

B.PHARM V SEMISTER

COURSE NO 501: PHARMACEUTICAL BIOTECHNOLOGY

objectives:

1. To impart knowledge on various biological products, preparation, storage and uses.
2. To gain knowledge on preparation, storage and use of blood and blood products. To impart the knowledge on preparation, standardization and storage of various immunological preparations.
3. To impart knowledge on fermentative production, recovery and uses of selected products.
4. Knowledge on sterility testing and its importance, RIA, and ELISA techniques.
5. Fundamentals of microbial production of useful enzymes and immobilization of enzymes, microbial transformations.
6. Basics of recombinant DNA technology, hybridoma technology- their application in production of therapeutically useful products.
7. Introduction to bioinformatics.

Units	Contents	Hrs
Unit-1:	Animal products: I) Insulin – Extraction, Purification and types of formulations II) Preparation and uses of Pancreatin, Pepsin, Heparin, Thyroid and Liver preparations as per I.P. Blood products & Plasma substitutes: Preparation, uses and storage of the following; Whole human blood, Dried human plasma, human gamma globulins, clinical dextran and absorbable haemostats.	06
Unit-2:	Immunological products: Preparation & standardization of the following; Vaccines – BCG, DPT, Poliomyelitis and Typhus. Toxoids – Diphtheria and Tetanus. Antitoxins – Diphtheria and Gas-gangrene	10
Unit-3:	Fermentation Products Introduction to fermentation, aerobic and anaerobic, surface, submerged and solid state fermentations and fermentation media. Design and operation of industrial fermenter. Fermentative production, recovery and uses of the following, I) Antibiotics - Penicillin and Streptomycin II) Organic acids - Citric and Lactic acids III) Solvents - Alcohol IV) Vitamins - Vitamin-B ₁₂ V) Miscellaneous - Lactobacillus spores	10

Unit-4:	Test for sterility: Sterility testing media, sampling, neutralization of various antimicrobial substances in dosage forms, conducting the tests for injections, surgical sutures (Catgut), cotton, tubings and bottles. Principles of microbiological assay of amino acids, vitamins and antibiotics. Detailed assay of lysine, vitamin-B ₁₂ and penicillin.	09
Unit-5:	Radioimmunoassay (RIA): Principle and applications. Estimation of insulin in blood by RIA. ELISA: Principle and applications	04
Unit-6:	Enzymes, Enzyme immobilization and microbial transformations 1. Enzymes: Sources and general methods of preparation. Preparation of fungal diastase. Applications in pharmaceutical industry, therapeutics and clinical assays 2. Immobilization: Advantages and limitations, techniques of immobilization of enzymes and cells. 3. Microbial transformations: Advantages, different types of microbial and steroid Conversions	7
Unit-7:	Recombinant DNA technology 1. Introduction to genetic engineering. Brief description of (a) Restriction of DNA (b) Ligation of DNA (c) Introduction into host cells (d) Recombinant selection (e) Use of the plasmids and bacteriophages as cloning vehicles, artificial plasmid vectors, cosmids and phasmids (f) Agarose gel electrophoresis, southern, northern and western blotting. 2. Applications of R-DNA technology: Production of human insulin and hepatitis B vaccine. Hybridoma technology: Production of monoclonal antibodies and their applications.	10
Unit-8:	Bioinformatics: Introduction, scope and applications	04

Text books and Reference books:

1. Bentley's text book of pharmaceutics by Herold Davis - 7th and Latest edition
2. The microbiological assay of Vitamin B-complex and amino acids by E. C. Barton – Wright, Sir Issac Pitman and Sons Ltd., London
3. Analytical microbiology by Kavanagh, Academic press

4. Tutorial pharmacy by Cooper and Gunn
5. Indian Pharmacopoeia, Volume-I, 2010 Edition.
6. Remington's Pharmaceutical Sciences
7. Pharmaceutical biotechnology by Vyas and Dixit, BS Publications & distributors, New Delhi.
8. Pharmaceutical Biotechnology by K.Sambamurthy&Ashutoshkar, New age international publishers.
9. Industrial microbiology by L.E. Casida JR., New age international publishers.
10. Principles of gene manipulation by Primrose, Twyman, 6th Edition, Blackwell.
11. Foundation in Pharmaceutical Biotechnology by B.P Nagori and RoshanIssarani published by Pharma book syndicate.

