic Compounds by R.M. Acheson Wiley Eastern Ltd. New Delhi.
14. Spectrometric identification Of Organic Compounds by R. M. Silverstein, G. Claytorn Bassel's. T.C. Mivvill. John wiley & Sons, USA.
15. Organic spectroscopy by William Kemp .ELBS, London.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH614 Pharmaceutical Analysis – II

Theory

3 hours/Week

No.	Chapter	Hours
01	Extraction procedure including separation of drugs from excipients by single extraction, multiple extraction, counter current distribution, batch extraction, continuous extraction, solid-liquid and liquid-liquid extraction	05
02	Classification, principle, theories and parameters of chromatography.	06
03	Chromatographic techniques: TLC, HPTLC, Paper chromatography and column Chromatography	06
04	Principle, Instrumentation, calibration and applications of following electro analytical techniques: pHmetry [2], Potentiometry [3], Conductometry [3], Calorimetry [3], Polarography [4], Amperometry and Biamperometry [2] Polarimetry [3].	20
05	Radiochemical techniques: Radiochemical Laboratories, Instrumentation. Radiochemical methods of analysis	08

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

1. Practicals involving electro analytical methods like pHmetry, Potentiometry, Conductometry.
2. Practicals involving chromatographic techniques like TLC and paper chromatography.
3. Extraction techniques.

Books Recommended

1. Principles of Instrumental Analysis - Skoog, Holler, Nieman, Saunders College Publishing.
2. Textbook of Pharmaceutical Analysis - Kenneth A. Connors,, John Wiley & Sons.
3. Instrumental Methods of Chemical Analysis - Galin W. Ewing, McGraw Hill International Editions.
4. Principles of Instrumental Analysis - Skoog, Leary, 4th Ed., Saunders college Publishing.
5. Instrumental Methods of Analysis - Willard, Merritt, Dean, Settle, CBS Publishers.
6. Textbook of quantitative chemical analysis, 6th edition, Pearson publication.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH615 Pharmacognosy – IV

Theory

3 hours/Week

No.	Chapter	Hours
01	Pharmacognostical study of following alkaloid containing crude drugs: (a) Pyridine piperidine: Tobacco, Areca and Lobelia. (b) Tropane: Belladonna, Hyoscyamus, Datura, Duboisia, Coca. (c) Isoquinoline: Ipecac, Opium. (d) Quinoline: Cinchona, Camptotheca. (e) Indol: Ergot, Rauwolfia, Catharanthus, Nux-vomica and Physostigma. (f) Imidazole: Pilocarpus. (g) Steroidal: Kurchi, Veratrum and Ashwagandha. (h) Alkaloidal amine: Ephedra, Colchicum. (i) Glycoalkaloid: Solanum. (j) Purines: Coffee, Tea and Cola. (k) Quinazoline: Vasaka.	27
02	Alkaloidal Phyto-constituents: Chemistry, biosynthetic pathways, Isolation, Estimation and pharmacological action of Atropine, Scopolamine, Morphine, Papaverine, Ephedrine, Reserpine, Caffeine, Ergotamine and Quinine.	10
03	Chemotaxonomy of medicinal plants.	05
04	Herbs as health food.	03

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

- Identification of crude drugs mentioned in theory.
- Microscopical study of characters of selected drugs given in the theory in entire and powdered form.
- Chemical evaluation of powdered drugs.
- Laboratory experiments on extraction, isolation, separation, purification of various groups of chemical constituents of pharmaceutical significance.

Books Recommended

1. Pharmacognosy: C.K.Kokate, A.P.Purohit, S.B.Gokhale, Nirali prakashan, Pune, 39th Edition, 2007.
2. A Text Book of Pharmacognosy: C. S. Shah, J. S. Quadry, B. S. Shah Prakashan, Ahemedabad, 8th edition, 1990
3. Trease and Evan's Pharmacognosy: W. C. Evans, W.B.Saunders Co., Singapore, 15th Edition, 2008.
4. Text Book Pharmacognosy: T.E. Wallis, CBS Publishers and Distributors Delhi- 5th Edition, Reprint, 1997.

5. Pharmacognosy and Phytochemistry, Part I and II and Vinod D. Rangari, Carrier Publications, 1st Edition, Reprint, 2007,
6. Pharmacognosy: V. E. Tylar, L. R. Brady, J. E. Habbers, Lea and Febgir Philadelphia, 8th Edition, 1981.
7. Cultivation and Utilization of Aromatic Plants, Handa S.S. and Kaul M.K., Regional Research Laboraotry, Jammu, 1st Edition, 1997.
8. Essentials of Pharmacognosy, S. H. Ansari, Birla Publications Pvt. Ltd., 1st edition, 2005-2006.
9. Microscopic profile of powdered drugs used in Indian systems of medicine, Malti G. Chauhan and Pillai A.P.G., volume 1, Leaf drugs, (2005), Gujarat Ayurved University, Jamnagar.
10. Microscopic profile of powdered drugs used in Indian systems of medicine, Malti G. Chauhan and Pillai A.P.G., volume 2, bark drugs, (2007), Gujarat Ayurved University, Jamnagar.
11. Textbook of Industrial Pharmacognosy, By A.N. Kalia, CBS Publishers & Distributors.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH616 Pharmacology and Pathophysiology – I

Theory

3 hours/Week

No.	Chapter	Hours
01	Pathophysiology: <ul style="list-style-type: none"> - Cell injury and repair mechanism - Inflammation - Healing - Apoptosis & Necrosis. 	20
02	Pathophysiology of various diseases including: <ul style="list-style-type: none"> - Respiratory disease: Asthma, COPD. - Gastrointestinal disorders: Peptic Ulcer, Ulcerative Colitis, Hepatitis, Cirrhosis 	13
03	Drug acting on respiratory system: <ul style="list-style-type: none"> - Antiasthmatic drugs including bronchodilators - Antitussive and expectorants - Respiratory stimulants 	06
04	Drug acting on gastrointestinal tract: <ul style="list-style-type: none"> - Antacid anti-secretory and anti-ulcer drugs - Laxatives and anti-diarrheal drug - Appetite stimulant and suppressant - Emetics and anti-emetics - Miscellaneous agents 	06

