



UNIVERSITY OF CALICUT

Abstract

BVoc programme in Pharmaceutical Chemistry – under Modified BVoc Regulations 2014 – Scheme and Syllabus - implemented w.e.f 2015 admission onwards - Orders issued

G & A - IV - J

U.O.No. 3707/2016/Admn

Dated, Calicut University.P.O, 31.03.2016

- Read:-*1. Minutes of the meeting of the Principals of the colleges got permission to start BVoc programmes and Community College programme held on 19.06.14
2. U.O.No. 9809/2014/Admn Dtd 23.10.2014
3. U.O.No. 2650/2015/Admn Dtd :17.03.2015
4. Item No.1 in the Minutes of the Board of Studies in Chemsitry UG held on 29.02.2016
5. Remarks of Dean Faculty of Science dated 16.03.2016
6. Approval of Vice Chancellor dated 26.03.2016

ORDER

As per the paper read as (1) above the Draft Regulations for BVoc Programmes have been prepared.

As per paper read as (2) The BVoc Regulations have been implemented and as per paper read as (3) the Modified BVoc Regulations have been finalised and implemented.

Vide paper read as (4), Board of Studies in Chemistry UG approved the syllabus for BVoc programme in Pharmaceutical Chemistry.

Dean, Faculty of Science vide paper read as (5) approved the resolution of the Board.

Vide paper read as (6) Vice Chancellor, exercising the powers of Academic Council, approved the minutes of the Board, subject to ratification by Academic Council.

Sanction has, therefore, been accorded for the implementation of the Scheme and Syllabus of BVoc programme in Pharmaceutical Chemistry under BVoc Regulations 2014, in the University, w.e.f 2015 Admissions.

Orders are issued accordingly.

(The syllabus is available in the website: universityofcalicut.info)

Anuja Balakrishnan
Deputy Registrar

To

Pareeksha Bhavan/ Colleges offering BVoc in Pharmaceutical Chemistry

Forwarded / By Order

Section Officer

UNIVERSITY OF CALICUT

B. VOC. Degree Programme in PHARMACEUTICAL CHEMISTRY

SCHEME AND SYLLABI For General and Skill Papers

2015 ADMISSION ONWARDS

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**CURRICULAM
FOR
PHARMACEUTICAL
CHEMISTRY**

Sem No.	Course no.	Course Code	Course Title	Credits	Hour/ Per week	Marks
1	1.1	GEC1EG01	A01 The Four Skills For Communication	4	4	100
	1.2	GEC1ML02 / GEC1HD02	MAL1A01(2)Malayalam-Bhashayum Sahithyavum I A07 Communication Skills in Hindi	4	4	100
	1.3	GEC1HA01	Human Anatomy, Physiology & Health Awareness	4	4	100
	1.4	SDC1PH01	Pharmaceutics I	4	4	100
	1.5	SDC1PP01	Pharmacology & Pharmacovigilance	4	4	100
	1.6	SDC1HA02 (P)	Human Anatomy	3	3	100
	1.7	SDC1PH02(P)	Pharmaceutics I	3	3	100
	1.8	SDC1PP02(P)	Pharmacology	4	4	100
Total				30 credits		800 marks
Sem No.	Course No.	Code	Course Title	Credits	Hour/ Per week	Marks
2	2.1	GEC2EG02	A02 Modern Prose and Drama	4	4	100
	2.2	GEC2ML02 / GEC2HD02	MAL2A02(2)Malayalam-Bhashayum Sahithyavum- II A09 Literature in Hindi	4	4	100
	2.3	GEC2OC01	Fundamentals of Organic Chemistry and maintaining a QC/PC laboratory	4	4	100
	2.4	SDC2PH03	Pharmaceutics II	2	2	100
	2.5	SDC2AC01	Analytical chemistry I	2	2	100
	2.6	SDC2AC02	Analytical Chemistry II Advanced	2	2	100
	2.7	SDC2IC01(P)	Inorganic Chemistry	2	2	100
	2.8	SDC2OC02(P)	Organic Chemistry	2	2	100
	2.9	SDC2AC03(P)	Analytical Chemistry I	2	2	100
	2.10	SDC2AC04(P)	Analytical Chemistry II Advanced	2	2	100
	2.11	SDC2PC01(Int)	Internship	4	4	100
Total				30 credits		1100 marks
Sem No	Course No.	Code	Course Title	Credits	Hour/ Per week	Marks
			4			

3	3.1	GEC3EG03	A03 Inspiring Expressions	4	4	100
	3.2	GEC3BC01	Biochemistry	4	4	100
	3.3	GEC3BS01	Biostatistics	4	4	100
	3.4	SDC3MB01	Microbiology	4	4	100
	3.5	SDC3FC01	Food Chemistry and Technology	4	4	100
	3.6	SDC3MB02(P)	Microbiology	5	5	100
	3.7	SDC3BC02(P)	Biochemistry	5	5	100
Total				30 credits		700 marks
Sem No.	Course No.	Code	Course Title	Credits	Hour/Per week	Marks
4	4.1	GEC4EG04	A04 Reading on Society	4	4	100
	4.2	GEC4MC01	Medicinal Chemistry I	4	4	100
	4.3	GEC4PG01	Pharmacognosy	4	4	100
	4.4	SDC4PH04	Pharmaceutics III	4	4	100
	4.5	SDC4MC02(P)	Medicinal Chemistry I	4	4	100
	4.6	SDC4PG02 (P)	Pharmacognosy	4	4	100
	4.7	SDC4PC02(Int)	Internship	6	6	100
Total				30 credits		700
Sem No.	Course No.	Code	Course Title	Credits	Hour/Per week	Marks
5	5.1	GEC5MC03	Medicinal Chemistry II	4	4	100
	5.2	GEC5NP01	Chemistry on Natural Products	4	4	100
	5.3	GEC5CE01	GEC5CE01 Chemistry In Everyday Life	4	4	100
	5.4	SDC5PJ01	Pharmaceutical Justice, Prudence and Ethics	4	4	100
	5.5	SDC5PM01	Pharmaceutical Management	4	4	100
	5.6	SDC5NP02 (P)	Chemistry on natural products	5	5	100
	5.7	SDC5MC04(P)	Medicinal Chemistry II	5	5	100
Total				30 credits		700 marks
Sem No.	Course No.	Code	Course Title	Credits	Hour/Per week	Marks

6	6.1	SDC6PC03(Int)	Internship	30 credits (900 hours)		100 Marks
Total				180 credits		4100 marks

DETAILED SYLLABUS
FOR
PHARMACEUTICAL
CHEMISTRY

SEMESTER I

SEMESTER -1

Course code: GEC1HA01

Course 1.3 : HUMAN ANATOMY, PHYSIOLOGY & HEALTH AWARENESS

Total Hours: 60 ;Credits :4; Hours/week: 4

Objective:

A study of the anatomical structure of human body. Body structure will be studied by organ systems and will involve a balance between gross anatomical study and histology.

Outcomes:

1. Study about structure, composition and functions of the organ systems of the human body.
2. Awareness about diseases and their way of control.
3. Importance of first aid.

Module 1 : Human Anatomy (10 hrs)

Skeletal system :-Structure, composition and functions of skeleton, classification of joints, types of movements at joints, Disorders of joints.

Muscular System: Anatomy & physiology of skeletal & smooth muscle, types of muscle contraction, muscle tone. , physiology of muscle contraction, physiological properties of skeletal muscle and their disorders.

Circulatory system ;:- Composition and function of blood and its elements, their disorders, blood groups and their significance, mechanism of coagulation, disorders of platelets and coagulation.

Lymph and Lymphatic system: Composition, formation and circulation of lymph, disorders of lymph and lymphatic system. Basic physiology and functions of spleen.

Module 2: Cardiovascular system and Digestive System (10 hrs)

Cardiovascular system: Basic anatomy of the heart, physiology of heart, blood vessels and circulation.

Basic understanding of cardiac cycle, heart sound and electrocardiogram. Blood pressure and its regulation. Brief outline of cardiovascular disorders like hypertension, hypo tension, arteriosclerosis, angina, myocardial infarction, congestive heart failure and cardiac arrhythmia.

Digestive system Digestive System: Gross anatomy of the gastrointestinal tract functions of its different parts including those of liver, pancreas and gall bladder. Various gastro-intestinal secretions and their role in the absorption and digestion of food, disorders of digestive system.

Module 3: Respiratory and Excretory system (10 hrs)

Respiratory system Respiratory system: Anatomy of respiratory organs, functions of respiration, mechanism and regulation of respiration, respiratory volumes and capacity.

Excretory system Urinary System: Various parts, structures and functions of the kidney and urinary tract. Physiology of urine formation and acid base balance. Diseases of the urinary system.

Module 4: Nervous system (10 hrs)

Central Nervous System: Functions of different parts of brain and spinal cord. Neurohumoral transmission in the central nervous system, cranial nerves and their functions. Autonomic Nervous System: Physiology and functions of the autonomic nervous system. Mechanism of neurohumoral transmission in the A.N.S

Endocrine system: Basic anatomy and physiology of pituitary, thyroid, Parathyroid, Adrenals, Pancreas, Testes and ovary, their hormones and functions.

Reproductive system Reproductive system: Male and Female reproductive system and their hormones.

Module 5: Animal Cells and Tissues (10 hrs)

Structural & functional organization of cell, its components and functions: Body fluids & its composition, transport mechanisms across the cell membrane, Cell cycle.

Elementary tissues of the human body: Epithelial, connective muscular and nervous tissues, their Sub-type and characteristics.

Module 6 : Public Health, Diseases & Awareness (10 hrs)

First Aid: Emergency treatment of shock, snake bites, burns, poisoning, fractures and resuscitation methods. Orientation of Disease Management Disease management for common diseases.

REFERENCES

1. Best and Taylor's "Physiological basis of Medical Practice".
2. Guyton A.C. Hall J.E. Text book of Medical Physiology.
3. Human Physiology by C.C. Chatterjee.
4. Samson Wright's Applied Physiology by Cyril A. Keek, Eric Neil and Norman Joels.
5. Textbook of Preventive and Social Medicine by J.E. Park and K. Park.

SEMESTER -1

Course Code: SDC1PH01

Course1.4: PHARAMCEUTICS I

Total Hours :60 ;Credits: 4 ; Hours/Week: 4

Objective:

To handle prescription and about the pharmaceutical calculation. Also understanding the general procedure of dispensing and labeling of medicines reason and correction for incompatibilities how to coordinate as community pharmacy.

Outcomes

To Know about,

- 1.Factors affecting dose and its calculation.
- 2.How to handle the prescription.
- 3.General dispensing and labeling procedures.
- 4.Various pharmaceutical calculations.
- 5.Types incompatibilities and their remedies.
- 6.Role of community pharmacist.

Module 1: Posology (15hrs)

Meaning of pharmaceutical dose and dosage formulae Factor affecting pharmaceutical dose , dosage route of administration, calculation of doses for infants, adults and elderly patients,medical terms,pharmaceutical distribution system,Healthsystem,first aid measures, General view of pharmaceutical industries in world wide view.

Module 2: Pharmaceutical Calculations (10 hrs)

System of weights and measures in Pharmacy - House hold measures and use of equivalents imperial system to metric system, Enlarging and reducing recipes, , Dilution and concentration of formulation – Calculation of Allegation method - Alligation medial and allegation alternate , percentage solutions, proof spirit, isotonic solutions and displacement value.

Module 3: Dosage forms of drugs (20 hrs)

Principle involved and procedures adopted in dispensing (I): Typical prescriptions like of solids, semisolids and liquid dosages.

Module 4: Community Pharmacy (15 hrs)

Organization and structure of retail and wholesale drug store types of drug store and design, legal requirements for establishment, maintenance and drug store, dispensing of proprietary products, maintenance of records of retail and wholesale, patient counseling, role of pharmacist in community healthcare & education. Regulatory authorities and Govt policies.

REFERENCES

1. Carter SJ. "Cooper & Gunn's Tutorial Pharmacy", 6th edition, CBS Publishers & Distributors, New Delhi.
2. Indian Pharmacopoeia 2007, Vol I-III, 2008, Indian Pharmacopoeia Commission, Ghaziabad.
3. British Pharmacopoeia 2009, British Pharmacopoeia Commission, UK.
4. Remington's The Science & Practice of Pharmacy Mack Publishing Co. Easton, PA
5. Jain NK & Gupta GD. Modern Dispensing Pharmacy, II edition, 2009, Pharma Book Syndicate, Hyderabad

SEMESTER -1

Course Code: SDC1PP01

Course1.5: Pharmacology&Pharmacovigillence

Total Hours :60 ;Credits: 4 ; Hours/Week: 4

Objective:

It is the understanding therapeutically effects of chemicals and learn about structure , mode of action of drugs are mainly used in CNS , ANS and cardiovascular system

Outcomes:

1. Idea of general pharmacology
2. Structure, mechanism of action, pharmacokinetics etc. of drugs acting on cardiovascular systems, CNS and ANS

Module 1: General pharmacology (15 hrs)

Introduction, definitions and scope of pharmacology - Routes of administration of drugs .Pharmacokinetic principles: absorption, distribution, metabolism and excretion of drugs. (ADME). Pharmacodynamic principles: dose response relationships, mechanism of drug action, unusual and adverse responses of drugs.Drug interactions-synergism, antagonism, drug addiction and drug dependence, drug tolerance, drug hypersensitivity.Mechanism of drug action, principles of drug action, drug receptors and cellular signaling systems.

Module 2 : Pharmacology of drugs acting on ANS (15 hrs)

- a) Adrenergic and antiadrenergic drugs
- b) Cholinergic and anticholinergic drugs
- c) Neuromuscular blockers
- d) Drugs used in Alzheimers disease
- e)Drugs used in Parkinsonism

Module 3: Pharmacology of drugs acting on CNS (10 hrs)

- a) General anesthetics
- b) Muscle relaxants
- c) Anticonvulsants
- d) Analgesic and anti-inflammatory agents
- e) CNS stimulants

Module 4: Pharmacology of drugs acting on cardiovascular system

(10 hrs)

- a) Antihypertensives
- b) Anti-anginal drugs
- c) Anti-arrhythmic drugs
- d) Drugs used for therapy of Congestive Heart Failure
- e, Antilipidermic drugs
- f) Cardiotonic drugs

(discuss only general action, eg, therapeutic use, dose and mode of administration and adverse effect)

Module 5: Orientation on Pharmacovigilance (10 hrs)

To familiarize what comprise the field of pharmacovigilance and its related fields.

To understand its relevance & potential for MSR's role. How to use this knowledge for effective performance.

To know common terms used and their reference.

To understand the scope of Pharmacovigilance as a system.

To know National & International pharmacovigilance regulatory Authorities

To learn basic processing of a typical “case” through case studies

Introduction of Drug Formularies and their relevance for MSR

REFERENCES

1. K. D. Tripathi, Essentials of Medical Pharmacology, 6th Edn., Jaypee, 2008
2. L.S. Goodman, A. Gillman, The Pharmacological Basis of Therapeutics, 10th Edn., McGraw Hill, 2001.
3. Pharmacology and Therapeutics – Satoskar.
4. Kulkarni S.K., Hand book of Experimental Pharmacology.
5. Topics of Molecular Pharmacology I & II by Nurger and Roberts.
7. Essentials of Pharmacotherapeutics by F.S.K. Barar.

SEMESTER -1

Course Code : SDC1HA02 (P)

Course(Practical)1.6: HUMAN ANATOMY

Total hours: 45 ; Credits: 3 ; Hours/week:3

Objective:

A study of the anatomical structure of human body and organ systems

Outcomes:

1. Study about identification structure and functions of the organ systems of the human body
2. Blood group identification
3. Hb count determination of WBC RBC

Study on Human Skelton system

Demonstration of models

Blood group identification

Hb count determination of WBC RBC

REFERENCES

1. Best and Tailor's "Physiological basis of Medical Practice".
2. Guyton A.C. Hall J.E. Text book of Medical Physiology.
3. Human Physiology by C.C. Chatterjee.

