Chhattisgarh Swami Vivekanand Technical University

B. Pharmacy Second Year,

THIRD SEMESTER, (New) from 2012 - 13

S. No	Subject Code No.	Board of Studies	Subject	Periods Per Week			Scheme of Examination			Total Marks	Credit =L+[T+P]/2
							Theory				
				L	T	P	ESE	CT	TA		
1	341316(41)	Pharmacy	Pharmaceutics -IV (Physical Pharmacy- I)	4	1	-	70	20	10	100	5
2	341317(41)	Pharmacy	Pharmaceutical Analysis-I	4	1	-	70	20	10	100	5
3	341318(41)	Pharmacy	Computer Application	4	1	-	70	20	10	100	5
4	341319(41)	Pharmacy	Pharmacognosy- II	4	1	-	70	20	10	100	5
5	341331(41)	Pharmacy	Mathematics	4	1	-	70	20	10	100	5
6	341332(41)	Pharmacy	English Communication- II	4	1	-	70	20	10	100	5
7	341326(41)	Pharmacy	Pharmaceutics - IV (Physical Pharmacy- I) (Lab)	-	-	3	60	-	40	100	2
8	341327(41)	Pharmacy	Pharmaceutical Analysis- I (Lab)	-	-	3	60	-	40	100	2
9	341328(41)	Pharmacy	Computer Application	-	-	3	60	-	40	100	2
10	341329(41)	Pharmacy	Pharmacognosy- II (Lab)	-	-	3	60	-	40	100	2
			TOTAL	**24**	**6**	**12**	**660**	**120**	**220**	**1000**	**38**

Min. Pass Marks: (A) Theory ESE & TA+CT (Combined): 50%, (B) Practical ESE & TA (Combined): 50%

L- Lecture, T- Tutorial, P- Practical, ESE- End Semester Exam, TA- Teacher's Assessment

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 3rd **Branch: B.Pharmacy**
Subject: Pharmaceutics- IV (Physical Pharmacy- I) **Code: 341316 (41)**
Total Theory Periods: 40 **Total Tut. Periods: 12**
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1. Matter, Properties of Matter : States of matter, change in the state of matter, latent heat and vapour pressure, sublimation, critical point, eutectic mixtures, gases, aerosols ,inhalers, relative humidity, liquid complexes, liquid crystals, glassy state, solids crystalline, amorphous and polymorphism.

Module: 2 (8 Hrs.)

2.1. Thermodynamics: First, second and third laws, Zeroth law, absolute temperature scale, thermo chemical equations, phase equilibria and phase rule.

2.2. Solutions: Ideal and real solutions, solution of gases in liquids, colligative properties, partition coefficient, conductance and its measurement. Debye Huckel theory.

Module: 3 (8 Hrs.)

3.1. Viscosity and Rheology: Law of flow, kinematic viscosity, effect of temperature, Newtonian systems, non-Newtonian systems, pseudoplastic, dilatant, plastic flow.Thixotropy, thixotropy in formulation, determination of viscosity using capillary, falling ball and rotational viscometers.

Module: 4 (8 Hrs.)

4.1. Buffers: Buffer solution, buffer equations and buffer capacity, buffers in pharmaceutical systems, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity.

4.2. Adsorption: Freundlich and Gibbs' adsorption isotherms, Langmuir theory of adsorption, BET equation.

Module: 5 (8 Hrs.)

5.1. Surface and Interfacial Phenomenon : Surface tension and interfacial tensions, surface free energy, measurement of surface tension and interfacial tension, spreading coefficient, adsorption at liquid interfaces, surface active agents, HLB classification, solubilization, detergency, adsorption at solid interfaces, solid-gas and solid-liquid interfaces, complex films, electrical properties.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 3rd **Branch: B. Pharmacy**
Subject: Pharmaceutical Analysis-I **Code: 341317 (41)**
Total Theory Periods: 40 **Total Tut. Periods: 12**
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1. Introduction: Significance of qualitative analysis in quality control, Different techniques of analysis, Preliminaries and definitions, Significance of figures. Rules for retaining significant digits. Types of errors, minimization of error, selection of sample, precision and accuracy. Fundamentals of volumetric analysis, methods of expressing concentration, primary and secondary standards.

Module: 2 (8 Hrs.)

2.1. Acid Base Titration: Acid base concepts, role of solvents, Relative strength of acids and bases, Ionization, Law of mass action, Common ion effect, ionic product of water, pH, Hydrolysis of salts, Henderson-Hesselbalch equation, Buffers solutions, Neutralization curves, Acid-base indicators, Theory of indicators, Choice of indicators, Mixed indicators, Polyamine and amino acid systems. Amino acid titration, applications in assay, H_3PO_4, NaOH, $CaCO_3$.

Module: 3 (8 Hrs.)

3.1. Precipitation Titrations: Precipitation reactions, solubility product, effect of acids, temperature and solvent upon the solubility of a precipitate, Argentometric titration and titrations involving ammonium or potassium thiocyanate, mercuric nitrate orthophosphoric acid, sodium hydroxide, calcium carbonate and barium sulphate, Indicators, Gay-Lussac method; Mohr's method, Volhard's method and Fajan's method.

Module: 4 (8 Hrs.)

4.1. Non-aqueous titrations: Basic principles of Acidimetry and Alkalimetry, solvents involved, indicators. Typical examples of Acidic and Basic drug molecules.

4.2. Complexometric titration: Types of complexometric titrations, Metal ion indicators, Complexometric titrations involving EDTA. Typical examples of complexometric titration.

Module: 5 (8 Hrs.)

5.1. Gravimetric Analysis: Precipitation techniques, solubility products. The colloidal state, supersaturation, co-precipitation, post precipitation, Digestion, washing of the precipitate, Filtration, Filter papers and crucibles, Ignition. Thermo gravimetric curves, specific examples like barium sulphate, aluminum as aluminum oxide, calcium as calcium oxalate and magnesium as magnesium pyrophosphate, organic precipitants.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 3rd **Branch: B. Pharmacy**
Subject: Computer Application **Code: 341218 (41)**
Total Theory Periods: 40 **Total Tut. Periods: 12**
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1. Introduction to computer, definition of computer, Block diagram of computer, history of computer, parts of computer (Key board, mouse, CPU, printer), memory of computers, operating systems.

Module: 2 (8Hrs.)

2.1 Classification of computer: Types of computers (mini, micro, mainframe, super computer, analog and digital computers). Hardware and software, calculator and computer.

Module: 3 (8 Hrs.)

3.1. MS-Word: MS-Word environment, working with word documents, formatting text, checking spellings and grammar, creating table, updating, deleting table and print documents.

Module: 4 (8 Hrs.)

4.1. MS-EXCEL: working with MS-EXCEL, insert and delete cell, workbook, adding spreadsheet, some basic formulas, print spreadsheet.

4.2. MS-POWERPOINT: Power point environment, working with power point, create new slide, formatting slide, animation in slide and slide show.

Module: 5 (8 Hrs.)

5.1. Introduction to multimedia text, voice, graphics, animation, image, introduction to internet, search engine, downloading data, www, web site and webpage.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 3rd
Branch: B. Pharmacy
Subject: Pharmacognosy-II
Code: 341319 (41)
Total Theory Periods: 40
Total Tut. Periods: 12
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 (6 Hrs.)

1.1. Cultivation, Collection, Processing and storage of crude drugs:

Factors influencing cultivation of medicinal plants, Type of Soils & fertilizers of common use.

1.1.1. Pest and Pest Management, natural pest control agents.

1.1.2. Plant hormones and their applications.

1.1.3. Polyploidy, Mutation and hybridization with reference to medicinal plants.

1.1.4. Poly Houses/ Green Houses for cultivation.

Module: 2 (4 Hrs.)

2.1. Resins: Study of Drugs Containing Resins and Resin Combination like Podophyllum, Cannabis, Capsicum, Myrrh, Asafoetida, Balsam of Tolu, Balsam of Peru, Benzoin, Turmeric, Ginger.

2.2. Tannins: Study of tannins and tannin containing drugs like Black catechu, Gall and Arjuna.

Module: 3 (8 Hrs.)

1.1. Volatile Oils:

3.1.1. General methods of extraction of volatile oils from plants, Study of biological source, chemical constituents, chemical tests and uses of volatile oils of Mentha, Lemon peel, Orange peel, Sandal wood, Citronella, Dill, Nutmeg, Chenopodium, Valerian, Musk, Palmarosa, Gaultheria.

3.1.2. Detailed Pharmacognosy of Clove, Coriander, Lemon grass, Cardamom, Cinnamon and Eucalyptus.

Module: 4 (10 Hrs.)

4.1. Phytochemical Screening: An introduction to active constituents of drugs, their isolation, classification and properties with Qualitative chemical tests of the followings –

Alkaloids, Saponins, Cardenolides and bufadienolides, flavonoids and Leucoanthocyanidine, cyanogenetic glycosides.

Module: 5 (12 Hrs.)

5.1. Study of the biological sources, chemical constituents, substitutes, adulterants, uses, macroscopic and microscopic features and specific chemical tests of following groups of drugs containing glycosides :

5.1.1. Saponins: Ginseng, Dioscorea, Sarsaparilla.

5.1.2. Cardioactive sterols: Digitalis, Squill, Thevetia.

5.1.3. Anthraquinone cathartics: Aloe, Rhubarb, Cascara.

5.1.4. Others: Psoralea, Ammi Majus, Ammi Visnaga, Gentian, Chirata, Quassia.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 3rd **Branch: B. Pharmacy**
Subject: Mathematics **Code: 341331 (41)**
Total Theory Periods: 40 **Total Tut. Periods: 12**
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1. Matrix, determinants, definition of differential coefficient, differentiation of standard function.

Module: 2 (8Hrs.)

Basic concept of definite and indefinite integral, application of integration in pharmacy, logarithms.

Module: 3 (8 Hrs.)

3.1. Basic concepts of data: graphical representation of data, diagrammatic representation of data, measures of central tendencies, measures of dispersion.

Module: 4 (8 Hrs.)

4.1. Correlation, regression, skewness, standard deviation, standard errors of means.

Module: 5 (8 Hrs.)

5.1. Introduction to probability, some basic probability, probability distribution, normal distribution, poisson distribution, t-test, f-test.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 3rd **Branch: B. Pharmacy**
Subject: English Communication – II **Code: 341332 (41)**
Total Theory Periods: 40 **Total Tut. Periods: 12**
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1. Writing: Paragraph writing **(** topic sentence, cohesion and coherence, sentence linkers)

Module: 2 (8 Hrs.)

2.1. Preparation of a business report: Writing a business proposal – format, length, structure.

Module: 3 (8 Hrs.)

3.1. Preparing notes: writing business letters and E-Mail messages

Module: 4 (8 Hrs.)

4.1. Documentation: References, notes and bibliographies, Writing curriculum vitae (both chronological and functional) along with an application for a job.

4.2. Public relation: concept and relevance public relation in a business organization-handing the media.

Module: 5 (8 Hrs.)

5.1. Meeting and presentation: Organizing a meeting, preparing an agenda, chairing a meeting drafting resolutions, writing minutes; Making an oral presentation; Facing an interview.

Text Books/Reference Books (Latest Edition):

1. Bovee et al, Business Communications Today Pearson Education.
2. J.V. Vilanilam, More effective Communication, Sage Publication.
3. J .K. Chand & B.C. Das, A Millennium Guide to Writing & Speaking English, Friends' Publishers.
4. Sushil Bahl, Business Communication Today, Sage Publications.
5. John Sealy, Oxford Guide to Writing & Speaking English, OUP.
6. Pati and Khuntia, Communicative English & Business Communication, Alok Pub.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 3 rd **Branch:** B. Pharmacy
Subject: Pharmaceutics-IV (Physical Pharmacy-I) Lab. **Code: 341326 (41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. Study of different states of matter of same/ different materials
2. To prepare eutectic mixtures
3. To study colligative properties of liquids
   - Elevation of boiling point
   - Depression of freezing point
4. To determine the surface tension of given sample by drop count/ weight method.
5. To determine partition coefficients of any two suitable drug materials
6. To determine the HLB value of the given surfactant.
7. To determine surface tension by stalagmometer & by capillary rise method
8. To determine the CMC of given the surfactant by surface tension method.
9. To determine interfacial tension between 2 liquids using Ostwald's viscometer.
10. To determine the percent composition of an unknown solution of glycerin in water using Ostwald's viscometer.
11. To determine viscosity of liquid by falling ball
12. To prepare acetate buffer and compare theoretical pH value with the experimental value.
13. To prepare a given percentage of solution by allegation method
14. To study adsorption phenomenon by activated charcoal
15. To observe the effect of dielectric constant of solvent on drug solubility
16. Determination of latent heat, vapor pressure, critical point of various liquids.

Text Books / Reference Books (Latest Edition):

1. A. Martin, Physical Pharmacy, Lippincott Williams & Wilkins, London.
2. S.J. Carter, Tutorial Pharmacy, Copper & Gunn, CBS Publishers, New Delhi.
3. E.A. Rawlins, Bentley, Bailliere Tindall, Textbook of Pharmaceutics, London.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 3rd
Branch: B. Pharmacy
Subject: Pharmaceutical Analysis-I Lab.
Code: 341327 (41)
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. Standardization of analytical weights and calibration of volumetric apparatus.
2. Preparation and standardization of sodium carbonate, potassium hydrogen phthalate, Sodium bicarbonate, oxalic acid solution.
3. Assay of boric acid, ammonium carbonate.
4. Preparation and standardization of silver nitrate and ammonium thiocyanate solution.
5. Titration according to Mohr's and Volhard's methods.
6. Preparation and standardization of perchloric acid and sodium methoxide and assay of one official drug under each type.
7. Preparation and standardization of EDTA solution and assay of calcium gluconate, magnesium sulphate.
8. Assay of calcium by gravimetric analysis.

Text Books / Reference Books (Latest Edition):

2. Garratt, The Quantitative Analysis of Drugs, CBS Publishers & Distributors.
3. H.H. Willard, Instrumental Methods of Analysis, CBS Publishers, Delhi.
4. Vogel, Text book of Quantitative Chemical Analysis, (Person Education, Singapore).

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 3rd **Branch:** B. Pharmacy
Subject: Computer Application Lab **Code: 341328 (41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. Practical based on working with Windows 7 AND Windows xp environment e.g. File Management, Copying, Burning CD/DVD, understanding various formats of Operating system.
2. Practical based on MS Office(Word, Excel, Power point) .Integration of all three office tools to make an document including picture manager.
3. Safe Internet Browsing, E-Mail and basics of website development as based on free hosting sites.
4. Understanding Virus attack, basics and measures to avoid virus attack, hacking and file corruption.

