Shri Rawatpura Sarkar University, Raipur

Examination Scheme & Syllabus

for

BACHELOR OF PHARMACY

SEMESTER - V

(Effective from the session: 2019-20)

Prof. (Dr.) Vijay Kumar Singh Dr. Veena Devi Singh Mr. Nagendra Bhuwane Mr. Pushpendra Kurre

Faculty of Pharmacy
Shri Rawatpura Sarkar University, Raipur
BACHELOR OF PHARMACY
SEMESTER - V
Examination Scheme
(Effective from the session: 2019-20)

Sr. No.	Subject Code	Name of the Course with PCI code	Internal assessment				Teaching hours per week			Credit	End semester exams			Total Marks
			TA	Sessional exams										
				CT	Duration	Total	L	T	P		Marks		Duration	
1	BPH501T	Medicinal Chemistry II – Theory	10	15	1 Hr	25	3	1		4	75	25	3 Hrs	100
2	BPH502T	Industrial Pharmacy-I – Theory	10	15	1 Hr	25	3	1		4	75	25	3 Hrs	100
3	BPH503T	Pharmacology II – Theory	10	15	1 Hr	25	3	1		4	75	25	3 Hrs	100
4	BPH504T	Pharmacognosy and Phytochemistry II– Theory	10	15	1 Hr	25	3	1		4	75	25	3 Hrs	100
5	BPH505T	Pharmaceutical Jurisprudence – Theory	10	15	1 Hr	25	3	1		4	75	25	3 Hrs	100
6	BPH502P	Industrial Pharmacy-I – Practical	5	10	4 Hr	15			4	2	35	15	4 Hrs	50
7	BPH503P	Pharmacology II – Practical	5	10	4 Hrs	15			4	2	35	15	4 Hrs	50
8	BPH504P	Pharmacognosy and Phytochemistry II – Practical	5	10	4 Hrs	15			4	2	35	15	4 Hrs	50
			65	105	17 Hrs	170	Total 26				480	170	27 Hrs	650

<table>
<tr><td>Course Title</td><td colspan="5">MEDICINAL CHEMISTRY II– THEORY</td></tr>
<tr><td>Course Code</td><td colspan="2">BPH501T Total theory period 45Hrs</td><td colspan="3">Total Tutorial Period 15</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td>Total marks in the end semester : 75</td></tr>
<tr><td>3</td><td>1</td><td></td><td>4</td><td>Minimum of class test to be conducted: 02</td></tr>
<tr><td>Prerequisites</td><td colspan="5">This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs.
The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs.
The syllabus also emphasizes on chemical synthesis of important drugs under each class.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">Uponcompletion of the course the student shall be able to

1. Understand the chemistry of drugs with respect to their pharmacological activity
2. Understand the drug metabolic pathways,adverse effect and therapeutic value of drugs
3. Know the Structural Activity Relationship of different class of drugs
4. Study the chemical synthesis of selected drugs</td></tr>
<tr><td>Course Contents</td><td colspan="5">Study of the development of the following classes of drugs,Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted(*)

UNIT-I 10 Hours

Antihistaminic agents: Histamine ,receptors and their distribution in the human body

H1–antagonists: Diphenhydramine hydrochloride*, Dimenhydrinate, Doxylaminescuccinate,Clemastinefumarate,Diphenylphyralinehydrochloride, Tripelenaminehydrochloride, Chlorcyclizine hydrochloride, Meclizine hydrochloride, Buclizine hydrochloride, Chlorpheniramine maleate,Triprolidine hydrochloride*, Phenidamine tartarate, Promethazine hydrochloride*, Trimeprazine tartrate, Cyproheptadine hydrochloride, Azatidine maleate, Astemizole ,Loratadine ,Cetirizine ,Levocetrazine Cromolyn sodium

H2-antagonists: Cimetidine*, Famotidine, Ranitidin.

Gastric Proton pump inhibitors: Omeprazole, Lansoprazole, Rabeprazole, Pantoprazole

Antineoplastic agent

Alkylating agents:Meclorethamine*, Cyclophosphamide, Melphalan, Chlorambucil, Busulfan, Thiotepa

Antimetabolites:Mercaptopurine*, Thioguanine, Fluorouracil, Floxuridine, Cytarabine, Methotrexate*, Azathioprine

Antibiotics: Dactinomycin, Daunorubicin,Doxorubicin, Bleomycin</td></tr>
</table>

Plant products: Etoposide, Vinblastin sulphate, Vincristin sulphate

Miscellaneous: Cisplatin, Mitotane.