SEMESTER -1

Course Code: SDC1PH02 (P)

Course (Practical)1.7: PHARMACEUTICS I

Total Hours: 45 ;Credit: 3; Hours/week: 3

Objective

To know about preparation of different classes of pharmaceutical dosage

Learning outcomes:

Preparation of aromatic water,mixtures,powders,lotion,liniments etc.

I: Preparation of following classes of Pharmaceutical dosage forms (as official in IP and IP/USP)

a. Aromatic Waters

1. Rose Water IP
2. Concentrated Peppermint Water BP

b) Mixtures

1. Light Magnesium Carbonate and Kaolin Mixture

c) Powders

1. ORS Powder IP

II. Study of the role of pharmaceutical additives in formulations

1. Compound Sodium Chloride Mouthwash BP
2. Phenol Gargle BPC
- 3 Orange Tincture IP
4. Potassium Citrate Mixture BP
5. Simple Elixir IP
6. Calamine Lotion
7. Cresol with Soap Solution IP
8. Turpentine Liniment BP

REFERENCE

1. Pharmacopoeia of India, Ministry of Health & Family Welfare, Govt of India, New Delhi.
2. British Pharmacopoeia, Stationary Press, Royal Society of Pharmaceutical Press, London.
3. United State Pharmacopoeia, United State Pharmacopoeial Convention, Inc., 12601. Twinbrook Parkway, Rockyville M.D. 20852, USA.
4. Jain, N. K. and Sharma, S.N., Theory and Practice of Professional Pharmacy, Vallabh Prakshan, New Delhi.

SEMESTER -1

Course Code : SDC1PP02 (P)

Course (Practical)1.8:PHARMACOLOGY

Total Hours: 60; Credit: 4; Hours/week: 4

Objectives

Learn about case study and information technology

Learning outcomes

Learning a particular case through hospital visit, Skills for presentation

1.Basic knowledge of information technology

Introduction to Computer
Microsoft word 2010
Microsoft power point 2010
Microsoft Excell 2010
Internet and Net work
Typing practice

2.Case study and Hospital visit.

3.Seminars on Drug profile.

REFERENCES

1. "Computers Today" by Senders D. H., McGrawHill.
2. "Computer fundamentals" by P. K. Sinha. Third edition, BPB Publication.
3. "Information technology", Jaiswal, S., Galgotia Pub.
4. Manuals for MS DOS, MS Office, MS Windows, UNIX.
5. "Office 2000/2003 Complete", BPB Publication.

SEMESTER II

SEMESTER -2
Course Code: GEC2OC01

**Course2.3: FUNDAMENTALS OF ORGANIC
CHEMISTRY AND**

MAINTAINING A QC/PC LABORATORY

Total Hours:60;Credit: 4; Hours/week: 4

Objective:

To understand about the organic compounds with different functional groups as well as their derivatives also discuss importance of knowing the stereochemistry of organic compounds.

Outcomes:

Students are able to know

1. about types of organic reagents and their reactions.
2. Various methods used to find out the stereochemistry of organic compounds.
3. Preparation, structure and various reactions of organic compounds containing different functional

Module 1: Fundamentals of organic reaction mechanism (10 hrs)

Types of reagents – Electrophiles Nucleophiles and free radicals

Reactive intermediates with examples – Carbocations, Carbanions and Free radicals.

Electron displacement effects- Inductive, electromeric, mesomeric, hyper conjugation and steric effects.

Aliphatic nucleophilic substitutions, mechanism of S_N1, S_N2 - reactions and their Stereochemistry- Walden inversion

Elimination Reactions:- Saytzeff rules- mechanisms of E1 and E2 reactions.

Addition reactions- mechanisms of addition of Bromine and hydrogen halides to double bonds-Markownikoff's rule and peroxide effect .

Aromaticity :- Concept of aromaticity –Huckel’s rule – application to Benzenoid -Benzene, Naphthalene- and Non – Benzenoid compounds - cyclopropenyl cation, and tropylium cation.

Module 2: Stereochemistry of organic compounds (10 hrs)

Stereoisomerism - definition - classification into optical and geometrical isomerism

Projection formulae - sawhorse and Newman projection formulae - notation of optical isomers -D-L notation-

Optical isomerism - optical activity -conditions for optical activity - asymmetric centre -- chirality - achiral molecules - meaning of (+) and (-)

Elements of symmetry -. Racemisation and Resolution

Geometrical isomerism - cis-trans, syn-anti notations - geometrical isomerism in maleic and fumaric acids .

Conformational analysis - Conformational analysis of ethane - conformers of cyclohexane (chair and boat forms) - axial and equatorial bonds.

Module 3: Organic Name Reactions(General mechanism) (10 hrs)

Alcohols: Classification, physical properties–hydrogen bonding–distinction between primary ,secondary and tertiary alcohols

Phenols – Acidity of phenols- effects of substituents – comparison of acidity with alcoholsReimer Tiemann reaction.Preparation and uses of nitrophenols, picric acid, catechol, resorcinol and quinol

Ethers: Williamson’s synthesis, action of hydro iodide acid on ethers (Ziesel’s method).

Comparative studies of -aldehydes and ketones - aliphatic and aromatic aldehydes - formaldehyde and acetaldehyde Claisen , Claisen-Schmidt, Benzoin, Aldol, and Perkin condensations. Condensation with ammonia and its derivatives. Wittig reaction. Mannich reaction.-Addition of Grignard reagents.

Oxidation and reduction of aldehydes and ketones - Baeyer-Villiger oxidation-Cannizzaro’s reaction, Meerwein-Ponndorf Verley, Clemmensen, Wolff-Kishner, LiAlH_4 and NaBH_4 reductions (mechanisms not expected) .

Module 4: Carboxylic acids (10 hrs)

Structure of carboxylate ion- effects of substituents on acid strength of aliphatic and aromatic carboxylic acids- ascent and descent in fatty acid series- Hell-Volhard- Zelinsky reaction -Mechanism of decarboxylation
Preparation- reactions and structure of urea, thiourea and semi carbazide
manufacture of urea.

Module 5: Nitrogenous Compound (10 hrs)

Nitro compounds- reduction products of nitrobenzene in acidic, neutral and alkaline media-

Amines-. Structural features affecting basicity of aliphatic and aromatic amines.

Diazonium salts-preparation, synthetic transformations of aryl diazonium salts, azo coupling-. Mechanisms of Sandmeyer's and Gatterman reactions- Preparation and uses of Phenyl hydrazine.

Module 6: Managing A Laboratory (10 hrs)

Ensuring healthy, safe and secure working environment: self monitor and adhere to safety principles and standards. Ensure behavioural safety by workmen to cGMP and applicable safety standards on the shop floor/ laboratory report any identified breaches in health, safety, and security policies and procedures to the designated person
Managing emergency procedures: illness,accidents, fires and other reasons to evacuate the premisesbreaches of security.

REFERENCES

- 1 R. T. Morrison and R. N. Boyd, 'Organic Chemistry', 6th Edition - Prentice Hall of India,(Chapters-5,8,9).
2. P. S. Kalsi' 'Organic Reactions and their Mechanisms'' New Age International Publishers. (Chapters- 4, 5,11,12,16)
3. K.S. Tewari and N.K. Vishnoi 'Organic Chemistry', 3rd Edition, Vikas Publishing House. (Chapter 5)
4. M. K. Jain and S.C. Sharma 'Modern Organic Chemistry', 3rd Edition, Vishal Publishing Company Co. (Chapter 3,4)

SEMESTER -2

Course Code:SDC2PH03

Course2.4: PHARMACEUTICS II

Total Hours: 30; Credit: 2; Hours/week: 2

Objective:

To learn about the chemical bonding, hybridization of molecules and its geometry
Understanding about Molecular Orbital diagrams and importance of coordination compounds

Learning outcomes:

The student should be able to

1. Find out the hybridization and geometry of various molecules.
2. Draw the diagram of molecular orbital and their stability.
3. Understand about the weak bonds.
4. Understand what are coordination complexes and their pharmaceutical importance

Module 1: Chemical bonding (5 hrs)

Ionic bond -Properties of ionic compounds factors favouring the formation of ionic compounds- Ionization potential, electron affinity, and electronegativity.

Lattice energy: definition, factors affecting lattice energy, Born-Haber cycle-affecting lattice energy, - Covalent character in ionic compounds-polarization and Fajan's rules.

Covalent bond- Valence bond theory and its limitations, concept of resonance, resonance energy, hybridization and geometry of sp , sp^2 , sp^3 , sp^3d dsp^2 , and sp^3d^2 . Bonding, shapes and structures of the following molecules:- $BeCl_2$, BF_3 , CH_4 , PCl_5 , and SF_6 .

VSEPR theory - illustration of structures by VESPR model - shapes of molecules (NH_3 , XeF_6 , ClF_3). Molecular orbital theory – LCAO method, criteria of orbital overlap - molecular orbital energy diagram and properties of homo and hetero diatomic molecules (N_2 , O_2 , CO and NO). bond order and stability of molecules.

Dipole moment and molecular structure – percentage ionic character from dipole moment.

Metallic bonding – free electron theory, valence bond theory and band theory, explanation of metallic properties based on these theories.

Hydrogen bonding-intra- and intermolecular hydrogen bonding, effects of hydrogen bond van der waals forces, ion dipole-dipole interactions.

Module 2: Coordination Compounds (10 hrs)

Co-ordination compounds – Nomenclature – Werner Co-ordination theory – electronic interpretation of coordinate bond by Sidgwick.

Isomerism: Examples of Geometrical and optical isomerism in square planar and octahedral coordination compounds – magnetic properties of coordination compounds and their interpretation by crystal field theory. Chelates and their pharmaceutical importance,

Module 3: Quality control and test for purity (2 hrs)

Sources of impurities in pharmaceutical substances. Limit tests: Definition, importance, general procedure for limit test for chlorides, sulphates, iron, arsenic, heavy metals, lead and modifications in procedures with suitable examples.

Module 4: Inorganic Pharmaceutics (2 hrs)

Antacids: Classification, qualities of an ideal antacid, side effects, advantages, acid neutralizing capacity, Sodium bicarbonate, Aluminium hydroxide gel, Calcium carbonate, Milk of magnesia, Magnesium oxide, Magnesium trisilicate, Combination antacid preparations Antacids

- a. Topical agents:- Protectives – Talc, Zinc oxide, Calamine, Titanium dioxide. Anti- microbials and astringents – Hydrogen peroxide solution, Potassium permanganate, Iodine, Boric acid, selenium sulphide and zinc undecenoate.
- b. Water – Purified water, Water for injection, sterile water for injection.
- c. Dental products ;- Anti-caries Agents: Role of fluorides as anti-caries agents, sodium fluoride Dentifrices: Calcium carbonate, dibasic calcium phosphate, strontium chloride, zinc chloride.

Module 5 : Essential and Trace ions (2 hrs)

Definition, physiological role of iron, copper, zinc, chromium, manganese, molybdenum, selenium, sulphur and iodine ferrous fumarate, ferrous gluconate, ferrous sulphate, Ferric ammonium citrate.

Module 6: Radio pharmaceuticals and contrast media (2 hrs)

-radioactivity-alpha; beta and gamma radiations, biological effects of radiations, measurement of radioactivity, G.M. counter; radio isotopes—their uses, storage and precautions with special reference to the official preparations. Radio opaque contrast media—barium sulfate.

Module 7 : Major intra and extracellular electrolytes (2 hrs)

- (A) Electrolytes used for replacement therapy—sodium chloride and its preparations, potassium chloride and its preparations.
- (B) Physiological acid-base balance and electrolytes used—sodium acetate, potassium acetate, sodium bicarbonate injection, sodium citrate, potassium citrate, sodium lactate injection, ammonium chloride and its injection.
- (C) Combination of oral electrolyte powders and solutions.

Module 8: Physical Chemistry (5 hrs)

Adsorption: Freundlich and Gibbs adsorption isotherms, Langmuir theory of adsorption.

The Liquid State: Physical properties (surface tension, parachor, viscosity, refractive index, optical rotation, dipole moments and chemical constituents).

Solutions: Ideal and real solutions, solutions of gases in liquids, colligative properties, partition coefficient, conductance and its measurement, Debye Huckel theory. Rate, order, rate law, rate constants and rate equations for Simple reactions involving zero, first and second– order reactions. Pseudo-first – order reactions.

Homogeneous catalysis :- Reactions in gases and in solutions (Acid, base and Wilkinson's catalysts).

Heterogeneous catalysis :- Theory of heterogeneous catalysis on the basis of Langmuir adsorption

Enzyme catalysis in biological systems.

Size reduction :- Objectives, and factors affecting size reduction, methods of size reduction—Study of Hammer mill, Ball mill, Fluid Energy mill and Disintegrator.

Size separation—Size separation by sifting. Official Standard for powders. Sedimentation methods of size separation. Construction and working of cyclone separator.

Knowledge on critical quality attributes(CQA), Critical process parameters(CPP), critical process control(CPC)

REFERENCE:

1. J. D. Lee, *Concise Inorganic Chemistry*, 5th ed., Blackwell Science, London, 1996.
2. Principles of Inorganic Chemistry, B.R. Puri L.R. Sharma, Shobanlal Nagin Chand & Co.
3. Inorganic Chemistry, P.L.Soni, Sultan Chand & Sons.

SEMESTER -2
Course Code:SDC2AC01

Course2.5: ANALYTICAL CHEMISTRY I

Total Hours: 30; Credit:2; Hours/week: 2

Objective:

Generate knowledge of different types of titrimetric analysis and instrumental applications

Outcomes:

1. Familiarize Analytical terms
2. Generate knowledge of different types of titrimetric analysis
3. Make aware of application of potentiometry , conductometry and polarography

Module 1: Errors (2hrs)

Significance of quantitative analysis in quality control, Different techniques of analysis, Preliminaries and definitions, Significant figures, Rules for retaining significant digits, Types of errors, Mean deviation, Standard deviation, Statistical treatment of small data sets, Selection of sample, Precision and accuracy.

Module 2: Titrimetric methods of analysis (5hrs)

General principle. Types of titrations. – Acid – Base titrations , Non aqueous titrations , Oxidation – reduction titrations , precipitation titrations , complexometric titrations

Concentration systems: Molarity, normality, wt% ppm, milli equivalence and milli moles-problems.

Fundamentals of volumetric analysis, methods of expressing concentration, primary and secondary standards. Criteria for primary standards preparation of standard solutions, standardization of solutions. Limitation of volumetric analysis, endpoint and equivalence point.

Complexometric titrations :- Stability of complexes, titration involving EDTA. Metal ion indicators and characteristics

Module 3: Acid Base Titrations (5 hrs)

Acid base concepts, , Relative strengths of acids and bases, Neutralization curves, Acid-base indicators, Theory of indicators, Choice of indicators, Use of phenolphthalein and methyl orange.

Module 4: Oxidation Reduction Titrations (5 hrs)

Chemistry of redox titrations, Redox indicators, , Iodimetry and Iodometry, Titrations involving, potassium iodate, potassium permanganate and potassium dichromate.

Module 5 : Precipitation Titrations (5 hrs)

Precipitation reactions, Solubility products, Effect of acids, temperature and solvent upon the solubility of a precipitate. Argentometric titrations and titrations involving ammonium or potassium thiocyanate.

Module 6: Gravimetric Analysis (5 hrs)

Precipitation techniques, Solubility products; The colloidal state, Supersaturation co-precipitation, Postprecipitation, Digestional washing of the precipitate, Filtration, Filter papers and crucibles, Ignition

Module 7: Instrumentation (3hrs)

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

REFERENCES

1. D. A. Skoog, D. M. West, and S. R. Crouch, Fundamentals of Analytical Chemistry 8th edn, Brooks/Cole Nelson (Chapters 13,14)
2. Vogel's Textbook of Quantitative Chemical Analysis 6th edn, Pearsons Education Ltd.(Chapter 10)
3. G. D. Christian, Analytical Chemistry, JohnWiley and Sons(Chapter12)

SEMESTER 2

Course Code:SDC2AC02

Course 2.6 :ANALYTICAL CHEMISTRY II ADVANCED

Total Hours:30; Credit: 2; Hours/week: 2

Objective:

Generate knowledge of different types of Spectroscopic methods and their applications.

