MA 112: MATHEMATICS

Algebra: Solving Linear Equations and Quadratic Equations, Simultaneous Linear Equation, Function and their types, Introduction to logarithms and its application in pharmaceutical science, Determinants (meaning), Matrices and its type, Arithmetic Operations on matrices.

Differential Calculus : Introduction to Limits, Methods to solve limits, differential coefficient, Differentiation of standard functions, Product rule, Quotient rule, Differentiation of function of a function (Chain rule). Logarithmic differentiation, Parametric differentiation, Successive differentiation.

Integral Calculus: Introduction to Integration, integration of standard forms, Integration of Algebraic Expression, integration by parts, Method of Substitution, Integration by Partial fractions.

Differential Equations : Definition and Formation of differential equations, equations of first order and first degree, variable separable method, Linear differential equations.

Statistics: Data and Diagrammatic representation of Data : Bar and Pie Chart, Histogram and Frequency Curve, Measures of central tendency : Mean, Mode, Median, Geometric Mean. Measures of Dispersion – Mean deviation, Standard deviation, coefficient of variations. Introduction to Correlation and Regression, Applications of Statistical Concept in Pharmaceutical Science.

Probability : Basic Concept of Probability and Preliminary ideas, Definition of probability with simple numerical examples, Addition and Multiplication Theorems, Probability Distributions – Fitting of Binomial and Poisson distribution, Normal distribution (Basic Concept).

Books & References Recommended:

1. Calculus, Volumes 1, T. M. Apostol, Wiley Eastern.
2. Ray M., Algebra
3. Pathak. H.K, Calculus and Statistical Methods, Shikha Sahitya Prakashan, Merrut.
4. Gupta S.P. Statistical Methods, Sultan Chand and Co., New Delhi.
5. Ramana B V, Higher Engineering Mathematics , Tata McGraw Ltd., New Delhi, 2006
6. Narayan Shanti, Integral calculus , Sultan Chand & Co.
7. Greval B.S., Higher Engineering Mathematics, Khanna Publication, New Delhi

PY 114: PHARMACEUTICAL CHEMISTRY-II (ORGANIC CHEMISTRY-I)

Fundamentals of organic reaction mechanism: Classification of organic reactions, bond- breaking and bond-making processes, concerted and stepwise reactions, reactivity and orientation, electrophiles and nucleophiles, aromatic, role of solvent, polarity of solvent.

Free Radical Reactions: Stability and structure generation and fate of free radicals, free radical substitution reaction.

Reaction involving Carbenes: Carbenes, its stability and structure generation and fate of carbenes.

Reaction involving Nitrenes: Nitrenes, its stability and structure generation and fate of nitrenes.

Stereochemistry:

Optical activity, Cause of optical activity, Enantiomers, Racemic modifications, Configuration: D and L System (carbohydrate and amino acids), Cahn Ingold Prelog system, diastrereoisomers, asymmetric synthesis, method of resolution and optical purity, cis-trans isomerism resulting from double bond.

Chemistry of Aliphatic Compounds:

(Carbonyl compounds, alcohols, phenol, ethers, esters and amides**)**

Reaction involving Carbocations: Structure generation and stability and fate of carbocataions, SN1, SN2

Reaction involving Carbanions: Stability and structure generation and fate of carbanions,

Elimination Reactions: 1,2 Elimination reactions, dehydrohalogenation of alkyl halides, E1, E2

PRACTICALS: Minimum 15 experiments based on following

- Qualitative analysis of organic compounds and preparation of their derivatives
- Synthesis of organic compounds
- Characterization of synthesized compounds
- Use of stereo models.

BOOKS & REFERENCES RECOMMENDED

Text books

1. Robert T. Morrison and Robert N. Boyd (1992) Organic Chemistry: 6th ed. Printice Hall
2. Finar I. L., Organic Chemistry (1963) vol. 1, Organic Chemistry: 4th ed. Longman
3. Finar I. L., Organic Chemistry (1964) vol.2, Organic Chemistry: 4th ed. Longman
4. Cleyden J., Greeves N., Warren S., and Wothers P., (2001) organic chemistry: 1st ed. Oxford university press

Reference books

1. Eliel, E. L.; Wilen, S. H Eliel, (1993) Steriochemistry of Organic Compounds: John Wiley & Sons, New York.
2. Mann, G. F., and Saunders, C. B., (1960) Practical Organic Chemistry: 4th ed. Longman
3. Vogel, I. A., (1956) A Text Book of Practical Organic Chemistry Including Qualitative Organic Analysis:3rded Longman.