UNIT– II **10 Hours**

Anti anginal:

Vasodilators: Amyl nitrite, Nitroglycerin*, Pentaerythritol tetranitrate, Isosorbide dinitrite*, Dipyridamole.

Calcium channel blockers: Verapamil, Bepridil hydrochloride, Diltiazem hydrochloride ,Nifedipine, Amlodipine, Felodipine, Nicardipine,Nimodipine.

Diuretics:
Carbonic anhydrase inhibitors: Acetazolamide* Methazolamide, Dichlorphenamide.
Thiazides: Chlorthiazide*, Hydrochlorothiazide, Hydroflumethiazide, Cyclothiazide,
Loop diuretics: Furosemide*, Bumetanide, Ethacrynicacid.
Potassium sparing Diuretics: Spironolactone, Triamterene, Amiloride.
Osmotic Diuretics: Mannitol

Anti-hypertensive Agents: Timolol, Captopril, Lisinopril, Enalapril, Benazepril hydrochloride, Quinapril hydrochloride, Methyldopa tehydrochloride,* Clonidine hydrochloride, Guanethidine monosulphate, Guanabenzacetate, Sodium nitroprusside, Diazoxide, Minoxidil, Reserpine, Hydralazine hydrochloride.

UNIT-III **10 Hours**

Anti-arrhythmic Drugs: Quinidine sulphate,Procainamidehydrochloride, Disopyramide phosphate*, Phenytoin sodium, Lidocaine hydrochloride, Tocainide hydrochloride,Mexiletine hydrochloride,Lorcainide hydrochloride, Amiodarone, Sotalol.

Anti-hyperlipidemic agents:

Clofibrate, Lovastatin, Cholesteramine

Coagulant & Anticoagulants:
Menadione,Acetomenadione,Warfarin*,Anisindione,clopidogrel

Drugs used in Congestive Heart Failure: Digoxin, Digitoxin, Nesiritide,Bosentan, Tezosentan.

UNIT-IV **08 Hours**

Drugs acting on Endocrine system

	Nomenclature, Stereochemistryand metabolism of steroids **Sex hormones**: Testosterone, Nandralone, Progestrones, Oestriol, Oestradiol, Oestrione, Diethyl stilbestrol. **Drugs for erectile dysfunction:**Sildenafil, Tadalafil. **Oral contraceptives:**Mifepristone, Norgestril,Levonorgestrol **Corticosteroids:** Cortisone, Hydrocortisone, Prednisolone, Betamethasone, Dexamethasone **Thyroid andantithyroid drugs**: L-Thyroxine, L-Thyronine, Propylthiouracil, Methimazole. **UNIT– V** **07 Hours** **Antidiabetic agents:** Insulin and its preparations Sulfonyl ureas: Tolbutamide*, Chlorpropamide, Glipizide, Glimepiride. Biguanides: Metformin. Thiazolidinediones: Pioglitazone, Rosiglitazone. Meglitinides: Repaglinide, Nateglinide. Glucosidaseinhibitors: Acrabose,Voglibose. **Local Anesthetics:** SAR of Local anesthetics Benzoic Acid derivatives; Cocaine,Hexylcaine,Meprylcaine,Cyclomethycaine, Piperocaine. Amino Benzoic acid derivatives: Benzocaine*,Butamben,Procaine*,Butacaine, Propoxycaine, Tetracaine, Benoxinate. Lidocaine/Anilide derivatives:Lignocaine, Mepivacaine, Prilocaine, Etidocaine. Miscellaneous: Phenacaine, Diperodon, Dibucaine.*
Course Outcomes	1. Helps in correlating between pharmacology of a disease and its mitigation or cure. 2. To know the structural activity relationship of different class of drugs. 3. Knowledge about the mechanism pathways of different class of medicinal compounds.
Text Books	1. Wilson and Giswold's Organic medicinal and PharmaceuticalChemistry. 2. Foye's Principles of MedicinalChemistry. 3. Burger's Medicinal Chemistry, Vol I toIV. 4. Introduction to principles of drug design- Smith andWilliams.

