

[School of Pharmacy  
Syllabus]

**Bachelor of Pharmacy 2<sup>nd</sup> year (4<sup>th</sup> Semester)  
(Theory and Practical)**

S No.	Course	Subject name	Credits		Sessional			Exam	Total
			T	P	TA	MSE	Total	ESE	
1	GSP-401	Pharmaceutical Analysis-II	3	0	30	20	50	50	100
2	GSP-402	Human Anatomy Physiology and Pathophysiology-IV	4	0	30	20	50	50	100
3	GSP-403	Pharmaceutical Microbiology	3	0	30	20	50	50	100
4	GSP-404	Pharmacognosy- II	3	0	30	20	50	50	100
5	GSP-405	Pharmaceutical Jurisprudence & Ethics	4	0	30	20	50	50	100
<b>PRACTICAL</b>									
1	GSP-401P	Pharmaceutical Analysis-II	0	2	30	20	50	50	100
2	GSP-403P	Microbiology	0	2	30	20	50	50	100
3	GSP-404P	Pharmacognosy- II	0	2	30	20	50	50	100
<b>Total</b>									<b>800</b>

T- Theory, P- Practical, TA- Teacher Assessment, MSE- Mid Semester Examination, ESE- End semester examination.

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**GSP-401**

**PHARMACEUTICAL ANALYSIS-II**

Theoretical considerations and application in drug analysis and quality control by the following analytical techniques (assays included in the latest edition of Indian Pharmacopoeia).

**UNIT-1.**

- a. Non-aqueous titration
- b. Diazotisation titrations

**UNIT-2.**

Miscellaneous methods of analysis:, Karl-Fischer titration, Oxygen flask combustion, Kjeldahl method of nitrogen estimation.

**UNIT-3.**

Principle, Instrumentation and Applications of: Potentiometry, Conductometry, Polarography, Amperometry, Electrophoresis.

**UNIT-4.**

Theory, Instrumentation and Applications of: Atomic absorption spectroscopy, Flame Photometry.

**UNIT-5.**

Principle, instrumentation and pharmaceutical applications of chromatography such as Paper Chromatography, Column Chromatography and TLC.

**GSP-401P**

**PHARMACEUTICAL ANALYSIS-II (PRACTICAL)**

1. Exercises based on paper, column and thin- layer chromatography.
2. Exercises involving diazotization, Karl-Fischer methods.
3. Determination of Sodium, Potassium and Calcium ion by Flame Photometry.

**BOOKS RECOMMENDED:**

1. Connors KA, A text book of Pharmaceutical Analysis, Wiley
2. Vidya Sagar, Basics of Drug Analysis, PharmaMed Press
3. Beckett, A H and Stenlake, J.B, Practical Pharmaceutical Chemistry, Vol I and II, The Athlone Press of the University of London.
4. Y Anjaneyulu, A Textbook of Analytical Chemistry, PharmaMed Press
5. Pharmacopoeia of India, published by The Controller of Publications, Delhi.
6. British Pharmacopoeia, Her Majesty's Stationary Office, University Press, Cambridge.
7. Mendham J. Denny RC Barnes, J.D. Thomas M.J.K. "Vogel's Text Book of Quantitative Chemical.

**HUMAN ANATOMY PHYSIOLOGY AND PATHOPHYSIOLOGY-IV**

**UNIT-1.**

Respiratory System– Anatomy & function of respiratory structures, Mechanism of respiration, regulation of respiration, pathophysiology of Asthma, Pneumonia, Bronchitis, Emphysema, Tuberculosis.

**UNIT-2.**

Cardiovascular System– Functional Anatomy of heart, conducting system of heart, cardiac cycle, ECG (Electro cardiogram). Pathophysiology of hypertension, Angina, CHF, myocardial infarction, cardiac arrhythmias, Ischaemic heart disease, Arteriosclerosis.

**UNIT-3.**

Cell injury & Adaptation– Courses of cell injury, pathogenesis & morphology of cell injury. Cellular Adaptation– Atrophy, hypertrophy, aplasia, metaplasia, & dysplasia, intracellular accumulation & pathophysiology of Neoplasm.

**UNIT-4.**

Basic mechanisms involved in the process of inflammation and repair Alterations in vascular permeability and blood flow, migration of WBC's, mediators of inflammation, repair mechanism.