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

- A. To study the anti-secretory and anti-ulcer activity using pylorus ligated rats.
- B. To estimate the strength of test sample of agonist/drug (e.g. Acetylcholine, Histamine, 5-HT & Oxytocin etc.) using a suitable muscle preparation of employing Matching bioassay, End Point bioassay, Graphical bio-assay, three point & Four point methods of Bioassay

Books Recommended

1. Goyal R.K.-Practicals in pharmacology (1994-95) 1st Edn. M/s B.S.Shah Prakashan, Ahmedabad.
2. Sheth U.K. et al-Selected topics in experimental pharmacology (1972) 1st Edn. The Kothari Book Depot, Mumbai.
3. Kulakarni S.K.- handbook of experimental pharmacology (1993) 2nd Edn.Vallabh Prakashan, New Delhi.
4. Ghosh M.N-Essentials of experimental pharmacology scientific book agency, Calcutta, 1984,
5. Rang h.P., dale M.M., etal-Pharmacology (1995) 3rd Edn. Churchill livingstone USA.
6. Satoskar R.S., etal-Pharmacology and pharmacotherapeutics (1999)16th Edn. Popular Prakashan, Mumbai.

7. Harvel, R.A., Champe P.C. etal –Pharmacology (1997) 2nd Edn. Lippincott-Raven Company, Philadelphia, New York.
 8. Craig C.R., Stitzel, R.E-Modern pharmacology (1994) 4th Edn. Little brown and Company, USA.
 9. Goodman and Gilman's –the pharmacological basis of therapeutics (1996) 9th Edn. Pergamon Press, Singapore.
- Seth,S.D. text Book of pharmacology,B.I.Churchill,1997.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH617 Pharmaceutical Jurisprudence – II

Theory

2 hours/Week

No.	Chapter	Hours
01	An elaborate (practical oriented) study of the following: a. Drugs and Cosmetics Act-1940 and Rules –1945 b. Narcotic Drugs and Psychotropic Substances Act-1985 and rules c. Drug Price Control Order.	18
02	A brief study of the following with special references to the main provisions: a. Factories Act-1948 b. Minimum Wages Act-1948 c. Patents Act d. Trade and Merchandise Act e. Industrial Regulation Act (Pollution) f. I. Poisons Act-1919	12

Books Recommended

1. A Text Book of Forensic Pharmacy by B. M. Mithal, 8th edition.
2. A Text Book of Forensic Pharmacy by N. K. Jain, Vallabh Prakashan
3. The Patent Act-1970 with Patens Rules –1972
4. The Narcotic and Psychotropic Substances Act-1985 with the prevention of illicit traffic in narcotic drugs and psychotropic substances act-1988 along with allied rules and orders-1993.
5. The Medical Termination of Pregnancy Act-1971, along with the medical termination of pregnancy rules-1975
6. Insecticides Act-1963 to gather with insecticide rule 1971 and insecticide (Price, Stock, Display and Submission of reports) order-1986 along with selected notifications (5th edition, 1998)
7. The Drugs (Price Control) Order-1987 along with new drug policy-1994 and drugs (Price Control) order-1995
8. The Opium Act-1857 with opium act-1878 and opium and revenue laws act-1950
9. The Standards of Weight and Measures Act-1976
10. The Pharmacy Act-1998

Bachelor of Pharmacy Program

Semester VII

Scheme of Teaching & Examination

Subject code	Subjects	Marks		Hours/ Week	
		Theory	Practical	Theory	Practical
PH711	Dosage Form Design	100	100	3	3
PH712	Medicinal Chemistry – III	100	100	3	3
PH713	Pharmaceutical Analysis – III	100	100	3	3
PH714	Pharmacognosy-V	100	100	3	3
PH715	Pharmacology & Pathophysiology-II	100	100	3	3
PH716	Pharmaceutical Management	100	-	2	-
	Total	600	500	17	15

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH711 Dosage Form Design

Theory

3 hours/Week

No.	Chapter	Hours
01	<p>Preformulation studies:</p> <p>a) Study of physical properties of drug like physical form, particle size, shape, density, wetting, dielectric constant, solubility, dissolution and organoleptic property and their effect on formulation, stability and bioavailability.</p> <p>b) Study of chemical properties of drugs like hydrolysis, oxidation, reduction, polymorphisms, racemization, polymerization etc., and their influence on formulation and stability of products.</p> <p>c) Study of prodrugs in solving problems related to stability, bioavailability and elegance of formulations.</p>	11
02	<p>Pharmaceutical necessities:</p> <p>Effect of following adjuvants on formulation of different pharmaceutical products: Antioxidants, preservatives, colours, flavours, diluents, binders, disintegrants, antifrictional agents, emulsifiers, suspending agents, ointment bases, solvents etc. and other formulation additives.</p>	6
03	<p>Stability of pharmaceuticals:</p> <p>a) Kinetic principles and stability testing: Reaction rate and order, acid base catalysis, decomposition reactions and stabilization of pharmaceuticals.</p> <p>b) Stability of formulation, factors affecting formulation stability, MKT, climatic zones, matrixing and bracketing instability study, accelerated stability testing, real time stability. Current WHO, USFDA and stability testing as per ICH guidelines for pharmaceutical drug substances and drug products.</p> <p>c) Product stability: Requirements, shelf-life, overages, containers, closures.</p> <p>d) Overage calculations</p>	8
04	<p>Controlled and sustained release dosage forms</p> <p>Design of oral sustained release systems: Biological factors, Physicochemical factors Diffusional systems: - Reservoir system, Lag time, Burst effect, Matrix system, Effect of porosity and tortuosity Dissolution controlled system, Cube route dissolution equation, Diffusion layer controlled dissolution. Bioerodible and Combination of diffusion and dissolution systems. Design, development and evaluation of oral and parenteral controlled release formulations.</p>	8
05	<p>Novel drug delivery system</p> <p>(a) Modified drug delivery systems: Fundamentals, rationale of modified release drug delivery, factors influencing the design and performance, pharmacokinetic and pharmacodynamic basis for modified drug delivery systems, estimation of loading and maintenance dose.</p> <p>(b) Design and development of oral modified release dosage forms:</p>	22