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	5. The Organic Chemistry of Drug Synthesis by Lednicer, Vol.1-5. 6. Text book of practical organic chemistry-A.I.Vogel.
Reference Books	1. Remington's PharmaceuticalSciences. 2. Martindale's extrapharmacopoeia. 3. Organic Chemistry by I.L. Finar, Vol.II. 4. IndianPharmacopoeia.

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Bachelor of Pharmacy
Semester-V
2023-24

<table>
<tr><td>Course Title</td><td colspan="6">Industrial Pharmacy I– Theory</td></tr>
<tr><td>Course Code</td><td colspan="2">BPH502T</td><td colspan="2">Total theory period 45Hrs</td><td colspan="2">Total Tutorial Period 15</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td colspan="2">Total marks in the end semester : 75</td></tr>
<tr><td>3</td><td>1</td><td></td><td>4</td><td colspan="2">Minimum of class test to be conducted: 02</td></tr>
<tr><td>Prerequisites</td><td colspan="6">Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage form so on the performance of the drug product.</td></tr>
<tr><td>Course Objectives</td><td colspan="6">Upon completion of the course the student shall be able to
• Know the various pharmaceutical dosage forms and their manufacturing techniques.
• Know various considerations in development of pharmaceutical dosage forms
• Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality</td></tr>
<tr><td>Course Contents</td><td colspan="6">UNIT-I 07 Hours
Preformulation Studies: Introduction to preformulation, goals and objectives, study of physicochemical characteristics of drug substances.
a.Physical properties:Physicalform(crystal&amorphous),particlesize,shape,flow properties, solubilityprofile (pKa, pH, partition coefficient), polymorphism
b. Chemical Properties: Hydrolysis, oxidation, reduction, racemisation, polymerization
BCS classification of drugs
Application of Preformulation considerations in the development to solid, liquid oral and parenteral dosage forms and its impact on stability of dosage forms.
UNIT-II 10 Hours
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a. Introduction, ideal characteristics of tablets, classification of tablets. Excipients, Formulation of tablets, granulation methods, compression and processing problems. Equipments and tablet tooling.

b. Tablet coating: Types of coating, coating materials, formulation of coating composition, methods of coating,equipment employedand defects in coating.

c. Quality control tests: In process and finished product tests

Liquid orals: Formulation and manufacturing consideration of solutions, suspensions and emulsions; Filling and packaging; evaluation of liquid orals official in pharmacopoeia.

UNIT-III **08 Hours**

Capsule:

a. ***Hard gelatin capsules:*** Introduction, Extraction of gelatin and production of hard gelatin capsule shells. Size of capsules, Filling, finishing and special techniques of formulation of hard gelatin capsules. Inprocess and final product quality control tests for capsules.

b. ***Soft gelatin capsules:*** Nature of shell and capsule content, size of capsules, importance of base adsorption and minimum/gram factors, production, in process and final product quality control tests. Packing, storage and stability testing of soft gelatin capsules

Pellets: Introduction, formulation requirements ,pelletization process, equipments for manufacture of pellets.

UNIT-IV **10 Hours**

Parenteral Products:

a. Definition, types, advantages and limitations. Preformulation factors and essential requirements, vehicles, additives, importance of isotonicity

b. Production procedure, production facilities and controls.

c. Formulation of injections, sterile powders, emulsions, suspensions, large volume parenterals and lyophilized products, Sterilization.

d.Containers and closures selection ,filling and sealing of ampoules, vials and infusion fluids. Quality control tests.

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	Ophthalmic Preparations: Introduction, formulation considerations; formulation of eye drops, eye ointments and eye lotions; methods of preparation; labeling, containers; evaluation of ophthalmic preparations **UNIT-V** **10Hours** **Cosmetics:** Formulation and preparation of the following cosmetic preparations: lipsticks, shampoos, cold cream and vanishing cream, tooth pastes, hair dyes and sunscreens. **Pharmaceutical Aerosols:** Definition, propellants, containers, valves, types of aerosol systems; formulation and manufacture of aerosols; Evaluation of aerosols; Quality control and stability studies. **Packaging Materials Science:** Materials used for packaging of pharmaceutical products, factors influencing choice of containers, legal and official requirements for containers, stability aspects of packaging materials, quality control tests.
Course Outcomes	1. After successful completion of the course student will be able to understand the various drug delivery system and its mechanisms. 2. Students will learn advanced drug delivery system early stage. 3. They know very well about orally administered drugs, injectables, aerosol and semisolid preparations with standard protocols.
Text Books	1. Pharmaceutical dosageforms-Tablets, volume1-3 byH.A.Liberman,LeonLachman &J.B.Schwartz 2. Pharmaceutical dosageform - Parenteral medication vol- 1&2 by Liberman &Lachman 3. Pharmaceutical dosageform dispersesystem VOL-1 by Liberman&Lachman 4. Modern Pharmaceutics byGilbert S.Banker & C.T. Rhodes, 3rd Edition 5. Remington: The Science andPracticeofPharmacy,20thedition Pharmaceutical Science(RPS)
Reference Books	1. Theoryand Practice ofIndustrial Pharmacyby Liberman&Lachman 2. Pharmaceutics- The science of dosage form designbyM.E.Aulton, Churchill livingstone,Latest edition 3. Introduction to Pharmaceutical Dosage Forms by H. C.Ansel, Lea &Febiger, Philadelphia, 5thedition,2005 4. Drugstability-PrinciplesandpracticebyCartensen&C.J.Rhodes,3rdEdition, Marcel Dekker Series, Vol 107.