Text Books/ Reference Books (Latest Edition):

1. V. Rajaraman, Fundamental of Computers, B.P.B. Publications.
2. P. K. Sinha, Fundamental of Computers.
3. Suresh Basandra, Computer Today.
4. Steve Sagman, MS- Office 2000 (For Windows)
5. Tennenbum, Computer Networks, Tata Mac Grow Hill Publication.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 3rd
Branch: B. Pharmacy
Subject: Pharmacognosy-II Lab.
Code: 341329 (41)
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. Perform macroscopic examination (Morphology and Organoleptic) of at least fifteen crude drugs mentioned in theory.
2. Perform microscopic studies of seven-selected crude drugs and their powders mentioned under the category of volatile oils and glycosides in theory and their chemical tests,
3. Perform General chemical tests for alkaloids, glycosides, steroids, phenols, flavonoids, resins and tannins.
4. Perform identification test of some resin containing drugs at least three drugs (Capsicum, Myrrh, Balsam of Tolu, Benzoin, Asafoetida, Turmeric, Ginger).
5. Perform procedure for extraction of volatile oils from at least two drugs (Mentha, Lemon peel, Orange peel, Dill, Lemon grass, Eucalyptus).
6. Perform chemical tests to identify phytoconstituents present in unknown drug sample.
7. Perform field experiment to demonstrate the effect of auxins and gibberlins on potted plants.
8. Perform experiment to demonstrate the effect of at least one physical and one chemical mutating agent on plant cells.

Text Books / Reference Books (Latest Edition):

1. C. K. Kokate, A.P. Purohit, S.B. Gokhale, Text Book of Pharmacognosy, Nirali Prakashan, Pune.
2. G.E. Trease & W.C. Evans, Pharmacognosy, Saunders Elsevier.
3. T.E. Wallis, Text Book of Pharmacognosy, CBS Publishers & Distributors, New Delhi, Darya Ganj.
4. Text Book of Pharmacognosy, V.E. Tyler, L.R. Brady & J.E. Robbers, Len & Febiger, Philadelphia.
5. Essential of Pharmacognosy, S.H.Ansari, Birla Publication, Shahdara, New Delhi.
6. Analytical Microscopy, T. E. Wallis, J & A Churchill Limited, London.
7. K.R. Brain and T.D. Turner “The Practical Evaluation of Phyto Pharmaceutical”, Wright, Scientechnica-Bristol.
8. P, J. Schewer, Marine Natural products, Academic press, London.
9. Mohammed Ali, Pharmacognosy and Phytochemistry,

Chhattisgarh Swami Vivekanand Technical University

B. Pharmacy Second Year,

FORTH SEMESTER, (New) from 2012 – 13

S. No	Subject Code No.	Board of Studies	Subject	Periods Per Week			Scheme of Examination			Total Marks	Credit=L+[T+P]/2
							Theory				
				L	T	P	ESE	CT	TA		
1	341416(41)	Pharmacy	Pharmaceutics -V (Physical Pharmacy -II)	4	1	-	70	20	10	100	5
2	341417(41)	Pharmacy	Pharmaceutics -VI (Pharmaceutical Engineering- I)	4	1	-	70	20	10	100	5
3	341418(41)	Pharmacy	Pharmaceutical Chemistry-IV (Organic chemistry-3)	4	1	-	70	20	10	100	5
4	341419(41)	Pharmacy	Pharmaceutical Biochemistry	4	1	-	70	20	10	100	5
5	341410(41)	Pharmacy	Pharmaceutical Microbiology	4	1	-	70	20	10	100	5
6	341426(41)	Pharmacy	Pharmaceutics -V (Physical Pharmacy -II) Lab	-	-	3	60	-	40	100	2
7	341427(41)	Pharmacy	Pharmaceutics -VI (Pharmaceutical Engineering-I) Lab	-	-	3	60	-	40	100	2
8	341428(41)	Pharmacy	Pharmaceutical Chemistry- IV (Organic chemistry -3) Lab	-	-	3	60	-	40	100	2
9	341429(41)	Pharmacy	Pharmaceutical Biochemistry - Lab	-	-	3	60	-	40	100	2
10	341420(41)	Pharmacy	Pharmaceutical Micobiology - Lab	-	-	3	60	-	40	100	2
			TOTAL	**20**	**5**	**15**	**650**	**100**	**250**	**1000**	**35**

Min. Pass Marks: (A) Theory ESE & TA+CT (Combined): 50%, (B) Practical ESE & TA (Combined): 50%

L- Lecture, T- Tutorial, P- Practical, ESE- End Semester Exam, TA- Teacher's Assessment

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 4th **Branch: B. Pharmacy**
Subject: Pharmaceutics -V (Physical Pharmacy -II) **Code: 341416 (41)**
Total Theory Periods: 40 **Total Tut. Periods: 12**
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1. Micromeretics and Powder Rheology : Particle size and distribution, average particle size, number and weight distribution, particle number, methods for determining particle size, volume, shape, surface area, specific surface, derived properties of powders, porosity, packing arrangement, densities, bulkiness and flow properties.

Module: 2 (8 Hrs.)

2.1. Dispersion Systems: Colloidal dispersions, types, properties of colloids, protective colloids, applications of colloids in pharmacy; Suspensions: Interfacial properties of suspended particles, wetting of particles, controlled flocculation, flocculation in structured vehicles, rheological considerations, Emulsions: theories of emulsification, physical stability and rheological considerations.

Module: 3 (8 Hrs.)

3.1. Kinetics and Drug Stability: General considerations and concepts, half-life determination, Influence of temperature, light, solvent, catalytic species, accelerated stability study, determination of expiry date.

Module: 4 (8 Hrs.)

4.1. Solubility and related phenomenon: Solubility expression, Determination of solubility, Solubility of gases in liquids, Solubility of liquids in liquids, Solubility of solids in liquids.

4.2. Phase rule and phase diagram

Module: 5 (8 Hrs.)

5.1. Complexation: Classification of complexes, methods of preparation, analysis and applications.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 4 th **Branch: B. Pharmacy**
Subject: Pharmaceutics -VI (Pharmaceutical Engineering- I) Code: 341417 (41)
Total Theory Periods: 40 **Total Tut. Periods: 12**
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1. Unit Operation: Unit operations and processes, Material and energy balances, Dimensionless equations; formulas and groups.

Module: 2 (8Hrs.)

1.1. Corrosion and its Prevention: General considerations, Types of Corrosion, Methods of reducing Corrosion, Simple mathematical problems.

1.2. Fluid Flow: Fluid static, Manometers, Types of flow, Reynold's Number and its significance, Concept of boundary layers, Bernoulli's theorem and its applications, Measurement of flow of fluids, Valves.

Module: 3 (8 Hrs.)

3.1. Material Handling Systems:

3.1.1. Liquid handling: Different types of pumps.

3.1.2. Solid handling: Conveyors.

3.2. Heat Transfer: Heat transfer mechanisms, Heat transfer by conduction, Fourier's law, Natural and forced convection, Surface and overall heat transfer coefficients, Heat transfer by radiation, Heaters and heat exchangers.

Module: 4 (8 Hrs.)

4.1. Humidity, Air-Conditioning and Refrigeration: Basic concepts and definitions of various terms. Psychrometric charts, Wet bulb theory, Measurement of humidity. Application of humidity measurement, air-conditioning and refrigeration in Pharmacy.

4.2. Automated Process Control Systems: Process variables, Temperature, Pressure, Flow, Level and Vacuum and their measurements. Elements of computer aided manufacturing (CAM).

Module: 5 (8 Hrs.)

5.1 Materials of Pharmaceutical Plant Construction: Factors affecting the material selection for pharmaceutical plants, Physical; Chemical; Mechanical properties and use of the important materials of construction with special reference to Ferrous metals, Copper, Aluminium, Nickel, Glass, Plastics and their alloys, Heat and Corrosion resistant alloys.

5.2 Pilot Plant Scale up Techniques: Concepts of pilot plant scale up techniques in pharmaceutical industries.

5.3 Industrial Hazards and Safety Measures: Mechanical, Chemical, Electrical, Fire and Dust Hazards, Safety requirements, Legal requirements, Industrial dermatitis.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 4th **Branch: B. Pharmacy**
Subject: Pharmaceutical Chemistry-IV (Organic Chemistry-3) Code: 341418 (41)
Total Theory Periods: 40 **Total Tut. Periods: 12**
Total Marks in End Semester Examination: 70
Minimum number of class of tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1 Esters: Nomenclature, preparations with special emphasis on synthesis of Malonic and acetoacetic esters and their synthetic applications.

1.2 Amines: Nomenclature, General methods of preparation, Physical and Chemical properties, Basicity.

Module: 2 (8 Hrs.)

2.1. Benzene and its homologues: Structure of benzene, Resonance, Aromatic character, Huckel Rule. General methods of preparation, Physical properties, Electrophilic substitution reactions, Friedel crafts reaction, Catalytic hydrogenation.

2.2. Cycloalkanes: Nomenclature, General methods of preparation, Chemical reactions, Stability (Bayer strain theory), Conformational analysis of cyclohexane.

2.3. Nucleophilic aromatic substitution reactions, Electrophilic aromatic substitution reactions, Catalytic hydrogenation

Module: 3 (8 Hrs.)

3.1. Aniline: General methods of preparation, characteristic reactions.

3.2. Phenols: General methods of preparation, Acidity, Characteristic reactions.

3.3. Aromatic carboxylic groups

Module: 4 (8 Hrs.)

4.1. Selected reactions and mechanism of synthetic importance: Mannich reaction, Beckmann reaction, Fitting reaction, Di alder reaction, Birch Reduction.

4.2. Organic reagents used in drug synthesis

Module: 5 (8 Hrs.)

5.1. Heterocyclic Compounds: Nomenclature, structure and reactions of Imidazole, Indole, Pyrrole, Furan, Pyrimidine, Quinoline and Isoquinoline.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 4th **Branch: B.Pharmacy**
Subject: Pharmaceutical Biochemistry **Code: 341419 (41)**
Total Theory Periods: 40 **Total Tut. Periods: 12**
Total Marks in End Semester Examination: 70
Minimum number of class of tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1. Introduction: Biochemical organization of the cell and transport processes across cell membrane. Outlines of biochemistry of cell division and metastasis. The concept of free energy, determination of change in free energy from equilibrium constant and reduction potential, bioenergetics, production of ATP and its biological significance.

Module: 2 (8 Hrs.)

2.1. Enzymes: Nomenclature, factors affecting enzyme action, enzyme kinetics and its mechanism of action, mechanism of inhibition, enzymes and isoenzymes in clinical diagnosis.

2.2. Co-enzymes: Vitamins as co-enzymes and their significance, metals as co-enzymes and their significance.

Module: 3 (8 Hrs.)

3.1. Carbohydrate Metabolism: Glycolysis and fermentation and their regulation, Gluconeogenesis, Glycogenolysis, Glycogenesis, and Pentose phosphate Pathway.

3.2. The Citric Acid Cycle: Significance, reactions and energetics of the cycle, Amphibolic role of the cycle and Anaplerosis.

Module: 4 (8 Hrs.)

4.1. Lipid Metabolism: Oxidation of fatty acids; β-oxidation & energetics, α-oxidation, ω- oxidation, Biosynthesis of ketone bodies and their utilization, Biosynthesis of saturated and unsaturated fatty acids, control of lipid metabolism, Essential fatty acids & Biosynthesis of eicosanoids (prostaglandins, thromoboxanes and leukotrienes), phospholipids and sphingolipids.

Module: 5 (8 Hrs.)

5.1. Biosynthesis of nucleic Acids: Brief introduction to genetic organisation, organisation of mammalian genome, alteration and rearrangement of genetic material, biosynthesis of DNA and its replication, mutation, physical and chemical mutagenesis/carcinogenesis, DNA repair mechanism, biosynthesis of RNA.

5.2. Genetic code and Protein synthesis: Genetic code, Components of protein synthesis and inhibition of protein synthesis. Brief account of genetic engineering and polymerase chain reactions. Regulation of gene expression.

5.3. Principles of biological oxidation and detoxification mechanisms.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 4th **Branch: B. Pharmacy**
Subject: Pharmaceutical Microbiology **Code: 341410 (41)**
Total Theory Periods: 40 **Total Tut. Periods: 12**
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1. Introduction to the scope of microbiology.
1.2. Structure of bacterial cell.
1.3. Classification of microbes and their taxonomy. Actinomycetes, bacteria, rickettsiae, spirochetes and viruses.

Module: 2 (8 Hrs.)

2.1. Identification of Microbes: Stains and types of staining techniques, electron microscopy.
2.2. Nutrition, cultivation, isolation of bacteria, actinomycetes, fungi, viruses.

Module: 3 (8 Hrs.)

3.1. Microbial genetics and variation.
3.2. Control of microbes by physical and chemical methods.
3.2.1. Disinfection, factors influencing disinfectants, dynamics of disinfection, disinfectants and antiseptics and their evaluation.
3.2.2. Sterilization, different methods, validation of sterilization methods & equipments.

Module: 4 (8 Hrs.)

4.1. Sterility testing of all pharmaceutical products.
4.2. Immunity, primary and secondary, defensive mechanisms of body, microbial resistance, interferon.

Module: 5 (8 Hrs.)

5.1. Microbial assays of antibiotics, vitamins and amino acids.
5.2. Definition and uses of BOD and COD.
5.3. Industrial sewage treatment

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 4th **Branch: B. Pharmacy**
Subject: Pharmaceutics-V (Physical Pharmacy-II) Lab. **Code: 341426 (41)**
Total Practical Periods: 40
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. To determine the particle size and particle size distribution in the given sample of powder by optical microscopy method.
2. To determine particle size and size distribution of the given sample of granule by sieving method.
3. To determine the following derived properties of the given powdered sample
   (a) Flow property (b) Bulk density (c) Granule density (d) True density (e) Porosity (f) Carr's Index (g) Hausner's ratio
4. To determine the true density of given sand sample (non porous).
5. To determine angle of repose/ flow rate of given powder sample.
6. To determine the porosity of given sample of powder.
7. To prepare an emulsion & determine its type of various method.
8. To evaluate the physical stability of an emulsion.
9. To prepare flocculated and deflocculated suspensions
10. To determine the optimum concentration of tragacanth required for maximum physical stability of calcium carbonate suspension.
11. To determine the most suitable suspending agent for maximum physical stability of calcium carbonate suspension.
12. To determine the reaction rate constant and half life of an ester in 0.5 N HCl at room temperature.
13. To determine the order of reaction by half life method.
14. To perform aspirin degradation by colorimetry by complexometry method
15. To determine upper convolute temperature for phenol-water system.
16. Ternary phase diagram.