	<p>Matrix tablets, microspheres, hydrogels, osmotic pressure controlled systems, gastro retentive systems, colon targeting.</p> <p>(c) Fabrication of parenteral drug delivery systems: Parenteral emulsions & parenteral suspensions, microspheres, liposomes, niosomes, nanoparticles.</p> <p>(d) Formulation and evaluation of Transdermal drug delivery systems.</p> <p>(e) A brief study of site specific and targeted drug delivery systems, transmucosal and ocular drug delivery systems.</p>	
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Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

Books Recommended

1. The Theory & Practice of industrial pharmacy by Leon Lachmen et al., Lea & Febiger, Philadelphia.
2. Remington's Pharmaceutical Sciences, ed. A.R. Gennaro, Mack Publishing Co.
3. Modern Pharmaceutics ed. G.S. Banker & C.T. Rhodes, Marcel Dekker Inc. N.Y.
4. Pharmaceutical dosage forms: Tablets, Parenterals, Disperse systems. Vol.: 1,2,3 Leon, Lachman. Et.al.
5. Pharmaceutics: The science of dosage form design. M.E. Aulton. ELBS/Churchill Livingstone.
6. Drug Stability, T. Carstensen, Marcel Dekker Inc. N.Y.
7. Physical Pharmacy, A.N. Martin et al, K.M. Verghese & Co.
8. Pharmacokinetics, Gibaldi & D. Perrier Marcel Dekker Inc., N.Y.
9. Pharmaceutical calculation, N.J. Stoklosa, Lea & Febiger, Philadelphia.
10. Pharmaceutical Statistics, Sanford Bolton. Marcel Dekker Inc.
11. Novel drug delivery systems: Fundamentals & Developmental concepts. Y.W. Chien, Marcel Dekker Inc.
12. Biopharmaceutics & Pharmacokinetics - an introduction. R.E. Notary, Marcel Dekker Inc., N.Y.
13. Controlled drug Delivery, Fundamentals and applications, J.R. Robinson & Lee, Marcel Dekker Inc.
14. Handbook of Pharmaceutical Excipients" By James C. Boylan, Pub., American Pharmaceutical Association & The Pharmaceutical Society of Great Britain.
15. Pharmaceutical Dissolution testing, Umesh V. Bankar, Marcel Dekker Inc.

DHARMSINH DESAI UNIVERSITY

BACHELOR OF PHARMACY

PH712 Medicinal Chemistry – III

Theory

3 hours/Week

No.	Chapter	Hours
01	Drug Metabolism - Various processes of drug metabolism and its importance in drug design with specific examples and concepts in prodrugs	07
02	Drug design - Introduction various approaches for lead optimization, physicochemical parameters used in QSAR and different methods of QSAR. Introduction to Molecular modeling	06
03	Synthetic procedures of official drugs, mode of action, uses, structure activity relationship (including physicochemical aspects) of the following classes of drugs: A. Anti-hypertensives (03) B. Anti-arrythmic agents (03) C. Anti-anginal agents (02) D. Anti-hyperlipaemic agents (02) E. Cardiotonics (02) F. Anti-coagulants, Anti-Platelets and Anti-thrombolytic agents (03) G. Diuretics (03)	18
04	Thyroid and Antithyroid drugs	04
05	Insulin and hypoglycemic agents.	05
06	Steroid hormones: Detailed study of sex hormones and adrenal cortex hormones including synthetic substitutes, SAR in synthetic substitutes.	05

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

1. Selected drug synthesis from the course content.
2. Special analysis of the drug synthesized.
3. Organic spotting of binary mixtures with derivative preparation and TLC.
4. Establishing the Pharmacopoeial standards of the drugs synthesized.

Books Recommended

1. J.N.Delagado and W.A.R. Remers, Eds, Wilson and Giswild's Text book of Organic, Medicinal and Pharmaceutical Chemistry, J.Lipincott., Philadelphia.
2. H.E.Wolf,Ed., Burger's Medicinal Chemistry, John Wiley & Sons, New York.
4. B.N.Ladu, H.G.Mandel & E.L.Way, Fundamentals of Drug Metabolism & Disposition, William & Wilkins Co., Baltimore.
5. Popst and Perrum, "Computer Aided Drug Design", Acedemic Press, New York.
6. C.Hanch, Compresive Medicinal, Vol:IV, Quantitive Drug Design, Pregamon Peress, Oxford.
7. Y.C.Martin, Quatitative Drug Design - A Critical Introduction (Medicinal Research Monograph, Vol:8). Marcel Dekker.Inc., New York.