Outcomes:

1. General Analytical Instruments
2. Generate knowledge of different types of Chromatographic Techniques
3. analytical techniques X-ray Diffraction, Flame Photometry, Fluorimetry, Radio immunoassay.

Module 1: Typical Analytical Instruments -1 (10 hrs)

Spectrophotometry : Interaction of electromagnetic radiation with matter- classification of methods- Beer Lambert law- Deviation from Beer Lambert law.

UV- Visible spectrometry: Origin of absorption spectra, components of typical instrument – Source- Tungsten filament lamp, Hydrogen and Deuterium discharge lamps. Wavelength selectors- filters, prisms and grating -Sample cell - Detectors Single and double beam spectrophotometers

I.R spectrophotometry: classification of the types-Sources – Nernst glower, globar, Nichrome wire-Wavelength selectors-Sample cell – characteristics-sample preparation- solvent selection-Detectors – thermal, pneumatic and pyroelectric-NDIR instruments

Concept of c GMP, ISO, GLP,GDPetc. Orientation of pharmacopeia and overall equipment efficiency(OEE), knowledge of calculations and use of QC statistics like Levey-Jennings chart and westgard Rules , CV, Comparative evaluations, CVR, SDI

Module 2 : Typical Analytical Instruments -2 (10 hrs)

Molecular fluorescence: spectrofluorimetry – factors affecting fluorescence – typical instrumentation

Atomic spectroscopy: (1) AAS – Principle- typical instrumentation –Flames, Nebulisers- burner system- Non flame techniques-Resonant line source – HCL and EDL- source modulation- sample preparation- Interference in measurements

(2) AES: Excitation techniques- arc, spark and ICP

Sampling:Basis of sampling- sampling procedure- Importance of representative sampling- sample preparations of solid, liquid and gaseous analytes- Hazards in sampling. (10Hrs)

Module 3: Chromatographic Techniques (5hrs)

Chromatography: General aspects of chromatography- Classification: Adsorption, Partition, Ion exchange , and Gel permeation

Column chromatography: Construction and operation of column- choice of adsorbents and eluents, methods of detection. Derivatisation- HPLC equipment- Thin layer and paper chromatography:Different techniques- typical examples- Ion exchange chromatography

Gas chromatography: principle- types of carrier gases- stationary phases- different types of columns- capillary columns- temperature programming- Typical detectors- TCD, FID and ECD

Module 4: Instrumentation (5 hrs)

Principle, basic instrumentation and applications of the following analytical techniques

X -ray Diffraction, Flame Photometry, Fluorimetry, Radio immunoassay.

Photochemistry: Consequences of light absorption, Jablonski diagram, Lambert-Beer Law, Quantum efficiency.

REFERENCES:

1. Jeffry, Basset, Mendhem, R.C Denwy , Vogel's Text Book of Quantitative Inorganic Analysis, 4th & 5th Edition
2. Skoog and Leary, Principles of Instrumental analysis ,4th Edition, Sanders College Publishing
3. D.Patranabis, Principles of Industrial Instrumentation, 2nd Edition , Tata McGraw-Hill Company Delhi

SEMESTER 2
Course Code: SDC2IC01 (P)
Course(Practical)2.7 :INORGANIC CHEMISTRY
Total Hours: 30;Credit: 2; Hours/week: 2

Objectives:

Students are able to do Qualitative analysis of inorganic mixtures, limit tests and preparation of inorganic pharmaceuticals.

Learning out comes:

Students are able to do

1. Qualitative analysis of inorganic mixtures
 2. limit tests of ions
 3. preparation of inorganic pharmaceuticals.
-
1. Qualitative analysis of inorganic mixture
 2. Limit test for chlorides, sulphates, iron, heavy metals, arsenic and modified procedure for limit test for chloride and sulphates on potassium permanganate, sodium bicarbonate, sodium benzoate and sodium salicylate.
 3. Preparation of the following inorganic pharmaceuticals and their identification tests and other tests given in I.P.
 - a. Aluminium hydroxide
 - b. Zinc oxide
 - c. Barium sulphate
 - d. Calcium carbonate
 - e. Potassium citrate f. Boric acid
 - g. Magnesium sulphate
 - h. Ferrous sulphate

REFERENCES

1. Advanced inorganic Chemistry by G.R.Chatwal
2. Bentley and Driver's, Textbook of Pharmaceutical Chemistry.
3. Roger's Inorganic Pharmaceutical Chemistry by T.O.Soine and C.O.Wilson.
4. Indian Pharmacopoeia 2007.
5. Analytical chemistry principles by John H. Kennedy

SEMESTER 2

Course Code: SDC2OC02 (P)

Course (practical)2.8: ORGANIC CHEMISTRY

Total Hours: 30;Credit: 2; Hours/week:2

Objectives:

Students are able to analyse the organic substances in systematic way.

Learning outcomes:

Students are able to

1. Separate aromatic and aliphatic compounds
2. To do functional group tests
3. Synthesize organic compounds.

Organic Analysis and Organic Preparations

1. Systematic Analysis of Organic substances :

Detection of Elements (N, S, Halogens)

To distinguish between aliphatic and aromatic

To distinguish between saturated and unsaturated

Functional group tests for phenols, acids (mono and di), aromatic primary amine, amides, diamides, carbohydrates, nitro compounds, aldehydes, ketones.

Preparation of Derivative

2. Synthesize the organic compounds involving

Oxidation, Reduction, Rearrangement, Substitution, Condensation, Diazotization reactions.

REFERENCES

1. A. I. Vogel, 'A Text Book of Practical Organic Chemistry', Longman.

'Vogel's Textbook of Practical Organic Chemistry' Pearson Education

2. F. G.Mann and B. C. Saunders, 'Practical Organic Chemistry' 4th edn, Pearson Education.

3. V. K. Ahluwalia and S. Dhingra ' Comprehensive Practical Organic Chemistry'

SEMESTER 2

Course Code: SDC2AC03(P)

Course (Practical)2.9: Analytical Chemistry I

Total Hours: 30 ;Credit: 2; Hours/week: 2

Objectives:

Students are able to do different volumetric analysis and perform the assay.

Learning outcomes:

Students are able to

1. Do different volumetric analysis
2. Perform the assay of pharmaceuticals.

a. Volumetric analysis

Standardization of 0.1 N HCl using standard solution of sodium carbonate.

Standardization of 0.1 N H₂SO₄ using standard solution of sodium carbonate

Standardization of the given of 0.1 N NaOH using standard solution of oxalic acid

To perform the assay of given sample of sodium bicarbonate.

To perform the assay of given sample of boric acid.

Standardization of the given solution of 0.1N K₂Cr₂O₇ using standard solution of oxalic acid

To perform the assay of given sample of ferrous sulphate using standard solution of K₂Cr₂O₇.

Complexometric Titrations: Preparations and standardization of EDTA solution, some exercises related to pharmacopoeial assays by complexometric titrations.

b. Assays

To estimate the amount of aspirin in the given formulation.

. To estimate the amount of ascorbic acid in the given formulation

To carry out the assay of ibuprofen by using ultraviolet-visible spectrophotometer

To estimate sodium chloride by flame photometer

To carry out the simultaneous estimation of paracetamol and diclofenac Sodium in the given formulation.

REFERENCE

- L.M.Atherden, Bentley and Driver"s textbook of pharmaceutical chemistry, Oxford University Press, Delhi (Larest Edition).
- P. D. Sethi, Quantitative Analysis of Drugs in Pharmaceutical Preparations, 3rd edition, 1997, CBS publishers and distributors.
- G. D. Devala Rao, Practical pharmaceutical analysis, 3rd edition, 2010, Birla publications.
- B. G. Nagavi, Laboratory handbook of instrumental drug analysis,3rd edition, 2000, Vallabh prakashan.
- H. Beckett and J. B. Stanlake, Practical Pharmaceutical Chemistry part 2, 4th edition, 1997, CBS publishers and distributors

SEMESTER 2

Course Code:SDC2AC04(P)

Course (Practical)2.10: Analytical Chemistry II Advanced

Total Hours: 30; Credit: 2; Hours/week: 2

Objectives

Students are capable to use Typical analytical instruments to identify the chemical compounds and its properties.

Learning outcomes:

Knowledge of

Chromatographic techniques

Application of IT in QC lab

Standard Operation Procedure for cleaning, sterilization, safety, disinfection etc in QC lab.

1. TLC
2. Column chromatography
3. Application of IT in QC LAB
4. Standard Operation Procedure for cleaning, sterilization, safety, disinfection, and storage of raw materials maintenance of sanitation and control of contamination and handling of hazardous substance.
5. Communication skills-seminar on various topics)

REFERENCES

- 1 R. T. Morrison and R. N. Boyd, 'Organic Chemistry', 6th Edition - Prentice Hall of India,(Chapters-5,8,9).
2. P. S. Kalsi' 'Organic Reactions and their Mechanisms'' New Age International Publishers. (Chapters- 4, 5,11,12,16)
3. K.S. Tewari and N.K. Vishnoi 'Organic Chemistry', 3rd Edition, Vikas Publishing House. (Chapter 5)
4. M. K. Jain and S.C. Sharma 'Modern Organic Chemistry', 3rd Edition, Vishal Publishing Company Co. (Chapter 3,4)
5. I. L. Finar Organic Chemistry, 6th Edition. Vol.- I, Pearson(chapters-4,5,20,21)

SEMESTER 2

Course Code: SDC2PC01 (Int)

Course2.11: INTERNSHIP

Credit: 4

SEMESTER III

SEMESTER -3

Course Code: GEC3BC01

Course 3.2: BIOCHEMISTRY

Total Hours: 60; Credit: 4; Hours/week: 4

Objective:

Students are able to understand polymeric bio molecules and their monomeric building blocks. Principles of bio energetic and enzyme catalysis. How genetic information in the D N A is relatively expressed as functional proteins

Out comes:

1. Structure and classification of Proteins
2. Biological significance of enzyme and co-enzyme
3. Reaction and metabolism of lipids, fats, cholesterol and carbohydrates.
4. Structure of DNA, Explain how it carries genetic information in its base sequence.
5. Functional test of liver and kidney and biochemistry of urine and blood.

Module 1: Amino acids and Proteins (15 hours)

Living Cell – Plant and Animal cell. Cell membrane – organelles – functions of major subcellular components – Anabolism and catabolism and their relation to metabolism.

Proteins and amino acids: Classification and properties of amino acids and proteins. General structure of Amino acids, Composition of amino acid in protein and determining sequence of amino acid residue, Structure of protein, Types of protein structure - Primary structure, Secondary structure and Tertiary structure, Quaternary structure, Various other biologically important proteins. Essential amino acids, metabolism of amino acids and proteins.

Module 2: Enzymes and co-enzymes (10 hrs)

Structure and function of enzyme, Classification of enzyme, and its Mechanism of enzyme action – Lock and Key model and induced fit models. - Factors influencing enzyme action Enzyme inhibition, - Reversible and Irreversible enzyme

inhibition,. Coenzyme classification, Role of vitamin as coenzyme, Biological significance, Metal as coenzyme and its biological significance

Module 3: Lipids (10 hrs)

Definition and classification- neutral lipids, Phospho lipids and glycolipids – importance, synthesis and degradation. steroids and other biologically important lipids (Terpenes, steroids, cholesterol etc)

Fatty acids – saturated, unsaturated fatty acids, EFA. Properties – Hydrolysis- acid number, saponification number. Auto-oxidation (Rancidity), addition reactions-Iodine value, Polenske number, Reichert-Meissl number, acetyl number. Hydrogenation

Cholesterol – biosynthesis. Bile salts derived from cholesterol. Metabolism: Oxidation of glycerol- β - oxidation of fatty acids; biosynthesis of lipids – synthesis of fatty acids and synthesis of triglycerides.

Module 4: Carbohydrates (5 hrs)

Classification of carbohydrates- Monosaccharides, Disaccharides, Oligosaccharides, Polysaccharides. Glucose: structure- conformation – stability

Carbohydrates of the cell membrane – starch, cellulose and glycogen. (Structure and utility)

Metabolism: Glycolysis and its reversal; TCA cycle. Relation between glycolysis and respiration.

Module 5 : Bioenergetics (5 hrs)

Digestion, absorption and metabolism of carbohydrates, proteins and nucleoprotein. The concept of free energy, determination of change in free energy from equilibrium constant and reduction potential. TCA cycle and its biological significance, energetics of the TCA cycle.

Module 6: Nucleic Acids (10 hrs)

Nucleosides and nucleotides – purine and pyrimidine bases. Nucleic acids Difference between DNA and RNA. Classification of RNA.

Biosynthesis of DNA: Replication. Biosynthesis of mRNA: Transcription.

Genetic code – mutations and mutants. DNA repair. Biosynthesis of proteins.

DNA sequencing and PCR, recombinant DNA technology, DNA polymorphism.

Module 7: Nutrition (5 hrs)

Principles and nutritional significance of carbohydrates, lipids and proteins in major food stuffs, calorific value and basal metabolic rate. Functional tests of liver and kidney. Elementary basis of biochemical mode of action of drugs, liposomal benzoxidation, biochemistry of urine and blood.

REFERENCES

1. Principles of Biochemistry by Lehninger.
2. Harper's Biochemistry.
3. Textbook of Biochemistry by Rama Rao.
4. Textbook of Biochemistry by Deb.
5. Introduction of Practical Biochemistry by David T. Plummer. (II Edition)
6. Practical Biochemistry for Medical students by Rajagopal and Ramakrishna.
7. Handbook of practical Biochemistry by V.K. Malhotra.
8. Practical Biochemistry by Harold Varley.
9. Text book of Biochemistry by Satyanarayana.

SEMESTER 3

Course Code: GEC3BS01

Course3.3: BIOSTATISTICS

Total Hours: 60;Credit: 4; Hours/week: 4

Objective:

Learn about data organization diagrammatic representation of data, bar, pie, 2-D and 3-D diagrams measures of central tendency etc knowledge of differential equations.

Learning outcome

Students are able to know

about differential equations,Linear differential equations,Statistical inference,Biometrics

Module 1: Differential equations (20 hrs)

Definition and information of different equations, equation of first order and first degree. Variable separation homogenous and linear differential equation and equation reducible to such types.

Module 2: Linear differential equations (10 hrs)

Linear differential equation of order greater than one with constant coefficients, complimentary function and particular integral, simultaneous, pharmaceuticals applications.

Module 3: Statistical inference (10 hrs)

: Chi Square test as test of independence of Attributes, test of goodness of fit in testing of significance in biological/pharmaceutical experiments and elements of ANOVA in one variable.

Module 4 : Biometrics (20 hrs)

Significant digits and rounding off numbers, data collection, random and non-random sampling methods, sample size, data organization diagrammatic representation of data, bar, pie, 2-D and 3-D diagrams measures of central tendency, measures of dispersion, standard deviation and standard error of means, coefficient of variation, confidences (fiducial) limits, correlation, regression analysis.

REFERENCE:

1.Fundamentals of Biostatistics-Rastogi

SEMESTER 3

Course Code: SDC3MB01

Course 3.4: MICROBIOLOGY

Total Hours: 60; Credit: 4; Hours/week: 4

Objective:

To prepare the students with basic knowledge microorganisms, immunological and biochemical techniques.

Outcomes:

Students are able to know

1. Study about the types of micro organisms and their nutritional methods, cultural preparation etc.
2. sterilization methods and techniques
3. Importance of immunity, Vaccines and their preparation.
4. Basic knowledge of Industrial microbiology.

Module 1: Introduction to Microbiology (10 hrs)

Classification of Microorganisms with detailed reference to Bacteria, Fungi, virus, and protozoa- Morphology, isolation and identification, growth and cultural characteristics, enumeration and reproduction.