COURSE NO 502: PHARMACEUTICAL BIOTECHNOLOGY – PRACTICALS

List of experiments:

1. Sterilization by autoclaving and test for sterility;
2. Sterilization by dry heat and test for sterility;
3. Sterilization by heating with bactericide and test for sterility;
4. Sterilization by gas and test for sterility;
5. Test for sterility of commercial dextrose injection I.P.
6. Test for sterility of preparation containing sulphanilamide;
7. Preparation and standardization of a bacterial vaccine.
8. Fermentative production of penicillin/Neomycin (Demonstration)
9. Fermentative production of glutamic acid (Demonstration);
10. Microbiological assay of penicillin including construction of standard curve;
11. Test for presence of fungi in tap water;
12. Determination of minimum inhibitory concentration of phenol;
13. Immobilization of microbial cells by entrapment in sodium alginate;
14. Isolation of DNA from bacteria (Demonstration).

COURSE NO 503: PHARMACEUTICAL CHEMISTRY-IV (MEDICINAL CHEMISTRY- I)THEORY

Learning objectives:

1. To develop the linkage between organic molecules and their transformation to the drug molecule.

2. To develop the ability to name drugs having various structural features.
3. To expose students towards different chemical classes of compounds and their relationships according to their biological activity.

Units	Contents	Hrs
Unit-1:	History, introduction and development of medicinal chemistry, nomenclature of drugs. Heterocyclic compounds: Nomenclature and numbering of heterocyclic systems, general methods of preparation and important reactions of five membered and six membered heterocyclic systems-pyrrole, furan, thiophene, pyridine, quinoline, isoquinoline and indole	06
Unit-2:	Acquaintance with the following heterocyclic systems commonly encountered in therapeutic agents with suitable examples. Aziridine, thiadiazole, oxazole, isoxazole, thiazole, imidazole, pyrazole, pyridazine, pyrimidine, piperazine, piperidine, benzothiazole, purine, benzimidazole, indole, benzothiadiazine, pteridine, pthalazine, quinazoline, quinoline, isoquinoline, benzopyran, benzodiazepines, phenothiazine, aciridine, thioxanthene	10
Unit-3:	Study of the classification, mode of action, structural activity relationship (wherever applicable) and synthesis of specified members of the following classes of drugs. General anaesthetics: Halothane, thiopental sodium and diethyl ether. Sedatives and hypnotics: Phenobarbital, buspirone, diazepam, alprazolam. Anticonvulsants: phenytoin, valproic acid, etho suximide, carbamazepine . Central voluntary muscle relaxants: mefenicin, methocarbamol	10
Unit-4:	Study of the classification, mode of action, structural activity relationship (wherever applicable) and synthesis of specified members of the following classes of drugs. Analgesics: Narcotic analgesics-derivatives of morphin, morphinan, phenylpiperidine, benzazocine, diphenyl propylamine and isosters. Narcotic antagonists-morphine derivatives, miscellaneous compounds, antitussives and expectorants. Synthesis of meperidine, methadone, pethidine and propoxiphen.	08
Unit-5:	A study of the classification, mode of action, structural activity relationship (wherever applicable) and synthesis of specified members of the following classes of drugs. Nonsteroidal anti-inflammatory analgesics and antipyretics-paracetamol, aspirin, indomethacin, diclophenac sodium, ibuprofen and piroxicam.	06

Unit-6:	A study of the classification, mode of action, structural activity relationship (wherever applicable) and synthesis of specified members of the following classes of drugs. Analeptics: Nikethamide, picrotoxin, pentelene tetrazole, ethamiban, doxapram Antipsychotic agents: chlorpromazine, promethazine, thiothexene and haloperidol. Antidepressants: imipramine, desipramine, amitryptiline, isocarboxazide phenelzine	07
Unit-7:	A study of the classification, mode of action, structural activity relationship (wherever applicable) and synthesis of specified members of the following classes of drugs. 1. Diagnostic agents: Radio-opaques, agents for kidney function and liver function tests, miscellaneous agents. 2. Local anaesthetics: benzocaine, procaine, lignocain and dibucaine.	07
Unit-8:	A study of the classification, mode of action, structural activity relationship (wherever applicable) and synthesis of specified members of the following classes of drugs. Antihistaminic agents: diphenhydramine HCl, chlorpheniramine, chlorcyclizine, cetirizine, meperamine, ranitidine and omeprazole. Antidiabetic agents: Insulin and its preparations, tolbutamide and glibenclamide	06