Text Books/ Reference Books (Latest Edition):

1. Martin, Physical Pharmacy and Pharmaceutical Sciences, Williams & Wilkins, London.
2. E.A. Rawlins, Bentley, Textbook of Pharmaceutics, Bailliere Tindall, London.
3. S.J. Carter, Tutorial Pharmacy, Copper and Gunn, CBS Publishers, New Delhi.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 4 th **Branch: B. Pharmacy**
Subject: Pharmaceutics-VI (Pharmaceutical Engineering-I) Lab **Code: 341427 (41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. To determine radiation constant of Iron cylinder and to interpret the influence of temperature on radiation
constant.
2. To determine radiation constant of Copper cylinder and to interpret the influence of temperature on radiation
constant.
3. To determine radiation constant of Brass cylinder.
4. To determine overall heat transfer coefficient of water.
5. To determine the Reynolds number and frictional factor by calculating frictional loses in pipes in which fluids
are flowing.
6. To determine the Reynolds number by calculating velocity of fluids and area of pipes in which fluids are
flowing.
7. To determine the humidity of air by using dew point method.
8. To determine relative humidity by using psychometric chart.
9. To determine rate of corrosion of different metals in a given environment (acid medium, basic medium, neutral) of a metal.
10. To determine rate of corrosion of different metals in a given environment.
11. To study of different types of conveyors.
12. To study of different types of valves.
13. To study of various types of pumps.
14. To draw alphabets in capital letters in given engineering drawing sheet.
15. To draw four objects in different angles on engineering drawing sheet
16. Study of various elements of computer aided manufacturing.

Text Books/ Reference Books (Latest Edition):

1. W.L Badger and J.T Banchero, Introduction to Chemical Engineering McGraw Hill Intematonal Book Co.,
London.
2. K. Sambamurty, Pharmaceutical Engineering, New Age International, New Delhi.
3. Introduction to Chemical Engineering, Tata Mcgraw Hill, New Delhi.
4. S.J. Carter, Tutorial Pharmacy, Cooper & Gunn, CBS Publishers, New Delhi.
5. C.V.S. Subrahmanyam et al, Pharmaceutical Engineering Principles and Practices.
6. Pharmaceutics-The Science of Dosage Form Design, Churchill Livingstone, London.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 4th **Branch: B. Pharmacy**
Subject: Pharmaceutical Chemistry-IV (Organic chemistry -3) Lab **Code: 341428 (41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. Preparation of organic compounds and their derivatives, crystallization and determination of their melting point or boiling point.
2. Analysis of organic compounds containing different functional groups.
3. Identification of mono-functional organic compounds by a study of their physical properties, detection of characteristic functional group reactions and preparations of the rational derivative. (Acid, Phenol, Aldehyde, ketones, amides, esters, hydrocarbons and carbohydrates.
4. Esterification of alcohols.
5. Monographs of selected official drugs including identification tests and tests for purity.
   (eg: Aspirin, Paracetamol, Ascorbic acid)

Text Books/Reference Books (Latest Edition):

1. R.T. Morrison & R. N. Boyd, Organic Chemistry, Pearson Education, Latest Edition.
2. B.S. Bahl & Arun Bahl, Advanced Organic Chemistry, S. Chand Publisher, New Delhi.
3. O.P. Agarwal, Organic Chemistry – Reactions & Reagents, Krishna Prakashan, Meerut.
4. I.L. Finar, Organic Chemistry, Vol. I & Vol. II, Pearson Education.
5. Bentley & Driver, A Text Book of Pharmaceutical Chemistry, Oxford University Press, New Delhi.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 4th **Branch: B. Pharmacy**
Subject: Pharmaceutical Biochemistry Lab **Code: 341429 (41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. Preparation of standard buffers (citrate, phosphate and carbonate) and measurement of pH.
2. Colorimetric estimation of blood glucose.
3. Estimation of cholesterol, creatinine, urea and uric acid in biological fluids.
4. Qualitative test for normal and abnormal constituents of urine.
5. Estimation of reducing sugars in urine.
6. Estimation of bilirubin contents of the blood.
7. Enzymatic hydrolysis of glycogen by alpha and beta amylases.
8. Effect of temperature on the activity of alpha amylases.
9. Estimation of Blood Cholesterol
10. Estimation of SGOT, SGPT by UV Spectrophotometer.
11. Estimation of serum alkaline phosphate and acid phosphatase levels.
12. Estimation of serum sodium, potassium and calcium levels.

Text Books/ Reference Books (**Latest Edition):**

1. Harper's Illustrated Biochemistry, R. K. Murray & D. K. Granner, P. Mayes, Mc Grawhill Publisher.
2. A.C. Deb, Fundamentals of Biochemistry, New Central Book Agency, Calcutta.
3. A.V.S.S. Rama Rao, Text Book of Biochemistry, UBS Publishers & Distributors, New Delhi.
4. Satyanarayana, U.Chakrapani, Text Book of Biochemistry, Books & Allied (Pvt.) Ltd., Vijayawada.
5. Lehringer Principles of Biochemistry, David L. Nelson, Michael M. Cox, W.H. Freemann & Company New York.
6. West & Todd, Text Book of Biochemistry, (Oxford & IBH Pub., Co., New Delhi)

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 4th **Branch: B. Pharmacy**
Subject: Pharmaceutical Microbiology Lab. **Code: 341420 (41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. Identification of microorganism by different microscopical and staining methods.
2. Prepare & sterilize Nutrient Agar.
3. Prepare & sterilize Thioglycolate media.
4. Microbial assays of antibiotics.
5. Microbial assays of vitamins.
6. Study of the lactose fermenting bacteria from milk sample using differential plating.
7. Testing the sterility of pharmaceutical products.(Creams & ointments)
8. Sterility test for aqueous solution & suspension.
9. Sterility test for water for injection.
10. Study the effect of pH of the culture media on the growth of microbes.
11. Study the effects of osmotic pressure on growth of microbes.

Text Books / Reference Books (Latest Edition):

1. Pelczar & Kreig, Microbiology, Pub Tata McGraw – Hill, New Delhi.
2. Anantanarayana & Panicker, Text Book of Microbiology, Orient Longman Pvt. Ltd., Chennai.
3. Bernard R. Glick, Jack J. Pastemak, Molecular Biotechnology – Principal & application of recombinant DNA, Deptt. Of Biology, University of Waterloo, Waterloo, Ontario, Canada. ASM Press Washington DC.
4. S.P. Vyas & V.K. Dixit, Pharmaceutical Biotechnology, CBS Publishers & Distributors.
5. L. M. Prescott, G. P. Jarely, D.A. Klein, Microbiology, Wm C Brown Publishers, Oxford.
6. Prescott and Dunn, Industrial Microbiology, McGraw Hill Book Company Inc.
7. N.K. Jain, Pharmaceutical Microbiology, Vallabh Prakashan, Delhi.
8. A.H. Patel, Industrial Microbiology, MAC Millan, India Ltd.
9. L.E. Casida, Industrial Microbiology, JR, New AGC International (P) Ltd. Publishers

Chhattisgarh Swami Vivekanand Technical University

B. Pharmacy Third Year,

FIFTH SEMESTER, (New) from 2012 – 13

S. No	Subject Code No.	Board of Studies	Subject	Periods Per Week			Scheme of Examination			Total Marks	Credit=L+[T+P]/2
							Theory				
				L	T	P	ESE	CT	TA		
1	341516(41)	Pharmacy	Pharmaceutics -VII (Pharmaceutical Engineering- II)	4	1	-	70	20	10	100	5
2	341517(41)	Pharmacy	Medicinal Chemistry-I	4	1	-	70	20	10	100	5
3	341518(41)	Pharmacy	Pharmacognosy-III	4	1	-	70	20	10	100	5
4	341519(41)	Pharmacy	Pharmacology-I	4	1	-	70	20	10	100	5
5	341510(41)	Pharmacy	Pharmaceutics VIII (Cosmetic technology)	4	1	-	70	20	10	100	5
6	341526(41)	Pharmacy	Pharmaceutics -VII (Pharmaceutical Engineering II) (LAB)	-	-	3	60	-	40	100	2
7	341527(41)	Pharmacy	Medicinal Chemistry-I (LAB)	-	-	3	60	-	40	100	2
8	341528(41)	Pharmacy	Pharmacognosy- III (LAB)	-	-	3	60	-	40	100	2
9	341529(41)	Pharmacy	Pharmacology-I (LAB)	-	-	3	60	-	40	100	2
10	341520(41)	Pharmacy	Pharmaceutics VIII (Cosmetic technology) (LAB)	-	-	3	60	-	40	100	2
			TOTAL	**20**	**5**	**15**	**650**	**100**	**250**	**1000**	**35**

Min. Pass Marks: (A) Theory ESE & TA+CT (Combined): 50%, (B) Practical ESE & TA (Combined): 50%

L- Lecture, T- Tutorial, P- Practical, ESE- End Semester Exam, TA- Teacher's Assessment

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 5th
Branch: B. Pharmacy
Subject: Pharmaceutics -VII (Pharmaceutical Engineering- II)
Code: 341516(41)
Total Theory Periods: 40
Total Tut. Periods: 12
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1. **Size Reduction and Size Separation:** Definition objectives and significance of size reduction, Factors affecting size reduction, Standard of powders, Sieves and their usage in grading of powders, Laws governing energy and power requirements of a mill, Classification of size reduction machines, Study of various types of mill including ball mill, hammer mill, fluid energy mill.

1.2. **Evaporation:** Basic concepts, Factors affecting evaporation, Types of evaporators, Study of short tube evaporators, Forced circulation evaporators and Film evaporators, Single and multiple effect evaporation, Evaporation under reduced pressure, Evaporation capacity, Heat and material balance, Scale formation, Foam and entrainment.

Module: 2 (8 Hrs.)

2.1. **Drying:** Introduction, Theory of drying Rate of drying curves, Classification of dryers, Study of dryers used in pharmaceutical industries, Special drying methods.

2.2. **Extraction:** Principles of solid-liquid and liquid- liquid extraction, Theories of extraction of drugs, Diffusion battery, Continuous counter-current extraction system.

Module: 3 (8 Hrs.)

3.1. **Mixing:** Theory of mixing, Solid -solid, solid-liquid and liquid- liquid mixers used in\ pharmaceutical industries

3.2. **Centrifugation:** Principles of centrifugation, Industrial filters and centrifugation sedimenters.

Module: 4 (8Hrs.)

4.1. **Crystallization:** Importance of crystal purity, size, shape, geometry, habit, forms and types. Solubility curves and calculation of yields, Mier's supersaturation theory and its limitations, Nucleation and crystal growth, Classification of crystallizers, Principles underlying the design and operation of Tank, Swenson-walker, Krystal and Vacuum crystallizer. Crystallizer employed for producing large crystals, Caking of crystals and its prevention.

4.2. **Filtration**: Theory of filtration, Factors affecting filtration, Filter media, Filter aids, Classification of filters, Industrial filters including Filter press, Rotary filter, Membrane filter.

Module: 5 (8 Hrs.)

5.1. **Distillation:** General theory applied to binary mixtures, Boiling point and equilibrium diagrams, Raoult's Law and Henry's Law, Constant boiling mixtures. Simple, steam and Equilibrium distillations. Rectification, Constructions of rectifying columns. Analysis of rectifying column**:** McCabe Thiele method and Lewis Sorel method for calculation of number of theoretical plates, Azeotropic and extractive distillations.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 5th **Branch:** B. Pharmacy
Subject: Medicinal Chemistry-I **Code: 341517(41)**
Total Theory Periods: 40 **Total Tut. Periods:** 12
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1. **Basic Principles of Medical Chemistry:** Physico-chemical aspects (Optical, geometric and bioisosterism) of drug molecules and biological action; Drug receptor interaction including transduction mechanisms.

1.2. **Brief concept on QSAR:** Derivation of Hansch analysis and discussion on different parameters like electronic parameters, steric factor, and partition coefficient.

Module: 2 (8 Hrs.)

Classification, mode of action, uses and structure activity relationship of the following classes of drugs. Synthesis of those compounds only exemplified against each class.

2.1. **Drugs acting on autonomic nervous system:**

2.1.1. **Cholinergics and Anticholinergic:** Acetylcholine, Carbachol, Bethanechol, methacholine, Neostigmine, Edrophonium, Demecarium, Atropine.

2.1.2. **Adrenergic drugs and adrenergic blocking agents:** Adrenaline, Ephedrine, Salbutamol, Phenylephrine, Naphazoline,

2.1.3. **Antispasmodic and anti-ulcer drugs:** Homatropine, Cyclopentolate, Diclomine, Tropicamide.

Module: 3 (8 Hrs.)

3.1. **Drugs acting on autonomic nervous system:**

3.1.1. **Neuromuscular blocking agents:** Gallamine, succinylcholine

3.1.2. **Local Anaesthetics:** Benzocaine, Procaine, Lignocaine

3.2. **Drugs affecting uterine motility**: Oxytocins (including oxytocin, ergot alkaloids and prostaglandins) their Occurrence, Chemical nature, Medicinal applications.

Module: 4 (8 Hrs.)

4.1. **Autacoids:**

4.1.1. **Antithistamines:** Diphenhydramine, Mepyramine, Chlorpheniramine, Promethazine, Chlorcyclizine, Cimetidine, Ranitidine.

4.1.2. **Eicosanoids:** Occurrences, Chemical nature, Medicinal applications

4.1.3. **Analgesic–antipyretics, anti-inflammatory (non-steroidal) agents:** Aspirin,

4.1.4. Paracetamol, Ibuprofen, Phenylbutazone, Naproxen, Diclofenac sodium, mefenamic acid.

Module: 5 (8 Hrs.)

5.1 Structure of the following drugs: Paralidoxime, Donepezil, Ipratropium bromide, Propantheline, Terbutaline, Dobutamine, Propanolol, Doxazocin, Labetolol, Tripelennamine, Dimenhydrinate, Doxylamine, Triprolidin, Cetrizine, Cyproheptadine, Astemizole, Oxyphenylbutazone, Piroxicam, Ketoprofen, Probenecid, Allopurinol, Tubocurarine, Physostigmine, Nimesulide, Celecoxib.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 5 th **Branch:** B. Pharmacy
Subject: Pharmacognosy-III (Natural Products) **Code: 341518 (41)**
Total Theory Periods: 40 **Total Tut. Periods:** 12
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 (14 Hrs.)

1.1. Chemical and spectral approaches to simple molecules of natural origin as exemplified by Reserpine, Morphine, Quinine and Menthol.

1.2. Biosynthesis: Introduction to biogenesis

1.1.1. Employment of Radio-tracer techniques in Biogenetic studies.

1.1.2. A brief account of primary and secondary metabolite's production from carbon metabolism in plants.

1.1.3. Study of Calvin cycle, TCA cycle, Shikimic acid pathway

1.1.4. Embden-Maerhoef pathway, acetate hypothesis, isoprenoid pathway.

1.1.5. Biosynthesis of carbohydrates, lipids and volatile oils.

Module: 2 (06 Hrs.)

2.1. **Extraction, Isolation and Chemistry of**

2.1.1. Glycosides - Digitoxin, Diosgenin & Sarasapogenin

2.1.2. Lignans- Secoisolariciresinol diglycoside

2.1.3. Quassinoids- Bruceantin

2.1.4. Flavonoids- Rutin, Quercetin

Module: 3 (08 Hrs.)

3.1. Extraction, Isolation and Chemistry of Alkaloids

3.1.1. Atropine & related compounds

3.1.2. Quinine, reserpine, morphine, papaverine, ephedrine, ergot

3.1.3. Vinca Alkaloids.

3.2. Extraction, Isolation and Chemistry of Xanthine bases: Caffeine, theophylline and theobromine.

Module: 4 (06 Hrs.)