Nutritional requirements, growth and cultivation of bacteria and virus. Study of different important media required for the growth of aerobic and anaerobic bacteria & fungi. Differential media, enriched media and selective media, maintenance of lab cultures

Staining of bacteria, theories of staining and types of staining techniques. General principles of microbial control- sterilization and disinfection.

Module 2: Infections (10 hrs)

Classification- sources - virulence and pathogenicity -Method of transmission of diseases – incubation period exotoxins and endotoxins

A brief study of common organisms – Staphylo coccus, strepto coccus, , coliforms , salmonella , cholera vibrio, and pneumo coccus,

Module 3: Control of microbes by physical and chemical methods

(15hrs)

Disinfection, factors influencing disinfectants, Dynamics of disinfection, Disinfectants and antiseptics and their evaluation

Sterilization, different methods, validation of sterilization methods and equipments

Sterility testing as per I.P, Preservative efficacy.

Module 4: Immunity (20 hrs)

Types of immunity. Antigens and antibodies: theories of antigen-antibody reactions, applications of antigen-antibody reactions. Interferons. Vaccines and sera - general study of the preparation of different types of vaccines, sera and toxoids.

AIDS.

Immunity defensive mechanism of body, microbial resistance, interferon.Vaccines, their preparation, standardization and storage. Sera, the ir preparation, standardization and storage.

Module 5: Industrial microbiology

(5hrs)

General outline of fermentation process- Manufacture of antibiotics and other pharmaceutical process

REFERENCES

1. Vanitha Kale and Kishor Bhusari — Applied Microbiology || Himalaya Publishing house Mumbai.
2. Mary Louis Turgeon — Immunology and Serology in Laboratory Medicines|| 2nd edition, 1996 Mosby- Year book inc St. Louis Missouri 63146.
3. Harsh Mohan, — Text book of Pathology|| 3rd edition, 1998, B-3 Ansari road Darya ganj N. Delhi
4. Prescott L.M., Jarley G.P Klein D.A —Microbiology|| 2nd- edition Mc Graw Hill Company Inc b.
5. Rawlins E.A.||Bentley's Text Book of Pharmaceutics|| B ailliere Tindals 24-28 London 1988
6. . Forbisher — Fundamentals of Microbiology|| Philadelphia W.B. Saunders. d. Prescott L.M. Jarley G.P., Klein.D.A. — Microbiology.||2nd edition WMC Brown Publishers, Oxford. 1993
7. War Roitt, Jonathan Brostoff, David male, — Immunology||3rd edition 1996, Mosby-year book Europe Ltd, London.

SEMESTR 3

Course Code: **SDC3FC01**

Course3.5: FOOD CHEMISTRY AND TECHNOLOGY

Total Hours: 60;Credit: 4; Hours/week: 4

Objectives:

Students understand about Nutrition and Balanced Diet , Foods and Food Additives, food adulteration.

Learningoutcomes:

Students will be familiarized with 1.Nutrition values Thermogenic effect
2.Food additives, Modern food, Beverages
3.Quality control and food adulteration

Module 1 : Nutrition and Balanced Diet (20hrs)

Nutrition – calorific value of food stuff – RQ of food (Respiratory quotient of food) – basal metabolic rate – factors influencing BMR, specific dynamic action (SDA) of food.

Thermogenic effect – energy requirements of individuals – diet and its components – the protein requirements – biological value of proteins, supplementary value of proteins. Diseases associated with protein malnutrition.

Nutritional value of carbohydrates. – Fibers in the diet, dietary sugars – nutritional aspects of lipids.

Module 2: Foods and Food Additives (20 hrs)

Food additives: Artificial sweeteners – saccharin, cyclamate, aspartame – food flavours – esters, aldehydes and heterocyclic compounds. Food colours – changes in cooking.Restricted use. Spurious colours. Emulsifying agents, preservatives – leavening agents. Baking powder –Yeast. Taste enhancers – MSG-vinegar

Modern food: Production of bread, bun and biscuits. Raw materials and methods Candy manufacturing. Fast foods. Instant foods. Dehydrated foods.

Beverages: Soft drinks, soda, fruit juices. Composition of soft drinks. Side effects of Excessive use (urinary bladder stones etc) preservation and packing of fruit juices Preservation of tetrapak. Nitrogen preservation and packing of fruit juices.Alcoholic beverages (Types and content of alcohol) alcoholic

beverages (Types and content of alcohol). Examples, Carbonation. Addiction to alcohol.
Cirrhosis of liver Nitrogen

Module 3: Food Adulteration (20 hrs)

Common adulterants in wheat, rice, dhal milk and milk products, vegetable oils, and fats, spices and condiments, cereals, pulses, sweetening agents and beverages

Tests for detecting food adulteration. adulteration of Oils . Detection of adulterated Foods by simple analytical techniques. Principles involved in the analysis of detection and prevention of food adulteration

Food poisons: natural poisons (alkaloids, nephrotoxins), pesticides (DDT, BHC, endosulphan etc

Quality control: Specifications and standards: PFA, FPO, FDA, WHO standards, ISI specifications, packing and label requirements, essential commodities act, consumer protection act. AGMARK.

REFERENCES

1. Swaminathan M. *Advanced Text Book on Food and Nutrition , volume I and II Printing and Publishing CO., Ltd., Bangalore.* 1993.
2. Swaminathan M. *Text Book on Food chemistry, Printing and Publishing CO., Ltd., Bangalore.* 1993.
3. Norman N. Potter , *Food science, CBS publishers and distributors, New Delhi.* 1994.
- 4.. Owen R Fennema, *Food Chemistry, Marcel Decker Inc., New York.* 1996.
5. Srilakshmi B., *Food Science, New age International Pvt. Ltd. Publishers, III ed.* 2003.
6. Siva Sankar B., *Food Processing and Preservation. Prentice – Hall of India Pvt. Ltd., New Delhi.* 2002.
7. Ramakrishnan S., Prasannam K.G and Rajan R –*Principles. Text book of medical biochemistry. Orient Longman Ltd.* III ed. 2001.

SEMESTER 3

Course Code:SDC3MB02 (P)

Course (practical)3.6: MICROBIOLOGY

Total Hours: 75 ; Credit: 5; Hours/week: 5

Objectives:

Students are able to prepare various type of culture media and the tests of microorganisms.

Learning outcomes:

Able to do

1. culture media
 2. Staining of bacteria
 3. Evaluation of disinfectants and antiseptics
 4. Antibiotic sensitivity test.
-
1. Preparation of Various type of culture media :- Preparation of some typical nutrient media for collection and isolation of bacteria – preparation of pure cultures
Nutrient agar, endo 's agar, chapman's agar,tergitol – 7 agar, Mcconkey agar.
 2. Identification and staining of bacteria (simple staining, Gram staining, Acid fast staining, negative staining, and capsule staining)
 3. Examination of Bacteria for motility: - Hanging drop method
 4. Enumeration of bacteria in milk :- The reductase test
 5. Evaluation of disinfectants and antiseptics (phenol coefficient test, minimum inhibitory concentration)
 6. Antibiotic Sensitivity test – disc diffusion method.

REFERENCES

1. A.J. Salle, Laboratory Manual of Fundamental Principles of Bacteriology, McGraw Hill, 1973.
2. R.C. Goss, Experimental Microbiology Laboratory Guide, Iowa State Univ. Press, 1967.
3. T.J. Mackie, J.E. McCartney, Handbook of Practical Bacteriology, E&S Livingstone, 1948.
4. J.A. Kolmer, E.H. Spaulding, H.W. Robinson, Approved Laboratory Techniques, Appleton Century Crofts, 1951.

SEMESTER 3

Course Code : SDC3BC02 (P)

Course(Practical)3.7 : BIOCHEMISTRY

Total Hours: 75; Credit: 5; Hours/week: 5

Objectives:

Make students are capable of doing testes and familiarity in biochemistry lab.

Learning outcomes:

Students are able to do

1. Estimation of cholesterol, urea, Glucose and ketone bodies inn blood.
2. Milk analysis
3. Seperation of amino acids.

1. Preparation of standard buffers (citrate, phosphate and carbonate) and measurement of pH.
2. Separation of amino acids by TLC.
3. Qualitative analysis of inorganic as well as organic constituents of Urine.
4. Quantitative estimation of amino acids.
5. Estimation of glucose in urine
6. Estimation of calcium in Blood
7. Estimation of urea in urine
8. Milk analysis estimation of specific gravity, TDS,fat,lactose

9. Estimation of cholesterol in Blood.

10. Estimation of Glucose in blood & urine.

11. Estimation of Urea in blood.

12. Estimation of ketone bodies in blood.

REFERENCE

1. D.T. Pulmmer, An Introduction to Practical Biochemistry, McGraw Hill, 1987.
2. Practical Biochemistry by Harold Varley.
3. Text book of Biochemistry by Satyanarayana.

SEMESTER IV

SEMESTER 4

Course Code: GEC4MC01

Course 4.2: MEDICINAL CHEMISTRY I

Total Hours: 60; Credit: 4; Hours/week: 4

Objective:

Learn about chemical synthesis and development for pharmaceutical agents.

Learning outcomes:

Students are able to know

1. Principles of medicinal chemistry
2. Structure, nomenclature, preparation, mode of action, properties etc. of drugs acting on ANS and CNS
3. antihistaminic agents
4. Pharmacology of drugs used in diuretics.

Module 1: Basic Principles of Medicinal Chemistry (15 hrs)

History and development of medicinal chemistry –

Physicochemical and Stereochemical properties of drugs in relation to biological action : - Ionization, Drug distribution, hydrogen bonding, protein binding, chelation, isosterism, bioisosterism optical and geometrical isomerism, steric effect, Types of receptors, drug-receptor interaction.

Conventional methods of drug design, Lead, Discovery of Lead, lead optimization

Module 2: Drugs acting on CNS (15 hrs)

Introduction, Structure, Stereochemistry, Nomenclature, Synthesis of specified drugs (**drugs marked with asterisk**), mode of action, Structure Activity Relationships (if any) uses and Physicochemical properties of the following classes of drugs:

A. General anaesthetics: Enflurane and Thiopental sodium.

- B. Anxiolytics, Sedatives and Hypnotics: Diazepam*, Oxazepam, and Phenobarbital.
- C. Antipsychotics: h, Prochlorperazine maleate, , Haloperidol*,, Risperidone.
- D. Anticonvulsants or antiepileptics: Barbiturates, phenytoin* , , and Valporic acid .
- E. CNS stimulants and Psychedelics: Nikethamide*, Doxapram hydrochloride and Dextroamphetamine sulphate.
- F. Local Anaesthetics:- Cocaine, Benzocaine* Butamben, , and Dyclonine.

Module 3 : Drugs acting on ANS (20 hrs)

- A. Adrenergic Neurotransmitters: Structure and physiochemical properties, biosynthesis and metabolism.
(Introduction, Structure, Stereochemistry, Nomenclature, Synthesis of specified drugs (drugs marked with asterisk), mode of action, Structure Activity Relationships (if any) uses and Physicochemical properties of the following classes of drugs)
- B. Sympathomimetic agents: Epinephrine, Nor-epinephrine, Dopamine, Salbutamol*, Terbutaline and , Ephedrine
- C. Adrenergic Antagonists:- Tolazoline, Phentolamine*, Propranolol, Dichloroisoproterenol and Practolol, ,
- D. Cholinergic receptors drugs and related agents: Cholinergic receptors, biochemical effects of muscarinic stimulation, cholinergic neuro chemistry and stereochemistry of cholinergics. Acetylcholine, Carbachol*, Bethanechol, Methacholine, Pilocarpine, Physostigmine, Neostigmine, Pyridostigmine, Parathione and Malathion.
- E. Cholinergic Blocking agents: - Tropicamide, Cyclopentolate hydrochloride, Dicyclomine hydrochloride*, and Isopropamide iodide.
- F. Ganglionic blocking agents and Neuromuscular blockers: Nicotine, Trimethaphan, Mecamylamine hydrochloride* and Tubocurarine chloride.

Module 4: Antihistaminic agents: (5 hrs)

H₁, H₂ and H₃ receptors, Termination of histamine action. doxylamine, Cimetidine*, Famotidine, Ranitidine and Omeprazole.

Module 5: Diuretics (5 hrs)

Acetazolamide, Chlorthiazide*, Furosemide* and , Spironolactone,

REFERENCES

1. Medicinal Chemistry Wilson and Giswold
2. Remington's Pharmaceutical Sciences, 20th edition.
3. Ashutoshkar's Medicinal Chemistry.
4. Medicinal Chemistry by W.A. Foye.

SEMESTER 4

Course Code:GEC4PG01

Course4.3: PHARMACOGNOSY

Total Hours: 60; Credit:4; Hours/week: 4

Objective:

Aims to develop clear understanding of natural products(found in plants) used therapeutically in medicine.

Outcomes:

Students to get the ideas of

1. About the medicinal ,plants and phyto constituents in drugs.
2. Structure of plant tissue and their morphology
3. About the classification of crude drugs incuding source , preparations, constituents, chemical ltests etc.
4. traditional drugs
5. Important methods adopts in quality control.

Module1: Introduction to Pharmacognosy (15 hrs)

. Definition, scope, history and development of Pharmacognosy. Significance of medicinal plants in Pharmacy. Introduction to Phyto constituents of drugs: Definition, classification, properties and identification tests of alkaloids, glycosides, terpenoids, steroids and flavonoids
Sources of drugs : Biological, marine, and minerals as sources of drugs cultivation, collection, processing and storage of crude drugs. Brief introduction to evaluation of crude drugs by organoleptic, microscopic, physical, chemical and biological methods
Study of the following families with special reference to medicinally important plants – Malvaceae, Apocynaceae, Solanaceae, Leguminosae, Rubiaceae.

Module 2 : Plant tissue & Morphology (10 hrs)

Structure of plant cell and its nonliving inclusions, different types of plant tissues and their functions. Morphology and histology of root, stem, bark, wood, leaf, flower, fruit and seed. Modifications of root and stem.

Module 3: Classification of crude drugs (20 hrs)

Detailed study of crude drugs with emphasis on source, collection/ preparation, constituents, chemical tests, substitutes, adulterants & uses of

- a. Carbohydrates and their derived products: Agar, Gum Acacia, Gum tragacanth, pectin, Starch.
- b. Tannins: Catechu, Gall, and Tannic acid.
- c. Lipids: Castor oil, Shark liver oil, , Beeswax, Cod liver oil and Bran oil.
- d. Proteins: Gelatin, and soya.
- e. Volatile oils: Mentha, Coriander, Cinnamon, , Caraway, Dill, Clove, Fennel, Nutmeg, Cardamom, Lemon grass oil, Eucalyptus, Sandalwood,.
- f. Saponins: Liquorice,
- g. Cardio active sterols: Digitalis, and Squill.
- h. Anthraquinone cathartics: Aloes, Senna,
- i. Alkaloids – Belladonna, Cinchona, Ipecac Opium , Ergot, Rauwolfia, Nuxvomica, Physostigmine, Pilocarpus cannabis Vinca and Ephedra.
- j. Purines: Tea, Coffee.
- k. . Resins:, Cannabis, Capsicum, , Asafoetida, Turmeric and Ginger.
- l. Pharmaceutical aids: Talc, Kaolin and Bentonite

Module 4 : Studies of traditional drugs (10 hrs)

Common vernacular names, botanical sources, morphology and chemical nature of chief constituents, pharmacology and common use of the following indigenous drugs.

Amla, Satavari, Punarnava, Chitrack, Gokhru, Shankapuspi, Brahmi, Arjuna, Ashoka, Methi, Pyrethrum, Adathoda Neem stramonium, vasakasantonica, , umbelliferous fruits like Cumin, Fennel, Caraway, Aloes and Vinca rosea,

Module 5: Quality Control of crude drugs (5 hrs)

Adulteration of crude drugs and their detection by organoleptic, microscopic, physical, chemical and biological methods of evaluation including Quantitative microscopy.