TEXT BOOKS:

1. Wilson and Gisvold, Textbook of organic, Medicinal and Pharmaceutical Chemistry
2. Bently and Driver's Textbook of Pharmaceutical Chemistry
3. Remington's Practice of Pharmaceutical Sciences.
4. Medicinal chemistry by Nadendla Rama Rao Published by Pharma book syndicate.

Reference Books

1. Organic Chemistry, Vol. I. By I.L.Final
 2. Essentials of Medicinal Chemistry by Karlkovas
 3. Medicinal Chemistry, Vol. I,II and III. By A.Burger
- Indian Pharmacopoeia

(MEDICINAL- I)

PRACTICALS

1. Preparation of drugs including heterocyclic compounds involving two or more steps like: Benzimidazole, 3,4-dihydroxy-4-oxo-phthalazine, Benztriazole, 1,2,3,4-tetrahydrocarbazole, 6-methyl uracil, 7-hydroxy-4-methyl coumarin, 3-methyl-1-phenyl-5-pyrazolone, Benzoin, Diphenylhydantoin, Chlorbutol.
2. Identification tests for selected drugs.
3. Analysis of formulations containing selected drugs like meprobamate, phenytoin, ibuprofen, chlorpromazine, lignocaine, oxyphenbutazone, diphenhydramine.

COURSE NO 505: PHARMACEUTICAL ENGINEERING – II

A study of the following unit operations as applied to Pharma Industry.

Learning objectives:		
<ol style="list-style-type: none"> 1. To create awareness regarding the unit operations involved in Pharmaceutical industry. 2. To provide overview of equipment used in a pharmaceutical industry. 3. To enable students in selecting proper equipment for material processing in Pharma. Industry 4. To educate learners about hazards and safety aspects in industrial environment. 		
Units	Contents	Hrs
Unit-1:	Drying: Introduction, classification of drying equipment - static bed, moving bed and fluidized bed systems – spray dryer, infrared drying, freeze drying, choice of dryers. Factors influencing the rate of drying, Mechanism of drying with carrier gas, typical drying curve.	10
Unit-2:	Crystallization : Crystal forms and Crystal habit – supersaturation and formation of crystals and crystal growth, Mier’s supersaturation theory of Crystallization and its limitations, solubility curves	08
Unit-3:	Mixing: Solid – solid mixing mechanism of mixing. Mixers: V type, drum, paddle and Rotocube mixers – selection of mixer, mixing of viscous masses: kneading machines and ointment mills.	07
Unit-4:	Liquid – liquid and gas – liquid mixing equipment. Impellers – their characteristics and field of operation.	07
Unit-5:	Size reduction : Classification of equipment – cutting roll, edge runner and end runner mills, disintegrators, hammer mills, ball and tube mills, colloid mills – impact mills, fluid energy mill,	07
Unit-6:	Choice of size reduction machinery – theory of size reduction. Energy for size reduction. Size separation: Screens and screening equipment – air and hydraulic separators, sedimentation, particle size distribution and its measurement – representation of data.	07
Unit-7:	Refrigeration: Principles and equipment, choice of refrigerant, coefficient of performance. Humidity control: Definition, methods of monitoring and drying gases – air conditioning, cooling towers – wet and dry bulb hygrometry, study of air handling systems.	07
Unit-8:	Extraction: Principles of solid – liquid and liquid – liquid extraction, equipment, diffusion batteries – extraction of towers – Podbielniak extraction.	07

Text Books

1. Introduction to Chemical Engineering by Walter L. Badger and Julius T. Banchero.
2. Elementary Chemical Engineering by Max S. Peters.
3. The theory and practice of Industrial Pharmacy by Leon Lachman, H.A. Lieberman and Joseph L. Kanig.
4. Pharmaceutical engineering by K.Sambamurthy published by New age international (P) LTD. Publishers
- 5.

