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B. Pharm Semester-III Program

Structure for B. Pharm Semester-III Program

Sr. No.	Course Code	Course Title	Teaching Scheme Hrs/Week						Type of Course
			Theory	Credit	Weighted Credit Point	Practical	Credit	Weighted Credit Point	
01	3A01PHP	Physical Pharmacy-II	3	3	10 X 3 = 30	3	1.5	10 X 1.5 = 15	Core
02	3A02PEN	Pharmaceutical Engineering-II	3	3	10 X 3 = 30	2	1	10 X 1 = 10	Core
03	3A03PCO	Pharmaceutical Chemistry-III (Organic Chemistry)	3	3	10 X 3 = 30	3	1.5	10 X 1.5 = 15	Core
04	3A04PAN	Pharmaceutical Analysis-I	3	3	10 X 3 = 30	3	1.5	10 X 1.5 = 15	Core
05	3A05PPH	Pathophysiology	2	2	10 X 2 = 20	-	-	-	Core
06	3A06PCG	Pharmacognosy-II	2	2	10X 2 = 20	3	1.5	10 X 1.5 = 15	Core
07	3B07DMG	Disaster Management	3	3	10 X 3 = 30	-	-	-	Common
		Total	19	19	190	14	7	70	
Total Credit 19+07 = 26 and Weighted Credit Point 190 + 70 = 260									

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Teaching and Examination scheme for B. Pharm Semester-III Program

Sr. No	Course Code	Course Title	Teaching Scheme Hrs/Week		Total Hours		Examination				
			Theory	Practical	Theory	Practical	Theory		Practical		Total
							Int	Ext	Int	Ext	
1	3A01PHP	Physical Pharmacy-II	3	3	45	45	30	70	30	70	200
2	3A02PEN	Pharmaceutical Engineering-II	3	2	45	30	30	70	30	70	200
3	3A03PCO	Pharmaceutical Chemistry-III (Organic Chemistry)	3	3	45	45	30	70	30	70	200
4	3A04PAN	Pharmaceutical Analysis-I	3	3	45	45	30	70	30	70	200
5	3A05PPH	Pathophysiology	2	-	30	-	30	70	-	-	100
6	3A06PCG	Pharmacognosy-II	2	3	30	45	30	70	30	70	200
7	3B07DMG	Disaster Management	3	-	45	-	30	70	-	-	100
		Total	19	14	285	210	210	490	150	350	1200

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3A01PHP Physical Pharmacy-II

Theory (3 Hours / Week; 45 Hrs)

1.	**Solutions of nonelectrolytes** Concentration expressions, equivalent weights, ideal and real solutions, colligative properties, molecular weight determination	**05**
2.	**Solutions of electrolytes** Properties of solutions of electrolytes, Arrhenius theory of electrolytic dissociation, theory of strong electrolytes, coefficients for expressing colligative properties	**05**
3.	**Kinetics** Rates and orders of reactions, influence of temperature and other factors on reaction rates, decompositions and stabilization of medicinal agents, accelerated stability analysis, ICH guidelines for stability study	**10**
4.	**Complexation and protein binding** Metal complexes, organic molecular complexes, Types of complexes – Inclusion complexes, Techniques for characterization of complexes & their application protein binding	**07**
5.	**Polymer science** Clarification & fabrication technology, Pharmaceutical applications of polymers, Characterization of polymers, polymers in drug delivery systems, general properties of polymer solutions, introduction to synthetic polymers used in pharmacy	**08**
6.	**Diffusion and dissolution** Theory of diffusions & dissolution procedure, Steady state diffusion, dissolution, drug release	**10**

Practical (3 Hours/Week; 45 Hours)

Practicals demonstrating any theoretical aspects of above topics may be carried out.

Reference Books:

1. Martin's Physical Pharmacy and Pharmaceutical Sciences by Patrick J. Sinko, 6th ed., Lippincott Williams & Wilkins, New York, 2010.
2. Aulton's Pharmaceutics: The Design and Manufacture of Medicines, by Aulton, Michael E., 3rd ed., Chrchill Livingstone, London, 2007
3. Remington: The Science and Practice of Pharmacy Remington by Remington, 21th ed., Lippincott W.W.,Philadelphia, 2009.
4. Physicochemical Principles of Pharmacy, 3rd ed., Florence, A. T. Atwood, D. Macmillan Press Ltd., London, 1998.
5. Ansel's Pharmaceutical Dosage forms and Drug delivery systems by Allen, Loyd V., 9th ed., Walter Kluwer (India) Pvt. Ltd., New Delhi., 2009.
6. Cooper and Gunn's Tutorial Pharmacy, edited by Carter, S. J., 6th ed., CBS Publishers &Distributors, New Delhi, 2000.
7. Bentley's textbook of Pharmaceutics by Rawlins, E.A., 8th ed., Elsevier I Pvt. Ltd., 2010.

