

ANDHRA UNIVERSITY
DIRECTORATE OF ADMISSIONS
APPLICATION FORM FOR ADMISSION INTO
Two Year MS Programs in Industrial Pharmaceutics/ Pharmaceutical Analysis &
Quality Assurance / Drug Regulatory Affairs
at RACE, JN Pharma City, Visakhapatnam

Last date for receipt of filled – in applications: 5 p.m. on 05-08-2011

- Note: (i) Read the information Brochure carefully before filling the application form.
(ii) Incomplete applications are liable to be summarily rejected.

1. Application Fee: Rs. 1,000/- by Demand Draft (DD)

DD No. _____ Date: _____ for Rs. _____ Bank: _____

Attested
Photograph

(i) Course MS: (Order of Preference)

1.		
2.		
3.		

Test Centre (Andhra University, Visakhapatnam)

(ii) Name of the Applicant (IN CAPITAL LETTERS)

SURNAME	FULL NAME

(iii) Sex: (put \surd mark)

Male	Female

Father's Name.....

Mother's Name

(iv) Date of Birth

Day	Month	Year

Name.....

Address

PIN:..... Tel. No. with STD Code.....

Mobile No.....

Email:.....

- (v) Reservation Category : Put $\sqrt{\quad}$ mark in appropriate box (Enclose attested copies – See information Brochure)

SC	ST	BC				
		A	B	C	D	E

- (vi) Details of Qualifying Examination:

Name of the Qualifying Exam.	Branch	University	Year of Passing	Overall % of Marks (all years of study)

- (vii) Particulars of marks Obtained: (B.Pharm / M.Sc (Chemistry))

Years of Study	College / University	Year of Passing	Marks Scored	Maximum Marks	% of Marks
First Year					
Second Year	I-Sem				
	II-Sem				
Third Year	I-Sem				
	II-Sem				
Fourth Year	I-Sem				
	II-Sem				

- (viii) Details of Job experience after obtaining the qualifying degree.

S.No.	Designation	Period of Work		Name & Address of Employer
		From	To	

DECLARATION BY THE CANDIDATE

The particulars furnished above are true and correct to the best of my knowledge and I hereby agree for the cancellation of my application/ admission if any of the above details are found to be false.

Station:

Date:

Signature of the Applicant

PROSPECTUS

**Ramky Academy of Culture and Education
(A Society Registered under A.P Societies Act of 1860)**

Under MOU with Andhra University

Admissions open for M.S. Pharma (2011 – 13)

Ramky Academy of Culture and Education (Ramky Group) is offering the following two- year full-time M.S. Programmes through MOU with Andhra University, Visakhapatnam.

M.S. Programmes offered are

1. Industrial Pharmaceutics
2. Pharmaceutical Analysis and Quality Assurance
3. Drug Regulatory Affairs

Eligibility

- a) B.Pharmacy graduates are eligible for admission into all the three specializations.
- b) M.Sc (Chemistry) candidates are eligible for admission into only two of the specializations namely
 - i) Pharmaceutical Analysis and Quality Assurance and
 - ii) Drug Regulatory Affairs.

Fee Structure: 2,50,000/- (Rupees Two lakhs fifty thousand only) per annum which includes Rs. 1,50,000/- (Rupees One Lakh fifty thousand only) as Academic Fee + Rs. 50,000/- Lab fee + Rs. 50,000/- as Infrastructure Fee.

Entrance Test:

- Candidates seeking admission into the M.S Courses in Pharmacy are required to write a separate entrance test conducted by Andhra University, for the purpose.
- **Hall Tickets for the entrance test be collected by applicants , from the Director, Directorate of Admissions, Vijayanagar Palace, Andhra University, Visakhapatnam one day before the entrance test i.e. on 6-8-2011.**
- Successful candidates will be given admission based on the rank obtained in the Test and other Criteria.
- Separate Question Papers will be set for B.Pharm and M.Sc (Chemistry) Candidates

- Syllabuses for the Test can be downloaded from the Website (Separate for B.Pharm and M.Sc Candidates)
- The question paper will be of objective type comprising of multiple choice questions.
 - o Maximum Marks of the test : 100 Marks
 - o No. of Questions (Bits) : 100
 - o Duration of test : 120 Minutes

(Students have to mark their answers in OMR Sheets)

- Number of Seats in each Course : 30
- 25 percent of the seats are reserved for Industry sponsored candidates
- 25 percent of the seats are allotted for M.Sc Candidates (Two Courses)
- However, the seats are inter convertible (between B.Pharm & M.Sc Candidates) & also between sponsored & regular candidates.
- Filled – in Application forms along with a D.D for Rs. 1,000/- (Application Fee) should reach the Director, Directorate of Admissions, Andhra University, Peda Waltair, Visakhapatnam – 530003.
- Date of Entrance Test : 07.08.2011
- Test Centre (Venue) : Andhra University Campus Visakhapatnam
- Date of Admission : Will be intimated on the day of the Entrance Test Into the courses

Model Questions:

1. Ninhydrin can be used as a spray reagent to identify
 A) Carbohydrates B) Aminoacids C) Fatty acids D) Alkaloids

Ans: (b)