COURSE NO 506: PHARMACEUTICAL ENGINEERING – II PRACTICAL

- I. Determination of radiation constant of brass, iron, unpainted and painted glass (4 experiments).
- II. Steam distillation – To calculate the efficiency of steam distillation.
- III. To determine the overall heat transfer coefficient.
- IV. Construction of drying curves (for calcium carbonate and starch).
- V. Determination of moisture content and loss on drying.
- VI. Determination of humidity of air – i) From wet and dry bulb temperatures – use of humidity chart, II) Dew point method.
- VII. Surface evaporation – To calculate the mass transfer coefficient from water to air.
- VIII. Size analysis by sieving – To evaluate size distribution of tablet granulations – construction of various size frequency curves including arithmetic and logarithmic probability plots.
- IX. Size reduction : To verify the laws of size reduction using ball mill.
- X. Demonstration of colloid mill, fluidized bed dryer, freeze dryer and such other major equipments.

Text books:

1. Pharmaceutical engineering Practical manual (unit operations) by Sudhakara Reddy published by Pharma book syndicate.

COURSE NO 507: HOSPITAL & COMMUNITY PHARMACY AND INDUSTRIAL MANAGEMENT

Learning objectives:		
<ol style="list-style-type: none"> 1. To understand the organization of a pharmacy unit in a hospital and the responsibilities of a hospital pharmacist. 2. To have knowledge on the organization of a community pharmacy 3. To understand the managerial aspects in running a pharmaceutical industry 		
Units	Contents	Hrs
Unit-1:	Hospital Pharmacy – Definition, Hospital organization, Pharmacy organization and personnel, Location and layout of a hospital pharmacy unit in a hospital, responsibilities of a hospital pharmacist. Pharmacy and therapeutics committee, Hospital formulary, Dispensing to inpatients (a) Floor stock system, (b) Individual prescription order system, (c) Combination of (a) and (b), Dispensing to out patients	10
Unit-2:	Drug information center, Central sterile supply, Intravenous drug admixture, Unit dose dispensing, prepackaging in the hospital, Patient counseling- theory, counseling for analgesics and antipyretics, antidiabetics, antibiotics and antihypertensive drugs.	08
Unit-3:	Purchase and inventory control in hospitals and in community pharmacy: Vendor development, Buying techniques, Types of discount, Selection of right source of supply, Purchasing Procedure (Purchase request form, Purchase order form), Receipt of materials and maintenance of records. Factors influencing inventory control, Selective inventory control methods (ABC , VED, SOS), Lead Time, Stockouts, Safety Stocks, Reorder Quantity methods, Economic Order Quantity, Reorder point methods	07
Unit-4:	Community Pharmacy:– selection of site, space, lay-out, and legal requirements for starting and maintaining a drug store as per Drugs and Cosmetics Act 1940, Maintenance of registers for drugs of different schedules, Use of computers, Business and healthcare softwares	08
Unit-5:	Meaning and Evolution of Management; Planning, organizing, staffing, Directing, Co-ordinating, Reporting and Budgeting; Functions of management with reference to pharmaceutical management.	07
Unit-6:	Understanding Organisation: Types of organizational structures, line, line & staff & matrix organizational structure. Resistance to change, authority and responsibility	08
Unit-7:	Sales promotion: Market research-salesmanship, qualities of a salesman, advertising and window display. Recruitment, training,	06

	evaluation of pharmacists and compensation to the pharmacist.	
Unit-8:	Pharmacy finance: Budgeting, budgetary control, types of budgets, Capital requirements, sources of pharmacy capital, Risk management and insurance.	06

Reference Books:

1. Merchant and Qadry's text book of hospital pharmacy revised by Dr. Ramesh K Goyal and RK Parikh; BS Shah Prakashan Publications.
2. Hospital Pharmacy by William E Hassan, Lea & Febiger, Philadelphia
3. Pharmacy management for students and practitioners, by C. Patrick Tharp and Pedro J Lecca.
4. Pharmaceutical Production and Management by C.V.S. Subrahmanyam, Vallabh Prakashan Publications