8. Exploring QSAR: Vol:I, Fundamentals and Applications in Chemistry and Biology by C.Hanch and A.Leo. and Vol:II, Hydrophobic, Electronic and Steric constants by C.Hanch, A.Leo. and D.Hockman.
9. P.C.Jurs, Computer Software Application in Chemistry, John Wiley & Sons, New York.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY

PH713 Pharmaceutical Analysis – III

Theory

3 hours/Week

No.	Chapter	Hours
01	Ultraviolet and Visible Spectrophotometry: Electromagnetic Radiation (EMR), properties of EMR, Mechanism of Absorption of EMR by molecules, Factors affecting absorption position and absorption intensity, Laws of photochemistry, Deviations from Beer's Law, Instrumentation (components and their general working principles), single beam and double beam instruments, sample handling, selection of wavelength and band width, Applications (direct methods, indirect methods, analysis of mixtures)	13
02	Fluorimetry: Origin of fluorescence and phosphorescence, Factors affecting fluorescence intensity, Relationship of fluorescence and phosphorescence to molecular structure, Instrumentation (components and their general working principles), Applications	06
03	Infrared Spectrophotometry Origin of an I.R. spectrum, Instrumentation (components and their general working principles), Sample handling, A brief introduction to Fourier transform infrared spectroscopy (FTIR), Applications, Analytical shortcomings	10
04	Nuclear Magnetic Resonance Spectroscopy: Magnetic properties of the nucleus, Origin of NMR spectrum, Chemical shift, Coupling, Factors affecting chemical shift and coupling, Instrumentation (CW and FTNMR), Brief introduction to ¹³ CNMR	08
05	Mass Spectrometry Origin of mass spectra, Fragmentation rules, Recognition of molecular ion peak, Instrumentation, Applications	08

Practical

3 hours/Week

To illustrate the topics included under theory

Quantitative estimation and general tests of formulations containing single drug, using instrumental techniques based on theory.

Books Recommended

1. Principles of Instrumental Analysis - Skoog, Holler, Nieman, 5th Ed. Saunders College Publishing.
2. A Textbook of Pharmaceutical Analysis - Kenneth A. Connors, 3rd Ed., John Wiley & Sons.
3. Instrumental Methods of Chemical Analysis - Galin W. Ewing, 5th Ed., McGraw Hill International Editions.
4. Principles of Instrumental Analysis - Skoog, Leary, 4th Ed., Saunders college Publishing
5. Instrumental Methods of Analysis - Willard, Merritt, Dean, Settle, CBS Publishers 7th Ed.
6. Spectrometric Identification of Organic compounds - Silverstein, Morrill, 5th Ed., John Wiley & Sons, Inc.

7. Pharmaceutical Analysis: Modern Methods, James W. Munson, Marcel Dekker, Inc.
8. Practical Pharmaceutical Chemistry-I & II, A.H. Beckett and J.B. Stenlake, 4th Ed. CBS Publishers.
9. Indian Pharmacopoeia.
10. British Pharmacopoeia.
11. United States Pharmacopoeia.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH714 Pharmacognosy-V

Theory

3 hours/Week

No.	Chapter	Hours
01	Plant Tissue Culture Techniques & its Application in Pharmacy : Introduction and types of PTC. Equipment and facilities require for PTC. Media composition. Immobilized cell techniques, Micropropagation, protoplast, static, suspension, hairy root cultures and some other new techniques in PTC. Biotransformation studies including recent developments in production of biological active constituents in PTC.	09
02	Marine Pharmacognosy, novel medicinal agents from marine sources.	05
03	Role of medicinal plant and aromatic plants in national economy.	01
04	Chemical and spectral approaches to simple molecules of natural origin.	03
05	Concept of stereoisomerism taking examples of Natural Products such as Sennoside, hyoscyamine, citral, menthol, quinine, ephedrine & papaverine.	03
06	Terpenoids: Chemistry, Biogenesis and Pharmacological activity of Geraniol, Menthone, Carvone, Pinene, Abietic acid, β -amyrin, Oleanolic acid, Vitamin – A.	08
07	Traditional drugs: Common vernacular names, botanical sources, morphology, microscopy, chemical nature of chief constituents, pharmacology, categories and common uses and marketed formulations of following indigenous drugs: Entire herb: Punarnava, Apamarg, Brahmi, Shankhpusphi, Kantakari. Root & Rhizomes: Satavari, Majith, Chitrak, Vaj, Rasna, Nagarmotha Bark: Arjuna , Ashoka. Flower: Palash. Unorganised drugs: Guggal, Shilajit.	16

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

1. Identification of crude drugs mentioned in theory.
2. Microscopical study of characters of selected drugs given in the theory in entire and powdered form.

Books Recommended

1. Pharmacognosy: C.K.Kokate, A.P.Purohit, S.B.Gokhale, Nirali prakashan, Pune, 39th Edition, 2007.

2. Pharmacognosy and pharmacobiotechnology, Ashutosh Kar, New Age International (P) Ltd, Publishers, 2nd edition 2007.
3. A Text Book of Pharmacognosy: C. S. Shah, J. S. Quadry, B. S. Shah Prakashan, Ahemedabad, 8th edition, 1990
4. Trease and Evan's Pharmacognosy: W. C. Evans, W.B.Saunders Co., Singapore, 15th Edition, 2008.
5. Text Book Pharmacognosy: T.E. Wallis, CBS Publishers and Distributors Delhi- 5th Edition, Reprint, 1997.
6. Pharmacognosy and Phytochemistry, Part I and II and Vinod D. Rangari, Carrier Publications, 1st Edition, Reprint, 2007,.
7. Pharmacognosy: V. E. Tylar, L. R. Brady, J. E. Habbers, Lea and Febgir Philadelphia, 8th Edition, 1981.
8. Cultivation and Utilization of Aromatic Plants, Handa S.S. and Kaul M.K., Regional Research Laboraotry, Jammu, 1st Edition, 1997.
9. Pharmacognosy of powdered crude drugs: M. A. Iyenger, Manipal Power Press, 1st Edition,1974.
10. Mukherji P. K., Quality Control of Herbal Drugs, Business Horizon Pharma. Publishers, 1stEdition, 2002.
11. Herbal drug technology, S. S. Agrawal and M. Paridhavi, Univeristies Press, 1st Edition, 2007.
12. Essentials of Pharmacognosy, S. H. Ansari, Birla Publications Pvt. Ltd., 1st edition, 2005-2006.
13. Microscopic profile of powdered drugs used in Indian systems of medicine, Malti G. Chauhanand Pillai A.P.G., volume 1, Leaf drugs, (2005), Gujarat Ayurved University, Jamnagar.
14. Microscopic profile of powdered drugs used in Indian systems of medicine, Malti G. Chauhan and Pillai A.P.G., volume 2, bark drugs, (2007), Gujarat Ayurved University, Jamnagar