**UNIT-5.**

Pathophysiology of Joints disorder– Arthritis, gout, myasthenia gravis, spasticity, tetany, fatigue. Pathophysiology of anaemia, AIDS, hypersensitivity, allergic conditions, cataract, glaucoma etc.

**BOOKS RECOMMENDED**

1. Tortora GJ, & Anagnostokos NP, Principles of Anatomy & Physiology, Wiley
2. Mc Corry, Essentials of Human Physiology for Pharmacy, 2nd Ed, CRC
3. Chaurasia B.D, Human Anatomy, Regional & Applied Part I, II & III, CBS Publishers & Distributors, New Delhi.
4. Guyton AC, Hall JE., Text book of Medical Physiology, WB Saunders Company.
5. Chatterjee C.C. Human Physiology, Medical Allied Agency, Calcutta.
6. Ross & Wilson, Anatomy & Physiology in Health & Illness, Churchill Livingstone.
7. Keele, C.A., Niel, E and Joels N, Samson Wright's Applied Physiology, Oxford University Press.
8. Dipiro JL, Pharmacotherapy – A Pathophysiological Approach, Elsevier.

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**GSP-403**

**PHARMACEUTICAL MICROBIOLOGY**

**Unit-1.**

Introduction to the scope of microbiology, Microscopy Structure of bacterial cell. Classification of microbes and their taxonomy: Bacteria, fungi and viruses.

**Unit-2.**

Identification of Microbes: Stains and types of staining techniques. Nutrition, cultivation, isolation and purification of bacteria, fungi & viruses. Different culture media and their classification-Microbial growth and their curve, measurement of microbial growth, factor influencing Microbial growth.

**Unit-3.**

Control of microbes by physical and chemical methods. Disinfection, factors influencing disinfectants, dynamics of disinfection, Disinfectants and antiseptics and their evaluation. Preservative efficacy.

**Unit-4.**

Sterilization, different methods. Sterility testing as per I.P. Isolation and identification of contaminants in sterile and non-sterile Products, Microbiological standards of non-sterile products, Equilibrium related to humidity (ERH) in microbiological testing.

**Unit-5.**

Microbial assays as per I.P. of antibiotics and vitamins.

**GSP-403P**

**PHARMACEUTICAL MICROBIOLOGY (PRACTICAL)**

1. Various staining methods,
2. Experiments designed to prepare various types of culture media sub-culturing of common aerobic and anaerobic bacteria, fungus and yeast,
3. Various methods of isolation and identification of microbes
4. Sterilization techniques and their validation, validation of sterilization techniques
5. Evaluation of antiseptics and disinfectants
6. Testing the sterility of pharmaceutical products as per I.P. requirements,
7. Microbial assay of antibiotics and vitamins, preservative efficacy,
8. Microbiological testing of non-sterile products.

**BOOKS RECOMMENDED:**

1. Stanier R.Y., Ingraham, J.L., Wheelis M.L. & Painter P.R. General Microbiology, Macmillan Press Limited.
2. Malathi, Manual of Practical Microbiology, Pharma Med Press, Hyderabad
3. Tortora, Microbiology An Introduction, 9TH. Ed, Pearson education
4. Glazer, "Microbial Biotechnology" Cambridge Univ. Press
5. Pelczar & Reid, Microbiology, Tata Mc Graw Hill, Delhi.
6. Ananthanarayan R & Paniker CKJ, Textbook of Microbiology, Orient Longman.
7. Gunasekaran P, Lab Mannual of Microbiology, New Age Publishers.

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**GSP-404**

**PHARMACOGNOSY-II**

**UNIT-1.**

**Glycosides:** Nature and classification. Biological sources, chemical constituents, adulterants and uses of Digitalis, strophanthus, squill, thevetia, oleander, cascara, aloe, rhubarb, senna, quassia, dioscorea, quillaia, glycyrrhiza, ginseng, gentian, senega, ruta, wild cherry, Withania, Bitter almond.