B.PHARM VI SEMISTER

COURSE NO 601: PHARMACOLOGY-I THEORY

Learning objectives:		
<ol style="list-style-type: none"> 1. To understand pharmacokinetic and pharmacodynamic principles involved in the use of drugs. 2. To understand and identify the various factors that can affect the action of drugs. 3. To know the various routes of drug administration. 4. To know the effect of drugs on different systems of the body. 5. To know the drugs used in systemic illness. 6. To understand the methods in experimental pharmacology to correlate drug effects with receptors. 		
Units	Contents	Hrs
Unit-1:	General pharmacology: How do drugs act? Receptor and non receptor mechanisms of drug action. Brief introduction to structure activity relationship. Normal and unwanted activities of drugs. Factors influencing drug action.	08
Unit-2:	Drugs acting on Central Nervous System: Central depressants- ethyl alcohol, general anesthetics, basal narcotics, hypnotics, analgesic hypnotics, anxiolytics, antipyretic analgesics. CNS stimulants and analeptics.	10
Unit-3:	Psychopharmacological agents: Neuroleptics, antidepressants,	08

	anxiolytics, hallucinogens. Habit forming drugs and drugs of addiction.	
Unit-4:	Drugs acting on Autonomic Nervous System: Parasympathomimetic and parasympathetic blocking agents.	06
Unit-5:	Drugs acting on Autonomic Nervous System Sympathomimetic and sympathetic blocking agents.	06
Unit-6:	Drugs acting on Ganglionic stimulants and blockers, skeletal muscle relaxants.	06
Unit-7:	Drugs acting on Cardiovascular system: Coagulants, anticoagulants, Drugs acting on blood forming organs, antihypertensive agents, vasodilators, antianginal agents, antiarrhythmics, cardiotonics, plasma substitutes, antihyperlipidemic agents.	10
Unit-8:	Drugs acting on the kidney: Diuretics, antidiuretics, drugs useful in urinary tract infections.	06

Text Books:

1. Textbook of Pharmacology by Rang and Dale .
2. Essentials of Medical Pharmacology. -KD Tripathi.
3. Lippincott's illustrated pharmacology.
4. Pharmacology and pharmacotherapeutics by Satoshkar and Bandarkar.

Reference Books:

Pharmacological basis of Therapeutics by Goodman and Gillman.
Text book of clinical pharmacology –Bertram.C.Katzung

COURSE NO 602: PHARMACOLOGY-I PRACTICAL

1. Excretion of drugs in urine, sweat, saliva in humans.
2. Role of acetylcholine in ciliary movement of frog's oesophagus.
3. Drug action on the eye of rabbit- (miotic and mydriatic).
4. Drug antagonism with pilocarpine and atropine in rabbits.
5. To study the analgesic effect of morphine in mice using Tail Flick method
6. Effect of Adrenaline and Acetylcholine on frogs rectum in situ.
7. Drug action on intact frog heart.
8. Action of acetylcholine and nicotine on the rectus abdominis muscle of frog.
9. Dose response curve (DRC) with acetylcholine on rectus abdominis muscle of frog.
10. Potentiation of acetylcholine response but not of nicotine by eserine on rectus abdominis muscle of frog.

11. Inhibition of acetylcholine response by curare/procaine/quinidine/pethidine on rectus abdominis muscle of frog.
12. Different stages of general anaesthesia using ether in mice.
13. Effect of different ions(Ca^{+2} , K^{+}) on isolated perfused frog heart.
14. Effect of digoxin on normal and hypodynamic heart.
15. To evaluate Antiepileptic Activity of Drugs (Diazepam or Sodium Valproate) against Chemoshock Induced by Pentylenetetrazole or Picrotoxin in Mice.
16. To study the Anticonvulsant Activity of Diphenylhydantoin Sodium (Dilantin Sodium) against Maximal Electroshock Seizures (MES) in Mice.