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH715 Pharmacology & Pathophysiology-II

Theory

3 hours/Week

No.	Chapter	Hours
01	Pathophysiology of various diseases including: <ul style="list-style-type: none"> • CNS disorders: Epilepsy, Parkinsonism, Schizophrenia, Depression • Joint and connective tissue disorders: Rheumatoid arthritis, Gout and Hyperuricemia • Renal disorders: Acute Renal Failure & Chronic Renal Failure • Haematopoietic disorders: Anemia • Endocrine: Diabetes mellitus and thyroid disorders 	15
02	Central Nervous system: <ul style="list-style-type: none"> • Neurohumoral transmission in the C.N.S • General anesthetics • Alcohols and disulfiram • Sedatives, hypnotics & anxiolytics agents • Antiepileptic drugs • Anti-parkinsonian drugs • Psychopharmacological agents (Antipsychotic, antidepressants, antimaniacs and hallucinogens) • Opioid analgesics • Non- opioid analgesics • C.N.S stimulants • Drug addiction and drug abuse • Drug used in Alzheimer's disease • Drug used in migraine 	26
03	Immunopharmacology	04

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

1. Experiments on CNS:

- a) Spontaneous motor activity
- b) Analgesic activity
- c) Anti-convulsant activity
- d) Anti-parkinsonism activity
- e) CNS stimulant and CNS depressant activity
- f) Sedative and hypnotics activity
- g) Anti-inflammatory activity
- h) Muscle relaxant activity of drugs using simple experiments.

2. Experiments on clinical pharmacy:

- a) To audit given prescription for format of prescription, essentiality and rationality and suggest carry home message (three experiments containing three prescriptions each, in totality nine prescriptions, covering various diseases or organ-systems).

- b) To evaluate formulations on anemia, diarrhoea and cough for their essentiality and rationality and also provide carry home message.
- c) To suggest appropriate parenteral nutrition for hospitalized patients after proper nutritional assessments in different conditions, and enlist importance of medications necessary in a pharmacy for Intensive Care Unit management.
- d) To evaluate drug-drug interactions for the type of drug interaction, the mechanism responsible for drug interactions, possible outcomes or clinical manifestations of interaction and suggestion corrective measure to overcome or prevent the drug interaction.
- e) To evaluate case for Interpretation of laboratory data.
- f) To evaluate case involving skills of pharmacist for patient counseling.
- g) To evaluate case for dose adjustment in geriatrics, pediatrics and pregnant women.
- h) To evaluate case for Therapeutic Drug Monitoring (TDM).

Books Recommended

1. Goyal R.K.-Practicals in pharmacology (1994-95) 1st Edn. M/s B.S.Shah Prakashan, Ahmedabad.
2. Sheth U.K. et al-Selected topics in experimental pharmacology (1972) 1st Edn. The Kothari Book Depot, Mumbai.
3. Kulakarni S.K.- handbook of experimental pharmacology (1993) 2nd Edn.Vallabh Prakashan, New Delhi.
4. Ghosh M.N-Essentials of experimental pharmacology scientific book agency, Calcutta, 1984,
5. Rang h.P., dale M.M., etal-Pharmacology (1995) 3rd Edn. Churchill livingstone USA.
6. Satoskar R.S., etal-Pharmacology and pharmacotherapeutics (1999)16th Edn. Popular Prakashan, Mumbai.
7. Harvel, R.A., Champe P.C. etal –Pharmacology (1997) 2nd Edn. Lippincott-Raven Company, Philadelphia, New York.
8. Craig C.R., Stitzel, R.E-Modern pharmacology (1994) 4th Edn. Little brown and Company, USA.
9. Goodman and Gilman's –the pharmacological basis of therapeutics (1996) 9th Edn. Pergamon Press, Singapore.
10. Seth,S.D. text Book of pharmacology,B.I.Churchill,1997.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH716 Pharmaceutical Management

Theory

2 hours/Week

No.	Chapter	Hours
01	Concept of Management: Administrative Management (Planning, Organizing, Staffing, Directing and Controlling), entrepreneurship development, 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, total quality management (TQM).	05
02	Accountancy : Principles of Accountancy, Brief introduction to Ledger, book entries, Trial balance, Cash book, Bank reconciliation statement, Profits and loss account, Balance sheet.	03
03	Economics: Principles of economics with special reference to the laws of demand and supply, demand schedule, demand curves.	02
04	Pharmaceutical Marketing: Functions buying, selling, transportation, storage, finance, feedback, information, channels of distribution, wholesale, retail, departmental store, multiple shop and mail order business.	04
05	Salesmanship: Principles of sales promotion, advertising, ethics of sales, merchandising, literature, detailing.	02
06	Market Research: Recruitment, training, evaluation, compensation to the pharmacist , Pre-requisition: Basic information services.	02
07	Materials Management: A brief exposure of the basic principles of Materials. Management Purchase, stores and inventory control (Eligibility, Efficiency Evaluation, Recruitment Methodology, Service Conditions, Termination Performance Evaluation, etc.).	06
08	Production Management: A brief exposure of the different aspects of Production Management Visible and Invisible inputs, Methodology of Activities, Performance Evaluation Technique, Process-Flow, Process Know-how, Maintenance Management.	06

Books Recommended

1. J.A. Stoner, R.E. Freeman & D.R. Gilbert "Management" Prentice Hall, New Delhi.
2. P. Kotler, "Marketing Management analysis, planning, implementation & control, Prentice hall. New Delhi,

3. H.A. Smith, "Principles and Method of Pharmacy Management", Lea & Febiger, Philadelphia,
4. P. Gopalkrishan and M. Sundaresan, "Material management: An integrated approach", Prentice hall, New Delhi.
5. C.B. Mannoria, "Personal management", Himalaya publishing house, Bombay, Latest edition.
6. L. Lachman, H.A. Liberman and J.L. Kanic, "Theory & practice of Industrial Pharmacy", Lea & Febiger, U.S.A.
7. P. Kotler, "Principles of marketing" Prentice Hall, New Delhi.