REFERENCE

1. Trease, G. E. and Evans, W.C. Pharmacognosy, Published by Elsevier, a Division of Reed Elsevier India Pvt. Ltd., New Delhi.
2. Kokate, C.K., Purohit, A.P. and Gokhale, S.B Pharmacognosy, Nirali Prakashan, Pune.
3. Handa, S.S and Kapoor, V.K. Textbook of Pharmacognosy, Vallabh Prashan, New Delhi.
4. Wallis, T.E. Textbook of Pharmacognosy, Fifth Edition, CBS Publishers and Distributors, New Delhi.

SEMESTER 4

Course Code:SDC4PH04

Course4.4: PHARMACEUTICS –III

Total Hours: 60;Credit: 4; Hours/week: 4

Objective:

To handle prescription and about the pharmaceutical calculation. Also understanding the general procedure of dispensing and labeling of medicines reason and correction for incompatibilities how to coordinate as community pharmacy.

Outcomes

To Know about,

How to handle the prescription.

General dispensing and labeling procedures. Types incompatibilities and their remedies. Idea about IP,BP,USP.

Methods adopted in packing of pharmaceuticals.

Study filtration technique and their instruments.

Deep knowledge of sterilization techniques.

Module 1: Dispensing History of Pharmacy and Pharmacopoeia

(5 hrs)

Origin & development of pharmacy, Importance of Chemistry in Pharmacy, Scope of pharmacy, introduction to Pharmacopoeias - IP, BP, USP & International Pharmacopoeia An introduction to contents of the IP. Typical parts of a monograph of Indian pharmacopoeia, Their classification with examples-their relative applications. Familiarisation with new drug delivery systems

Module 2: Prescription (5 hrs)

Definition, various part of prescription, Latin terms used in prescription, Handling of prescription, source of errors in prescription, General dispensing procedures including labelling of dispensing products.

Module 3: Incompatibilities (10 hrs)

Physical, therapeutic and chemical incompatibilities, definition, reasons and correction of incompatibilities, Incompatibility of alkaloidal salts, barbiturates, salicylates, iodides salts, gas production (chemical types), etc. correction of incompatibilities. Therapeutic incompatibilities.

Module 4: Packing of Pharmaceuticals (10 hrs)

–Desirable features of a container–types of containers. Study of glass and plastics as materials for containers and rubber as material for closures-their merits and demerits. Introduction to aerosol packaging

Module 5: Size reduction and separation (10hrs)

Size reduction :- Objectives, and factors affecting size reduction, methods of size reduction–Study of Hammer mill, Ball mill, Fluid Energy mill and Disintegrator.

Size separation–Size separation by sifting. Official Standard for powders. Sedimentation methods of size separation. Construction and working of cyclone separator.

Module 6: Homogenisation & Filtration (10 hrs)

Mixing and Homogenisation–Liquid mixing and powder mixing, Mixing of semisolids, Study of Silverson Mixer–Homogeniser, Planetary Mixer; Agitated powder mixer; Triple Roller Mill; Propeller Mixer, Colloid Mill and Hand Homogeniser. Double cone mixer.

Clarification and Filtration –Theory of filtration, Filter media; Filter aids and selection of filters. Study of the following filtration equipments–Filter Press, Sintered Filters, Filter Candles, Metafilter.

Module 7 : Sterilization (10 hrs)

Sterilization–Concept of sterilization and its differences from disinfection –Thermal resistance of micro–organisms. Detailed study of the following sterilization process. (i) Sterilization with moist heat, (ii) Dry heat sterilization,(iii) Sterilization by radiation, (iv) Sterilization by filtration and (v) Gaseous sterilization.

Aseptic techniques: Application of sterilization processes in hospitals particularly with reference to surgical dressings and intravenous fluids. Precautions for safe and effective handling of sterilization equipment.

REFERENCES

1. Cooper and Gunn's Dispensing for Pharmaceutical Students, CBS publishers, Delhi
2. Cooper and Gunn's Tutorial Pharmacy, S.J. Carter.
3. Theory and practice of Industrial Pharmacy by Lachman.
4. Remington's, The Science and Practice of Pharmacy, Mack Publishing Co. Easton.
5. McCabe WL and Smith J.C. Unit operations of Chemical Engineering McGraw Hill International Book Co. London.
6. Parry R.H. and Chi Kon, C.H. Chemical Engineers Handbook of Kogakusha Ltd. B.Pharmacy
7. Carter SJ. "Cooper & Gunn's Tutorial Pharmacy", 6th edition, CBS Publishers & Distributors, New Delhi.
8. Indian Pharmacopoeia 2007, Vol I-III, 2008, Indian Pharmacopoeia Commission, Ghaziabad.
9. British Pharmacopoeia 2009, British Pharmacopoeia Commission, UK.
10. Remington's The Science & Practice of Pharmacy Mack Publishing Co. Easton, PA
11. Jain NK & Gupta GD. Modern Dispensing Pharmacy, II edition, 2009, Pharma Book Syndicate, Hyderabad
12. Gaud RS & Gupta GD. Practical Pharmaceutics, 1st edition, Reprint 2008, , CBS Publishers & Distributors, New Delhi.

SEMESTER 4

Course Code: SDC4MC02(P)

Course (Practical)4.5 : MEDICINAL CHEMISTRY I

Total Hours: 60; Credit: 4; Hours/week: 4

Objectives:

Students are learn about the preparation procedures an importance medicinal drugs from organic compounds, also improve their skills into analyze the spectral values.

Learning out comes:

Stuents are able to

- 1.Synthesize typical drugs
2. Analyse the spectral characteristics.

1. To synthesize anthraquinone from o-benzoyl benzoic acid.
2. To synthesize acetanilide from aniline
3. To synthesize benzophenone oxime from benzophenone.
4. To synthesize benzanilide from oxime.
5. To synthesize iodoform from ethyl alcohol.
6. To synthesize sulphanilic acid from aniline.
7. To synthesize sulphanilamide from acetanilide.
8. To synthesize benzoic acid from benzamide.

REFERENCES

1. Singh & Kapoor. Medicinal & Pharmaceutical chemistry. 1st edition, 2001. Vallabh publications, Delhi.
2. Wilson & Gisvolds. Text book of Organic Medicinal & Pharmaceutical Chemistry. 11th edition, 1998. Lippincott Willians & Wilkins, London.
3. Lemke, Willians, Roche & Zito. Foye's Principles of Medicinal Chemistry. 6th edition, 2008. Lippincott Willians & Wilkins, London.
4. Nogrady & Weaver. Medicinal Chemistry. 3rd edition, 2005. Oxford university, Newyork.
5. Wermuth. The Practice of Medicinal Chemistry. 2nd edition, 2004. Elsevier India Pvt Ltd, New Delhi.

SEMESTER 4

Course Code: SDC4PG02 (P)

Course(practical)4.6: PHARMACOGNOSY

Total Hours: 60;Credit: 4; Hours/week: 4

Objectives:

Students are able to do qualitative analysis of crude plant extract and isolation of photochemical.

Learning outcomes:

Students are able to do the

1. Macroscopic evaluation of crude drugs.
2. Isolation of photochemical.
3. Analysis of fixed oils.
4. Preparation of herbarium sheets.

1. **Macroscopic evaluation of crude drugs:-** Identification of crude drugs listed in theory (entire and broken condition) by Morphological characters- plant identification active principles, medicinal properties.
2. Microscopic examination of and identification of the powders of the following crude drugs:- clove, Ginger, Nux vomica, Cumin, cardamom Liquorice Ashoka Cinamon Vasaka and Nutmeg
3. Qualitative analysis of crude plant extract :- Qualitative analysis of crude plant extract to detect the presence of phytochemicals - alkaloids, carbohydrates, glycosides,tannins ,flavanones and saponins.
4. Isolation phytochemicals from natural products- caffeine from tea,niccottin from tobacco,curcumin from turmeric,lycopene from tomato (not for Exam)
5. Analysis of fixed oils - Acid value ,saponification value,ester value etc.
6. Preparation of herbarium sheets.

REFERENCES

1. Pharmacognosy: Varro E. Tyler, Lynn R. Brady, James E. Robgers.
2. Textbook of Pharmacognosy – T.E. Wallis
3. Study of crude drugs – Ed. 4-M.A. Iyengar
4. A Textbook of Pharmacognosy – Shah and Quadry
5. Anatomy of Crude drugs – M.A. Iyengar and Nayak
6. Pharmacognosy of Powdered Crude drugs – Iyengar and Nayak
7. Trease and Evans – Pharmacognosy – 14th and 15th edition.
8. Pharmacognosy and Pharmaco biotechnology – James Robbers, Marilyn K. Speedice and Varro E., Tyler.
9. Drug Plant Resources of Central Indian Inventory – Srivastava.
10. Pharmacognosy – Ed. 3 – Kokate C.K, Purohit A.P, Gokhale S.B.
11. Practical Pharmacognosy by Rasheeduz Zafar and Neeraj Gandhi.
12. Practical Pharmacognosy by C.K. Kokate.

SEMESTER 4 Course

code: SDC4PC02(Int)

Course4.7: INTERNSHIP

Credit: 6

SEMESTER V

Semester -5

Course Code: GEC5MC03

Course 5.1: MEDICINAL CHEMISTRY II

Total Hours: 60; Credit: 4; Hours/week: 4

Objectives:

Structure, Stereochemistry, Nomenclature of drugs, mode of action, Structure Activity, Relationships, uses and Physicochemical properties of the drugs.

Learning out comes;

Knowledge about

1. Structure, Stereochemistry, Nomenclature, of drugs,
2. Its mode of action, Structure Activity Relationships
3. uses Physicochemical properties of the drugs.

Module 1; Cardiovascular agents (10 hrs)

Antianginal & vasodilators, antiarrhythmics, antihypertensives, anticoagulants, antihyperlipidemics & cardiotonics – Nifedipine, Procainamide, Propranolol*, Methyldopa*, Captopril, Clofibrate, Warfarin, Phenidione.

Module 2: Analgesics (5 hrs)

Analgesics-antipyretics and Non-steroidal Anti-inflammatory agents: Basic idea of COX I & II inhibitors, salicylates- aspirin*, p-aminophenol derivatives-

paracetamol*, phenacetin, anthranilic acid derivatives-mefenamic acid,, arylacetic/propionic acid derivatives ibuprofen, and diclofenac*

Module 3: Thyroid and Antithyroids (5 hrs)

Thyroid and Antithyroids – Carbimazole, Levothyroxine, Propylthiouracil, Methimazole. Insulin & Oral Hypoglycaemics – Chlorpropamide, Phenformin*, Tolbutamide, Glybenclamide.

Module 4: Steroids and related drugs (10 hrs)

Introduction, Classification, Nomenclature & Stereochemistry.

- a) Androgens and Anabolic steroids – Testosterone, Stanozolol.
- b) Estrogens and Progestational agents – Progesterone, Estradiol*.
- c) Adrenocorticoids – Prednisolone, Dexamethasone, Betamethasone.

Module 5: Chemotherapy (30 hrs)

Antibiotics: β -lactam antibiotics-penicillins and cephalosporins, tetracyclines and chloramphenicol, a brief study of, aminoglycoside antibiotics, polyene antibiotics,

Sulphonamides: sulphanilamide, mechanism of action, sulphones-dapsone*, dihydrofolate reductase inhibitors.

Antitubercular agents: first line drugs-isoniazid*, rifampicin, ethambutol*, and streptomycin. Second line drugs-ethionamide, and para aminosalicic acid .

Antifungal agents: Antibiotics-amphotericinB, griseofulvin and nystatin. Azole derivatives-ketoconazole, fluconazole and clotrimazole*.

Antiviral drugs: amantidine, interferon and ribavirin. Anti HIV agents zidovudine, and abacavir. Anti herpes simplex agents-brivudine, vidarabin and acyclovir. Anti-influeza agents-oseltamivir (tamiflu).

Antiprotozoal agents: Amoebicides-metranidazole

Antimalarials chloroquine, primaquine, and proguanil*.

Anthelmintics :- piperazines and benzimidazoles.

Antineoplastic agents: Neoplasm-cause therapeutic approaches Alkylating agents, folic acid antagonist, natural anticancer agents - Plant products-vinca alkaloids, taxol derivatives. Cisplatin, Chlorambucil, 5- Fluorouracil*, methotrexate,cylophosphamide, ,busulphan

REFERENCES

1. Burger's Medicinal Chemistry Vol I to IV.
2. Remington's Pharmaceutical Sciences, 20th edition.
3. Ashutoshkar's Medicinal Chemistry.
4. . Medicinal Chemistry by W.A. Foye.
5. Medicinal Chemistry Wilson and Giswold
6. Bentley and Driver's Textbook of Pharmaceutical Chemistry.
7. Pharmaceutical Chemistry (Drug synthesis) Vol. I by Roth.
8. Essentials of Medical Pharmacology by Tripathi
9. Medicinal Chemistry by K. Ilango
10. Pharmaceutical Substances Synthesis (two parts) ,patents, applications by A.Kleemann, J.Engel by Thieme Stuttgart New York .
11. 11 Principles of Medicinal Chemistry by Dr. S. S. Kadam, K.G. Bothara , Nirali Prakashan Pune
12. Medicinal and Pharmaceutical Chemistry by Harkishan Singh, V.K.Kapoor by Vallabh Prakashan New Delhi .
13. D. Sriram, P.Yogeswari, Medicinal Chemistry, Pearson Education India, 2010.

SEMESTER 5

Course Code: GEC5NP01

Course 5.2: CHEMISTRY ON NATURAL PRODUCTS

Total Hours: 60; Credit: 4; Hours/week: 4

Objectives:

Students are learning about Natural products, amino acids and action of Enzymes.

Learn outcomes:

Students will get the ideas of

1. Terpenoids , Alkaloids, Vitamins and lipids.
2. Amino acids and its classification.
3. Carbohydrates and its action Reactions of Hetrocycles.

Module 1 :Natural products (15hrs)

Natural Products - Terpenoids - isoprene rule. Structure of citral and geraniol.

Alkaloids - general methods of isolation –classification – structure of conine, piperine and nicotine.

Vitamins – classification- structure (elementary idea) of vitamin A, C and B1.B2 ,B6

Lipids – biological functions – oils and fats – common fatty acids- extraction and refining- hydrogenation – rancidity- identification of oils and fats – saponification value, acid value,iodine value and RM value

Module 2: Amino acids and Proteins (15 hrs)

Amino acids- classification, Zwitter ion. Peptide- solution phase peptide synthesis.

Classification of proteins based on physical and chemical properties and on physiological functions.

Primary secondary and tertiary structure of proteins, helical and sheet structures (elementary treatment only). Denaturation of proteins.

Nucleic acids. Types of nucleic acids -RNA and DNA, polynucleotide chain components - biological functions.

Green Fluorescent Proteins (elementary idea)

Module 3: Carbohydrates (15 hrs)

Classification - constitution of glucose and fructose. Reactions of glucose and fructose - osazone formation. Mutarotation and its mechanism. Cyclic structure. Pyranose and furanose forms. Determination of ring size. Haworth projection formula, configuration of monosaccharides ,epimerisation, chain lengthening and chain shortening of aldoses. Inter conversion of aldoses and ketoses.

Disaccharides - reactions and structure of sucrose. Ring structure

Structure and properties of starch and cellulose. (elementary idea) .Industrial applications of cellulose.

Module 4: Enzymes (5hrs)

Chemical nature and properties of enzymes. Nomenclature and classification of enzymes. Mechanism of enzyme action. Substrate specificity of enzymes. Enzyme inhibition

Module 5: Steroids (5 hrs)

Introduction – Diels hydrocarbon-

Structural features and of cholesterol and ergosterol and saponin (excluding chemistry) Elementary idea of HDL, LDL, Vitamin D

Module 6: Heterocyclic compounds. (5hrs)

Preparation, properties and uses of furan, pyrrole and thiophene.

Synthesis and reactions of pyridine and piperidine - comparative study of basicity of pyrrole, pyridine and piperidine with amines.

Synthesis and reactions of quinoline, isoquinoline and indole with special reference to Skraup. and Fisher indole synthesis.