COURSE NO 603: PHARMACEUTICAL CHEMISTRY-V (MEDICINAL CHEMISTRY-II)

Learning objectives:		
<ol style="list-style-type: none"> 1. To give an understanding regarding the use of different name reactions in preparation of some useful compounds for synthesis of simple drug molecules. 2. To train the students in safe handling of very reactive chemical reagents by giving suitable reactions. 		
Units	Contents	Hrs
Unit-1:	Physico-chemical properties and biological activity: Influence of partition coefficient, covalent bonding, hydrogen bonding, surface activity, redox potentials, chelation, enantiomeris, and geometrical isomerism on biological activity.	08
Unit-2:	Factors affecting absorption, transport, distribution and elimination of drugs, protein binding of drugs. Introduction to the concepts of prodrugs, soft drugs and targeted drugs. Introduction to principles of chemotherapy, chemotherapeutic index, drug resistance, super infection.	07
Unit-3:	A study of the classification, mode of action, uses and synthesis of specified members in each of the following categories. Antiinfective agents: (a) Ectoparasitocides: Lindane, pyrethrins, sulfurated compounds, benzyl benzoate (b)	07
Unit-4:	A study of the classification, mode of action, uses and synthesis of specified members in each of the following categories. Antiseptics and disinfectants: alcohol, formaldehyde, resorcinol, hydrogen peroxide, benzalkonium chloride, gentian violet, methylene blue and furazolidone.	08

Unit-5:	Sulphonamides: sulfisoxazole, sulphamethazole and sulphathiazole. Antimycobacterial agents: (a)Antitubercular agents: PASA, isoniazid (b) antileprotic agents: dapsone Anthelmintics: diethyl carbamazine citrate, mebendazole, tinidazole, thiabendazole and pyrantel pamoate	08
Unit-6:	Antimalarials: chloroquine, primaquine, mefloquine and pyrimethamine Antiamoebic agents: metronidazole, diloxanide furoate and carbarsone. Antifungal agents: clotrimazole, ketocanazole and tolnaftate. Antiviral agents: acyclovir, zidovudine, idoxuridine and adamantane Cytostatic agents: chlorambucil, cyclophosphamide, lomustine, methotrexate, 5-fluoro uracil and mercaptopurine	07
Unit-7:	Adrenergic drugs: Biosynthesis and metabolism of catecholamines, direct and indirect sympathomimetics, mode of action and structure activity relations, adrenergic blocking agents, synthesis of amphetamine, phenyl ethylamine and isoproterenol. Cholinergic agents and anticholinesterases: Structural features of acetylcholine, cholinergic agonists, anticholinesterases, synthesis of carbachol, physostigmine, neostigmine and dicyclomine.	08
Unit-8:	Diuretics: acetazolamide, furosemide, ethacrynic acid and hydrochlorothiazide. Antihypertensives: methyldopa, amlodipine, prazosin and propranolol.	07

TEXT BOOKS:

1. Wilson and Gisvold, Textbook of organic, Medicinal and Pharmaceutical Chemistry
2. Bentley and Driver's Textbook of Pharmaceutical Chemistry
3. Remington's Practice of Pharmaceutical Sciences.

Reference Books

1. Organic Chemistry, Vol. I. By I.L. Finlay
2. Essentials of Medicinal Chemistry by Karlkovas
3. Medicinal Chemistry, Vol. I, II and III. By A. Burger
4. Indian Pharmacopoeia.

COURSE NO 604: PHARMACEUTICAL CHEMISTRY-V (MEDICINAL-II)

PRACTICALS

1. Preparation of synthetic drugs involving two or three steps such as benzocaine, barbituric acid, methaqualone, cinchophen, phenolphthalein.

2. Identification of drugs.
3. Analysis of formulations containing drugs studied in theory such as Chloroquine phosphate, metronidazole, diethyl carbamazine, pentobarbitone, dapsone, isoniazid, tolbutamide, sulpha drugs.