Internet references

1. http://www.mhhe.com/physsci/chemistry/carey/student/olc/ch02summary.html

PY 115: PHARMACEUTICAL DOSAGE FORM

Introduction to dosage forms: Classification, significance of classification, classification of dosage forms based on: physical state, method of preparation, sterile and non-sterile preparations, classification as per mode of application, classification according to drug release pattern, pharmacological classification.

Routes of drug administration: types, criteria for selection and their merits and demerits.

Pharmaceutical Calculation: Different systems of weights and measures, Interconversion of different measuring units, Dilution and concentration of solutions, Percentage solutions, Calculation by alligation method. Dose calculation.

Liquid Formulation Additives: Types and properties of additives- Vehicles, Solvents & Co-solvents, Preservatives, Antioxidants, Suspending agents, Emulsifying agents, Solubilizers, Colours, Flavours and sweetners.

Liquid Dosage Forms: Definition, general formulation, principles and method of preparation, storage and official products of the following categories of dosage forms:

Solutions, Syrups, Elixirs, Spirits, Linctuses, Gargles, Mouth washes, Suspension, Emulsions, Lotions, Liniments, Milks and Magmas, Jellies.

Packaging of pharmaceutical dosage forms: Introduction, objective and functions of packaging, packaging components, containers and closures, blister and strip packaging.

List of Practical

01 Prepare and submit Aqueous Iodine Solution

02 Prepare and submit Weak Iodine Solution

03 Prepare and submit Strong Iodine Solution

04 Prepare and submit Strong Ammonium Acetate Solution

05 Prepare and submit Cresol with Soap Solution

06 Prepare and submit Chloroxylenol solution

07 Prepare and submit Simple Syrup IP

08 Prepare and submit Simple Syrup USP

09 Prepare and submit Compound Ferrous Phosphate Syrup

10 Prepare and submit Simple Elixir

11 Prepare and submit Piperazine Citrate Elixir

12 Prepare and submit Chloroform Spirit

13 Prepare and submit Aromatic Spirit of Ammonia

14 Prepare and submit Simple Linctus

15 Prepare and submit Phenol Gargle

16 Prepare and submit Compound Sodium Chloride Mouth Wash

17 Prepare and submit Calamine Lotion

18 Prepare and submit Soap Liniment

19 Prepare and submit Turpentine Liniment

20 Prepare and submit Milk of Magnesia

21 Prepare and submit Aluminium Hydroxide Gel

22 Prepare and submit Bentonite Magma.

23 Prepare and submit Liquid Paraffin Emulsion

24 Prepare and submit Turpentine oil Emulsion

25 Prepare and submit Paracetamol Oral Suspension

26 Prepare and submit dilute hydrochloric acid solution from concentrated Hydrochloric acid

27 Prepare and submit 50 % v/v alcohol from 90 % v/v alcohol after calculating by Alligation method

BOOKS & REFERENCES RECOMMENDED

Textbooks:

1. Ansel H.C., Ansel's Pharmaceutical Dosage Forms & Drug Delivery Systems, 8th Ed., Lippincot Williams & Wilkins
2. L. Lachman, H.A. Lieberman and J.L.Kanig, The theory and practice of industrial pharmacy, 4th ed., 1991, Varghese publishing house.

Reference books:

1. Remington's The Science and Practice of pharmacy, 21st ed., 2005, Lippincott williams & Wilkins
2. Ansel H.C., Pharmaceutical calculations, 14th ed., 2015, Lippincott Williams & Wilkins, India

PY 116 : HUMAN ANATOMY AND PHYSIOLOGY-I

1. **Introduction to anatomy and physiology**: Scope and basic terminology, introduction to human body. Cellular organization: Structure of cell, its components and their function. Elementary Tissues of the Human Body: Epithelial, connective, muscular and nervous tissues; their sub-types and characteristics.

2. Skeletal System: Structure, composition and functions of skeleton, Classification of joints, Types of movement at joint, Arthritis.

3. Skeletal Muscles: Their gross anatomy, physiology of muscle contraction, physiological properties of skeletal muscle, Myasthenia gravis.