4.1. Extraction, Isolation and Chemistry of Terpenoids:

Camphor, Menthol, Citral, β- Carotene, α -Tocopherol, α-Pinene.

Module: 5 (06 Hrs.)

5.1. Study of Natural Pesticides and Insecticides: Tobacco, Pyrethrum, Cevadilla, Neem, Ryania.

5.2. Introduction to herbicides, fungicides, fumigants and rodenticides

5.3. Study of Toxic Drugs: Allergens, hallucinogens, narcotics, mycotoxins, toxic mushrooms and Indian toxic plants.

5.4. A brief introduction to natural plant bitters and sweeteners.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 5th
Branch: B. Pharmacy
Subject: Pharmacology-I
Code: 341519 (41)
Total Theory Periods: 40
Total Tut. Periods: 12
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 General Pharmacology (8 Hrs.)

1.1 Introduction to Pharmacology, Sources of drugs, routes of administration, mechanism of action, combined effect of drugs, Factors modifying drug action, Tolerance and dependence

1.2 Pharmacokinetics: Absorption, Distribution, Metabolism and Excretion of drugs

1.3 Pathophysiology of common diseases; (Asthma, diabetes, gout, ulcerative colitis, acute and chronic renal failure, hypertension, angina, congestive heart failure, hepatic disorders, tuberculosis, urinary tract infections).

1.4 Basic Principles of Cell Injury and Adaptations:
Causes of Cellular injury, pathogenesis, morphology of cell injury, adaptations and cell death.
Basic Mechanisms involved in the process of inflammation and repair:

Module: 2 Pharmacology of drugs acting on Peripheral Nervous System (8 Hrs.)

2.1. Neurohumoral transmission (autonomic and somatic)
2.2. Cholinergic drugs, Cholinergic blockers
2.3. Adrenergic drugs, Adrenergic blockers
2.4. Ganglionic stimulants and blocking agents skeletal muscle relaxants

Module: 3 Pharmacology of drugs acting on Central Nervous System (8 Hrs.)

3.1 Neurohumoral transmission in the Central Nervous System
3.2 Local anaesthetic agents, general anaesthetics
3.3 Alcohol and treatment of alcoholism
3.4 Sedatives, hypnotics, Anti-epileptic drugs

Module: 4 Psychopharmacological agents (8 Hrs.)

4.1. Antipsychotics (Neuroleptic drugs), Antidepressants, Anti-anxiety drugs
4.2. Anti-parkinsonism drugs, Central Nervous System stimulants
4.3. Drug addiction and Drug abuse

Module: 5 Drugs Used In Management of Pain (8 Hrs.)

5.1. Narcotic analgesics and antagonists
5.2. Analgesics, Antipyretics, Anti-inflammatory and Treatment of arthritis

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 5th
Branch: B. Pharmacy
Subject: Pharmaceutics VIII (Cosmetic technology)
Code: 341510 (41)
Total Theory Periods: 40
Total Tut. Periods: 12
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Formulation, packaging and evaluation of the following categories of cosmetics:

Module: 1 (8 Hrs.)

1. Face Preparations: Face powder, Compact powder, Talcum powder, Face packs and Masks.

2. Skin Preparations: Skin creams, Anti-wrinkle preparations, Barrier materials, Protective creams and gels, Vanishing creams, Cold creams, Cleanising creams Skin moisturisers, Sunscreen, burn preparations.

Module: 2 (8 Hrs.)

3. Shaving preparations: Lather shaving stick, Lather shaving cream, Shaving foams, Shaving gels, Pre- and After shave lotions.

4. Shampoo and Bath preparations: Clear liquid shampoo, Aerosol shampoo, dry shampoo, Acid-balanced shampoo, Egg shampoo, Bath oils, Foam baths.

Module: 3 (8 Hrs.)

5. Hair Preparations: Hair tonics, Hair conditioners, Hair lotions, Hair sprays, Hair dressings, Hair setting lotions and creams, Hair dyes, Bleaches, Hair waiving, Hair straightners and Hair strengthners.

6. Dentrifice: Tooth powders, Tooth pastes, Solid dentrifice, Tooth brush and Denture cleansers.

Module: 4 (8 Hrs.)

7. Foot Preparations: Foot powders, Foot sprays, Foot creams, Corn preparations and Athelete's foot preparation.

8. Manicure Preparations: Nail polish, Nail lacquer and Nail bleach.

Module: 5 (8 Hrs.)

9. Herbal Cosmetics: Cosmetics containing Aloe, Babul, Brahmi, Chandan, Cucumber, Haldi, Jatamansi, Khus, Mehandi, Neem, Reetha, Shikakai, Tulsi, Arnica, Amla, Bhringraj and Volatile oils

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 5th **Branch: B. Pharmacy**
Subject: Pharmaceutics-VII (Pharmaceutical Engineering-II) Lab. **Code: 341526(41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. To compare the efficiency of size reduction of a mixer and a ball mill.
2. To determine the size distribution of particles present in the given sample (powder or granules).
3. To determine rate of evaporation influenced by different factors (surface area, viscosity, concentration).
4. To perform the evaporation under reduced pressure by using Rota- evaporator.
5. To separate the pure liquid from & given impure liquid mixture-(simple distillation).
6. To find out the efficiency of steam distillation process for distillation of high boiling solvents from & non-volatile substance (liquid-mixture) [steam distillation].
7. To identify the azeotropic mixture with the different Techniques of distillation of distillation method.
8. To construct Boiling point Diagram of miscible liquids.
9. To dry a given wet solid and to construct drying curve.
10. To determine rate of drying influenced by different factors (various parameters).
11. To compare the extraction efficiencies of single and multiple stage extractions.
12. To observe the effects of various factors on the nature of crystal growth of a super saturated solution by different method.
13. To construct the solubility curve of a given drug (NaCl) at different temperature and to plot a solubility curve.
14. To study the effect of filter-aid on the rate of filtration and to determine the optimum concentration of filter-aid.
15. To study the factors effecting the rate of filtration of solutions.
16. To verify the stokes law for a given sphere (solid materials) in a given liquid.
17. To estimate the sedimentation time for the formulation having different concentrations of suspending agents by using centrifugation.

Text Books / Reference Books (Latest Edition):

1. W.L Badger and J.T Banchero, Introduction to Chemical Engineering McGraw Hill Intematonal Book Co., London.
2. Warren L. McCabe, Julian C. Smith, Peter Harriott, Unit Operations of Chemical Engineering, McGraw Hill Intematonal Edition Book Co.,London
3. K. Sambamurty, Pharmaceutical Engineering, New Age International, New Delhi.
4. Introduction to Chemical Engineering, Tata Mcgraw Hill, New Delhi.
5. S.J. Carter, Tutorial Pharmacy, Cooper & Gunn, CBS Publishers, New Delhi.
6. C.V.S. Subrahmanyam et al, Pharmaceutical Engineering Principles and Practices.
7. Pharmaceutics-The Science of Dosage Form Design, Churchill Livingstone, London.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 5th **Branch:** B. Pharmacy
Subject: Medicinal Chemistry-I) Lab. **Code: 341527(41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. Synthesis of selected chemical compounds of pharmaceutical importance.
   (Aspirin, benzamide, Benzoic acid, Phenytoin, Paracetamol, Phenacetin, Fluorescein, Eosin, Benzil, Benzilic acid, Trinitrophenol, Phenylbenzoate, Phthalamide)
2. Monographs of selected official drugs including identification tests and tests for purity.

Text Books/ Reference Books (Latest Edition):

1. Wilson & Grisvold, Text Book of Organic Medicinal & Pharmaceutical Chemistry, Lippincott Williams & Wilkins.
2. William Foye, Principles of Medicinal Chemistry, Lippincott Williams & Wilkins.
3. S. N. Pandeya, A Text Book of Medicinal Chemistry, SG Publisher, Varanshi.
4. Ashutosh Kar, Medicinal Chemistry, New Age International Publishers, New Delhi.
5. Bentley & Driver, Text Book of Pharmaceutical Chemistry, Oxford University Press, New Delhi.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 5th **Branch:** B. Pharmacy
Subject: Pharmacognosy-III (Natural Products) Lab. **Code: 341528 (41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. Estimation of following organic groups: hydroxyl (alcoholic and phenolic), amino, carboxylic groups and acetyl group.
2. Preparation of different Alkaloid testing reagents like Dragendroff, Mayer's, Wagner's, etc. and testing some alkaloids and Plant extracts using these reagents.
3. Identification of Alkaloids by specific colour tests.
4. Tests for steroids, steroidal glycosides and cardiac glycosides. Liberman-Burchard test, Salkowski reaction, Kedde reaction, etc.
5. Tests for flavanoids and their glycosides. Shinoda Test (Mg /HCl test), Fecl3 test.
6. Test for terpenoids
7. TLC Examination of Alkaloids, Steroids, Steroidal Glycosides and Cardiac Glycosides.
8. Isolation of caffeine from tea leaves.
9. Isolation of digitoxin from digitalis leaves.
10. Isolation of rutin from any two sources (orange, grapefruit, lemon, lime).
11. Isolation of menthol from mentha.
12. Isolation of atropine from datura leaves.
13. Isolation of curcumin from *Curcuma longa*.

Text Books / Reference Books (Latest Edition):

1. C. K. Kokate, A.P.Purohit, S.B. Gokhale, Text Book of Pharmacognosy, Nirali Prakashan, Pune.
2. G.E. Trease & W.C. Evans, Pharmacognosy, Saunders Elsevier.
3. T.E. Wallis, Text Book of Pharmacognosy, CBS Publishers & Distributors, New Delhi.
4. V.E. Tyler, L.R. Brady & J.E. Robbers, Text Book of Pharmacognosy, Lea & Febiger, Philadelphia, Recent Ed.
5. S.H. Ansari, Essential of Pharmacognosy, Birla Publication, Shahdara, New Delhi.
6. T. E. Wallis, Analytical Microscopy, J&A Churchill Limited, London.
7. K.R. Brain and T.D.Turner. "The Practical Evaluation of Phyto Pharmaceutical", Wright, Scientechnica-Bristol.
8. P, J. Schewer, Marine Natural products, Academic press, London.
9. Brain, K.R., & Turner T.D, The Practical evaluation of phytopharmaceutical, Wright, Bristol.
10. Sim, Medicinal Plant Alkaloids & Glycosides.
11. C. K. Kokate, Practical Pharmacognosy, Vallabh Prakashan, New Delhi.
12. E. Stahl, Thin layer chromatography, A Laboratory Hand Book , Springer Verlag, Berlin.
13. J.B. Harborne, Phytochemical Methods, Chapman & Hall, International Ed, London.
14. I.L. Finar, Organic chemistry, Vol. I & II ELBS, London.
15. O.P. Agarwal, Chemistry of Organic Natural Product, Vol. I & II Goel Pub. House, Meerut.
16. J. S. Qadry, B.S. Shah Pharmaconosy, Vallabh Prakashan.
17. J. B. Pridham & T. Swain, Biosynthetic pathway Higher plants, Academic Press, New York.
18. D. J. Abraham, Medicinal Chemistry & Drug Discibery, Berger's, John Wiley & Sons, New Jersey.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 5th **Branch:** B. Pharmacy
Subject: Pharmacology-I Lab. **Code: 341529 (41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals

1. To study the student organ bath
2. To prepare and submit 50 ml of physiological salt solution (Frog Ringer).
3. To draw and study the animal house equipments
4. To study the techniques of holding the animals.
5. To study the different routes of administration of drugs in mice.
6. To study the effect of Acetylcholine on rectus abdominus muscle of frog with the help of software.
7. To study the local anaesthetics on rabbit cornea with the help of software.
8. To record the concentration response curve of Histamine on guinea Pig's ileum with the help of software.

Text Books / Reference Books (Latest Edition):

1. K.D. Tripathi, Essentials of Medical Pharmacology, JAYPEE.
2. Goodman and Gilman's, The Pharmacological basis of Therapeutics; Editors: J G Hardman, L E Limbird, P B Molinoss, R W Ruddon and A G Gil, Pergamon Press."
3. Satoshkar and Bhandarkar, Pharmacology & Parmacotherapeutics, Popular Publication.
4. M.P. Rang, M.M .Dale, I. M. Riter, Pharmacology, Churchill Livingstone.
5. J. Crossland and J.H. Thomson., Essentials of Pharmacology, Harper and Row Publishers NY
6. Craig C R and Stitzel R R, Modem Pharmacology, Little Brown and Company.
7. S.R Kale, R.R Kale and S.A Hasan, Practical Pharmacology and Toxicology. Nirali Prakashan.
8. S.K. Kulkarni., Handbook of Experimental Pharmacology, Vallabh Prakashan Delhi.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 5th **Branch:** B. Pharmacy
Subject: Pharmaceutics VIII (Cosmetic technology) Lab. **Code: 341520 (41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

Experiments to be performed:

Exp.1 - To study the structure & functions of skin & hair.

Exp.2 - Prepare & submit talcum powder.

Exp.3 - Prepare & submit face powder.

Exp.4 - Prepare & submit vanishing cream.

Exp.5 - Prepare & submit moisturizing cream.

Exp.6 - Prepare & submit bleaching cream.

Exp.7 - Prepare & submit anti sun burn cream.

Exp.8 - Prepare & submit lather shaving cream.

Exp.9 - Prepare & submit after shave lotion.

Exp.10 - Prepare & submit hair shampoo.

Exp.11 - Prepare & submit hair creams.

Exp.12 - Prepare & submit tooth powder & tooth paste.

Exp.13 - Prepare & submit athelete's foot prepration.

Exp.14 - Prepare & submit nail polish.

Exp.15 - Prepare & submit herbal cosmetics containing Aloe, Haldi, Mehndi & Amla.