COURSE NO 605: INDUSTRIAL PHARMACY & COSMETIC TECHNOLOGY

Learning objectives:		
1. To understand the formulation and production technology of different dosage forms		
2. To understand the formulation and production technology of different cosmetics		
Units	Contents	Hrs
Unit-1:	Pre – formulation: Objectives – Protocols –solubility studies (pKa determinations, pH solubility profile and common ion effects, effect of temperature, solubilization, partition coefficient, dissolution), bulk characterization (crystallinity and polymorphism, hygroscopicity, micromeritic properties, particle characterization, density and porosity and powder flow properties), stability analysis (solution stability, solid state stability, drug-excipient compatibility).	10
Unit-2:	A study of the formulation, process and equipment used in the large scale manufacture, evaluation, and quality control of the following dosage forms. (i) Suspensions (ii) Emulsions (iii) Liquid orals (Syrups and Elixirs) (iv) Semisolids.	10
Unit-3:	A study of the formulation, process and equipment used in the large scale manufacture, evaluation, and quality control of the following dosage forms. Tablets, Tablet coating –sugar, film and enteric coating, Capsules – hard and soft	08
Unit-4:	A study of the formulation, process and equipment used in the large scale manufacture, evaluation, and quality control of the following dosage forms. (i) Parenterals (ii) Other sterile products – eye ointments, eye drops.	07
Unit-5:	(i) Sustained release products (drug complexes, encapsulated granules, slow release granules, tableted slow release granules, matrix tablets) (ii) Microencapsulation and microcapsules (iii) Aerosol preparations	08
Unit-6:	Formulation and preparation of the following Cosmetics – Hand lotions and creams, face powders, baby and bath powders,	08
Unit-7:	Formulation and preparation of the following Cosmetics -dentifrices, shampoo, lipstick, shaving preparations and hair dyes and creams,	06

	skin creams.	
Unit-8:	Case studies: Formulation of (i) An antacid product (ii) An ampicillin product for Paediatric use (iii) An antibacterial product for a child (iv) Pain balm (v) An anti-inflammatory gel.	05

Text Books:

1. The theory and practice of Industrial Pharmacy by Leon Lachman, H.A. Lieberman and Joseph L. Kanig, CBS Publishers and Distributors.
2. Pharmaceutics, The Science of Dosage Form Design, edited by Michael E. Aulton.
3. Science and Technology of Cosmetics by Sagarin.
4. Remington's Practice of Pharmaceutical Sciences.
5. Cosmetics a practical manual by Swarnalata saraf and shailendra saraf published by pharma book syndicate.
6. Handbook of Pharmaceutical Manufacturing Formulations, Uncompressed solid products, Volume 2, Sarfaraz K Niazi, CRC Press

COURSE NO 606: INDUSTRIAL PHARMACY & COSMETIC TECHNOLOGY PRACTICAL

Formulation, preparation and quality control of pharmaceutical products (25) covering dosage forms listed in theory. The number of products under each category is as follows:

Tablets – 6, Liquid orals – 4, Emulsions – 3, Capsules – 2, Parenterals – 4, SR Tablets – 2, Cosmetics – 4.

Text Books:

7. The theory and practice of Industrial Pharmacy by Leon Lachman, H.A. Lieberman and Joseph L. Kanig.
8. Pharmaceutics, The Science of Dosage Form Design, edited by Michael E. Aulton.
9. Science and Technology of Cosmetics by Sagarin.
10. Remington's Practice of Pharmaceutical Sciences.

11. Cosmetics a practical manual by Swarnalata saraf and shailendra saraf published by pharma book syndicate.

COURSE NO 607: PHARMACEUTICAL JURISPRUDENCE

Learning objectives:		
1. The subject exposes the student to important legislations related to Pharmacy profession in India.		
2. It imparts knowledge about the Drug and Cosmetic Act and its Rules.		
3. It provides the basic idea regarding DPCO drug policies and patenting in India.		
Units	Contents	Hrs
Unit-1:	Pharmacy Act	10
Unit-2:	Drugs and Cosmetic Act and Rules	10
Unit-3:	Narcotic Drugs and Psychotropic Substances Act (1986)	07
Unit-4:	Drugs and Magic Remedies Act	06
Unit-5:	Drugs (Price Control) Order 2013	07
Unit-6:	Medicinal and Toilet Preparations (Excise duties) Act and Rules.	07
Unit-7:	Patents Act and Intellectual Property Rights	07
Unit-8:	Medical Termination of Pregnancy Act, Code of Pharmaceutical Ethics	06

Suggested Books

1. Original Laws Published by Government of India.
2. Forensic Pharmacy by B.M.Mithal, 5th Edition, National Book Centre, 1997.
3. Forensic Pharmacy by N.K.Jain, 6th Edition, Vallabh Prakashan, 2003.
4. Forensic Pharmacy by C.K. Kokate and S.B. Gokale, Pharmamed Press, 2008.
5. Intellectual Property Law by R.K. Nagarajan, Jain Book Depot, 2004.