Bachelor of Pharmacy Program

Semester VIII

Scheme of Teaching & Examination

Subject code	Subjects	Marks		Hours/ Week	
		Theory	Practical	Theory	Practical
PH811	Biopharmaceutics & Pharmacokinetics	100	100	3	3
PH812	Medicinal Chemistry – IV	100	100	3	3
PH813	Pharmaceutical Analysis – IV	100	100	3	3
PH814	Pharmacognosy-VI	100	100	3	3
PH815	Clinical Pharmacy	100	-	3	-
PH816	Elective	-	100	-	3
	Total	500	500	15	15

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH811 Biopharmaceutics & Pharmacokinetics

Theory

3 hours/Week

No.	Chapter	Hours
01	Introduction to Biopharmaceutics and pharmacokinetics and their role in formulation development and clinical setting	02
02	<p>Biopharmaceutics:</p> <p>a) Introduction to biopharmaceutics and its role in formulation development.</p> <p>b) Passage of drugs across biological barriers (passive diffusion, active transport, facilitated diffusion and pinocytosis).</p> <p>c) Factors influencing absorption- physiochemical, physiological and pharmaceutical.</p> <p>d) Drug distribution in the body, plasma protein binding and drug excretion.</p>	15
03	<p>Pharmacokinetics</p> <p>(a) Definition and scope, significance of plasma drug concentration measurement.</p> <p>(b) Compartment model: Pharmacokinetics of drug absorption Zero order and first order absorption rate constant using Wagner- Nelson and Loo-Riegelman method.</p> <p>(c) Volume of distribution and distribution coefficient.</p> <p>(d) Compartment kinetics- one compartment and two compartment models. Determination of pharmacokinetic parameters from plasma and urine data after drug administration by intra vascular and oral route.</p> <p>(e) Curve fitting (Method of Residuals), regression procedures.</p> <p>(f) Clearance concept, mechanism of renal clearance, clearance ratio, determination of renal clearance.</p> <p>(g) Hepatic elimination of drugs, first pass effect, extraction ratio, hepatic clearance, biliary excretion, extrahepatic circulation.</p> <p>(h) Non-linear pharmacokinetics with special reference to one compartment model after I.V. drug administration, Michaelis Menten Equation, detection of nonlinearity (Saturation mechanism).</p> <p>(i) Numericals related to pharmacokinetic parameters using one compartmental model.</p>	20
03	<p>Bioavailability and Bioequivalence:</p> <p>a) Measures of bioavailability, C_{max}, t_{max} and area under the curve (AUC).</p> <p>b) Design of single dose bio-equivalence study and relevant statistics.</p> <p>c) Review of regulatory requirements for conduction of bio-equivalent studies.</p>	8

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

Books Recommended

1. The Theory & Practice of industrial pharmacy by Leon Lachmen et al., Lea & Febiger, Philadelphia.
2. Remington's Pharmaceutical Sciences, ed. A.R. Gennaro, Mack Publishing Co.
3. Modern Pharmaceutics ed. G.S. Banker & C.T. Rhodes, Marcel Dekker Inc. N.Y.
4. Pharmaceutical dosage forms: Tablets, Parenterals, Disperse systems. Vol.: 1,2,3 Leon, Lachman. Et.al.
5. Pharmaceutics: The science of dosage form design. M.E. Aulton. ELBS/Churchill Livingstone.
6. Drug Stability, T. Carstensen, Marcel Dekker Inc. N.Y.
7. Physical Pharmacy, A.N. Martin et al, K.M. Verghese & Co.
8. Pharmacokinetics, Gibaldi & D. Perrier Marcel Dekker Inc., N.Y.
9. Pharmaceutical calculation, N.J. Stoklosa, Lea & Febiger, Philadelphia.
10. Pharmaceutical Statistics, Sanford Bolton. Marcel Dekker Inc.
11. Novel drug delivery systems: Fundamentals & Developmental concepts. Y.W. Chien, Marcel Dekker Inc.
12. Biopharmaceutics & Pharmacokinetics - an introduction. R.E. Notary, Marcel Dekker Inc., N.Y.
13. Controlled drug Delivery, Fundamentals and applications, J.R. Robinson & Lee, Marcel Dekker Inc.
14. Handbook of Pharmaceutical Excipients" By James C. Boylan, Pub., American Pharmaceutical Association & The Pharmaceutical Society of Great Britain.
15. Pharmaceutical Dissolution testing, Umesh V. Bankar, Marcel Dekker Inc.

DHARMSINH DESAI UNIVERSITY

BACHELOR OF PHARMACY

PH812 Medicinal Chemistry – IV

Theory

3 hours/Week

No.	Chapter	Hours
01	Synthetic procedures of official drugs, mode of action, uses, structure activity relationship (including physicochemical aspects) of the following classes of drugs A. Sulphonamides and Fluoroquinolones (03) B. Anti-malarial drugs (03) C. Anti-Leprotic drugs (02) D. Anti-tubercular drugs (02) E. Anti-septics and Disinfectants (03) F. Anti-fungal agents (02) G. Anti-amoebic agents (02) H. Anti-viral Drugs including anti-HIV agents (08) I. Anti-Neoplastic agents (08) J. Immunosuppressive agents (02)	35
02	Antibiotics: General Chemistry of (β -lactum antibiotics, Aminoglycoside antibiotics Tetracyclines, Chloramphenicol, Macrolide antibiotics, Polyene and Polypeptide antibiotics	10

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

1. Selected drug synthesis from the course content.
2. Special analysis of the drug synthesized.
3. Organic spotting of binary mixtures with derivative preparation and TLC.
4. Establishing the Pharmacopoeial standards of the drugs synthesized.