Reference / Recommend Books:

1. Harry's cosmeticology

2. Sagarin & Balsam, M.S. conmetic Science and Technology, Vol. 1-3, John Wiley & Sons, NY, USA

3. Mac Chesney, J.C. Packaging of Cosmetic and Toiletries, Newsness Butterworth, London.

4. Jellinek, J.S., Formulation and Functions of Cosmetics, John willey & sons, New York.

5. Thomssen, SG., Modern Cosmetics, Universal Publishing corporation, Bombay.

Chhattisgarh Swami Vivekanand Technical University

B. Pharmacy Third Year,

SIXTH SEMESTER, (New) from 2012 – 13

S. No	Subject Code No.	Board of Studies	Subject	Periods Per Week			Scheme of Examination			Total Marks	Credit=L+[T+P]/2
							Theory				
				L	T	P	ESE	CT	TA		
1	341616(41)	Pharmacy	Pharmaceutics -IX (Pharmaceutical Technology- I)	4	1	-	70	20	10	100	5
2	341617(41)	Pharmacy	Medicinal Chemistry -II	4	1	-	70	20	10	100	5
3	341618(41)	Pharmacy	Pharmacology - II	4	1	-	70	20	10	100	5
4	341619(41)	Pharmacy	Pharmaceutical Analysis II	4	1	-	70	20	10	100	5
5	341610(41)	Pharmacy	Pharmaceutical Biotechnology	4	1	-	70	20	10	100	5
6	341625(41)	Pharmacy	Pharmaceutics -IX (Pharmaceutical Technology- I) (LAB)	-	-	3	60	-	40	100	2
7	341626(41)	Pharmacy	Medicinal Chemistry- II (LAB)	-	-	3	60	-	40	100	2
8	341627(41)	Pharmacy	Pharmacology II (LAB)	-	-	3	60	-	40	100	2
9	341628(41)	Pharmacy	Pharmaceutical Analysis II (LAB)	-	-	3	60	-	40	100	2
10	341629(41)	Pharmacy	Pharmaceutical Biotechnology (LAB)	-	-	3	60	-	40	100	2
TOTAL				**20**	**5**	**15**	**650**	**100**	**250**	**1000**	**35**

Min. Pass Marks: (A) Theory ESE & TA+CT (Combined): 50%, (B) Practical ESE & TA (Combined): 50%

L- Lecture, T- Tutorial, P- Practical, ESE- End Semester Exam, TA- Teacher's Assessment

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 6th
Branch: B. Pharmacy
Subject: Pharmaceutics -IX (Pharmaceutical Technology- I)
Code: 341616 (41)
Total Theory Periods: 40
Total Tut. Periods: 12
Total Marks in End Semester Examination: 70
Minimum number of class of tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1. Preformulation Studies: Preformulation studies of API: BCS classification, Study of physical properties of drug like physical form, particle size, shape, density, wetting, dielectric constant. Solubility, dissolution and organoleptic properties and their effect on formulation, stability and bioavailability.

Module: 2 (8 Hrs.)

2.1. Semisolid Dosage Forms: Definitions, types, mechanisms of drug penetration, factors influencing penetration, semisolid bases and their selection. General formulation of semisolids, clear gels manufacturing procedure, evaluation and packaging.
2.2. Suppositories: Ideal requirements, bases, manufacturing procedure, packaging and evaluation.

Module: 3 (8 Hrs.)

3.1. Pharmaceutical Aerosols: Definition, propellants, general formulation, manufacturing and packaging methods, pharmaceutical applications.

Module: 4 (8 Hrs.)

4.1. Blood Products and Plasma Substitutes: Collection, processing and storage of whole human blood, concentrated human RBCs, dried human plasma, human fibrinogen, human thrombin, human normal immunoglobulin, human fibrin, foam plasma substitutes, -ideal requirements, PVP, dextran etc. for control of blood pressure as per I.P.

Module: 5 (8 Hrs.)

5.1. Liquid Dosages Forms: Introduction, types of additives used in formulations, Vehicles, stabilizers, preservatives, suspending agents, emulsifying agents, solubilizer, colors, flavours and others, manufacturing packaging and evaluation of clear liquids, suspensions and emulsions official in pharmacopoeia.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 6th
Subject: Medicinal Chemistry II
Total Theory Periods: 40
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Branch: B. Pharmacy
Code: 341617 (41)
Total Tut. Periods: 12

Classification, mode of action, uses and structure activity relationship of the following classes of drugs. Synthesis of those compounds only exemplified against each class.

Module: 1 (8 Hrs.)

1.1. Drugs acting on the Central Nervous System:

1.1.1. General Anaesthetics: Anaesthetic ether, Halothane, Thiopental Sodium.

1.1.2. Hypnotics and Sedatives: Hexobarbitone, Phenobarbitone, Cyclobarbitone, Glutethimide, Diazepam

1.1.3. Opioid analgesics: Pethidine, Methadone.

Module: 2 (8 Hrs.)

2.1. Drugs acting on the Central Nervous System:

2.1.1. Anticonvulsants: Phenytoin, Ethosuximide, Primidone, Carbamazepine

2.1.2. Antiparkinsonism drugs: Levodopa, Amantidine, Biperiden, Procyclidine

2.1.3. CNS stimulants: Caffeine, Nikethemide, Amphetamine, Pentylene tetrazole.

Module: 3 (8 Hrs.)

3.1. Sulphonamides

3.2. Anticoagulant and Antiplatelet Drugs.

3.3. Thyroid and antithyroid Drugs.

3.4. Vitamins: Vitamin A, Thiamine, Riboflavin, Folic Acid, Niacin, Panthotenic Acid, Pyridoxine, Cyanocobalamine, Vitamin C, Vitamin D, Vitamin E, Vitamin K.

Module: 4 (8 Hrs.)

4.1. Psychopharmacological agents (neuroleptics, antidepressants, anxiolytics): Chlorpromazine, Haloperidol, Impiramine, Phenelzine, Chlordiazepoxide,Alprazolam.

4.2. Combinatorial Chemistry- Introduction, combinatorial approaches, applications, methodology, introduction to High Throughputs Screening (HTS).

Module: 5 (8 Hrs.)

5.1. Structure of Some Drugs: Nitrazepam, Meprobromate, Phenosuximide, Valproic Acid, Ipronizid, Flupherazine, Methaqualone, Paraldehyde, Chloralhydrate, Allobarbitone, Methohexital sodium, Benztropine, Doxapram, Ethamivam , Fluoxentine, Trazodom, Bupropion, Cycrimine, Ethopropazine, Alpidem, Hydroxyzine.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 6th
Branch: B. Pharmacy
Subject: Pharmacology - II
Code: 341618 (41)
Total Theory Periods: 40
Total Tut. Periods: 12
Total Marks in End Semester Examination: 70
Minimum number of class of tests to be conducted:

Module: 1 Pharmacology of drugs acting on Cardiovascular System (8 Hrs.)

1.1. Digitalis and cardiac glycosides, treatment of CHF
1.2. Antihypertensive drugs
1.3. Antianginal and vasodilator drugs
1.4. Antiarrhythmic drugs
1.5. Antihyperlipidemic drugs,
1.6. Diuretics

Module: 2 Principles of Toxicology (8 Hrs.)

2.1. Definition of poisons
2.2. Adverse drug reactions
2.3. General principles of treatment of poisoning with particular reference of barbiturates, opioids, organophosphorous, paracetamol and atropine poisoning.

Module: 3 Drugs Acting on the Haemopoetic System (8 Hrs.)

3.1. Haematinics
3.2. Anticoagulants, Fibrinolytic and anti-platelet drugs
3.3. Vitamin K and haemostatic agents

Module: 4 Autacoids (8 Hrs.)

4.1. Histamine, 5-HT and their antagonists
4.2. Prostaglandins, thromoboxanes and leukotrienes.

Module: 5 Drugs Acting on the Respiratory System (8 Hrs.)

5.1. Anti-asthmatic drugs including bronchodilators
5.2. Anti-tussives and expectorants
5.3. Respiratory stimulants

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 6th
Branch: B. Pharmacy
Subject: Pharmaceutical Analysis II
Code: 341619 (41)
Total Theory Periods: 40
Total Tut. Periods: 12
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Theoretical considerations and application in drug analysis and quality control of the following analytical techniques:

Module: 1 (8 Hrs.)

1.1. Oxidation Reduction Titrations : Concepts of oxidation and reduction, Redox reactions, strengths and equivalent weights of oxidizing and reducing agents, Theory of redox titrations, Redox indicators, cell representations, Measurement of electrode potential, Oxidation-reduction curves, Iodimetry and Iodometry, Titrations involving ceric sulphate, potassium iodate, potassium bromate, potassium permanganate, Titanous chloride and sodium 2, 6-dichlorophenol indophenol.

Module: 2 (8 Hrs.)

2.1. Miscellaneous Methods of Analysis: Diazotisation titrations, Kjeldahl method of nitrogen estimation, Karl-Fischer titration, Oxygen flask combustion gasometry.

2.2. Potentiometry and pH Meter**.**

Module: 3 (8 Hrs.)

3.1. Conductometry

3.2. Polarography

3.3. Amperometry

Module: 4 (8 Hrs.)

4.1. Radioimmunoassays

4.2. ELISA tests

4.3. Electrophoresis, Immunoelectrophoresis.

Module: 5 (8 Hrs.)

5.1. Thermoanalytical methods: Thermogravimetry, Differential Thermal Analysis, Differential Scanning Calorimetry, Thermometric titration.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 6th
Branch: B. Pharmacy
Subject: Pharmaceutical Biotechnology
Code: 341610 (41)
Total Theory Periods: 40
Total Tut. Periods: 12
Total Marks in End Semester Examination: 70
Minimum number of class of tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1. Historical Development

1.2. Immunology and Immunological Preparations: Principles, Antigens and antibodies, Antigen-antibody reactions and their applications, Immune system. Cellular humoral immunity, Immunological tolerance, Hypersensitivity, Immunological and diagnostic preparations: Methods of their preparation, standardization and storage.

Module: 2 (8 Hrs.)

2.1. Enzyme Immobilization: Techniques of Immobilization of enzymes, kinetics and factors affecting enzymes kinetics, Enzymes electrodes, Enzymes based sensors, Study of enzymes produced by biotechnology, Immobilization of bacteria and plant cells, Applications of Immobilization.

Module: 3 (8 Hrs.)

3.1. Genetic Recombination: Transformation, Conjugation, Transduction, Protoplast fusion, Gene mutation, Gene cloning and their applications, Monoclonal antibodies and hybridoma technology, Recombinant DNA technology: Concepts, Methodology and Pharmaceutical applications. Study of drugs such as Activase, Humulin, Humatrope, HB etc, Drug delivery systems in Gene therapy, transgenic plants-pest and disease resistance.

3.2. Proteomics, genomics (genome and human genome project), DNA Fingerprinting, concept of bioinformatics.

3.3. Plant tissue culture techniques.

Module: 4 (8 Hrs.)

4.1. Microbiological Transformation: Introduction, Types of reactions mediated by microorganisms. Design of biotransformation processes, Selection of organisms, Biotransformation processes and its improvements with special reference to steroids.

Module: 5 (8 Hrs.)

5.1. Industrial Biotechnology: Historical development, Fermenter and its design, Control of different parameters in fermentation process. Isolation of mutants, factors influencing rate of mutation. Design of fermentation process, production of Penicillin, streptomycins, tetracyclines and vitamin B12.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 6th | Branch: **Pharmacy**
Subject: **Pharmaceutics-IX (Pharma technology-I) Lab.** | Code: **341625 (41)**
Total Practical Periods: **36**
Total Marks in End Semester Examination: **60**

List of Practicals (A minimum of 10 experiments shall be conducted)

1. To perform solubility studies on drugs in different solvents.
2. To determine particle size of drug powder by optical microscopy.
3. To perform stability of active pharmaceutical ingredient.
4. To prepare, evaluate and submit Paracetamol suspension 50 ml.
5. To prepare, evaluate and submit Paracetamol syrup.
6. To prepare, evaluate and submit Iodine ointment.
7. To prepare and evaluate Ibuprofen Ointment
8. To prepare, evaluate and submit Salicylic acid ointment 10gm IP.
9. To prepare, evaluate and submit emulsifying ointment-IP.
10. To prepare and evaluate Diclofenac Gel.
11. To prepare, evaluate and submit suppositories.
12. To prepare and evaluate Diclofenac Sodium Suppositories.
13. To prepare and evaluate Benzyl benzoate application.
14. To study micromeritic properties of excipients like microcrystalline cellulose, dibasic calcium phosphate, lactose etc.
15. To study the rheology of semisolids like ointments creams, gels etc.
16. To study the flow rate/ rheological properties with different size of particles / granules.

Text Books/ Reference Books (Latest Edition):

1. Lachmann L, Lieberman HA and Kanig J L, The Theory and Practice of Industrial Pharmacy, Lea & Febiger, Philadelphia.
2. E.A. Rawlins Bentley, Textbook of Pharmaceutics, Tindall, London.
3. Ansel, Allen & Popovich, Pharmaceutical Dosage Forms & Drug Delivery Systems, Lippincott Williams & Wilkins, London.
4. Lippincott Williams & Wilkins Science & Practice of Pharmacy, Remington, London.
5. Sagarin & Balsam M S Cosmetic Science and Technology, Vol 1-3, 2nd ed John Wiley & Sons, NY.
6. S. Saraf & S. Saraf, Cosmetics: A Practical Manual, Pharma Book Syndicate.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 6th **Branch:** B. Pharmacy
Subject: Medicinal Chemistry-II Lab. **Code: 341626 (41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. Synthesis of selected drugs of Pharmaceutical importance.
2. Monographs of selected official drugs including identification tests and tests for purity.
(Ascorbic acid, Prochlorperazine, Riboflavin, Chloramphenicol, Isoniazid, Chlorpropamide, Caffeine, Omeprazole, Ondansetron)

TEXT BOOKS/ REFERENCE BOOKS (Latest Edition):

1. Wilson & Gisvold, Text Book of Organic Medicinal & Pharmaceutical Chemistry, Lippincott Williams & Wilkins, Latest Edition.
2. William Foye, Principles of Medicinal Chemistry, Lippincott Williams & Wilkins, Latest Edition.
3. S.N. Pandeya, A Text Book of Medicinal Chemistry, SG Publisher, Varanshi, Latest Edition.
4. Ashutosh Kar, Medicinal Chemistry, New Age International Publishers, New Delhi, Latest Edition.
5. Bentley & Driver, Text Book of Pharmaceutical Chemistry, Oxford University Press, New Delhi, Latest Edition.
6. G Ozin, A. Arsenault, Nanochemistry: A chemical approach to nanomaterials, RSC Publishing.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 6th **Branch:** B. Pharmacy
Subject: Pharmacology-II Lab. **Code: 341627 (41)**
Total Practical Periods: 40
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. To record the dose response curve (DRC) of acetylcholine cockerel ileum.
2. To record the DRC of histamine on isolated loop of guinea pig ileum.
3. To calculate the pA2, value of mepyramine or chlorpheniramine using histamine as agonist on isolated loop of guinea pig ileum.
4. To estimate the strength of the test sample of agonist/drug (e.g. Acetylcholine, Histamine) using a suitable isolated muscle preparation employing matching bioassay, Bracketing assay.
5. Study of agonists, antagonists and ions on frog heart (simulated exp).
6. Effect of different drugs on rabbit eye (simulated exp).
7. Effect of drugs on neuromuscular junction (simulated ex).
8. Study of neurotransmission with the help of visual aids.