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Bachelor of Pharmacy
Semester-V
2023-24

<table>
<tr><td>Course Title</td><td colspan="5">Pharmacology II – Theory</td></tr>
<tr><td>Course Code</td><td colspan="3">BPH503T Total theory period 45Hrs</td><td colspan="2">Total Tutorial Period 15</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td>Total marks in the end semester : 75</td></tr>
<tr><td>3</td><td>1</td><td></td><td>4</td><td>Minimum of class test to be conducted: 02</td></tr>
<tr><td>Prerequisites</td><td colspan="5">This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses ,side effects and contraindications) of drugs acting on different systems of body and in addition, emphasis on the basic concepts of bioassay.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">Up on completion of this course the student should be able to

1. Understand the mechanism of drug action and its relevance in the treatment of different diseases
2. Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments
3. Demonstrate the various receptor actions using isolated tissue preparation
4. Appreciate correlation of pharmacology with related medical sciences</td></tr>
<tr><td>Course Contents</td><td colspan="5">UNIT-I 10 hours

1. Pharmacology of drugs acting on cardio vascular system
a. Introduction to hemodynamic and electrophysiology of heart.
b. Drugs used in congestive heart failure
c. Anti-hypertensive drugs.
d. Anti-anginal drugs.
e. Anti-arrhythmic drugs.
f. Anti-hyperlipidemic drugs.

UNIT-II 10 hours</td></tr>
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1. Pharmacology of drugs acting on cardio vascular system

a. Drug used in the therapy of shock.
b. Hematinics, coagulants and anticoagulants.
c. Fibrinolytics & antiplatelet drugs
d. Plasma volume expanders

2. Pharmacology of drugs acting on urinary system

a. Diuretics
b. Anti-diuretics.

UNIT-III **10 hours**

3. Autocoids and related drugs

a. Introduction to autacoids and classification
b. Histamine, 5-HT and their antagonists.
c. Prostaglandins, Thromboxanes and Leukotrienes.
d. Angiotensin, Bradykinin and Substance P.
e. Non-steroidal anti-inflammatory agents
f. Anti-gout drugs
g. Antirheumatic drugs

UNIT-IV **08 hours**

5. Pharmacology of drugs acting on endocrine system

a. Basic concepts in endocrine pharmacology.
b. Anterior Pituitary hormones- analogues and their inhibitors.
c. Thyroid hormones-analogues and their inhibitors.
d. Hormones regulating plasma calcium level-Parathormone, Calcitonin and Vitamin-D.
e. Insulin, Oral Hypoglycemic agents and glucagon.
f. ACTH and corticosteroids.

UNIT-V **07 hours**

5. Pharmacology of drugs acting on endocrine system

a. Androgens and Anabolic steroids.
b. Estrogens, progesterone and oral contraceptives.
c. Drugs acting on the uterus.