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B. Pharm. Semester- III

3A02PEN Pharmaceutical Engineering-II

Theory (3 Hours / Week; 45 Hrs)

1	**Content uniformity** Importance of content uniformity, means of achieving content uniformity, Sampling techniques, statistical treatment, requirements of regulatory agencies, (FDA, USP and European Pharmacopoeia)	**08**
2	**Powder flow** Importance of flow in pharmacy, Factors influencing powder/granules flow (moisture, particle size, etc.), Determination of angle of repose (AR),Hausner ratio (HR), Carr's compressibility index (CI) , Sample calculations (examples), pharmacopoeial specifications for AR, HR and CI	**09**
3	**Control charts and its applications in pharmacy** Elements of control charts and types of control charts, etc.	**06**
4	**Extrusion and Pelletization** Factgors affecting pellet properties, Cold extrusion, Melt extrusion,Applications of extrusion in pharmacy (including preparation of solid solution), selective quipments used for extrusion and pelletization, Use of polyethylene oxide and Eudragit in melt extrusion, Use of MCC in pelletization	**10**
5	**Supercritical fluids** Introduction to supercritical fluids, Pharmaceutical applications of supercritical fluids in extraction, size reduction, preparation of inclusion complexes, preparation of solid dispersions, equipments etc.,	**10**

Practical (3Hours/Week; 45 Hours)

Practicals related to topics in pharmaceutical engineering theory should be carried out.

Note: 1. Calculations shall be performed in EXCEL
2. Graphs shall be drawn using EXCEL

Reference Books:

1 Perry's Chemical Engineer's Handbook by Robert H Perry, Green D.W., Maloney J. O. 8th ed., McGraw – Hill Inc., New Delhi, 2007.

2 Cooper and Gunn's Tutorial Pharmacy, edited by Carter, S. J., 6th ed., CBS Publishers & Distributors, New Delhi, 2000.

3 Aulton's Pharmaceutics: The Design and Manufacture of Medicines, by Aulton, Michael E., 3rd ed., Chrchill Livingstone, London, 2007.

4 The Theory & Practice of Industrial Pharmacy by Lachman Leon, 3rd ed., CBS Publishers & Distributors, New Delhi, 2009

5 Remington: The science and practice of pharmacy Remington by Reminston, 21th ed., Lippincott W.W.,Philadelphia, 2009.

6 Pharmacopoeia : I.P., U. S. P., E.P

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B. Pharm. Semester- III

3A03PCO Pharmaceutical Chemistry-III (Organic Chemistry)

Theory (3 Hours / Week; 45 Hrs)

1.	**Structure and Properties** Introduction to organic chemistry, quantitative analysis of elements, determination of molecular weight and molecular formula, Atomic structure, atomic orbitals, wave equation, molecular orbital theory, molecular orbitals, bonding and antibonding orbitals.	**12**
2.	**Chemical bonding and Properties** Introduction, covalent bond, hybridization and hybrid orbitals, intermolecular and intramolecular forces, bond dissociation energy, electronegativity, polarity of bonds, polarity of molecules, resonance, hyperconjugation, acids and bases	**12**
3.	**Reactive intermediates of carbon** Carbocation, carbanion, free radical, carbenes, nitrenes and nitrinium ions, reaction involving these intermediates.	**04**
4.	Structure, properties, nomenclature, preparation and reactions of the following class of functional groups Alkanes, alkenes, alkynes, dienes, cycloalkanes, alkyl halides, alcohols, ethers, epoxides.	**11**
5.	Electrocyclic cycloaddition and sigmatropic reactions, neighboring group effects, catalysis by transition.	**06**

Practicals (3 Hours/Week; 45 Hours)

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

Reference Books:

1. Organic Chemistry, Robert T. Morrison and Robert N. Boyd, 6th ed., PH I Learning Pvt. Ltd., New Delhi, 2008
2. Organic Chemistry by G. Marc Loudon, 4th ed., Oxford University Press, 2004.
3. Organic Chemistry, Vol I and II by I. L. Finar, 6th ed., Pearson Education, New Delhi 2000.
4. Advanced Organic Chemistry, by Jerry March, 4th ed., Wiley India, 2007.
5. Vogel's textbook of practical organic chemistry, by Furniss, Brain S., 5th ed., Pearson Education, Delhi, 2005.
6. Experimental Organic Chemistry by L. M. Harwood, L. J. Moody, J. M. Percy, 2nd Edition, Blackwell Science, 2005.
7. Techniques and Experiment of Organic Chemistry, Addison Ault, 6th Edition, University Science Books, 1998.
8. Introduction to Organic Laboratory Techniques, A Microscale Approach, Donald L. Pavia, Gary M. Lampman, 4th ed., Harcourt College Pub., 2007.

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B. Pharm. Semester- III

3A04PAN Pharmaceutical Analysis-I

Theory (3 Hours / Week; 45 Hrs)

1	**Basics of drugs and formulation analysis** weights, balances, importance of analysis, accuracy and precision, analytical methods (classification), chemicals (types, purification, checking purity), glasswares (types, calibration, cleaning), sampling techniques, sampling error minimization. Units of concentrations. Errors science, errors minimization.	**06**
2	**Volumetric analysis: Titrimetric analysis**	
	Acid-base titrations: Relative strength and its effect on titration, common ion effect, pH, Henderson-Hesselbach equation, buffers, neutralization curve, acid base indicators, theory of indicators, back titrations, biphasic titrations,pharmacopoeial applications, hydrolysis of salts, ionic products of water and law of mass action.	**08**
	Redox titrations: Theory of redox titrations, redox indicators, types of redox titrations, iodometry, cerrimetry, mercury metry, diazotization nitrite titrations, 2,6-dichlorophenol indophenol titrations, titration curve and calculations of potentials during course of titrations.	**07**
	Precipitation titrations : Precipitation reactions, Solubility Products, Effect of acid, temperature and solvents upon solubility of precipitates	**04**
	Nonaqueous titrations : Nonaqueous solvents, titrants and indicators. Differentiating and leveling solvents.	**02**
	Complexometric titrations : Theory of the titrations, titrant, indicators and pharmacopoeial applications.	**04**
	Karl-Fischer titrations:	**03**
3	**Gravimetric analysis** Stability, solubility products, types of precipitations, precipitation techniques, pharmacopoeial applications.	**03**
4	**Extraction techniques** Simple extraction, multiple extractions, separation of drugs in multicomponent system. Effect of pH on extractability of drugs, continuous extractions.	**5**
5	**Miscellaneous methods** Oxygen combustion flask method, Kjeldahl method and gasometric method, etc.	**2** **3**

Practicals (3 Hours/Week; 45 Hours)

1. Acid-base titrations: Simple, back titrations, titrations of mixtures like NaOH + Na_2CO_3, borax + boric acid.
2. Redox titrations: Simple, iodometry, cerrimetry, 2,6-dichlorophenol-indophenol titrations, mixtures like Fe^{+2} + Fe^{+3}, oxalic acid + sodium oxalate
3. Complexometric titrations: Replacement, back titrations
4. Nonaqueous titrations
5. Argentometric titrations
6. Gravimetric assay of one pharmacopoeial drug
7. Calibrations/cleaning of glasswares and checking precision and lower limit of quantitaiton of titrimetric method

Reference Books:

1. Pharmacopoeia: USP, B.P., I.P.
2. Practical Pharmaceutical Chemistry, Vol. I & II by Backett, A. H.,1st ed., CBS Publishers & Distrubuters, New Delhi, 1997.
3. Fundamentals of Analytical Chemistry by Skoog, Douglas A., 8th ed., Harcourt College Publishers, 2004
4. Quantitative chemical analysis by Vogel A. I., 6th ed., Pearson Education, 2000
5. Text Book of Pharmaceutical Analysis by K. A. Connor, 3rd ed., John Willey & Sons,Delhi, 2009.
6. Quantitative Chemical Analysis by Gilbert H. Ayres, 2nd Ed. Harper & Row, Ltd, New York, 1968

GANPAT UNIVERSITY
B. Pharm. Semester- III

3A05PPH Pathophysiology

Theory (2 Hours / Week; 30 Hrs)