- A B C D

2. Cardiac glycosides are present in
 A) Senna B) Rauwolfia C) Digitalis D) Vasaka

Ans: (C)

- A B C D

SYLLABUS

**SYLLABUS FOR THE ENTRANCE TEST (2011) FOR ADMISSION INTO M.S.
PROGRAMMES IN PHARMACY OF RAMKY ACADEMY OF CULTURE &
EDUCATION, RAMKY PHARMA CITY, VISAKHAPATNAM.
(FOR M. Sc. Chemistry CANDIDATES)**

Total Bits: 100

Max. marks: 100

(I) INORGANIC CHEMISTRY (15 bits)

1. Coordination Chemistry: IUPAC nomenclature, bonding theories – review of Werner's theory and Sidgwick's concept of coordination, Valence bond theory, geometries of coordination numbers 4-tetrahedral and square planar and 6-octahedral and its limitations, crystal field theory, splitting of d-orbitals in octahedral, tetrahedral and square-planar complexes – low spin and high spin complexes – factors affecting crystal-field splitting energy, merits and demerits of crystal-field theory. Isomerism in coordination compounds – structural isomerism and stereo isomerism, stereochemistry of complexes with 4 and 6 coordination numbers.

2. Spectral and magnetic properties of metal complexes: Electronic absorption spectrum of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ ion. Types of magnetic behavior, spin-only formula, calculation of magnetic moments, experimental determination of magnetic susceptibility – Gouy method.

3. Reactivity of metal complexes: Labile and inert complexes, ligand substitution reactions – $\text{S}_\text{N}1$ and $\text{S}_\text{N}2$, substitution reactions of square planar complexes – Trans effect and applications of trans effect.

4. Stability of metal complexes:

Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method and mole ratio method.

5. Hard and soft acids bases (HSAB): Classification, Pearson's concept of hardness and softness, application of HSAB principles – Stability of compounds / complexes, predicting the feasibility of a reaction.

6. Bio-inorganic chemistry: Essential elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn and chloride (Cl^-). Metalloporphyrins – hemoglobin, structure and function, Chlorophyll, structure and role in photosynthesis.

(II) ORGANIC CHEMISTRY (40 bits)

1. Nitrogen compounds: Nitro hydrocarbons: Nomenclature and classification – nitro hydrocarbons – structure. Tautomerism of nitroalkanes leading to aci and keto form. Preparation of Nitroalkanes. Reactivity – halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Michael addition and reduction.

Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1^o, 2^o, 3^o Amines and Quaternary ammonium compounds. Preparative methods -1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromamide reaction (mechanism). 4. Reduction of Amides and Schmidt reaction. Physical properties and basic character – Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline – comparative basic strength of aniline, N-methylaniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects. Use of amine salts as phase transfer catalysts. Chemical properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation e) Reaction with Nitrous acid of 1^o, 2^o, 3^o (Aliphatic and aromatic amines). Electrophilic substitutions of Aromatic amines – Bromination and Nitration. oxidation of aryl and 3^o Amines. Diazotization Cyanides and isocyanides: Nomenclature (aliphatic and aromatic) structure. Preparation of cyanides from a) Alkyl halides b) from amides c) from aldoximes. Preparation of isocyanides from Alkyl halides and Amines. Properties of cyanides and isocyanides, a) hydrolysis b) addition of Grignard reagent iii) reduction iv) oxidation.

3. Heterocyclic Compounds, Introduction and definition: Simple 5 membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole. Importance of ring system – presence in important natural products like hemoglobin and chlorophyll. Numbering the ring systems as per Greek letter and Numbers. Aromatic character – 6- electron system (four-electrons from two double bonds and a pair of non-bonded electrons from the hetero atom). Tendency to undergo substitution reactions. Resonance structures: Indicating electron surplus carbons and electron deficient hetero atom. Explanation of feebly acidic character of pyrrole, electrophilic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions. Reactivity of furan as 1,3-diene, Diels Alder reactions (one example). Sulphonation of thiophene purification of Benzene obtained from coal tar). Preparation of furan, Pyrrole and thiophene from 1,4- dicarbonyl compounds only,

Paul-Knorr synthesis, structure of pyridine, Basicity – Aromaticity – Comparison with pyrrole – one method of preparation and properties – Reactivity towards Nucleophilic substitution reaction – chichibabin reaction.

4. Carbohydrates Monosaccharides: All discussion to be confined to (+) glucose as an example of aldo hexoses and (-) fructose as example of ketohexoses. Chemical properties and structural elucidation: Evidences for straight chain pentahydroxy aldehyde structure (Acetylation, reduction to n-hexane, cyanohydrin formation, reduction of Tollen's and Fehling's reagents and oxidation to gluconic and saccharic acid). Number of optically active isomers possible for the structure, configuration of glucose based on D-glyceraldehyde as primary standard (no proof for configuration is required). Evidence for cyclic structure of glucose (some negative aldehydes tests and mutarotation). Cyclic structure of glucose. Decomposition of cyclic structure (Pyranose structure, anomeric Carbon and anomers).