REFERENCES

1. I. L. Finar, Organic Chemistry - Volume I & II - Pearson Education(Chapters 18)
2. M. K. Jain and S. C. Sharma 'Modern Organic Chemistry', 3rd Edition, Visal Publishing Company Co. (Chapter-35)
3. K. S. Tewari and N. K. Vishnoi, 'Organic Chemistry', 3rd Edition, Vikas Publishing House (Chapter-33)

SEMESTER 5

Course code:GEC5CE01

Course5.3 : CHEMISTRY IN EVERYDAY LIFE

Total Hours: 60; Credit:4; Hours/week: 4

Objective

In our everyday life we come across with many utility materials which all are contributions of Chemistry whether it is food, cloth, drugs, cosmetics and what not. A common knowledge of all the fundamental chemistry behind these utility products will enable us to choose what is essential and discard what are harmful to our life.

Learning Out Comes

Stuents are able to know about the chemistry behined

- soaps
- detergents
- cosmetics
- polymers
- plastic

Module 1 : Soaps (10 hrs)

Soaps – Introduction, detergent action of soap. Toilet soap, bathing bars, washing soaps, liquid soap manufacture – Batch process, cold process, hot process –semi boiled process, boiled process. Additives, fillers and flavours. Significances of acidity and alkalinity.

Module 2: Detergents (15 hrs)

Detergents – Introduction, Detergent action, types of detergents – cationic,anionic, amphiphilic detergents. Common detergent chemicals. Additives, excipients colours and flavours. Enzymes used in commercial detergents. Environmental Hazards.

Module 3 :Cosmetics (10 hrs)

Cosmetics – Introduction, classification – bathing oils. Face creams, toilet powder, skin products, dental cosmetics, hair dyes, shaving cream, shampoo. General formation for each types. Toxicology of cosmetics.

Module 4: Polymers (10hrs)

Polymers – Homo polymers, copolymers, branched and crosslinked polymers, graft and block copolymers, rubbers, plastics, thermoplastics, thermosetting plastics, fibres (characteristic features of each). Natural and synthetic polymers – basic concept of monomers, functionality, molecular weight, degree of polymerization.

Module 5 : Plastics (15 hrs)

Plastics in daily use. Polymerization process (brief). Thermosetting and thermoplastic polymers. Use of PET, HDPE, PVC, LDPE, PP, PS, ABS, and others. Recycling of plastics. Biodegradable plastics. Environmental Hazards of plastics. Paper news print, writing paper, paper boards, cardboards. Organic materials, wood, cotton, Jute, coir – International Universal recycling codes and symbols for identification.

REFERENCES

1. T.P. Coultate, Food – The Chemistry of its components. Royal Society of Chemistry London, (paper back)
2. Shashi Chowls, Engineering Chemistry, Darpat Rai Publication.
3. B.K. Sharma, Industrial Chemistry.
4. CNR Rao, Understanding Chemistry, Universities Press.
5. . B.K. Sharma, Polymer Chemistry, Goel Publishing House, Meerut.

SEMESTER 5

Course Code:SDC5PJ01

Course5.4: PHARMACEUTICAL JUSTICE, PRUDENCE AND ETHICS

Total Hours: 60; Credit: 4; Hours/week: 4

Objectives:

learn about legal sides regarding with pharmaceuticals.

Learning about:

Students will be aware of

1. Pharmaceutical Legislations
2. Legal aspects of trade in drugs.

Module 1: Introduction (10 hrs)

Pharmaceutical Legislations - Pharmaceutical Legislation in India. A brief review.

Drugs & Pharmaceutical Industry - A brief review.,

Legal aspects of trade in drugs.

Pharmaceutical Education - A brief review.

Module 2: The drug Act and Drug rules (20 hrs)

a. Pharmaceutical Ethics

b. Pharmacy Act 1948.

c. Drugs and Cosmetics Act 1940 and Rules 1945.

d. Medicinal & Toilet Preparations (Excise Duties) Act 1955.

e. Narcotic Drugs & Psychotropic Substances Act 1985 & Rules.

f. Drugs Price Control Order.

Module 3 :

A brief study of the following with special reference to the main provisions. (20 hrs)

a. Poisons Act 1919

b. Drugs and Magic Remedies (Objectionable Advertisements) Act 1954

c. Medical Termination of Pregnancy Act 1970 & Rules 1975.

d. Prevention of Cruelty to Animals Act 1960.

e. States Shops & Establishments Act & Rules.

f. Insecticides Act 1968.

g. AICTE Act 1987.

h. Factories Act 1948.

j. Minimum Wages Act 1948. k Patents Act 1970.

4. A brief study of the various Prescription/Non-prescription Products, Medical /Surgical accessories, Diagnostic aids, appliances available in the market.

Module 4: Health care Ecosystem (10 hrs)

Intellectual Property Rights (IPR), Patents, Trademarks, Copy rights, Patent Acts relevant sections (basic ideas only)

REFERENCE

1. P. Ganguli, Intellectual Property Rights: Unleashing the Knowledge Economy, Tata McGraw Hill, 2001.

SEMESTER 5

Course code: SDC5PM01

Course 5.5: PHARMACEUTICAL MANAGEMENT

Total Hours: 60; Credit: 4; Hours/week: 4

Objectives:

Idea About Concept of Management and Drug regulatory affairs.

Learning about

1. Administrative Management (Planning, Organizing Staffing Directing and Controlling).
2. Entrepreneurship development
3. Operative Management (Personnel, Materials, Production, Financial, Marketing, Time/space, Margin/ Morale)
4. Principles of Management (Coordination, Communication, Motivation etc..)

Module 1: Concept of management (15 hrs)

Administrative Management (Planning, Organizing Staffing Directing and Controlling). Entrepreneurship development, Operative Management (Personnel, Materials, Production, Financial, Marketing, Time/space, Margin/ Morale) Principles of Management (Coordination, Communication, Motivation, Decision making, leadership, Innovation Creativity, Delegation of Authority / Responsibility. Record Keeping), Identification of key points to give maximum thrust for development and perfection.

Module 2: Drug regulatory affairs (5 hrs)

Drug regulatory affairs : Definitions, procedure of export & import of drug.

Module 3: Pharmaceutical marketing (5 hrs)

Pharmaceutical marketing : Functions, buying, selling, transportation, storage financed feedback information, channels of distribution, wholesale, retail, department store, multiple shop and mail order business.

Module 4: Salesmanship (5 hrs)

Salesmanship: Principle of sales promotion, advertising, ethics of sales, merchandising, literature, detailing, Recruitment, training, evaluation, compensation to the pharmacist.

Module 5: Market research (10 hrs)

Market research: Measuring & Forecasting Market Demand - Major concept in demand measurement, Estimating current demand Geo-demo- graphic analysis. Estimating industry sales, Market share and future demand. Market segmentation & Market targeting.

Module 6: Materials management (10 hrs)

Materials management: A brief exposure of basic principles of management major areas, scope, purchase, stores, inventory control and evaluation of materials management.

Module 7: Production management (10 hrs)

Production management : A brief exposure of the different aspects of Production Management– Visible and Invisible inputs, Methodology of Activities Performance Evaluation Technique Process– Flow, Process Know-how, Maintenance Management.

REFERENCE

2. Mohan S, Jai D.” Drug Store and Business Management “, 1st edition, 1995,S.V Kar & Co, Jalandhar .
3. Singh S, Singh P.” Drug Store and Business Management”, 1st edition, 1995, S.Dinesh & Co.Circular Road Jalandhar.
4. Koontz & O”Donnel Principles of Management Tata Mc Graw Hill, Delhi.
5. G. Vidya Sagar, Pharamceutical Industrial Management, 2nd edition, 2005, Pharma Book Syndicate

SEMESTER 5

Course code:SDC5NP02 (P)

Course (Practical)5.6 : CHEMISTRY ON NATURAL PRODUCTS

Total Hours: 75; Credit:5 ;Hours/week: 5

Objective

To prepare the students with basic knowledge of the presence of alkaloids, terpenoids etc. in plants

Learning Outcomes

Students will be able to

Isolate the organic compounds
Analyse the oils

1. Isolation of natural organic compounds from medicinal plants
2. Extraction of essential oils
3. Analysis of fixed oils (acid value, saponification value, ester value, and iodine value)

REFERENCE

01. T.E. Wallis, Text Book of Pharmacognosy, 5th Edn., J&A Churchill, 1967
02. W.C. Evans, Trease and Evans' Pharmacognosy, 15th Edn., Bailliere Tindall, 2002.
03. C.K. Kokate, A.P. Purohit and S.B. Gokhlae, Pharmaconosy, Nirai Prakashan, 2007.

SEMESTER 5

Course Code:SDC5MC04 (P)

Course (practical) 5.7: MEDICINAL CHEMISTRY II

Total Hours :75; Credit: 5; Hours/week: 5

Objectives

Students are able to do different volumetric analysis and perform the assay.

Learning outcomes:

Students are able to Perform the assay of pharmaceuticals.

Assays

To estimate the amount of aspirin in the given formulation.

. To estimate the amount of ascorbic acid in the given formulation

To carry out the assay of ibuprofen by using ultraviolet-visible spectrophotometer To estimate sodium chloride by flame photometer

To carry out the simultaneous estimation of paracetamol and diclofenac Sodium in the given formulation.

REFERENCE

1. L.M.Atherden, Bentley and Driver"s textbook of pharmaceutical chemistry, Oxford University Press, Delhi (Larest Edition).
2. P. D. Sethi, Quantitative Analysis of Drugs in Pharmaceutical Preparations, 3rd edition, 1997, CBS publishers and distributors.
3. G. D. Devala Rao, Practical pharmaceutical analysis, 3rd edition, 2010, Birla publications.
4. B. G. Nagavi, Laboratory handbook of instrumental drug analysis,3rd edition, 2000, Vallabh prakashan.
5. H. Beckett and J. B. Stanlake, Practical Pharmaceutical Chemistry part 2, 4th edition, 1997, CBS publishers and distributors

SEMESTER VI

SEMESTER -6
Course Code 6.1: SDC6PCO3(Int)

Course: INTERNSHIP

30 credits (900 hours)

Objective

Short-term working experience in pharmaceutical companies will help students better understand the pharmaceutical industry, learn the process of drug discovery and development, and build a strong network with experts and fellows in the pharmaceutical field, which can positively contribute to future career development. In addition, it will help students to identify if they really enjoy working in industry and help them in choosing a future career after school.

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MODEL QUESTION PAPER

FOR FIRST SEMESTER

MODEL QUESTION PAPER –THEORY

**FIRST SEMESTER B.VOC PROGRAMME IN
PHARMACEUTICAL CHEMISTRY
COURSE 1.3 HUMAN ANATOMY,PHYSIOLOGY &
HEALTH AWARENESS**

CODE:GEC1HA01

Maxmarks 80

Duration 3 Hrs

VERY SHORT ANSWER TYPE (Answer all)

(10x1=10)

1. Structural functional unit of kidney is
2. The lateral bone of forearm
3. Manubrium found in
4. The first seven vertebrae is called
5. The innermost layer of heart
6. Deoxygenated blood reaches tochamber of heart
7. Sub maxillary is an example of
8. Urine passed to urinary bladder through
9. In kidney the projections on inner side is called
10. Range of pH of extracellular fluid in normal person.

SHORT ANSWER TYPE (Answer any 8 from 12)

(8x2=16)

11. Various types of movements of joints
12. What are ligaments
13. Note on muscle tone
14. How the heart sound produced
15. What is congestive heart failure

16. what is blood pressure
17. Give the functions of bile juice
18. Role of teeth in digestive system
19. Disorders of skeletal muscles
20. Write the functions of kidney
21. What is Henle's loop
22. Write about renal circulation.

SHORT ESSAYS (Answer any 6 from 9)

(6x4=24)

23. Basic physiology and functions of spleen
24. Mechanism of coagulation of blood
25. Functions and compositions of blood
26. Composition and formation of lymph
27. Diseases of kidney
28. With a neat diagram discuss nephron.
29. Functions of thyroid gland
30. Note on pancreas as endocrine gland
31. Physiology of menstruation

ESSAYS (Answer any 2 from 4)

(15x2=30)

32. Neat and label diagram of liver Write the anatomy and physiology of liver
33. Give the anatomy and physiology of following
 - A) Liver B) pancreas
34. Anatomy of kidney
35. Discuss the common disease management with examples.

**FIRST SEMESTER B.VOC PROGRAMME
IN PHARMACEUTICAL CHEMISTRY**

COURSE 1.4 PHARMACEUTICS I

CODE:SDC1PH01

Maxmarks 80

Duration 3 Hrs

VERY SHORT ANSWER TYPE (answer all)

(10x1=10)

1. Doses calculate in proportionate to _____ of patient
2. An extra ordinary response to a drug which is different from its characteristic pharmacological action is _____
3. 1 Lb = _____ oz
4. Avoirdupois system belongs to _____
5. Paratonic means
6. A patient will normally buy medicine prescribed to him from
7. From the manufacturer or ware house ,medicines are delivered to
8. In pharmaceutics IPR stands for
9. To calculate weight and capacity Indian pharmacopeia follows _____ system
10. 57.1% v/v alcohol is _____

Short Answer Type (answer any 8 from 12)

(8x2=16)

11. The equation for calculating dose for child
12. How to calculate dose proportionate to age
13. Note on following
 - a) Synergism
 - b) antagonism

14. what do you understand by CRAMS
15. name any 5 indian pharmaceutical company
16. what are 6 Ps for health system
17. Note on patient counseling
18. Discuss dispensing of proprietary products
19. Maintenance of drug store
20. Write Nondiscrimination polices
21. Give the prescription for turpentine liniment
22. What are the advantages of cachets

Short Essays (answer any 6 from 9)

(6x4=24)

23. Discuss various routes of drug administration
24. Write various equations to calculate doses
25. Differentiate between lotion and liniments
26. Classification of powders
27. Note on suppository bases
28. Factors influencing dose
29. What is the contribution of retail pharmacy chains in total sales
30. Differentiate fatty and emulsifying bases
31. Maintenance of drug store

Essays (answer any 2 from 4)

(15x2=30)

32. Discuss suppositories as semisolid dosage forms
33. Define the term powde what are advantages and disadvantages of powders
34. Role of community pharmacist in health care and education
35. Discuss about posology.

FIRST SEMESTER B.VOC PROGRAMME IN PHARMACEUTICAL CHEMISTRY

COURSE 1.5 PHARMACOLOGY AND PHARMACOVIGILLENCE

CODE:SDC1PP01

Maxmarks 80

Duration 3 Hrs

VERY SHORT ANSWER TYPE (Answer all)

(10x1=10)

- 1) study of harmful effects of chemicals
- 2) Identification of botanical resources of drugs is
- 3) Any two routes of administration of drugs
- 4) Example for neurotransmitters
- 5) Example for catecholamines
- 6) Give a drug used for parkinsonism
- 7) Example for sympatholytic drugs
- 8) Isoprenaline is an example of
- 9) Halothane is an example for
- 10) ADME means

SHORT ANSWER TYPE (Answer any 8)

(8x2=16)

- 11 What are BBB
- 12 Important features of drug – protein binding
- 13 Note on active transport
- 14 What is acetylcholinesterases
- 15 discuss cardiac cycle
- 16 note on digoxin
- 17 note on beta blockers

- 18 Note parasympholitic drug
- 19 Note on neuro transmitters in cholinergic system
- 20 What are anticonvulsant agents
- 21 Classification of drugs used in epilepsy
- 22 Discuss example for barbiturates

SHORT ESSAY (Answer any 6 from 9 each carries 4 marks)

(6x4=24)

- 23 Explain pharmacodynamics
- 24 Explain briefly pharmacokinetics
- 25 Pharmacological action of adrenalin in cardiovascular system and its therapeutic use
- 26 Note on adrenaline
- 27 How the drug absorb from the GI tract
- 28 Pharmacology of analgesics
- 29 Mechanism of action of local anesthetic
- 30 Pharmacology of antiarrhythmic drugs
- 31 Discuss anti angina agents

ESSAY TYPE (answer any 2 from 4 each carries 15 marks)

(15x2=30)

- 32 Pharmacology of analgesis
- 33 Pharmacology of anesthetics
- 34 Pharmacology of antiarrhythmic drugs
- 35 Discuss pharmacodynamics.