6. Bioassay

a. Principles and applications of bioassay.
b. Typesof bioassay

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	c. Bioassay of insulin, oxytocin, vasopressin, ACTH, d-tubocurarine, digitalis, histamine and 5-HT
Course Outcomes	1. Students would have understood the mechanism of drug action and its relevance in the treatment of different diseases 2. They would be trained with isolation of different organs/tissues from the laboratory animals by simulated experiments 3. They would have observed the various receptor actions using isolated tissue preparation
Text Books	1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang andDale's Pharmacology,.Churchil LivingstoneElsevier 2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, TataMc Graw-Hill 3. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The PointLippincott Williams &Wilkins 4. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews-Pharmacology 5. K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE BrothersMedical Publishers (P) Ltd, NewDelhi. 6. Kulkarni SK. Handbook of experimental pharmacology.VallabhPrakashan,
Reference Books	1. Goodman and Gilman's, The Pharmacological Basis ofTherapeutics 2. Modern Pharmacology with clinical Applications, by Charles R.Craig&Robert 3. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medicalpublisher 4. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.

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Bachelor of Pharmacy
Semester-V
2023-24

<table>
<tr><td>Course Title</td><td colspan="5">Pharmacognosy and Phytochemistry II– Theory</td></tr>
<tr><td>Course Code</td><td colspan="2">BPH504T</td><td colspan="2">Total theory period 45Hrs</td><td>Total Tutorial Period 15</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td>Total marks in the end semester : 75</td></tr>
<tr><td>3</td><td>1</td><td></td><td>4</td><td>Minimum of class test to be conducted: 02</td></tr>
<tr><td>Prerequisites</td><td colspan="5">The main purpose of subject is to impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify and produce the industrially.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">Up on completion of the course, the student shall be able
To know them oder extraction techniques,characterization and identification of the herbal drugs and phyto constituents
To understand the preparation and development of herbal formulation.
To understand the herbal drug interactions
To carryout isolation and identification of phytoconstituents</td></tr>
<tr><td>Course Contents</td><td colspan="5">UNIT-I 07 Hours
Metabolic pathways in higher plants and their determination
a) Brief study of basic metabolic pathways and formation of different secondary metabolites through these pathways- Shikimic acid pathway, Acetate pathways and Amino acid pathway.
b) Study of utilization of radioactive isotopes in the investigation of Biogenetic studies.
UNIT-II 20 Hours
General introduction, composition, chemistry & chemical classes, biosources, therapeutic uses and commercial applications of following
secondary metabolites::
Alkaloids: Vinca, Rauwolfia, Belladonna, Opium,
Phenyl propanoids and Flavonoids: Lignans, Tea, Ruta</td></tr>
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	Steroids, Cardiac Glycosides & Triterpenoids: Liquorice, Dioscorea, Digitalis **Volatile oils**: Mentha, Clove, Cinnamon, Fennel, Coriander**,** **Tannins:** Catechu, Pterocarpus **Resins:** Benzoin, Guggul, Ginger, Asafoetida, Myrrh, Colophony **Glycosides:** Senna, Aloes, Bitter Almond **Iridoids, Other terpenoids & Naphthaquinones**: Gentian, Artemisia, taxus, carotenoids **UNIT-III** **10 Hours** Isolation, Identification and Analysis of Phytoconstituents a) Terpenoids: Menthol, Citral, Artemisin b) Glycosides: Glycyrhetinic acid & Rutin c) Alkaloids: Atropine, Quinine, Reserpine, Caffeine d) Resins: Podophyllotoxin, Curcumin **UNIT-IV** **10 Hours** Industrial production, estimation and utilization of the following phytoconstituents: Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine **UNIT V** **8 Hours** **Basics of Phytochemistry** Modern methods of extraction, application of latest techniques like Spectroscopy, chromatography and electrophoresis in the isolation, purification and identification of crude drugs.
Course Outcomes	This course is one of the most advanced introductions in Herbal Medicines that is offered. Will learn and get experience about 1. Herbs, and their Science. 2. Classification of Medicinal Plants, Phytochemistry, Carbohydrates, Lipids, 3. How herbs influence our physiology and can be helpful against several disorders.
Text Books	1. A.N. Kalia,Textbook ofIndustrial Pharmacognosy, CBS Publishers, New Delhi,2005. 2. R Endress, Plant cellBiotechnology, Springer-Verlag, Berlin, 1994. 3. Pharmacognosy&Pharmacobiotechnology. JamesBobbers, Marilyn KS, VE Tylor. 4. The formulation and preparation ofcosmetic, fragrancesand flavours.