1	**Basic principles of cell injury, cell death and adaptation** Causes, pathogenesis and morphology of cell injury, Apoptosis-causes and mechanism, intracellular alteration in lipids, proteins and carbohydrates, (abnormalities of lipoproteinemia, glycogen infiltration, and glycogen storage diseases) calcification, cellular adaptations-Atrophy, hypertrophy, metaplasia and hyperplasia	**08**
2	**Inflammation** Basic mechanism involved in the process of inflammation**,** pathogenesis of acute and chronic inflammation, chemical mediators of inflammation.	**03**
3	**Tissue repair processes** Control of cell proliferation, Growth factors and extra cellular matrix**,** Cell and tissue regeneration, repairs of wound in skin, pathological aspects of repair	**03**
4	**Diseases of the immune system** Introduction, Hypersensitivity(type I,II,III,IV with examples of diseases), allergy due to food, chemicals, drugs; Autoimmunity (Immunological tolerance, mechanism of autoimmunity); transplantation and mechanism of allograft rejection; Autoimmune diseases (Systemic Lupus erythematosus, Rheumatoid arthritis, Systemic sclerosis, Inflammatory myopathies, Mixed connective tissue disease, polyarteritis nodosa and other vasculitides), AIDS, Amylodosis.	**09**
5	. **Environmental and nutritional diseases** Air pollution and smoking, SO2, NO, NO2 and CO; protein calorie malnutrition, pathogenesis of starvation, vitamins, obesity.	**05**
6	**Biological effects of radiation**	**02**

Reference Books:

1. Robbin's Pathologic basis of disease by- Cotran, Kumar, Robbins, 7th ed., W.B.Saunders, 2004

2. Text book of Pathologyby Harsh Mohan, 4th ed., Jaypee Brothers, New Delhi, 2002

3. Text book of Pathology- Y. M. Bhinde

GANPAT UNIVERSITY
B. Pharm. Semester- III
3A06PCG Pharmacognosy-II

Theory (2 Hours / Week; 30 Hrs)

1	**Resins :** Introduction, Study of drugs containing resins and resins combination like Podophyllum, Jalap, Capsicum, Myrrh, Asafetida, Benzoin, Turmeric, Ginger.	**7**
2	**Tannins :** Introduction, Study of tannins containing drugs like Gambir, Black catechu, Myrobalan, Gall	**5**
3	**Volatile Oils** : Introduction including General methods of obtaining volatile oils from plants, Study of crude drugs and volatile oils of Fennel, Cumin, Caraway, Dill, Coriander, Cinnamon, Cassia, Cardamom, Clove, Mentha, Eucalyptus, Lemon peel, Lemon grass, Nutmeg, Chenopodium, Valerian, Sandal wood.	**10**
4	**Phytochemical Screening :** 4.1 Preparation of extracts 4.2 Screening of alkaloids, saponins, cardenolides and bufadienolides, flavonoids and leucoanthocyanidins, tannins and polyphenols, anthraquinones, cynogenetic glycosides, amino acids in plant extracts	**2**
5	**Fibres :** Study of fibers used in pharmacy such as cotton, silk, wool, nylon.	**3**
6	**Pharmaceutical aids:** Study of pharmaceutical aids like talc, diatomite, gelatin and natural colors.	**3**

***Practical* (3hrs/Week; 45Hours)**

1. Identification of crude drugs mentioned in theory (morphology and chemical tests.)
2. Study of fibers and pharmaceutical aids.
3. Microscopic studies of seven from nine underlined crude drugs and their powders mentioned under the category of volatile oils in theory and their chemicals tests.
4. General chemical tests for alkaloids, glycosides, steroids, flavonoids and tannins.

Reference Books:

1. Trease and Evans Pharmacognosy by Evans William Charles, 16th ed., Saunders Elsevier, Newyork, 2009.

2. Pharmacognosy by V. E. Tyler, 9th ed., Lea and Febiger, Philadelphia,, 1988.

3. A Text book of Pharmacognosy by Quadry, J. S.. 16th ed., CBS Publishers & Distrubuters, New Delhi, 2010.

4. Textbook of Pharmacognosy by T. E. Wallis, 5th ed., CBS Publishers & Distrubuters, New Delhi, 2005.

5. A Textbook of Pharmacognosy by T. C. Denston, 5th Edition, Pitman Medical Publishing Co. Ltd., London.

6. Recent Progress in Medicinal Plants, Vol 4, Biotechnology and Genetic Engineering. J. N. Govil, P. Ananda Kumar, V. K. Singh, Studium Press, LIC, Texas, 2002.