MODEL QUESTION PAPER – PRACTICAL

**FIRST SEMESTER B.VOC PROGRAMME
IN PHARMACEUTICAL CHEMISTRY
PRACTICAL EXAMINATION
COURSE 1.6 HUMAN ANATOMY
CODE:SDC1HA02 (P)**

Maxmarks 80

Duration 3 Hrs

Write in the first ten minutes the theory and principle of the marked two

(marks 10 x 2=20)

1. Write down the principle and procedure of determination of WBC.
2. Write down the principle and procedure of determination of RBC.
3. Draw the structures of WBC and their properties.
4. Write the principle and procedure for determination of Hb
5. Write the principle and procedure for determination of blood group

Do the marked 2 questions

(20+10=30)

1. Find out the Hb count of the given sample.
2. Identify the given human organs parts and write their properties.
3. Find out the blood group of given sample
4. Using microscope find out RBC of given sample

Result/Output

(maxmarks 10)

Record

(max mark 10)

Viva

(max mark 10)

**FIRST SEMESTER B.VOC PROGRAMME
IN PHARMACEUTICAL CHEMISTRY
PRACTICAL EXAMINATION
COURSE 1.7 PHARMACEUTICS I
CODE: SDC1PH02(P)**

Maxmarks 80

Duration 3 Hrs

I write in the first ten minutes the prescription and procedure for the following marked two **(marks 10X2=20)**

1. ORS powder IP/concentrated pepper mint water BP
2. Calamine lotion/ phenol gargle
3. Rose water IP/calamine lotion
4. Simple elixir/ORS powder IP

II **prepare and dispensing the following marked two (marks 15x2= 30)**

1. Preparation and dispensing of calamine lotion
2. Preparation and dispensing Concentration peppermint water BP
3. Preparation and dispensing of Turpentine liniment

Result/Output (max marks 10)

Record (max mark 10)

Viva (max mark 10)

**FIRST SEMESTER B. VOC PROGRAMME IN
PHARMACEUTICAL CHEMISTRY
ARCTICAL EXAMINATION
COURSE 1.8 PHARMACOLOGY**

CODE: SDC1PP02(P)

Maxmarks 80

Duration 3 Hr

(I) Power point presentation of marked one

(2 0x1=20)

1. Case study
2. Seminar on drug profile

(II) Recreate the following marked one

(30x1=30)

1.

A) Profile of the doctor :

Name of the Doctor	Qualification	Ideal visiting time and day	Practising since (year)	

B) Business potential

Heavy prescriber

Good prescriber

Price conscious

Quality conscious

Favorable

unfavorable

C) Record of visit

Visit details	Data collected from (name of chemists)	Name of company of the prescribed product	Name of competitor's product prescribed	Commitment	

2) Write a leave application with the following specification

- a) bold and italics the subject
- b) bold the date
- c) the letter should be justified
- d) font: calibri
- e) font size :12

3) Create the data sheet as per the specifications

given: a. Name the sheet Class_details.xls

b. create a table with column headers as-Roll No, Date of birth, Quallification, Age

c. make a chart which depicts no. of students in various age group

4) write a passage on your favorite topic with following specifications

- a) bold and italics the topic and red color
- b) the letter should be justified
- c) font: Arial
- d) font size :14

Result/Output

(maxmarks 10)

Record

(max mark 10)

Viva

(max mark 10)

QUESTION BANK

FOR

B.Voc PROGRAMME

IN

PHARAMCEUTICAL CHEMISTRY

FIRST SEMESTER EXAMINATION

QUESTION BANK- THEORY

Programme : B. Voc in Pharmaceutical Chemistry

Semester :1st

Course Code : GEC1HA01

Course Name : Human Anatomy ,physiology & Health awareness

AWARENES

Very short answer (1 mark)

Module 1

1. Name a facial bone
2. Medial bone of forearm
3. Thigh bone is
4. Strongest bone of the body
5. Name any bone on feet
6. Muscular dystrophy is
7. Shape of RBC
8. RBC also known as
9. Give a function of lymph
10. The lateral born of forearm
11. Manubrium found in
12. The first seven vertebrae is called
13. The end portion of the vertebrae column is
14. Power full and flexible pillar in our body is
15. Mandible is
16. Total numbers ofpairs of ribs are
17. Metacarpal found on
18. Freely movablejoint is

19. Arthritis is the disorder of.....

20. The source of Ca^{2+} is

Module 01 Answers

1. Nasal bone
2. Ulna
3. Femur
4. Tibia
5. Metatarsals
6. Disorder of skeletal muscle
7. Disc
8. Erythrocytes
9. To drain the excess interstitial fluid un to the circulatory system
10. radius
11. Sternum
12. Cervical vertebra
13. Coccyx
14. Vertebral column
15. Upper jaw
16. Twelve
17. Palm
18. Synovial joint
19. Joints
20. Sarcoplasmic reticulum

Module 02

1. Heart beat on average about.....
2. Tonicity is the properties of.....
3. Digital artery supplies blood to.....
4. Artery supplies blood to kidney
5. Biggest artery of the body
6. The innermost layer of heart
7. Deoxygenated blood reaches tochamber of heart
8. Sub maxillary is an example of
9. Jejunum is in the part of

10. Bile produced by

Module 02 answers

1. 72
2. Cardiac muscle
3. Fingers
4. Renal artery
5. Aorta
6. Endo cardium
7. Right atrium
8. Salivary glands
9. Small intestine
10. liver

Module 03

1. Volume of air taken during normal breathing is
2. Mediastinum is
3. Trachea belongs to
4. Lungs are covered by
5. Pulmonary trunk arises from
6. Structural functional unit of kidney is
7. Outer part of kidney is
8. Urine passed to urinary bladder through
9. In kidney the projections on inner side is called
10. Range of pH of extracellular fluid in normal person

Module 03 answers

1. Tidal volume
2. Space between the lungs
3. Respiratory system
4. Pleura
5. Right ventricle
6. Nephron

7. Cortex
8. Ureters
9. Pyramid
10. 7.35-7.45

Module 04

1. Cerebellum found in
2. Growth hormone is
3. Give a function of ovary
4. AIDS stands for
5. Frigidity is the
6. Spermatozoa produced by
7. Secretion of male reproductive organ is
8. FSH stands for
9. Formation and maturation of ovum is
10. TSH stands for
11. Pituitary gland is also called
12. The hormone produced by testes
13. Adrenal gland found on
14. Two parts of pancreas
15. Hypoglycemia is the disorder of
16. Principal secretion of adrenal medulla is

Module 04 answers

1. Behind the pons and medulla oblongata
2. Somatotrophic hormone
3. Secretion of hormones
4. Acquired Immune Deficiency Syndrome
5. Disorders of menstruation

6. Testis
7. Semen
8. Follicle stimulating hormone
9. Oogenesis
10. Thyroid stimulating hormone
11. Hypophysiscerebri gland
12. Testosterone
13. Kidney
14. Exocrine and endocrine
15. Pancreas
16. Adrenalin

Module 05

1. Power house of cell
2. Adipose tissue also known as
3. Key structure of living cell is
4. Ribosomes found in
5. Neuron contains only one axon is called
6. Nervous tissue is composed of
7. Muscle found in heart
8. Example for an epithelial cells fuse with adjacent cell forming tight junctions in certain organs
9. The two major periods in cell cycle are
10. RNA found in

Module 05 answers

1. Mitochondria
2. Beneath of skin
3. Nucleus
4. Cytoplasm
5. Unipolar
6. Neuron
7. cardiac

8. Alimentary canal
9. Cell growth, division
10. Ribosome

Short answers (2marks)

Module 01

1. Note on appendicular skeletal system
2. Note on ribs
3. Types of joints
4. Various types of movements of joints
5. What are ligaments
6. Note on muscle tone
7. Disorders of skeletal muscles
8. What is muscle tone
9. Compositions of blood
10. Disorders of joints
11. Properties of RBC
12. Functions of RBC
13. Disorders of lymphatic system

Module 02

1. discuss the physiology of heart
2. pulmonary circulation
3. coronary circulation
4. properties of cardiac muscle
5. refractory period of heart
6. nutrition of cardiac muscles

7. how the heart sound produced
8. what is congestive heart failure
9. what is blood pressure
10. give the functions of bile juice
11. Role of teeth in digestive system

Module 03

1. Functions of respiration
2. What is pulmonary circulation
3. Differentiate inspiratory and expiratory reserve volume
4. Define vital capacity
5. Note on respiratory volumes
6. Write the functions of kidney
7. What is Henle's loop
8. Write about renal circulation
9. Note on glomerular filtration
10. Neat and label the diagram of nephron

Module 04

1. Characteristics of hormone
2. List out the endocrine glands
3. Physiological actions on insulin
4. What are the physiological changes during pregnancy
5. Functions of ovary
6. Note on testosterone

7. Functions of progesterone
8. Functions of testes
9. Physiological actions of adrenalin
10. Note on diabetes-mellitus
11. Physiological actions of insulin
12. List out the endocrine glands and their secretion

Module 05

1. Differentiate mitosis and meiosis
2. Note on cell nucleus
3. What is homeostatic imbalance of cell division
4. Write about muscular tissue
5. Draw and label the physical structure of cell

Short essay type (4marks)

Module 01

1. Note on vertebral column and its function
2. Note on skull
3. Note on joints of skeletal system
4. Disorders of joints
5. Anatomy and physiology of different types of muscle
6. Physiological properties of skeletal muscles
7. Basic physiology and functions of spleen
8. Mechanism of coagulation of blood
9. Functions and compositions of blood

10. Composition and formation of lymph

Module 02

1. Differentiate between coronary and pulmonary circulation
2. Anatomy of heart
3. Write a note on systemic circulation
4. Discuss cardiac cycle
5. What is ECG
6. Discuss any two cardiac diseases
7. What is BP how it is regulate
8. Functions of large intestine
9. Discuss Absorption of digestive food from g.i, tract
10. Write a note on pancreas
11. Discuss the disorders of digestive system
12. Role of gallbladder
13. Functions of stomach
14. With neat diagram write the anatomy of stomach

Module 03

1. Mechanism of respiration
2. Anatomy of lungs
3. State respiratory volume and vital capacity
4. Discuss mechanism and regulation of respiration
5. Physiology of urine formation
6. Discuss about acid base balance in your body

7. Diseases of kidney
8. With a neat diagram discuss nephron

Module 04

1. Note on spinal cord
2. Discuss cranial nerves
3. Functions of brain
4. Anatomy of brain
5. Physiology of autonomic nerve system
6. Explain hypothalamus
7. Functions of thyroid gland
8. Note on pancreas as endocrine gland
9. Physiology of menstruation
10. Write a note on oestrogen and progesterone
11. List out the endocrine glands and their secretion

Module 05

1. Discuss epithelial tissue
2. Note on connective tissue
3. Note on neuron
4. Discuss different phases on cell cycle
5. Discuss physical structure of cell

Module 06

1. Note on first aid with examples
2. Discuss the common disease management with examples

Long essay type (15 marks for each)

Module 01

1. Discuss axial skeletal
2. Discuss lymphatic system
3. General functions and composition of blood
4. Explain skeletal system

Module 02

1. Neat and labeled diagram describe the structure and function of heart
2. Write a note on various circulation of blood vessels
3. Anatomy and disorders of digestive system
4. Neat and label diagram of liver Write the anatomy and physiology of liver
5. Give the anatomy and physiology of following A)Liver B) pancreas

Module 03

1. Label diagram and anatomy of respiratory system
2. Physiology of urine formation
3. Anatomy of kidney
4. One of the function of brain is

Module 04

1. Note on spinal cord
2. Discuss cranial nerves

3. Functions of brain
4. Anatomy of brain
5. Physiology of autonomic nerve system
6. Explain hypothalamus
7. Functions of thyroid gland
8. Note on pancreas as endocrine gland
9. Physiology of menstruation
10. Write a note on oestrogen and progesterone
11. List out the endocrine glands and their secretion

Module 05

1. Note on neuron
2. Discuss different phases on cell cycle
3. Discuss physical structure of cell

Module 06

1. Note on first aid with examples
2. Discuss the common disease management with examples

QUESTION BANK- THEORY

Programme : B. Voc in Pharmaceutical Chemistry

Semester :1st

Course Code : SDC1PH01

Course Name : Pharmaceutics I

SDC1PH01 Pharmaceutics 1

Very short answer (1 mark)

Module 1

1. Posology deals in
2. Give Clark's formula
3. Doses calculate in proportionate to _____ of patient
4. An extra ordinary response to a drug which is different from its characteristic pharmacological action is _____
5. Ephedrine usually used for
6. A patient will normally buy medicine prescribed to him from
7. From the manufacturer or ware house ,medicines are delivered to
8. In pharmaceutics IPR stands for
9. Health care insurance is to
10. Indian pharmaceutical quality is comparison to Chinese is
11. In Indian pharmaceutical market, Low cost of innovation and English speaking labor of India is one of the biggest
12. Rashtriya Swasthya Bima Yojana is a
13. The procurement by government is generally done from various drug manufactures through inviting in,
14. To know about potential customers , a MSR should take information from
15. All the stakeholders of health care ecosystem revolve around.....

Module 01 Answers

1. dose
2. dose for the child = (child's weight in kg / 70) adult dose
3. Age, body weight, surface area
4. idiosyncrasy
5. Release of noradrenalin
6. retail or hospital pharmacy
7. CFA
8. Intellectual property right
9. reduce his financial burden at the time of health challenge
10. equal
11. strength
12. central govt. scheme
13. tenders
14. stockist
15. patient

Module 02

1. To calculate weight and capacity Indian pharmacopeia follows _____ system
2. 1 Lb = _____ oz
3. Avoirdupois system belongs to _____
4. Paratonic means
5. 57.1% v/v alcohol is _____
6. 1 centigram = gm
7. 8 drachms = pound
8. Any strength above proof strength is

Module 02 Answers

1. metrics
2. 16 oz
3. Imperial method
4. Solutions which are not having the same osmotic pressure
5. Proof spirit
6. 0.1 gm
7. 1 ounce
8. Over proof

Module 03

1. Give an example for solid dosage form
2. Dentifrices means
3. Example for internal liquid dosage form
4. Lotions are applied for
5. Example for semisolid dosage form
6. Shape of nasal suppository
7. Cocoa butter is suitable base for _____suppositories
8. Cachets are also known as_____
9. Syrup is an application
10. Ear drops used in
11. Powders are dispensed in bulk, when..... of dosage is not important
12. Dusting powders are dispensed in containers
13. compression suppositories containand.....drugs
14. in suppositories the drugs released either due to theof base or.....its contents influid
15. cocoa butter is a mixture ofof fatty acid
16. suppositories aredosage form of drugs
17. suppositories are used to produce,and action

module03 Answers

1. Powder
2. Tooth powders
3. Syrup
4. External
5. Suppositories
6. Cylindrical
7. Nasal

8. Wafer capsules
9. External
10. Body cavity
11. accuracy
12. Sifter top containers
13. Thermo labile, insoluble
14. Melting, dissolving, body cavity
15. Glyceryl esters
16. Unit
17. Local, systemic, mechanical

Module 04

1. Write a field of Company policies related to
2. Action in case of violation of protection of intellectual property.....