4. Cardiovascular System: Composition and functions of blood and its elements, blood groups and their significance, mechanism of coagulation, Anemia, Hemophilia, Erythroblastosis fetalis.
Basic anatomy of the heart, physiology of heart, blood vessels and circulation. Cardiac cycle, heart sounds and electrocardiogram. Blood pressure and its regulation, hypertension, angina, myocardial infarction, congestive heart failure.

5. Lymph and lymphatic system: Structure and function of lymphatic vessels and lymph circulation, lymphatic organs and tissues, general principles of immunity.

6. Respiratory System: Anatomy of respiratory organs, mechanism and regulation of respiration, Respiratory volumes and vital capacity, Asthma, tuberculosis, COPD.

List of Practical:

- Determine RBC count of the given blood sample
- Determine WBC count of the given blood sample
- Determine differential WBC count of the given blood sample
- Determine hemoglobin count of the given blood sample
- Determine clotting and bleeding time of the given blood sample.
- Determine blood group.
- Study of epithelial, connective, muscular and nervous tissue using slide.
- Study human skeletal system with the help of chart, model and histological slides.

- Study of human cardiovascular system with the help of chart, model and histological slides.
- Record of blood pressure.
- Study of human respiratory system with the help of chart, model and histological slides.
- Study of lymphatic system with the help of chart, model and histological slides

Books Recommended

- Gerard J. Tortora and Byran Derrickson, Principles of Anatomy and physiology. International student version Vol-I and II, John Wiley and Sons (Asia)
- Kathleen J.W., Wilson Ross and Wilson: Anatomy and Physiology in Health and Illness
- Arthur C. Guyton: Textbook of Medical Physiology.
- Cyril A. Keele, Erie Neil, Norman Joels and Samson Wrights: Applied Physiology
- Chatterjee, C.C, Human Physiology, Medical allied agency, Calcutta.
- Ross and Wilson, Human anatomy and Physiology, Churchill Livingstone London.

PY 117 : Pharmacognosy-I

Definition, history, scope and development of the Pharmacognosy. : Sources of crude drugs and methods of their classification with examples

Exogenous and endogenous factors affecting production of crude drugs

a. Environmental conditions
b. Cultivation, collection, drying and storage
c. Natural pest control agents

Quality control of crude drugs

Organoleptic, physical, chemical, microscopic and biological evaluation

Quantitative Microscopy: Vein islet no. stomatal Index, palisade ratio, vein termination no.

Deterioration of stored crude drugs

Primary factors
Control of infestation

Carbohydrates and related drugs: Definition, properties, classification, chemical constituents, chemical test and uses
Tragacanth, Acacia, Honey, Agar, Pectin, Plantago and Starch

Tannins & resins and related drugs: definition, properties, classification, chemical constituents, chemical tests and uses
Ashoka, Amla, Arjuna, Myrobalan, Bahera
Ginger, turmeric, Asafoetida, Tolu balsam, benzoin

Traditional system of medicine: Introduction, basic concept, formulations used in Ayurvedic system of medicine, Asava, Arista,Churna, Bhasma

Biological sources, active constituents and uses of the following traditional drugs
Neem, Apamarga, Methi, Guduchi, Bramhi, satavari

List of Practical

1. Perform morphological and chemical Evaluation of Honey, Agar and Isabgol husk
2. Perform morphological Evaluation of Ashoka bark, Amla fruit, Arjuna bark, Myrobalan fruit and Bahera fruit
3. Perform morphological and chemical Evaluation of Asafoetida, Tolu Balsam and Benzoin
4. Perform morphological Evaluation of Neem leaves, Apamarga root, and Shatavari root
5. Perform morphological and chemical evaluation of Tragacanth gum, Agar and Acacia gum
6. Perform the Morphological Evaluation of Ginger rhizome

7. Perform the Morphological and Chemical Evaluation of Turmeric rhizome
8. Perform the Morphological Evaluation of Methi seed and Brahmi leaves
9. Isolate starch from potato/rice/maize/wheat and perform its powder microscopy.
10. Perform standardization of Asava/Arishta on basis of Organoleptic, Physical and Chemical parameters
11. Perform standardization of Churnas on basis of Organoleptic, Physical and Chemical parameters

Refrences

1. Text Book of Pharmacognosy – T.E. Wallis
2. Pharmacognosy – Trease & Evans
3. Pharmacognosy – Brady & Taylor
4.. Pharmacognosy – C.K.Kokate, A.P.Purohit, S.B.Gokhale.