7 Modern Pharmacognosy by Egil Ramstad,: Blackiston Division, McGraw-Hill, New York, 1959

8 The Organic Constituents of Higher Plants. Their chemistry and interrelationships. By Trevor Robinson, Burges Publishing Company, Minneapolis, USA, 1963.

9 Pharmacognosy: Phytochemistry Medicinal Plants.by Jean Bruneton, 2nd ed., TEC & DOC Paris, 1999

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B.PHARM. SEMESTER – III

3B07DMG DISASTER MANAGEMENT

Theory: 45 hours (3 hours/week; 3 credit)

1 NATURAL DISASTERS **10**

1.1 Types of natural disaster
- a) Cyclone
- b) Flood
- c) Fire
- d) Desert storms
- e) Land slides
- f) Snow avalanches

1.2 Cyclone
- a) Introduction
- b) Fundamentals
- c) Characteristics
- d) Causes & effects
- e) Preventive and Remedial measures

1.3 Flood
- a) Introduction
- b) Fundamentals
- c) Causes and effects
- d) Preventive and Remedial measures

1.4 Fire
- a) Fundamentals
- b) Causes & effects
- c)Preventive and remedial measures

2 FUNDAMENTALS OF SEISMIC ENGINEERING **06**

2.1 Introduction
- a) Definition
- b) History of earthquake
- c) Earth and its' structure

2.2 Terminology
- a) Epicenter
- b) Hypocenter
- c) Focus
- d) Epicenter distance

2.3 Waves generated due to earthquake
- a) P waves
- b) S waves

2.4 Causes of earthquake

2.5 Measurement of earthquake
- a) Intensity and magnitude of earthquake
- b) Sysmo-graph
- c) Sysmo-scope
- d) Sysmo-meter
- e) Richter scale

2.6 Zoning of earthquake as per I.S.

2.7 Effects of earthquake on
   a) Soil
   b) Low-rise and high-rise buildings
   c) Human psychology
   d) Communication
   e) Geology

2.8 General instructions for protection of people during earthquake

2.9 General guidelines for construction and maintenance of earthquake proof/resistant masonry structure

3 MAN MADE DISASTERS **16**

   a) War and Terrorism,
   b) Riots and Demonstrations,
   c) Residential and Industrial
   d) Fires,
   e) Transportation Accidents,
   f) Nuclear Power Accidents,
   g) Hazardous Materials and Toxic Emission,
   h) Utility Failure.

4 Problems regarding victims and its awareness **07**

   a) Saving Victims – First Twenty-Four Hours,
   b) Conducting Medical Relief Operations,
   c) Managing Relief Operations,
   d) Psychological Issues,
   e) CarryingOut Rehabilitation Work

5 Planning for disaster management **06**

   a) Local Disaster Management Cell,
   b) How to Prepare a Business Recovery Plan?,
   c) Government Response in Disaster.

NOTE: It is necessary to include mock drill, field visit and expert lectures in the portion of Disaster Management. The format of the question paper in the portion of Disaster Management should be objective with short answer questions, multiple choice questions etc.

References Books:

1. Disaster Management By G.K. Ghosh, A.P.H. Publishing Corporation, 2006

2. Disaster Management By R.B. Singh, Rawat Publications, 2000

3. Disaster Management: Through the New Millennium By Ayaz Ahmad, Anmol Publications

4. Emergency Medical Services and Disaster Management: A Holistic Approach By P.K. Dave Jaypee Brothers Medical Publishers (P) Ltd, 2001

5. Disaster Management By B Narayan, A.P.H. Publishing Corporation, 2004

6. Modern Encyclopaedia of Disaster and Hazard Management By B C Bose, Rajat Publications, 2009

7 Disaster Management By Nikuj Kumar, Alfa Publications, 2006

8 Disaster Management - Recent Approaches By Arvind Kumar, Anmol Publications, 2006

9 Tsunamis: Threats and Management by Dr. Jagbir Singh , I.K. International, 2009

10 Disaster Management Future Challenges and Opportunities by Dr. Jagbir Singh. , I.K. International, 2007

11 Citizen's guide to disaster management by Satish Modh Publisher:-Macmillan Publishers India, 2006

12 Environment and Sesmic Engineering By Atul Prakashan Ahmedabad, 2008