Module 04 Answers

1. 1. Confidentially, company assets, technology usage etc..
2. subject to civil or even criminal penalties

Short answer type (2 marks)

Module 01

1. Give the equation for calculating dose for child
2. How to calculate dose proportionate to age
3. Note on following
 - a) Synergism b) antagonism
4. What is idiosyncrasy
5. What is the role of stockiest in pharmaceutical industry
6. Note on pharmaceutical distribution
7. what is retail pharmacy
8. what do you understand by CRAMS
9. name any 5 indian pharmaceutical company
10. what are 6 Ps for health system

Module 02

1. Define allegation method
2. What is proof spirit
3. General principles to adjust isotonicity
4. Differentiate imperial and metric system
5. Note on isotonic solution

Module 03

1. Write the prescription for calamine lotion
2. Write the prescription for turpentine liniment
3. Differentiate the term monophasic and biphasic liquid dosage form
4. Advantages and disadvantages of suppositories
5. Note on types of suppositories
6. Note on lotion
7. Give any four disadvantages of suppository base
8. Advantages of powder
9. Define the term powder
10. What do you mean by cachets
11. What are the advantages of cachets
12. Example for semi liquid preparation
13. Give the prescription for turpentine liniment
14. Prescription for lotion

Module 04

1. Note on patient counseling

2. Discuss dispensing of proprietary products
3. Maintenance of drug store
4. Write Nondiscrimination policies
5. Write policy against sexual harassment

Short essay type (4 marks)

Module 01

1. Discuss various routes of drug administration
2. Write various equations to calculate doses
3. Factors influencing dose
4. What is the contribution of retail pharmacy chains in total sales
5. Note on pharmaceutical distribution
6. What is stockiest
7. Note on retail pharmacy
8. What is IPR how it is important for companies
9. Note on health care eco system
10. Mention any two challenges faced by Indian pharmaceutical companies
11. Note RashtriyaSwasthyaBimaYojana
12. Note 6Ps in health care system

Module 02

1. Calculate the volume of 95% alcohol required to prepare 600 ml of 70 % alcohol
2. Calculate the amount of 70%,60%,40% and 30% alcohol should be mixed to get 50% alcohol
3. Discuss isotonic solution

4. General principles of isotonicity

Module 03

1. Differentiate between lotion and liniments
2. Classification of powders
3. Note on suppository bases
4. Differentiate fatty and emulsifying bases
5. Advantages and disadvantages of powder
6. Note on suppositories
7. Discuss the advantages and disadvantages of suppositories
8. Discuss fatty bases
9. Explain preparation of suppositories
10. Note on new trends of suppositories

Module 04

1. Explain common policies regarding confidentiality
2. What are the policies related to the usage of illegal drugs at workplace
3. What are the company policies related against discrimination
4. Explain company policies regarding company asset
5. Maintenance of drug store

Long essay type (15 marks)

Module 01

1. What do you mean by posology discuss various factors influencing dose
2. Discuss about posology

3. Write a note on health care ecosystem with SWOT analysis of Indianpharma sector
4. Note on health care ecosystem

Module 03

1. Discuss solid dosage form
2. Discuss suppositories as semisolid dosage forms
3. Define the term powder what are advantages and disadvantages of powders
4. Define the term powder classify different types powders, discuss the bulk powders are meant for external use

Module 04

1. Role of community pharmacist in health care and education
2. Explain Govt. company policies and its process

QUESTION BANK- THEORY

Programme : B. Voc in Pharmaceutical Chemistry

Semester :1st

Course Code : SDC1PP01

Course Name :PHARMACOLOGY AND PHARMACOVIGILLENCE

SDC1PP01 PHARMACOLOGY AND PHARMACOVIGILLENCE

VERY SHORT ANSWERS (1 mark)

Module 01

1. study of harmful effects of chemicals
2. Identification of botanical resources of drugs is
3. Any two routes of administration of drugs
4. ADME means
5. IV stands for
6. IM stands for
7. BBB is
8. Block effect produces in the receptor by
9. Biological catalysis are
10. 100% bioavailability produces by.....type of administration
11. Give an example for type of drug applied through rectum
12. Prophylactic drug means

Module 01 Answers

1. Toxicology
2. Pharmacognosy
3. Oral, sublingual etc..
4. Absorption, distribution, metabolism and excretion
5. Intravenous
6. Intramuscular
7. Blood brain barrier
8. Antagonist
9. Enzyme
10. Intravenous
11. Suppositories
12. For disease precaution

Module 02

1. Example for neurotransmitters
2. Example for catecholamines
3. Give a drug used for parkinsonism

4. Example for sympatholytic drugs
5. Isoprenaline is an example of
6. Selective alpha1 receptor agonist is
7. L-dopa used for
8. Example for alpha adnergic blocker
9. One of the therapeutic use of parazosin
10. Rauwolfia alkaloid is
11. Any one of the beta adrenoreceptor site which block by beta blockers
12. Ach means
13. Muscarinic in the class ofreceptor
14. Atropine derived from
15. Drugs which inhibit action of parasympathetic system is called
16. Salbutamol is an example forselective
17. Selectivebeta 1 receptor is
18. Dopa is
19. COMT stands for
20. Any one of the enzyme used for metabolism of catecholamines

Module 02 Answers

1. Acetyl choline
2. Adrenaline
3. L-dopa
4. phenoxybezamine
5. non selective beta agonist
6. phenylepherine
7. Parkinson
8. phentolamine
9. vasodilators both artery and vein
10. Reserpine
11. dopamine
12. Acetyl choline etc..
13. Cholinergic receptor
14. Atropabelladona
15. prazosin
16. Beta 2
17. dopamin

18. dehydroxy phenyl alanine
19. Catechol-O- methyl transference
20. Mono amine oxidase

Module03

1. Halothane is an example for
2. Name drug as general anesthetic
3. Example for local anesthetic
4. Procaine is an example for
5. Example for naturally occurring local anesthetic
6. Example for volatile general anesthetic
7. Group of anesthetics which produce unconsciousness all over the body called
8. Drugs used before the administration of anesthetics called
9. Barbiturates derived from
10. Drugs used for epilepsy is called
11. Phenyl barbitone is an example for
12. EEG stands for
13. Naturally origin analgesis
14. Morphine is an example for
15. Diacetyl derivative of morphine
16. 4-hydroxy acetaanilide is
17. Adverse effect of paracetamol
18. Acetylsalicylic acid is
19. Example for para amino phenol derivative
20. NSAIDs stands for

Module 03 Answers

1. General anesthetic
2. Chloroform
3. Cocaine
4. Local anesthetic
5. Cocaine
6. Thiopental sodium
7. General anesthetic
8. Pre anesthetic drugs
9. Barbituric acid
10. Anticonvulsant
11. Barbiturates
12. Electro EncephaloGram
13. Morphine
14. Naturally occurring analgesis
15. Heroin
16. Paracetamol
17. Vomiting
18. Aspirin
19. Phenacetin
20. Non-steroidal anti-inflammatory drug

Module 04

1. ACE inhibitors stands for
2. Thiazides belongs to
3. Digoxin obtained from
4. Increase of heart rate is
5. Anti-arrhythmia drugs used for
6. Average heart rate is
7. Nitrites are used in the treatment of
8. Example for anti angina agents
9. Drugs used for the dilation of blood vessels
10. Adverse reaction of digitalis

11. Nifedipine is an example for
12. Difference between systolic and diastolic blood pressure give
13. Bretylium is an example for
14. Contraction of heart muscle is
15. Example for adrenergic blocking drug
16. Propranolol hydrochloride used as
17. Reserpine obtained from
18. Example for opium alkaloid
19. Bradycardia means
20. MI stands for

Module 04 Answers

1. Angiotensin converting enzyme
2. Diuretics
3. Digitalis lanata
4. Tachycardia
5. To order cardiac rhythm
6. 72
7. Angina pectoris
8. papaverine
9. Vasodilators
10. Nausea
11. Calcium blockers
12. Pulse pressure
13. Adrenergic neuron blocker
14. Systole
15. Phenoxy benzamine
16. Anti arrhythmic drug
17. Rauwolfia
18. Papaverine
19. Decrease heart rate
20. Myocardium infarction

Module 05

1. Pharmacovigilence relating to
2. ADRs defined as
3. Serious Adverse Event results in
4. Reporting of the adverse event is the responsibility of
5. Drugs are launched in the market when they get approval after showing evidence in
6. The elements of adverse event reporting are
7. Investigation of adverse event is the responsibility of
8. Name any organization that plays a key collaborative role in the global oversight of pharmacovigilance
9. If a doctor says a MSR about adverse event he should do

Module 05 Answers

1. Assessment, collection etc..
2. Lack of efficiency from a drug, any response to a drug which is noxious, to a drug that is unintended
3. Requires hospitalization
4. PV team
5. Phase 4 trial
6. Identifiable patient, suspect drug, an adverse event
7. PV team
8. WHO
9. Take complete information for AE reporting

SHORT ANSWERS TYPE (2 MARKS)

MODULE 01

1. What are BBB
2. Important features of drug – protein binding

3. Note on active transport
4. Differentiate pharmacology and pharmacodynamics
5. Write about distribution of drug
6. Define a drug
7. Define a poison
8. Pharmacokinetics deals in
9. What is bioavailability
10. Define biological lag
11. Drug synergism is
12. Drug addiction
13. Drug tolerance
14. Define pharmacodynamics
15. Define pharmacotherapeutics
16. Discuss about drug on the basis of sources
17. What is facilitated diffusion
18. Write active transport
19. Differentiate hydrophobic and hydrophilic drugs
20. Cardinal effects of drug protein bind
21. What is phase 2 metabolism

MODULE 02

1. What are dopamine receptors
2. Define neurotransmitters
3. Note on A) phenoxybenzamine B) prazosin
4. What is acetylcholinesterases

5. Note parasympathetic drug
6. Note on neuro transmitters in cholinergic system
7. Define muscarinic receptors
8. What are Dopamine receptors
9. Note on acetylcholine
10. Drugs in para sympathetic nerve system

MODULE 03

1. What is analgesis
2. Note on narcotic analgesis
3. What are anticonvulsant agents
4. Classification of drugs used in epilepsy
5. Discuss example for barbiturates
6. Adverse effect of aspirin
7. Note on ibuprofen
8. Classification of analgesis
9. Mechanism of action of narcotic analgesis
10. Mechanism of action of general anesthetic

MODULE 04

1. role of inhibitors to reduce BP
2. note on calcium channel blockers
3. discuss cardiac cycle
4. note on digoxin
5. note on beta blockers

6. mechanism of vasodilators

MODULE 05

1. Define pharmacovigilance
2. What is adverse of drug
3. What is adverse event
4. Which are the elements of adverse event
5. What is spontaneous reporting
6. What is expedited reporting
7. Define aggregate reporting
8. What is ISop
9. Note on WHO
10. Define IMP

SHORT ESSAY TYPE (4 MARKS)

MODULE 01

1. Discuss various routes of administration
2. How the drug metabolized
3. Discuss type of diffusion
4. Factors influencing drug absorption
5. Steps for biotransformation
6. Discuss various types of receptors
7. Explain pharmacodynamics
8. Explain briefly pharmacokinetics
9. How the drug absorb from the GI tract

MODULE 02

1. Note on selective beta 1 agonist
2. Note on sympatholytic drugs
3. What are cholinergic drugs
4. What is parkinsonism which are the drugs used for it
5. Therapeutic uses of sympathomimetic drugs
6. Write a short note on selective alpha and beta receptor agonist
7. What are adrenoreceptors
8. Pharmacological action of adrenalin
9. Pharmacological action of adrenalin in cardiovascular system and its therapeutic uses
10. Note on adrenaline
11. Note on drug affects in parasympathetic nerve system

MODULE 03

1. Discuss NSAIDs drug
2. Pharmacology of aspirin
3. Note on muscle relaxant drugs
4. Pharmacology of general anesthetics
5. Pharmacology of analgesics
6. What are anticonvulsants
7. Mechanism of action of local anesthetic

MODULE 04

1. Significance of propranolol hydrochloride
2. Pharmacology of antiarrhythmic drugs
3. Discuss anti angina agents
4. Note on cardiovascular system
5. Note on cardiac glycosides
6. Differentiate calcium channel blockers and beta blockers
Pharmacology of ACE converting inhibitors

MODULE 05

1. Discuss adverse Event Reporting
2. Note on WHO and ICH
3. Describe any three terms used for drug safety
4. Describe any two international collaboration on pharmacovigilance
5. Describe coding of adverse event and what is role of MSR in pharmacovigilance

LONG ESSAY TYPE (15 MARKS)

MODULE 01

1. Explain pharmacokinetic principles
2. How the drug absorbed from GI tract
3. Discuss pharmacodynamics

Module 02

1. What are sympathomimetic drugs
2. Explain selective adnergic receptor agonist

3. Discuss antiparkinsonian drugs

Module 03

1. Discuss the pharmacology of drugs used in epilepsy
2. Pharmacology of analgesis
3. Pharmacology of anesthetics
4. Pharmacology of general anesthetic

Module 04

1. How antihypertensive agents to reduce BP
2. Pharmacology of antiarrhythmic drugs
3. Discuss anti angina agents
4. Note on cardiovascular system

Module 05

1. Discuss terms commonly used in drug safety
2. Discuss pharmacovigilance and its importance
3. Discuss international collaboration on pharmacovigilance
4. Discuss adverse event of reporting.

QUESTION BANK -PRACTICAL

Programme : B. Voc in Pharmaceutical Chemistry

Semester :1st

Course Code : SDC1HA02 (P)

Course Name : Human Anatomy

SDC1HA02 (P) HUMAN

ANATOMY (Practical)

Questions for theory (10 mark)

1. Write down the principle and procedure of determination of WBC.
2. Write down the principle and procedure of determination of RBC.
3. Draw the structures of WBC and their properties.
4. Write the principle and procedure for determination of Hb
5. Write the principle and procedure for determination of blood group

For implementation (20 marks) & (10 marks)

1. Findout the Hb count of the given sample.
2. Identifythe given human organsparts and write their properties.
3. Find out the blood group of given sample

QUESTION BANK -PRACTICAL

Programme : B. Voc in Pharmaceutical Chemistry

Semester :1st

Course Code : SDC1PH02 (P)

Course Name : Pharmaceutics I

SDC1PH02 (P) Pharmaceutics I (Practical)

If or theory questions (marks 10)

1. ORS powder IP/concentrated pepper mint water BP
2. Calamine lotion/ phenol gargle
3. Rose water IP/calamine lotion
4. Simple elixir/ORSpowder IP

II for implementation (marks 15)

1. Preparation and dispensing of calamine lotion
2. Preparation and dispensing Concentration peppermint water BP
3. Preparation and dispensing of Turpentine liniment

QUESTION BANK- PRACTICAL

Programme : B. Voc in Pharmaceutical Chemistry

Semester :1st

Course Code : SDC1PP02(P)

Course Name : Pharmacology

SDC 1PP02(P) PHARMACOLOGY(PRACTICAL)

(I) Power point presentation (any one marks20)

1. Case study
2. Seminar on drug profile

(II) Recreate the following (any one Marks 30)

1.

Profile of the doctor :

Name of the Doctor	Qualification	Ideal visiting time and day	Practising since (year)	

Business potential

Heavy prescriber <input style="width: 50px; height: 20px; border: 1px solid green;" type="text"/>	Good prescriber <input style="width: 50px; height: 20px; border: 1px solid orange;" type="text"/>
Price conscious <input style="width: 50px; height: 20px; border: 1px solid green;" type="text"/>	Quality conscious <input style="width: 50px; height: 20px; border: 1px solid green;" type="text"/>
Favourable <input style="width: 50px; height: 20px; border: 1px solid green;" type="text"/>	unfavourable <input style="width: 50px; height: 20px; border: 1px solid green;" type="text"/>
<input style="width: 50px; height: 20px; border: 1px solid green;" type="text"/>	indifferent

Record of visit

Visit details	Data collected from (name of chemists)	Name of company of the prescribed product	Name of competitor's product prescribed	Commitment	

2) Write a leave application with the following specification

- f) bold and italics the subject
- g) bold the date
- h) the letter should be justified
- i) font: calibri
- j) font size :12

3) Create the data sheet as per the specifications given:

- a. Name the sheet Class_details.xls
- b. create a table with column headers as-Roll No, Date of birth, Quallification, Age
- c. make a chart which depicts no. of students in various age group

4) write a passage on your favourite topic with following specifications

- e) bold and italics the topic and red color
- f) the letter should be justified
- g) font: Arial
- h) font size :14