Text Books / Reference Books (Latest Edition):

1. K.D. Tripathi, Essentials of Medical Pharmacology, JAYPEE.
2. Goodman and Gilman's, The Pharmacological basis of Therapeutics; Editors: J G Hardman, L E Limbird, P B Molinoss, R W Ruddon and A G Gil, Pergamon Press."
3. Satoshkar & Bhandarkar, Pharmacology & Parmacotherapeutics, Popular Publication.
4. Rang MP, Dale MM, Riter IM., Pharmacology, Churchill Livingstone.
5. Crossland J and Thomson J H., Essentials of Pharmacology, Harper and Row Publishers NY
6. Craig C R and Stitzel R R, Modem Pharmacology, Little Brown and Company, 1994.
7. S.R Kale, R.R Kale and S.A Hasan, Practical Pharmacology and Toxicology. Nirali Prakashan, Latest Edition.
8. S.K. Kulkarni., Handbook of Experimental Pharmacology, Vallabh Prakashan Delhi.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 6th
Branch: B. Pharmacy
Subject: Pharmaceutical Analysis-II Lab.
Code: 341628 (41)
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. Exercise involving diazotization, Kjeldahl, Karl-Fischer, shall be covered.
2. Exercises based on acid base titration in aqueous and non-aqueous media, oxidation reduction titrations using potentiometric technique.
3. Determination of acid-base dissociation constants and plotting of titration curves using pH meter.
4. Exercises involving conductometric titrations.
5. Preparation and standardization of some redox titrants e.g. potassium permanganate, potassium dichromate, iodine, sodium thiosulphate.
6. Some exercises related to determination of oxidizing and reducing agents in the sample shall be covered.
7. Exercises involving potassium iodate, potassium bromate, iodine solution, sodium 2, 6-ichlorophenolindophenol, and ceric ammonium sulphate.

Text Books/ Reference Books (Latest Edition):

1. Vogel, Text Book of Quantitative Chemical Analysis, Pearson Education.
2. B.K. Sharma, Instrumental Methods of Chemical Analysis, Goel Publishing House.
3. Bentley & Driver, Text Book of Pharmaceutical Chemistry, Oxford Medical Publication.
4. Beckett & Stenlake, Practical Pharmaceutical Analysis, CBS Publishers &Distributors.
5. Pharmacopoeia of India Vol. I & II., Ministry of Health, Govt. of India, New Delhi.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 6th
Branch: B. Pharmacy
Subject: Pharmaceutical Biotechnology Lab.
Code: 341629 (41)
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. To prepare & evaluate enzyme immobilized calcium alginate beads.
2. To extract tyrosinase from potato and study the substrate specificity on different substrate.
3. To determine the enzyme kinetics of pepsin.
4. Enzyme immobilization with gelatin gel solution.
5. To isolate DNA from onion.
6. To treat yogurt fermentation with lactobacillus bacteria.
7. To isolate RNA from yeast cell.
8. A, B, O Blood group typing of own blood IgM mediated agglutination reaction.
9. To estimate total protein content in alginate beads by biurate reagents.
10. To isolate enzyme urease & determine its practical yields.
11. Batch submerged Fermentation of broken's yeast.
12. To isolate lecithin from egg yolk.
13. To isolate glutein from wheat flour.
14. To perform separation of amino acids by using TLC.
15. To prepare alcohol by using fermentation process.

Text Books / Reference Books (Latest Edition):

1. K. Kielslich, Ed Biotechnology Vol 6 a, Verleg Chemie, Switzerland.
2. R.S. Setty, G.R. Veena, Biotechnology I, New Age, New Delhi.
3. Setty Sreekrishna, Biotechnology II, New Age, New Delhi.
4. S. Mahesh, Biotechnology III, New Age, New Delhi.
5. Mahesh Vedamurthy, Biotechnology IV, New Age, New Delhi.
6. M.K. Mahesh, Biotechnology V, New Age, New Delhi.
7. K. Trehan, Biotechnology, New Age, New Delhi.
8. S.J. Carter, Cooper and Gunn's Tutorial Pharmacy, CBS Publishers, Delhi.
9. E.A. Rawlins, Bentley's Text Book of Pharmaceutics, ELBS Balliere tindall.
10. W.B. Hugo, and A.D. Russell, Pharmaceutical microbiology, Blackwell Scientific Pubication, Oxford.
11. A. Wiserman, Handbook of enzyme biotechnology, Ellis Harwood Ltd., Chichester
12. L.E. Cassida Industrial Microbiology, Wiley, Eastern Limited, New Delhi.
13. M. Weir Donald, John Stewart, Immunology, Churchill Livingstone, London.

Chhattisgarh Swami Vivekanand Technical University

B. Pharmacy Forth Year,

SEVENTH SEMESTER, (New) from 2012 – 13

S. No	Subject Code No.	Board of Studies	Subject	Periods Per Week			Scheme of Examination			Total Marks	Credit=L+ [T+P]/2
							Theory				
				L	T	P	ESE	CT	TA		
1	341716(41)	Pharmacy	Pharmaceutics –X (Pharmaceutical Technology -II)	4	1	-	70	20	10	100	5
2	341717(41)	Pharmacy	Pharmaceutics-XI (Biopharmaceutics & Pharmacokinetics)	4	1	-	70	20	10	100	5
3	341718(41)	Pharmacy	Medicinal Chemistry- III	4	1	-	70	20	10	100	5
4	341719(41)	Pharmacy	Pharmacology- III	4	1	-	70	20	10	100	5
5	341710(41)	Pharmacy	Pharmacognosy- IV	4	1	-	70	20	10	100	5
6	341725(41)	Pharmacy	Pharmaceutics –X (Pharmaceutical Technology -II) Lab	-	-	3	60	-	40	100	2
7	341726(41)	Pharmacy	Pharmaceutics- XI (Biopharmaceutics & Pharmacokinetics) Lab	-	-	3	60	-	40	100	2
8	341727(41)	Pharmacy	Pharmacology –III (Lab)	-	-	3	60	-	40	100	2
9	341728(41)	Pharmacy	Pharmacognosy- IV (Lab)	-	-	3	60	-	40	100	2
10	341729(41)	Pharmacy	Professional Training and report writing	-	-	-	-	-	100	100	2
TOTAL				**20**	**5**	**12**	**590**	**100**	**310**	**1000**	**35**

Min. Pass Marks: (A) Theory ESE & TA+CT (Combined): 50%, (B) Practical ESE & TA (Combined): 50%

L- Lecture, T- Tutorial, P- Practical, ESE- End Semester Exam, TA- Teacher's Assessment

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 7th
Branch: B. Pharmacy
Subject: Pharmaceutics -X (Pharmaceutical Technology -II)
Code: 341716(41)
Total Theory Periods: 40
Total Tut. Periods: 12
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1 Capsules: Advantages and disadvantages of capsule dosage form, material for production of hard gelatin capsules, size of capsules, method of capsule filling, soft gelatin, capsule shell and capsule content, importance of base absorption and minimum/gm factors in soft capsules, quality control, stability testing (ICH Guidelines) and storage of capsule dosage forms.

Module: 2 (8 Hrs.)

2.1 Tablets:

2.1.1 Formulation of different types of tablets, granulation, technology on large-scale by various techniques, physics of tablets making, different types of tablet compression machinery and the equipments employed, evaluation of tablets.

2.1.2 Coating of Tablets: Types of coating, film forming materials, formulation of coating solution, equipments for coating, coating process, evaluation of coated tablets.

Module: 3 (8 Hrs.)

3.1. Parenteral Products:

3.1.1. Preformulation factors, routes of administration, water for injection, pyrogenicity, non-aqueous vehicles, isotonicity and methods of its adjustment.

3.1.2. Formulation details, containers and closures and selection.

3.1.3. Prefilling treatment, washing of containers and closures, preparation of solution and suspensions, filling and closing of ampoules, vials, infusion fluids, lyophillization & preparation of sterile powders, equipment for large scale manufacture and evaluation of parenteral products.

3.1.4. Aseptic Techniques-source of contamination and methods of prevention, Design of aseptic area, Laminar flow bench services and maintenance.

3.1.5. Sterility testing of pharmaceuticals.

Module: 4 (8 Hrs.)

4.1. Ophthalmic Preparations: Requirements, formulation, methods of preparation, containers, evaluation.

4.2. Stability Studies: Stability kinetics, In process quality control and quality assurance, ICH Guidelines for *stability testing* of active pharmaceutical ingredients and finished *pharmaceutical products*

Module: 5 (8 Hrs.)

5.1 Packaging of Pharmaceutical Products: Packaging components, types, specifications and methods of evaluation, stability aspects of packaging. Packaging equipments, factors influencing choice of containers, legal and other.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 7th
Branch: B. Pharmacy
Subject: Pharmaceutics-XI (Biopharmaceutics & Pharmacokinetics)
Code: 341717(41)
Total Theory Periods: 40
Total Tut. Periods: 12
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1. Introduction to Biopharmaceutics and Pharmacokinetics and their role in formulation development and clinical setting.

1.2. Biopharmaceutics:

1.2.1. Passage of drugs across biological barrier (passive diffusion, active transport, facilitated diffusion and pinocytosis).

1.2.2. Factors influencing absorption - Physicochemical, physiological and pharmaceutical.

1.2.3. Drug distribution in the body, plasma protein binding.

1.2.4. Different types and mechanism of drug metabolism in the body.

1.2.5. Drug excretion through other routes than gastrointestinal and urinary: Excretion of drugs in saliva, tears, sweat, milk, semen.

Module: 2 (8 Hrs.)

2.1. Pharmacokinetics:

2.1.1. Significance of plasma drug concentration measurement.

2.1.2. Compartment model: Definition and Scope.
Pharmacokinetics of drug absorption: Zero order and first order absorption rate constant using Wagner - Nelson and Loo- Reigelman method.

2.1.3. Volume of distribution and distribution coefficient.

2.1.4. Compartment kinetics: One compartment and two compartment models. Determination of pharmacokinetic parameters from plasma and urine data after drug administration by intravascular and oral route.

Module: 3 (8 Hrs.)

3.1. Curve fitting (method of Residuals), regression procedures.

3.2. Clearance concept, Mechanism of renal clearance, clearance ratio, determination of renal clearance.

3.3. Extraction ratio, hepatic clearance, biliary excretion, Extrahepatic circulation.

3.4. Non-linear pharmacokinetics with special reference to one compartment model after drug administration,

3.5. Michaeles Menten Equation, detection of non-linearity (Saturation mechanism).

Module: 4 (8 Hrs.)

4.1. Clinical Pharmacokinetics: Definition and scope, Dosage adjustment in patients with and without renal and hepatic failure, Design of single dose bio-equivalence study and relevant statistics, Pharmacokinetic drug interactions and their significance in combination therapy.

Module: 5 (8 Hrs.)

5.1. Bioavailability and bioequivalence :

5.1.1. Measures of bioavailability, C_{max}, t_{max} and Area under the Curve (AUC).

5.1.2. Design of single dose bioequivalence study and relevant statistics.

5.1.3. Review of regulatory requirements for conduction of bioequivalent studies.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 7th
Branch: B. Pharmacy
Subject: Medicinal Chemistry- III
Code: 341718(41)
Total Theory Periods: 40
Total Tut. Periods: 12
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Classification, mode of action, uses and structure activity relationship of the following classes of drugs. Synthesis of those compounds only exemplified against each class.

Module: 1 (8 Hrs.)

1.1. **Steroids and Related Drugs:** General study on Steroidal nomenclature and stereochemistry, Androgens and anabolic agents, Estrogens and progestational agents,: synthesis of Progesterone from diosgenin, Diethyl stilbesterol, Synthesis of Testosterone from Cholesterol, General study of structural formula and therapeutic uses of steroidal antinflammatory agents.
1.2. **Antiviral Drugs:** Zidovudine, Didanosine, Vidarabine.

Module: 2 (8 Hrs.)

2.1. **Cardiovascular, Hypertensive Drugs:** Disopyramide phosphate, Clonidine, Methyldopa, Procainamide, Hydralazine, Nifedipine, Isosorbide dinitrate, Prazocin, clofibrate.
2.2. **Insulin and Oral Hypoglycemic Agents:** Insulin, Glibenclamide, Metformin.

Module: 3 (8 Hrs.)

3.1. **Antibiotics (Used in Chemotherapy):** Beta-lactam Antibiotics: Penicillin, Cephalosporin, Aminoglycoside antibiotics, Macrolide antibiotics, Tetracyclines, Chloramphenicol.

Module: 4 (8 Hrs.)

4.1. **Antineoplastic Agents:** Mechlorethamine, Cyclophosphamide, Thiotepa, Methotrexate
4.2. **Antimalarials:** Chloroquine, Primaquine, Pyrimethamine.

Module: 5 (8 Hrs.)

5.1. **Diuretics:** Acetazolamide, Chlorthiazide, Furosemide, Disulfamide, Chlorthalidone, Ethacrynic acid, Mersalyl.
5.2. **Structure of Some Drugs:** Oesterone, Quinidine sulphate, Procainamide, Amiodarone, Mercaptomerin Sodium, Spironolactone, Triamterene, Losartan, Tolbutamide, Mepacrine mesylate, Melphalan.

Text Books/Reference Books (Latest Edition):

1. Wilson & Grisvold, Text Book of Organic Medicinal & Pharmaceutical Chemistry, Lippincott Williams & Wilkins.
2. William Foye, Principles of Medicinal Chemistry, Lippincott Williams & Wilkins.
3. S.N.Pandeya, A Text Book of Medicinal Chemistry, SG Publisher, Varanshi.
4. Ashutosh Kar, Medicinal Chemistry, New Age International Publishers, New Delhi.
5. Bentley & Driver, Text Book of Pharmaceutical Chemistry, Oxford University Press, New Delhi.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 7th
Branch: B. Pharmacy
Subject: Pharmacology- III
Code: 341719(41)
Total Theory Periods: 40
Total Tut. Periods: 12
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 Drugs Acting on the Gastrointestinal Tract (8 Hrs.)

1.1. Antacids, Anti secretory and Anti-ulcer drugs, Laxatives and antidiarrhoeal drugs.
1.2. Appetite stimulants and suppressants.
1.3. Emetics and anti-emetics.
1.4. Miscellaneous: carminatives, demulcents, protectives, adsorbents, astringents, digestives, enzymes and mucolytics.

Module: 2 Pharmacology of drugs affecting Endocrine System (8 Hrs.)

2.1. Hypothalamic and pituitary hormones
2.2. Thyroid hormones and anti-thyroid drugs, calcitonin and Vitamin D.
2.3. Insulin, oral hypoglycemic agents
2.4. ACTH and corticosteroids
2.5. Androgens and anabolic steroids, Estrogens, progesterone and oral contraceptives.

Module: 3 Chemotherapy (8 Hrs.)

3.1. General principles of Chemotherapy.
3.2. Sulfonamides and Quinolones.
3.3. Penicillin, Cephalosporins, Tetracyclines, Amino glycoside antibiotics, Chloramphenicol and Erythromycin

Module: 4 Chemotherapy of Infections (8 Hrs.)

4.1. Chemotherapy of malaria tuberculosis, leprosy, fungal diseases, viral diseases
4.2. Chemotherapy of malignancy and immunosuppressive agents
4.3. Antiprotozoal drugs and anthelmintics

Module: 5 Concepts of Clinical Pharmacology (8 Hrs.)

5.1. Clinical Trial studies
5.2. Preclinical Toxicity studies
5.3. Bioassay of Drugs and Biological Standardization.
5.4. Drug interactions

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 7 th
Branch: B.Pharmacy
Subject: Pharmacognosy- IV
Code: 341710(41)
Total Theory Periods: 40
Total Tut. Periods: 12
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 (08 Hrs.)