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	5. Remington's Pharmaceutical sciences. 6. Text Book ofBiotechnologybyVyasand Dixit.Text Book ofBiotechnologybyR.C. Dubey. 7. W.C.Evans, Treaseand Evans Pharmacognosy, 16th edition, W.B. Sounders&Co.,London, 2009. 8. Mohammad Ali. Pharmacognosyand Phytochemistry, CBS Publishers&Distribution, New Delhi.
Reference Books	1. Text book ofPharmacognosybyC.K. Kokate, Purohit, Gokhlae(2007), 37th Edition, NiraliPrakashan, New Delhi. 2. Herbal drugindustrybyR.D. Choudhary(1996), IstEdn, Eastern Publisher, New Delhi. 3. EssentialsofPharmacognosy, Dr.SH.Ansari, IIndedition,Birlapublications, New Delhi, 2007 4. Herbal CosmeticsbyH.Pande, AsiaPacificBusinesspress, Inc, New Delhi.

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Semester-V
2023-24

<table>
<tr><td>Course Title</td><td colspan="6">Pharmaceutical Jurisprudence – Theory</td></tr>
<tr><td>Course Code</td><td colspan="2">BPH505T</td><td colspan="2">Total theory period 45Hrs</td><td colspan="2">Total Tutorial Period 15</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td colspan="2">Total marks in the end semester : 75</td></tr>
<tr><td>3</td><td>1</td><td></td><td>4</td><td colspan="2">Minimum of class test to be conducted: 02</td></tr>
<tr><td>Prerequisites</td><td colspan="6">This course is designed to impart basic knowledge on several important legislations related to the profession of pharmacy in India.</td></tr>
<tr><td>Course Objectives</td><td colspan="6">Upon completion of the course, the student shall be able to understand:
• The Pharmaceutical legislations and their implications in the development and marketing
• Various Indian pharmaceutical acts and Laws
• The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
• The code of ethics during the pharmaceutical practice</td></tr>
<tr><td>Course Contents</td><td colspan="6">UNIT-I 10 Hours

Drugs and Cosmetics Act, 1940 and its rules 1945:
Objectives, Definitions, Legal definitions of schedules to the Act and Rules

Import of drugs – Classes of drugs and cosmetics prohibited from import, Import under license or permit. Offences and penalties.

Manufacture of drugs – Prohibition of manufacture and sale of certain drugs,</td></tr>
</table>

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Conditions for grant of license and conditions of license for manufacture of drugs, Manufacture of drugs for test, examination and analysis, manufacture of new drug, loan license and repacking license

UNIT-II **10 Hours**

Drugs and Cosmetics Act, 1940 and its rules 1945.
Detailed study of Schedule G, H, M, N, P,T,U, V, X, Y, Part XII B, Sch F & DMR (OA)
Sale of Drugs – Wholesale, Retail sale and Restricted license. Offences and penalties
Labeling & Packing of drugs- General labeling requirements and specimen labels for drugs and cosmetics, List of permitted colors. Offences and penalties.

Administration of the Act and Rules – Drugs Technical Advisory Board, Central drugs
Laboratory, Drugs Consultative Committee, Government drug analysts, Licensing authorities, controlling authorities, Drugs Inspectors

UNIT-III **10 Hours**

- **Pharmacy Act** –1948: Objectives, Definitions, Pharmacy Council of India; its constitution and functions, Education Regulations, State and Joint state pharmacy councils; constitution and functions, Registration of Pharmacists, Offences and Penalties
- **Medicinal and Toilet Preparation Act –1955**: Objectives, Definitions, Licensing, Manufacture In bond and Outside bond, Export of alcoholic preparations, Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations. Offences and Penalties.
- **Narcotic Drugs and Psychotropic substances Act-1985 and Rules**: Objectives Definitions, Authorities and Officers, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse, Prohibition, Control and Regulation, opium poppy cultivation and production of poppy straw, manufacture, sale and export of opium, Offences and Penalties

UNIT-IV **08 Hours**

Study of Salient Features of Drugs and Magic Remedies Act and its rules:
Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties

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	Prevention of Cruelty to animals Act-1960: Objectives, Definitions, Institutional Animal Ethics Committee, CPCSEA guidelines for Breeding and Stocking of Animals, Performance of Experiments, Transfer and acquisition of animals for experiment, Records, Power to suspend or revoke registration, Offences and Penalties **National Pharmaceutical Pricing Authority**: Drugs Price Control Order (DPCO)-2013. Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations, Retail price and ceiling price of scheduled formulations, National List of Essential Medicines (NLEM) **UNIT-V** **07 Hours** • **Pharmaceutical Legislations** – A brief review, Introduction, Study of drugs enquiry committee, Health survey and development committee, Hathi committee and Mudaliar committee. • Code of Pharmaceutical ethics Definition, Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath • Medical Termination of Pregnancy Act • Right to Information Act • Introduction to Intellectual Property Rights (IPR) • **Medical Termination of pregnancy act** • **Right to information Act** • **Introduction to Intellectual Property Rights (IPR)**
Course Outcomes	Upon Completion of the subject student learnt: 1. About Professional ethics 2. They understood the various concepts of the Pharmaceutical Legislation in India. 3. They understood the various parameters in the Drug and Cosmetic Act and rules.
Text Books	1. Forensic Pharmacy by B. Suresh 2. Text book of ForensicPharmacybyB.M. Mithal 3. Hand book ofdruglaw-byM.L. Mehra 4. A text book of ForensicPharmacybyN.K. Jain

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Reference Books	1. Drugs andCosmeticsAct/Rules byGovt. ofIndia publications. 2. Medicinal and Toilet preparations act 1955 byGovt. ofIndia publications. 3. Narcoticdrugs andpsychotropicsubstancesactbyGovt. ofIndia publications 4. Drugs andMagic Remedies act byGovt. ofIndia publication 5. BareActs of thesaid laws publishedbyGovernment.Referencebooks (Theory)

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<table>
<tr><td>Course Title</td><td colspan="5">INDUSTRIAL PHARMACY (Practical)</td></tr>
<tr><td>Course Code</td><td colspan="2">BPH502T</td><td colspan="3">Total Practical period : 04Hrs/ week</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td>Total marks in the end semester : 35</td></tr>
<tr><td></td><td></td><td>4</td><td>2</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">The student to under standard preciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">• Know various considerations in development of pharmaceutical dosage forms
• Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality</td></tr>
<tr><td>Course Contents</td><td colspan="5">1. Preformulation studies on paracetamol/asparin/or any other drug
2. Preparation and evaluation of Paracetamol tablets
3. Preparation and evaluation of Aspirin tablets
4. Coating of tablets- film coating of tables/granules
5. Preparation and evaluation of Tetracycline capsules
6. Preparation of Calcium Gluconate injection
7. Preparation of Ascorbic Acid injection
8. Quality control test of (as per IP) marketed tablets and capsules
9. Preparation of Eye drops/ and Eye ointments
10. Preparation of Creams (cold / vanishing cream)
11. Evaluation of Glass containers (as per IP)</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">1. Developing a preparation of the drug which is both stable and acceptable to the patient.
2. Formulated drugs are stored in a suitable container closure system for extended periods of time.
3. Also they know the stability study and its standard evaluation procedure for better storage conditions</td></tr>
<tr><td>Text Books</td><td colspan="5">1. Pharmaceutical dosageforms-Tablets, volume1-3 byH.A.Liberman,LeonLachman &J.B.Schwartz
2. Pharmaceutical dosageform - Parenteral medication vol- 1&2 by Liberman &Lachman
3. Pharmaceutical dosageform dispersesystem VOL-1 by Liberman&Lachman
4. Modern Pharmaceutics byGilbert S.Banker & C.T. Rhodes, 3rd Edition
5. Remington: The Science andPracticeofPharmacy,20thedition Pharmaceutical Science(RPS)</td></tr>
</table>

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Reference Books	1. Theoryand Practice ofIndustrial Pharmacyby Liberman&Lachman 2. Pharmaceutics- The science of dosage form designbyM.E.Aulton, Churchill livingstone,Latest edition 3. Introduction to Pharmaceutical Dosage Forms by H. C.Ansel, Lea &Febiger, Philadelphia, 5th edition,2005 4. Drugstability-PrinciplesandpracticebyCartensen&C.J.Rhodes,3rdEdition, Marcel Dekker Series, Vol 107.