Books Recommended

1. J.N.Delgado and W.A.R. Remers, Eds, Wilson and Giswild's Text book of Organic, Medicinal and Pharmaceutical Chemistry, J.Lipincott., Philadelphia.
2. H.E.Wolf,Ed., Burger's Medicinal Chemistry, John Wiley & Sons, New York.
3. T.Nogradydey, Medicinal Chemistry - A Biochemical approach, Oxford University Press, New York
4. B.N.Ladu, H.G.Mandel and E.L.Way. Fundamentals of Drug Metabolism & Disposition, William & Welkins Co. 428E, Prestone street, Baltimore.
5. Vogel's Textbook of Practical Organic Chemistry, ELBS, Longman, London.
6. Mann & Saunder, Practical Organic Chemistry, Orient Longman, UK.
7. Shriner, Heremann, Morrill, Curtin & Fusion, The Systemic identification of Organic Compounds, John Wiley & Sons, New York.
8. W.C.Foye, Principles of Medicinal Chemistry, Lea and Feiber, Philadelphia.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH813 Pharmaceutical Analysis – IV

Theory

3 hours/Week

No.	Chapter	Hours
01	Atomic Absorption and Atomic Emission Spectroscopy: Origin of atomic absorption and atomic emission spectra, Instrumentation, Qualitative and quantitative application of flame photometry	06
02	Quality Assurance: Introduction to Basic principles and applications of QA and GLP: Importance and applications of ISO 9000 & 14000. Quality review and documentation in QC laboratory and analytical method validation	04
03	Harmonization of Pharmaceutical Standards, Outsourcing of pharmaceuticals, SUPAC guidelines, etc.	04
04	Validation	04
05	High Performance Liquid Chromatography Introduction, theory – migration equation, theoretical plate, measurement of column performance and its optimization, instruments for liquid chromatography including column packing for various types of chromatography, mobile phase characteristics for normal and reversed phases, polarity and selectivity of the solvents, scope and applications. Super critical fluid chromatography, exclusion chromatography	10
06	Gas Chromatography: Introduction, principles of Gas – Liquid Chromatography, instruments for Gas –Liquid Chromatography, columns and stationary phases, qualitative and quantitative applications to pharmaceuticals, brief introduction to hyphenated techniques like GC-MS, LC-MS, etc.	08
07	X – Ray Crystallography: Introduction, X-ray absorption and X-ray diffraction methods, Instrumentation for relevant instruments	04
08	Principle, instrumentation, types and applications of electrophoresis.	03

Practical

3 hours/Week

1. Quantitative estimation and general tests of formulations containing single drug, using instrumental techniques based on theory.

Books Recommended

1. Principles of Instrumental Analysis - Skoog, Holler, Nieman, 5th Ed. Saunders College Publishing.
2. A Textbook of Pharmaceutical Analysis - Kenneth A. Connors, 3rd Ed., John Wiley & Sons.
3. Instrumental Methods of Chemical Analysis - Galin W. Ewing, 5th Ed., McGraw Hill International Editions.
4. Principles of Instrumental Analysis - Skoog, Leary, 4th Ed., Saunders college Publishing
5. Instrumental Methods of Analysis - Willard, Merritt, Dean, Settle, CBS Publishers 7th Ed.

6. Understanding ISO 9000 and implementing the basics to Quality-D.H. Stamatis, Marcel Dekker, Inc.
7. Guidelines for Laboratory Quality Auditing - Donald C. Singer, Ronald P. Upton, Marcel Dekker, Inc.
8. Good Manufacturing Practices for Pharmaceuticals: A plan for total quality control - Sidney H Willing, James R. Stoker, Marcel Dekker, Inc.
10. O.P.P.I. Manual.
11. Good Laboratory Practice Regulations - Ed. by Sandy Weinberg, Marcel Dekker, Inc.
12. Pharmaceutical Analysis: Modern Methods, James W. Munson, Marcel Dekker, Inc.
13. Practical Pharmaceutical Chemistry-I & II, A.H. Beckett and J.B. Stenlake, 4th Ed. CBS Publishers.
14. Indian Pharmacopoeia.
15. British Pharmacopoeia.
16. United States Pharmacopoeia.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH814 Pharmacognosy-VI

Theory

3 hours/Week

No.	Chapter	Hours
01	Herbal Cosmetics: Introduction, classification, importance, preparation and evaluation of herbal cosmetics.	04
02	Standardisation of Herbal Drugs: <ul style="list-style-type: none"> • Importance of Standardisation and problem involved in the standardisation of herbs. • Standardisation of single drugs and compound formulations. • WHO Guidelines for quality standardized herbal formulation. • Estimation of the parameter limits used for standardisation. • Preparation and evaluation of Herbal Extract. 	06
03	Herbal formulations: The holistic concept of drug administration in traditional system & modern system of medicine. <ul style="list-style-type: none"> • General introduction, their importance, Classification. • Principles of Siddha, Ayurveda, Homeopathy, Unani & Naturopathy systems of medicine. • Introduction for different Ayurvedic dosage forms. • Toxicity studies of different complimentary medicine. • Rules and regulatory requirements for the production of the Ayurvedic medicines as per FDA. • General introduction and different stages required for herbal formulation. Dosage forms and its Evaluation parameters. 	12
04	Traditional drugs : Common vernacular names, botanical sources, morphology, microscopy, chemical nature of chief constituents, pharmacology, categories and common uses and marketed formulations of following indigenous drugs: Stem: Galo Underground stem: Garlic Leaf: Tylophora, Nagod, Adusa, Karen, Gymnema, Neem. Fruit: Amla, Gokhru, Pepper, Bhilama, Kalijiri. Seed: Methi, Chakramadu, Malkangni, Karanj.	17
05	World - wide trade in medicinal plants and derived products with special reference to diosgenin (Dioscorea), taxol (Taxus spp.), digitalis, tropane alkaloid containing plants, papain, cinchona, Ipecac, Liquorice, ginseng, aloe, valerian, rauwolfia and plants containing laxatives, artemisia, camptotheca.	04
06	A brief account of plant based industries and institution involved in work on medicinal and aromatic plants in India.	02

Practical

3 hours/Week

To illustrate the topics included under theory

Suggested Practical:

1. Demonstration of various traditional dosage forms.
2. Microscopical study of characters of selected drugs given in the theory in entire and powdered form.
3. Preparation and evaluation herbal cosmetics.
4. Preparation and evaluation of Ayurvedic formulation.