**UNIT-2.**

**Alkaloids:** Biological sources, chemical constituents, adulterants and uses of Cinchona, Opium, Ipecac, Nux vomica, Areca nut, Belladonna, Hyoscymus, Stramonium, Duboisia, Lobelia, Coca, Coffee, Tea, Ergot, Rauwolfia, Physostigma, Vinca, Kurchi, Veratrum, Ephedra, Colchicum, Vasaca, Pilocarpus, Aconite, Solanum xanthocarpum. Biosynthesis of tropane, cinchona and opium alkaloids.

**Unit-3.**

**Volatile oils:** Biological sources, chemical constituents, adulterants and uses of Mentha, Coriander, Cinnamon, Cassia, Lemon peel, Orange peel, Lemon grass, Citronella, Caraway, Dill, Spearmint, Clove, Fennel, Nutmeg, Eucalyptus, Chenopodium, Cardamam, Valerian, Musk, Palamarosa, Gaultheria, Sandalwood, cumin, jatamansi.

**UNIT-4.**

**Resins:** Systematic Pharmacognostic Study of Colophony, Podophyllum, Jalap, Canabis, Capsicum, Myrrh, Asafoetida, Balsam of tolu, Balsam of peru, Benzoin, Turmeric, Ginger, Guggule, Myrrh, storax.

**UNIT-5.**

**Tannins:** Biological sources, chemical constituents, chemical test and uses of Gambir, Black & Pale catechu, Gall, Myrobalam, Bahera, Arjuna, Tannic Acid, Amla, Ashoka Bark and Terocarpus.

**GSP-404P**

**PHARMACOGNOSY-II (PRACTICAL)**

1. Identification of organized drugs studied in theory on the basis of morphological and sensory characters.
2. Microscopic evaluation of some medicinal crude drugs and their powders mentioned in theory with their chemical test.
3. General chemical test for alkaloids, glycosides, steroids, flavonoids and tannins.
4. To prepare a report on an allotted topic.
5. Study and chemical test of pharmaceutical aids.

**BOOKS RECOMMENDED:**

1. Trease. GE & Evans WC, Pharmacognosy, Bailliere tindall East bourne. UK
2. Fischer, Modern Phytochemical Methods, Springer
3. Wallis. TE, Text book of Pharmacognosy,JA Churchill Ltd.
4. Kokate. CK, Practical Pharmacognosy, Vallabh Prakashan, Delhi.

**PHARMACEUTICAL JURISPRUDENCE & ETHICS**

**UNIT-1.**

Introduction:

1. Pharmaceutical Legislations – A brief review.
2. Drugs and Pharmaceutical Industry – A brief review.
3. Pharmaceutical Education – A brief review.
4. Pharmaceutical Ethics – A brief review.
5. Pharmacy Act 1948.

**UNIT-2.**

An Elaborate Study Of The Following:

1. Drugs and Cosmetics Act 1940 and rules 1945- Manufacturing , distribution and marketing , approval of manufacturing and quality control chemist, schedules .
2. Drugs Price Control Order 1995.

**UNIT-3.**

AN ELABORATE STUDY OF THE FOLLOWING:

1. Narcotic Drugs & Psychotropic Substances Act 1985 & Rules.
2. Drugs and Magic remedies (Objectionable Advertisements) Act 1954.

**UNIT-4.**

A Brief Study Of The Following With Special Reference To The Main Provisions.

1. Medicinal & Toilet preparations (Excise duties Act 1955)- relevant to drug and pharmaceuticals
2. Poisons Act 1919.
3. Medical termination of Pregnancy Act 1970 & Rules 1975.
4. Prevention of Cruelty to Animals Act 1961.
  - a. A.I.C.T.E. Act 1987.

**UNIT-5.**

1. Patents Act 1970, Trade mark and copyrights acts.- main provisions.
2. U.S Food and Federal D&C Act – CFR -21, CGMP; Eu GMP, WHO, Orange book.

**Note.** The teaching of all the above Acts should cover the latest amendments.

**BOOKS RECOMMENDED:**

1. CK Kokate, Text Book of Forensic pharmacy, Pharma Med Press.
2. Mittal B.M, Textbook of Forensic Pharmacy, National Book Centre,
3. Relevant Acts & Rules Published by the Govt. of India.
4. Jain N.K, A Textbook of Forensic Pharmacy, Vallabh Prakashan, New Delhi.
5. Singh, Harkishan “History of Pharmacy in India – Vol. I, II & III” Vallabh Prakashan.