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Bachelor of Pharmacy
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<table>
<tr><td>Course Title</td><td colspan="5">PHARMACOLOGY-II (Practical)</td></tr>
<tr><td>Course Code</td><td colspan="5">BPH507P Total Practical periods : 04Hrs / week</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td>Total marks in the end semester : 35</td></tr>
<tr><td></td><td></td><td>4</td><td>2</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">The fundamental knowledge on various aspects (classification ,mechanism of action, the therapeutic effects, clinical uses, side effects and contraindications) ofdrugsacting on different systems of body.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">To understand the bioassay, effect of various types of drugs with the help of different animals.</td></tr>
<tr><td>Course Contents</td><td colspan="5">1. Introduction to in-vitro pharmacology and physiological salt solutions.
2. Effect of drugs on isolated frog heart.
3. Effect of drugs on blood pressure and heart rate of dog.
4. Study of diuretic activity of drugs using rats/mice.
5. DRC of acetylcholine using frog rectus abdominis muscle.
6. Effect of physostigmine and atropine on DRC of acetylcholine using frog rectus
7. abdominis muscle and rat ileum respectively.
8. Bioassay of histamine using guinea pig ileum by matching method.
9. Bioassay of oxytocin using rat uterine horn by interpolation method.
10. Bioassay of serotonin using rat fundus strip by three point bioassay.
11. Bioassay of acetylcholine using rat ileum/colon by four point bioassay.
12. Determination of PA2 value of prazosin using rat anococcygeus muscle (by Schilds plot method).
13. Determination of PD2 value using guinea pig ileum.
14. Effect of spasmogens and spasmolytics using rabbit jejunum.
15. Anti-inflammatory activity of drugs using carrageenan induced paw-edema model.
16. Analgesic activity of drug using central and peripheral methods

Note: All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">1. Students would appreciate the correlation of pharmacology with related medical sciences
2. They would have understood the cell communication mechanism
3. They would appreciate the newer targets of several disease conditions for</td></tr>
</table>

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	treatment.
Text Books	1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang andDale's Pharmacology,.Churchil LivingstoneElsevier 2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, TataMc Graw-Hill 3. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The PointLippincott Williams &Wilkins 4. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews-Pharmacology 5. K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE BrothersMedical Publishers (P) Ltd, NewDelhi. 6. Kulkarni SK. Handbook of experimental pharmacology.VallabhPrakashan,
Reference Books	1. Goodman and Gilman's, The Pharmacological Basis ofTherapeutics 2. Modern Pharmacology with clinical Applications, by Charles R.Craig&Robert, 3. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medicalpublisher 4. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.

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Bachelor of Pharmacy
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2023-24

<table>
<tr><td>Course Title</td><td colspan="5">PHARMACOGNOSY AND PHYTOCHEMISTRY II – PRACTICAL</td></tr>
<tr><td>Course Code</td><td colspan="5">BPH502P Total Practical periods : 04Hrs / week</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td>Total marks in the end semester : 35</td></tr>
<tr><td></td><td></td><td>4</td><td>2</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">The main purpose of practical is to impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify and produce them industrially.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">Upon completion of the course, the student shall be able
To know the mdern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents
to understand the preparation and development of herbal formulation.
to understand the herbal drug interactions
to carryout isolation and identification of phytoconstituents</td></tr>
<tr><td>Course Contents</td><td colspan="5">1. Morphology, histology and powder characteristics & extraction & detection of:
Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander
2. Exercise involving isolation & detection of active principles
a. Caffeine - from tea dust.
b. Diosgenin from Dioscorea
c. Atropine from Belladonna
d. Sennosides from Senna
Separation of sugars by Paper chromatography
3. TLC of herbal extract
4. Distillation of volatile oils and detection of phytoconstitutents by TLC
5. Analysis of crude drugs by chemical tests:
(i) Asafoetida (ii) Benzoin (iii) Colophony (iv) Aloes (v) Myrrh</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">This course is one of the most advanced introductions in Herbal Medicines that is offered. Will learn and get experience about
1. Terpenes, Polyphenols, Alkaloids, Pharmacology, Toxicity, Formulations and</td></tr>
</table>

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	Preparations of Herbal Medicines. 2. The recognition of medicinal plants, identification of adulteration and Contamination.
Text Books	1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co., London,2009. 2. Tyler, V.E., Brady, L.R. and Robbers, J.E., Pharmacognosy, 9th Edn., Lea and Febiger, Philadelphia,1988. 3. Text Book of Pharmacognosy by T.E.Wallis 4. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers& Distribution, NewDelhi. 5. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, NiraliPrakashan, NewDelhi. 6. Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications,New Delhi, 2007
Reference Books	1. Practical Pharmacognosy: C.K. Kokate, Purohit, Gokhlae 2. Anatomy of Crude Drugs by M.A.Iyengar 3. Herbal drug industry by R.D. Choudhary (1996), IstEdn, Eastern Publisher, New Delhi.

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