1.1. Studies of Traditional Herbal Drugs: Common vernacular names, botanical sources, morphology, chemical nature of chief constituents, pharmacology, categories and common uses and marketed formulations of following indigenous drugs:

Punarnava (*Boerhavia diffusa*), Shankhpushpi (*Convolvulus microphylla*), Lahsun (*Allium sativum*), Guggul (*Commiphora mukul*), Kalmegh (*Andrographis peniculata*), Tulsi (*Ocimum sanctum*), Valerian (*Valerian officinalis*), Artemisia (*Artemisia annua*), Chirata (*Swertia chirata*), Asoka (*Saraca indica*), Saffron (*Crocus sativa*), Shilajit, Brahmi (*Bacopa monnieri* and *Centella asiatica*), Salai (*Boswellia serrata*), Giloe (*Tinospora cordifolia*) Amla (*Embellica officinalis*), Pipali (*Piper longum*).

1.1.1. Bhoamyalaki (*Phyllanthus niruri*), Stevia

Module: 2 (08 Hrs.)

2.1. Study of Herbal formulations: The holistic concept of drug administration in traditional systems of medicine.

2.2. Brief Introduction and principles of Ayurveda, Sidha, Unani, Chinese and Homeopathic systems of medicines.

2.3. Introduction to Herbal Pharmacopoeias /formulary with special reference to preparations like Aristas, Asava, Ghutika, Taila, Churna, Avaleha, Ghrita and Bhasms; Unani formulations like Majooms, Safoofs.

Module: 3 (08 Hrs.)

3.1. Systematic study of source, cultivation, collection, processing, commercial varieties, chemical constituents, substitutes, adulterants, uses, diagnostic macroscopic and microscopic features and specific chemical tests of following

3.1.1. Alkaloid containing drugs:

- Pyridine - Tobacco.
- Tropane: Belladonna and Withania
- Quinoline and isoquinoline: Cinchona and Opium.
- Indole : Ergot, Rauwolfia and Catharanthus.
- Imidazole: Pilocarpus
- Steroidal: Veratrum
- Alkaloidal amine: Ephedra
- Glycoalkaloid: Solanum.

3.1.2. Purines: Coffee, tea and cola.

Module: 4 (06 Hrs.)

4.1. Role of medicinal and aromatic plants in national economy.

4.2. World wide trade in Medicinal plants & derived product. Tropane alkaloids containing drugs, Cinchona, Rauwolfia, Taxol, Digitalis, Liquorice, Papain, Ginseng, Aloe, Valerian, & plant laxatives.

4.3. Biological sources, preparation, identification tests and uses of the following enzymes: Diastase, papain, pepsin, trypsin, pancreatin.

Module: 5 (08 Hrs.)

5.1. Introduction, classification and study of different chromatographic methods (Column Chromatography, TLC, PC, HPTLC, GC and HPLC) and their applications in evaluation of herbal drugs.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 7th **Branch:** B. Pharmacy
Subject: Pharmaceutics-X (Pharmaceutical Technology -II) Lab. **Code: 341725(41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. To formulate and evaluate Paracetamol / Aspirin tablets by different tabletting methods.
2. Prepare and evaluate Effervescent Tablets of Aspirin.
3. Prepare and evaluate dispersible tablets of Diclofenac Sodium.
4. Perform the sugar coating on the given sample of Tablets.
5. Perform the Film Coating on the given sample of Tablets.
6. Perform the enteric coating on the given sample of Tablets.
7. Prepare and evaluate Tetracycline HCL Capsules. .
8. Prepare and evaluate Ciprofloxacin Eye Drop.
9. Prepare and evaluate Water for Injection.
10. Prepare and evaluate Oxytetracycline Injection.
11. Prepare and evaluate an aqueous injection of poor water soluble drug using hydrotropic solubilization technique.
12. Experiments to illustrate physical and biological evaluation of pharmaceutical products like powders, surgical dressing.
13. To study the role of glidants on flow properties of granules.
14. To study the role of lubricant mixing on diminution profile of pharmaceuticals.
15. To study the rate of drying in static and in fluidized state.
16. To perform content uniformity by varying rate and time of mixing of powders.
17. To perform stability studies on drug formulations as per ICH guidelines.

Text Books / Reference Books (Latest Edition):

1. E. A. Rawlins, Bentley, Textbook of Pharmaceutics, Tindall, London, 8th Ed. 2005.
2. D. K. Tripathi, Introduction to Pharmaceutics (Theory and Practice), Jaypee Brothers Medical Publisher, Pvt. Lt.d., New Delhi.
3. Lachmann & Libermann, Theory & Practice of Industrial Pharmacy, Varghese Publishing House, Bombay.
4. Ansel, Allen & Popovich, Pharmaceutical Dosage Forms & Drug Delivery Systems, Lippincott Williams & Wilkins, London,
5. Science & Practice of Pharmacy, Remington, Lippincott Williams & Wilkins, London.
6. M.E.Aulton, Pharmaceutics, “The Science of Dosage Form Design”, Churchil lLivingstone, New York.
7. D. K. Tripathi, Industrial Pharmacy (A Comprehensive Approach) - PharmaMed Press, Hyderabad

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 7th **Branch:** B. Pharmacy
Subject: Pharmaceutics-XI (Biopharmaceutics and Pharmacokinetics) Lab. **Code: 341726(41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 08 experiments shall be conducted)

1. To find out mean dissolution time (MDT) of given sample of tablet and compare with other marketed brands.
2. To find out Km, Vm of given drug in presence of various enzyme (papain and albumin).
3. To determine kinetic parameter of given drug (aspirin) by urinary excretion data.
4. To find out protein binding rate of given drug sample.
5. To estimate buccal absorption of given chewable tablet of ascorbic acid.
6. To perform bioequivalence study of given drug samples.
7. To perform In-vitro drug release study of Enteric Coated Aspirin tablet.
8. To perform In-vitro bio-equivalence study of different marketed suspension formulation of paracetamol.
9. To perform In-vitro drug release study of conventional aspirin tablet.
10. To perform In-vitro drug release study of diclofenac sustain release tablet.
11. To perform In-vitro bioequivalence study of sustain Release formulation.
12. To determine the apparent permeability of drug using Cockrel Intestine.

Text Books / Reference Books (Latest Edition):

1. M. Gibaldi and D. Perrier, Pharmacokinetics, Marcel Dekker Inc., NY
2. R.E. Notari, Biopharmaceutics and Pharmacokinetics-An Introduction, Lea & Febiger, New York.
3. Jaiswal, Brahmankar, Biopharmaquality and pharmacokinetics.
4. I.D. Leepeter, Pharmacokinetic analysis
5. Niazi, Textbook of Biopharmacokinetics and clinical pharmacokinetics.
6. Venkaateshwaruv, Biopharmaceutics and pharmacokinetics, phared puss, Hyderabad.
7. Wagner-pharmacokinetics for the pharma studies.
8. Dhachinamoorthi D: Biopharmaceutics and pharmacokinetics: A practical manual.
9. Shargel: Pharmacokinetics & Biopharmacokinetics & Biopharmaceutics.
10. A.R. Gennaro, ed Remington's The science and Practice of Pharmacy, Mac Publishing Co. Pennsylvannia, USA.
11. Milo Gibaldi. Biopharmacokinetics and Clinical Pharmacokinetics, 3rd., Lea & Febizer, Philadelphia 1984.
12. Brahmankar's Biopharmaceutics and Pharmacokinetics, Vallabh Prakashan, Delhi.
13. Rowland & Tozer's Clinical Pharmacokinetics, Concepts and applications, Lea & Febiger Publication, USA.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 7th **Branch:** B. Pharmacy
Subject: Pharmacology-III Lab. **Code: 341727(41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. To calculate the pA2 value of atropine using acetylcholine as an agonist on rat ileum preparation.
2. To calculate the pA2 value of mepyramine or chlorpheniramine using histamine as agonist on guinea pig ileum.
3. To estimate the strength of the test sample of Acetylcholine using a suitable isolated muscle preparation employing Matching bioassay, Bracketing assay, three point assay and four point bioassay.
4. To estimate the strength of the test sample of Histamine using a suitable isolated muscle preparation employing Matching bioassay, Bracketing assay, three point assay and four point bioassay.
5. To estimate the strength of the test sample of Oxytocin using a suitable isolated muscle preparation employing Matching bioassay, Bracketing assay, three point assay and four point bioassay.
6. To study the Anti- secretary and anti-ulcer activity using pylorus ligation method.
7. To determine the MIC of antibiotics.
8. Study of OECD toxicity guidelines

Text Books / Reference Books (Latest Edition):

1. K.D. Tripathi, Essentials of Medical Pharmacology, JAYPEE.
2. Goodman and Gilman's, The Pharmacological basis of Therapeutics; Editors: J G Hardman, L E Limbird, P B Molinoss, R W Ruddon and A G Gil, Pergamon Press."
3. Satoshkar and Bhandarkar, Pharmacology & Parmacotherapeutics, Popular Publication.
4. Rang MP, Dale MM, Riter IM., Pharmacology, Churchill Livingstone.
5. Crossland J and Thomson J H., Essentials of Pharmacology, Harper and Row Publishers NY
6. Craig C R and Stitzel R R, Modem Pharmacology, Little Brown and Company, 1994.
7. S.R Kale, R.R Kale and S.A Hasan, Practical Pharmacology and Toxicology. Nirali Prakashan, Latest Edition.
8. S.K. Kulkarni., Handbook of Experimental Pharmacology, Vallabh Prakashan Delhi.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 7th **Branch:** B. Pharmacy
Subject: Pharmacognosy-IV Lab. **Code: 341728(41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. Perform macroscopic study of at least ten indigenous crude drugs listed in theory.
2. Perform macroscopic study of at least five alkaloid containing crude drugs as mentioned in theory.
3. Formulation and Standardization of at least two traditional drug formulations (Ayurvedic/Unani).
4. Perform microscopic study of eight - selected drugs given in theory in entire and powdered form (two drugs in each experiment).
5. Perform chemical evaluation of powdered drugs.
6. Perform chemical evaluation of enzymes
7. Perform experiment to isolate papain from papaya.
8. Perform experiment to isolate nicotine from tobacco
9. Perform experiment to isolate withanolides from withania leaves.
10. Perform chromatographic studies of some herbal constituents by TLC and PC.

Text Books / Reference Books(Latest Edition):

1. C. K. Kokate, A.P.Purohit, S.B. Gokhale, Text Book of Pharmacognosy, Nirali Prakashan, Pune.
2. G.E. Trease & W.C. Evans, Pharmacognosy, Saunders Elsevier.
3. T.E.Wallis, Text Book of Pharmacognosy, CBS Publishers & Distributors, New Delhi.
4. V.E. Tyler, L.R. Brady & J.E. Robbers, Text Book of Pharmacognosy, Lea & Febiger, Philadelphia.
5. S.H. Ansari, Essential of Pharmacognosy, Birla Publication, Shahdara, New Delhi.
6. T. E. Wallis, Analytical Microscopy, J&A Churchill Limited, London.
7. K.R. Brain and T.D.Turner. “The Practical Evaluation of Phyto Pharmaceutical”, Wright, Scientechnica-Bristol.
8. P, J. Schewer, Marine Natural products, Academic press, London.
9. Brain, K.R., & Turner T.D, The Practical evaluation of phytopharmaceutical, Wright, Bristol.
10. C. K. Kokate, Practical Pharmacognosy, Vallabh Prakashan, New Delhi.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 7th **Branch:** B. Pharmacy
Subject: Professional Training and report writing. **Code: 341729(41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 100

Industry : Pharmaceutical manufacturing industry/Hospitals/Medical Stores*

Duration: Minimum two weeks

*** The original certificate issued by the concerned training provider where the training is under gone to be enclosed with the report.**

Chhattisgarh Swami Vivekanand Technical University

B. Pharmacy Forth Year,

EIGTH SEMESTER, (New) from 2012 – 13

S. No	Subject Code No.	Board of Studies	Subject	Periods Per Week			Scheme of Examination			Total Marks	Credit=L+[T+P]/2
							Theory				
				L	T	P	ESE	CT	TA		
1	341815(41)	Pharmacy	Pharmaceutics-XII (Pharmaceutical Technology –III)	4	1	-	70	20	10	100	5
2	341816(41)	Pharmacy	Pharmaceutical Analysis- III (Instrumental)	4	1	-	70	20	10	100	5
3	341817(41)	Pharmacy	Pharmaceutical Analysis- IV (Quality Assurance and Drug Regulatory Affairs)	4	1	-	70	20	10	100	5
4	341818(41)	Pharmacy	Pharmacognosy- V	4	1	-	70	20	10	100	5
5	341819(41)	Pharmacy	Pharmaceutics- XIII (Pharmaceutical Jurisprudence)	4	1	-	70	20	10	100	5
6	341825(41)	Pharmacy	Pharmaceutics-XII (Pharmaceutical Technology –III) – Lab	-	-	3	60	-	40	100	2
7	341826(41)	Pharmacy	Pharmaceutical Analysis- III (Instrumental) – Lab	-	-	3	60	-	40	100	2
8	341827(41)	Pharmacy	Pharmacognosy-V – Lab	-	-	3	60	-	40	100	2
9	341828(41)	Pharmacy	Project	-	-	3	120	-	80	200	2
TOTAL				**20**	**5**	**12**	**650**	**100**	**250**	**1000**	**33**

Min. Pass Marks: (A) Theory ESE & TA+CT (Combined): 50%, (B) Practical ESE & TA (Combined): 50%

L- Lecture, T- Tutorial, P- Practical, ESE- End Semester Exam, TA- Teacher's Assessment

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 8th **Branch:** B. Pharmacy
Subject: Pharmaceutics -XII (Pharmaceutical Technology –III) **Code: 341815(41)**
Total Theory Periods: 40 **Total Tut. Periods: 12**
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1(8 Hrs.)

1.1. Introduction of Controlled and Extended drug delivery system.
1.2. Design, development, formulation and evaluation of controlled release formulations. Carriers for drug delivery systems, Prodrugs.

Module: 2 (8 Hrs.)

2.1. Micro-encapsulation: Types of microcapsules, importance of microencapsulation in pharmacy, microencapsulation by phase separation, coacervation, multi orifice, spray drying, spray congealing, polymerisation complex emulsion, air suspension technique, coating pan and other techniques, evaluation of micro capsules.

Module: 3 (8 Hrs.)

3.1. Targeted Drug Delivery Systems: Concept of drug targetting, importance in therapeutics, methods in drug targeting, Nanoparticles, Liposomes, Erythrocytes.
3.2. Transdermal Drug Delivery Systems: Principle, types of components, application, method of preparation, evaluation parameters.

Module: 4 (8Hrs.)

4.1. Sustained release formulations: Concept, Rationale for Extended – Release Pharmaceuticals, Terminology, Techniques of Extended release oral dosage forms. Delayed - Release oral dosage forms, Evaluation of sustained release formulations. Brief introduction to controlled release dosage forms. Design and evaluation of osmotic pump, implants, IUDs and occuserts,

Module: 5 (8Hrs.)