Books Recommended

1. Pharmacognosy: C.K.Kokate, A.P.Purohit, S.B.Gokhale, Nirali prakashan, Pune, 39th Edition, 2007.
2. Pharmacognosy and pharmacobiotechnology, Ashutosh Kar, New Age International (P) Ltd, Publishers, 2nd edition 2007.
3. A Text Book of Pharmacognosy: C. S. Shah, J. S. Quadry, B. S. Shah Prakashan, Ahmedabad, 8th edition, 1990.
4. Pharmacognosy and Phytochemistry, Part I and II and Vinod D. Rangari, Carrier Publications, 1st Edition, Reprint, 2007,.
5. Pharmacognosy: V. E. Tylar, L. R. Brady, J. E. Habbbers, Lea and Febgir Philadelphia, 8th Edition, 1981.
6. Pharmacognosy of powdered crude drugs: M. A. Iyenger, Manipal Power Press, 1st Edition, 1974.
7. Mukherji P. K., Quality Control of Herbal Drugs, Business Horizon Pharma. Publishers, 1st Edition, 2002.
8. Herbal drug technology, S. S. Agrawal and M. Paridhavi, Univeristies Press, 1st Edition, 2007.
9. Essentials of Pharmacognosy, S. H. Ansari, Birla Publications Pvt. Ltd., 1st edition, 2005-2006.
10. Microscopic profile of powdered drugs used in Indian systems of medicine, Malti G. Chauhan and Pillai A.P.G., volume 1, Leaf drugs, (2005), Gujarat Ayurved University, Jamnagar.
11. Microscopic profile of powdered drugs used in Indian systems of medicine, Malti G. Chauhan and Pillai A.P.G., volume 2, bark drugs, (2007), Gujarat Ayurved University, Jamnagar.
12. Herbal cosmetics, hand book By H. Panda
13. Cosmetics formulation, manufacturing and their quality control by P.P. Sharma
14. Textbook of Pharmacognosy and Phytochemistry by Edwin Jarald and Sheeja Jarald
15. Modern Methods of Plant Analysis by Peach & Tracey
16. Biotechnology by S.S. Purohit

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH815 Clinical Pharmacy

Theory

3 hours/Week

No.	Chapter	Hours
01	Endocrine system: <ul style="list-style-type: none"> • Hypothalamic and pituitary hormones • Thyroid hormones and anti-thyroid drugs • Insulin and oral hypoglycemic agents and glucagon. • ACTH and corticosteroids • Androgen and anabolic steroids • Estrogen, progesterone and oral contraceptives • Drug acting on uterus 	15
02	Introduction to clinical pharmacy: <ul style="list-style-type: none"> • Development and scope of clinical pharmacy • Concept of health care team • Role of clinical pharmacist as a member of health care team and important function. 	05
03	Basic concept of pharmacotherapy: <ul style="list-style-type: none"> • Therapeutic Drug Monitoring. • Critical care Unit: Blood and Plasma Volume expanders • Drug used during infancy and in the elderly (Pediatrics and Geriatrics) • Drug used during pregnancy • Drug induced diseases • The basics of drug interactions • General principle of toxicology: Heavy Metals and Antagonists. • Interpretation of clinical Laboratory test 	22
04	Clinical Trials & GCP guidelines.	03

Books Recommended

1. Goyal R.K.-Practicals in pharmacology (1994-95) 1st Edn. M/s B.S.Shah Prakashan, Ahmedabad.
2. Sheth U.K. et al-Selected topics in experimental pharmacology (1972) 1st Edn. The Kothari Book Depot, Mumbai.
3. Kulakarni S.K.- handbook of experimental pharmacology (1993) 2nd Edn.Vallabh Prakashan, New Delhi.
4. Ghosh M.N-Essentials of experimental pharmacology scientific book agency, Calcutta, 1984,
5. Rang h.P., dale M.M., etal-Pharmacology (1995) 3rd Edn. Churchill livingstone USA.
6. Satoskar R.S., etal-Pharmacology and pharmacotherapeutics (1999)16th Edn. Popular Prakashan, Mumbai.
7. Harvel, R.A., Champe P.C. etal –Pharmacology (1997) 2nd Edn. Lippincott-Raven Company, Philadelphia, New York.
8. Craig C.R., Stitzel, R.E-Modern pharmacology (1994) 4th Edn. Little brown and Company, USA.

9. Goodman and Gilman's –the pharmacological basis of therapeutics (1996) 9th Edn.
Pergamon Press, Singapore.
10. Seth, S.D. text Book of pharmacology, B.I. Churchill, 1997.

DHARMSINH DESAI UNIVERSITY
BACHELOR OF PHARMACY
PH816 Elective

3 hours/Week

- ❖ Topics for preparation of project report will be given on the basis of result of B. Pharm Semester - VI (merit list is to be prepared)
- ❖ Topics will be given from all the area of pharmaceutical sciences viz. pharmaceutical technology, pharmacology, pharmaceutical analysis, medicinal chemistry, Pharmacognosy, etc
- ❖ Preparation and submission of project report should be mandatory for all the students of B. Pharm semester-VIII.
- ❖ Evaluation of students will be done at the end of the year by preparing a power point presentation by students
- ❖ Presentations will be evaluated by external referee.