5.1. Surgical products: Definition, primary wound dressing, absorbents, surgical cotton, surgical gauzes etc., bandages, adhesive tape, protective cellulosic hemostatics, official dressings, absorbable and non absorbable sutures, ligatures and catguts. Medical prosthetics and organ replacement materials.

Text Books / Reference Books (Latest Edition):

1. D. K. Tripathi, Introduction to Pharmaceutics (Theory and Practice), Jaypee Brothers Medical Publisher, Pvt. Lt.d., New Delhi.
2. Lachmann & Libermann, Theory & Practice of Industrial Pharmacy, Varghese Publishing House, Bombay.
3. Ansel, Allen & Popovich, Pharmaceutical Dosage Forms & Drug Delivery Systems, Lippincott Williams & Wilkins, London,
4. Science & Practice of Pharmacy, Remington, Lippincott Williams & Wilkins, London.
5. M.E.Aulton, Pharmaceutics, “The Science of Dosage Form Design”, Churchil lLivingstone, New York.
6. D. K. Tripathi, Industrial Pharmacy (A Comprehensive Approach) - PharmaMed Press, Hyderabad

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 8th **Branch:** B. Pharmacy
Subject: Pharmaceutical Analysis- III (Instrumental) **Code: 341816(41)**
Total Theory Periods: 40 **Total Tut. Periods:** 12
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Principle, basic instrumentation, elements of interpretation of spectra and applications of the following analytical techniques should be discussed.

Module: 1 (8 Hrs.)
1.1. Ultraviolet and visible spectrophotometry.
1.2. Atomic Absorption spectroscopy

Module: 2 (8 Hrs.)
2.1. Infrared spectrophotometry.
2.2. Fluorimetry

Module: 3 (8 Hrs.)
3.1. Nuclear Magnetic resonance spectroscopy including C^{13} NMR.
3.2. Flame Photometry.

Module: 4 (8 Hrs.)
4.1. Mass Spectrometry
4.2. X-ray diffraction

Module: 5 (8 Hrs.)
5.1. Chromatography: The following techniques will be discussed with relevant examples of pharmacopoeial products.
5.1.1. TLC, Paper Chromatography, Ion exchange chromatography and Column Chromatography.
5.1.2. HPLC, GLC, and HPTLC

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 8th **Branch:** B.Pharmacy
Subject: Pharmaceutical Analysis- IV (Quality Assurance and Drug Regulatory Affairs) **Code: 341817(41)**
Total Theory Periods: 40 **Total Tut. Periods: 12**
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1. Quality Assurance

1.1.1. Basic concepts of Quality control & Quality Assurance, Total Quality Management, Philosophy of GMP, cGMP, GLP, ISO. Introduction of ICH guidelines

1.1.2. Regulatory control, regulatory drug analysis, interpretation of analytical data.

Module: 2 (8 Hrs.)

2.1. Pharmaceutical Validation

2.1.1. Process Validation, Equipment validation, Validation of Analytical Procedures.

2.1.2. Sterile products validation

2.1.3. Cleaning validation

2.1.4. Validation of Water systems for sterile & Non Sterile products

Module: 3 (8 Hrs.)

3.1. Quality control responsibilities, Routine controls on instruments, sampling plans, standard test procedures and protocols, Quality control documentation and audits of QC facilities. Finished product release, quality review, quality audits and batch release documents.

Module: 4 (8 Hrs.)

4.1. Drug Regulatory Affairs: Role of Regulatory Affairs Dept., Nomenclature and salient features of regulatory authorities of India, US, Japan and EU.

Module: 5 (8 Hrs.)

5.1. Stability testing protocols of drug products as per ICH guidelines.

Text Books / Reference Books (Latest Edition):

1. How to Practice GMPs, Vandana Publications, Delhi.
2. D. H. Shab, Quality Assurance Manual,– Business Horizons
3. Quality Assurance for Pharmaceuticals, Vol-I & II, Pharma Book Syndicate
4. D.H. Shah, SOP Guidelines, Business Horizon, Delhi.
5. R.A. Nash & A.H. Wachter, Pharmaceutical Process Validation, Marcel Dekker, New York,
6. S. H. Wilig, Good Manufacturing Practices for Pharmaceutics, Marcel Dekker, New York.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 8th
Branch: B. Pharmacy
Subject: Pharmacognosy- V
Code: 341818 (41)
Total Theory Periods: 40
Total Tut. Periods: 12
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1. Isolation Techniques:

1.1.1. General methods used for the isolation and characterization of alkaloids, lipids, glycosides, proteins, volatile oils, bioflavonoids, steroids, terpenoids and resins.

1.1.2. Application of column, paper and thin layer chromatographic techniques for the isolation of phytopharmaceuticals.

Module: 2 (8 Hrs.)

2.1. Plant Biotechnology:

2.1.1. Tissue culture, Nutritional requirements, Callus and suspension culture.
2.1.2. Production of secondary metabolites, viz. Shikonin and Taxol.
2.1.3. Biotransformation, immobilisation of cells and enzymes.
2.1.4. Applications of plant tissue culture in pharmacognosy.

Module: 3 (8 Hrs.)

3.1. Quality control and Standardization of herbal drugs:

3.1.1. WHO guidelines for evaluation of drugs
3.1.2. Factors affecting Herbs quality of herbal drugs
3.1.3. Chromatographic markers.
3.1.4. Spectroscopic techniques and assay methods.
3.1.5. Determination of heavy metals in herbal preparation like bhasmas and churanas
3.1.6. Determination of alcohol contents in Aristas and Asawas.
3.1.7. Quality control and rational use of herbal drugs as per WHO guidelines.
3.1.8. Deterioration of herbal drugs by insect.

Module: 4 (8 Hrs.)

4.1. Herbal cosmetics and novel phytopharmaceuticals:

4.1.1. Cosmeceuticals
4.1.2. Shampoos (soapnut), Conditioners, (Amla, Henna, Hibiscus, Tea), Hair darkeners (Amla, Henna), Skin care (Aloe, Turmeric).
4.1.3. Phytosomes: Definition and scope

4.2. Marine pharmacognosy: An introduction to potential cardio-vascular, anticancer/cytotoxic and antibiotic drugs from marine sources.
4.3. Chemotaxonomy of medicinal plants.

4.4. Herbs as health foods (Nutraceuticals)**.**

4.5. Antioxidants from plant origin

Module: 5 (8 Hrs.)

5.1. Extraction of herbal drugs:

5.1.1. Basic principle
5.1.2. Pre extraction operation for crude drugs
5.1.3. Effect of solvent, solvent mixture & solution of extraction
5.1.4. Extraction methods
5.1.5. Treatment of dry residue after extraction

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 8th
Branch: B. Pharmacy
Subject: Pharmaceutics- XIII (Pharmaceutical Jurisprudence)
Code: 341819(41)
Total Theory Periods: 40
Total Tut. Periods: 12
Total Marks in End Semester Examination: 70
Minimum number of class tests to be conducted: 2

Module: 1 (8 Hrs.)

1.1. Introduction: Pharmaceutical Legislations–A brief review; Pharmaceutical Education-A brief review; Code of Pharmaceutical Ethics.

Module: 2 (8 Hrs.)

1.1. An elaborate study of the followings: Pharmacy act 1948, Drugs and Cosmetics Act 1940 and Rules 1945, Narcotic Drugs & Psychotropic Substances Act 1985 & Rules.

Module: 3 (8 Hrs.)

3.1. A brief study of the following with special reference to the main provisions only: Poisons Act 1919, Medical Termination of Pregnancy Act 1970 & Rules 1975.,Prevention of Cruelty of Animals Act 1960.

Module: 4 (8 Hrs.)

1.1. Patents Act 1970: Objective, definition and type of patent, secrecy of certain inventions, procedure for getting patent.
1.2. Factories Act 1948: approval, licensing and registration of factory, inspection, design of work hour
1.3. Medicinal & Toilet Preparations (Excise Duties) Act 1955.

Module: 5 (8 Hrs.)

5.1. Drugs Price Control Order 1995: Objective and calculation of retail price of formulation.
5.2. Drugs and Magic Remedies (Objectionable Advertisements) Acts 1954.

Text Books / Reference Books (Latest Edition):

1. B.M. Mithal, A Textbook of Forensic Pharmacy, Vallabh Prakashan, New Delhi,
2. N.K. Jain, A Textbook of Forensic Pharmacy, Vallabh Prakashan, New Delhi.
3. V. Malik, Law relating to Drugs & Cosmetics, Eastern Book Com.,Lucknow.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 8th **Branch:** B. Pharmacy
Subject: Pharmaceutics-XII (Pharmaceutical Technology -III) Lab. **Code: 341825(41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. To formulate and evaluate sustain release matrix tablets of Diclofenac sodium.
2. To formulate and evaluate Transdermal patch of diclofenac sodium/salbutamol sulphate.
3. To microencapsulate diclofenac sodium by solvent Evaporation Technique.
4. To formulate solid dispersion of poorly water soluble drug using kneading method.
5. To formulate solid dispersion of poorly water soluble drug by solvent evaporation technique.
6. To formulate and evaluate the liposome prepared by thin film hydration hand shaking method.
7. To prepare and evaluate microcapsules
8. To prepare and evaluate transdermal patches
9. To prepare and evaluate solid dispersion tablets
10. To prepare and evaluate microspheres prepared by coacervation method and emulsification method.
11. To study the release profile of conventional and enteric coated tablets.
12. To study the effect of rate of stirring on size of microspheres.
13. To study the effect of cross linking agent on microspheres.
14. Evaluate various surgical products.

Text Books / Reference Books (Latest Edition):

1. J.R. Robinson & Lee Vincent, Controlled Drug Delivery: Fundamentals & Applications, Marcel Dekker Inc., NY.
2. Pharmacopoeia of India, Ministry of Health and family Welfare, Govt. of India, New Delhi.
3. Banker G.S. and Rhode C.T., Modern Pharmaceutics, Marcell Decker Inc., New York.
4. N. K. Jain Controlled and novel drug delivery; CBS Publishers, Delhi.
5. N.K. Jain, S. N. Sharma, Advances in Controlled & Novel Drug Delivery, CBS Publishers, Delhi.
6. E. A. Rawlins, Bentley, Textbook of Pharmaceutics, Tindall, London, 8th Ed. 2005.
7. Lachmann & Libermann, Theory & Practice of Industrial Pharmacy, Varghese Publishing House, Bombay.
8. Ansel, Allen & Popovich, Pharmaceutical Dosage Forms & Drug Delivery Systems, Lippincott Williams & Wilkins, London,
9. Science & Practice of Pharmacy, Remington, Lippincott Williams & Wilkins, London.
10. M.E. Aulton, Pharmaceutics, “The Science of Dosage Form Design”, Churchil lLivingstone, New York.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 8th **Branch:** B. Pharmacy
Subject: Pharmaceutical Analysis-III (Instrumental Analysis) Lab. **Code: 341826(41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. Estimation of Na+, K+, Ca++ ions using flame photometry.
2. Workshop to interpret the structure of simple organic compounds using UV, IR, NMR & MS
3. Determination of solvent cut off value of different solvents.
4. Study of effect of various solvents on spectral features of any drug.
5. Perform the quantitative spectrophotometric estimation of drug by single point method.
6. Perform the quantitative spectrophotometric estimation of drug by calibration curve method.
7. Perform the quantitative spectrophotometric estimation of drug by standard absorptivity method.
8. Simultaneous quantitative spectrophotometric estimation of two drugs by simultaneous equation method.
9. Simultaneous quantitative spectrophotometric estimation of two drugs by dual wavelength method.
10. Simultaneous quantitative spectrophotometric estimation of two drugs by derivative spectroscopy.
11. To determine the drug content of given tablet formulation
12. Interpretation of given IR spectra.
13. Chromatographic analysis of some pharmaceutical products, (Paper chromatography of Amino acids, TLC of alkaloids, sulphonamides)
14. Quantitative estimation of any drug by RP-HPLC.
15. Acid and alkaline stress degradation study of any drug.
16. Photo and thermal stress degradation study of any drug.
17. Oxidative stress degradation study of any drug.

Text Books / Reference Books (Latest Edition):

1. Vogel, Text Book of Quantitative Chemical Analysis, Pearson Education.
2. B.K. Sharma, Instrumental Methods of Chemical Analysis, Goel Publishing House.
3. Beckett & Stenlake, Practical Pharmaceutical Chemistry, Vol.-II, CBS Publishers & Distribution.
4. Corner, A Text Book of Pharmaceutical Analysis, John Wiley.
5. Willard Den & Merrit, Instrumental Methods of Analysis, CBS Publication & Distribution.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 8th **Branch:** B. Pharmacy
Subject: Pharmacognosy-V(Lab) **Code: 341827(41)**
Total Practical Periods: 36
Total Marks in End Semester Examination: 60

List of Practicals (A minimum of 10 experiments shall be conducted)

1. Isolation of some selected phytoconstituents studied in theory.
2. Extraction of volatile oils and their chromatographic profiles.
3. Some experiments in plant tissue culture.
4. Preparation and evaluation of herbal Cosmetics (atleast one from theory).
5. Perform experiment to demonstrate antioxidant activity by DPPH method / H_2O_2 method
6. Determination of solvent extractive values (water/alcohol).
7. Determination of ash values.
8. Determination of volatile oils in crude drugs.
9. Determination of specific microorganism in crude drugs.(salmonella\staphylococcus)
10. Determination of bitterness value.
11. Determination of hemolytic activity.
12. Determination of foaming index and swelling index.
13. Determination of tannins.
14. Determination of heavy metals by limit test /instrumental analysis of (As/Hg/Pb/Cd)

Text Books / Reference Books (Latest Edition):

1. C. K. Kokate, A.P. Purohit, S.B. Gokhale, Text Book of Pharmacognosy, Nirali Prakashan, Pune.
2. G.E. Trease & W.C. Evans, Pharmacognosy, Saunders Elsevier.
3. T.E. Wallis, Text Book of Pharmacognosy, CBS Publishers and Distributors, New Delhi.
4. V.E. Tyler, L.R. Brady & J.E. Robbers, Text Book of Pharmacognosy, Lea & Febiger, Philadelphia.
5. S.H. Ansari, Essential of Pharmacognosy, Birla Publication, Shahdara, New Delhi.
6. T. E. Wallis, Analytical Microscopy, J&A Churchill Limited, London.
7. K.R. Brain and T.D. Turner. “The Practical Evaluation of Phyto Pharmaceutical”, Wright, Scientechnica-Bristol.
8. C. K. Kokate, Practical Pharmacognosy, Vallabh Prakashan, New Delhi.
9. Quality control methods for medicinal plant materials, World Health Organisation, Geneva, AITBS Publishers and Distributors, Delhi.
10. Sagarin & Balsam M.S. Cosmetic Science and Technology, Vol 1-3, John Wiley & Sons, NY.
11. S. Saraf & S. Saraf, Cosmetics: A Practical Manual, Pharma Book Syndicate.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: 8 th
Branch: B. Pharmacy
Subject: Project
Code: 341828(41)
Total Marks in End Semester Examination: 200

The project should be based on the subject taught during the course.