Proof for the ring size (methylation, hydrolysis and oxidation reactions).

Different ways of writing pyranose structure (Haworth formula and chair conformational formula). Structure of fructose: Evidence of 2 – ketohexose structure (formation of penta acetate, formation of cyanohydrin its hydrolysis and reduction by HI to give 2-Carboxy-n-hexane). Same osazone formation from glucose and fructose, Hydrogen bonding in osazones, cyclic structure for fructose (Furanose structure and Haworth formula).

Interconversion of Monosaccharides: Aldopentose to aldo hexose – eg: Arabinose to D-Glucose, D-Mannose (Kiliani - Fischer method). Epimers, Epimerisation – Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose eg: D-glucose to D-arabinose by Ruff's degradation. Aldohexose (+) (glucose) to ketohexose (-) (Fructose) and Ketohexose (fructose) to aldohexose (Glucose)

5. Amino acids and proteins :

Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids – definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples – Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid b) Malonic ester synthesis c) strecker's synthesis. Physical properties: Optical activity of naturally occurring amino acids: L-configuration, irrespective of sign rotation, Zwitterion structure – salt like character - solubility, melting points, amphoteric character , definition of isoelectric point. Chemical properties: General reactions due to amino and carboxyl groups –

lactams from gamma and delta amino acids by heating peptide bond (amide linkage). Structure and nomenclature of peptides and proteins.

III. PHYSICAL CHEMISTRY (15)

1. Chemical kinetics: Rate of reaction, factors influencing the rate of a reaction- concentration, temperature, pressure, solvent, light, catalyst. Experimental methods to determine the rate of reaction. Definition of order and molecularity. Derivation of rate constants for first, second, third and zero order reactions and examples. Derivation for time half change. Methods to determine the order of reactions. Kinetics of complex reactions (first order only): opposing reactions, parallel reactions, consecutive reactions and chain reactions. Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy. Theories of reaction rates- collision theory-derivation of rate constant for bimolecular reaction. The transition state theory (elementary treatment).

2. Photochemistry : Difference between thermal and photochemical processes. Laws of photochemistry-Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence. Quantum yield. Ferrioxalate actinometry. Photochemical hydrogen- chlorine, hydrogen-bromine reaction. Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing). Photosensitized reactions- energy transfer processes (simple example) ,

3. Thermodynamics : The first law of thermodynamics-statement, definition of internal energy and enthalpy. Heat capacities and their relationship. Joule's law-Joule-Thomson coefficient. Calculation of w , q , dU and dH for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes. State function. Temperature dependence of enthalpy of formation-Kirchoff's equation. Second law of thermodynamics. Different Statements of the law. Carnot cycle and its efficiency. Carnot theorem. Thermodynamic scale of temperature. Concept of entropy, entropy as a state function, entropy changes in cyclic, reversible, and irreversible processes and reversible phase change. Calculation of entropy changes with changes in V & T and P & T . Entropy of mixing inert perfect gases. Entropy changes in spontaneous and equilibrium processes. The Gibbs (G) and Hlmholtz (A) energies. A & G as criteria for thermodynamic equilibrium and spontaneity-advantage over entropy change. Gibbs equations and the Maxwell relations. Variation of G with P , V and T .

IV. PHYSICO CHEMICAL METHODS OF ANALYSIS (30 bits)

1. Separation techniques : 1. Solvent extraction: Principle and process, Batch extraction, continuous extraction and counter current extraction. Application – Determination of Iron (III),

Chromatography: Classification of chromatography methods, principles of differential migration adsorption phenomenon, Nature of adsorbents, solvent systems, Rf values, factors effecting Rf values. a.

Paper Chromatography: Principles, Rf values, experimental procedures, choice of paper and solvent systems, developments of chromatogram – ascending, descending and radial. Two dimensional chromatography, applications.

b. Thin layer Chromatography (TLC): Advantages. Principles, factors effecting Rf values.

Experimental procedures. Adsorbents and solvents. Preparation of plates. Development of the chromatogram. Detection of the spots. Applications.

c. Column Chromatography: Principles, experimental procedures, Stationary and mobile Phases, Separation technique. Applications,

d. High Performance Liquid Chromatography (HPLC): Principles and Applications. e. Gas Liquid Chromatography (GLC): Principles and Applications

2. Spectrophotometry : General features of absorption – spectroscopy, Beer-Lambert's law and its limitations, transmittance, Absorbance, and molar absorptivity. Single and double beam spectrophotometers. Application of Beer-Lambert's law for quantitative analysis of : 1. Chromium in $K_2Cr_2O_7$, 2. Manganese in manganous sulphate, 3. Iron (III) with thiocyanate.

3. Molecular spectroscopy : (i) Electronic spectroscopy: Interaction of electromagnetic radiation with molecules and types of molecular spectra. Potential energy curves for bonding and antibonding molecular orbitals. Energy levels of molecules (σ, δ, n) . Selection rules for electronic spectra. Types of electronic transitions in molecules effect of conjugation. Concept of chromophore.

(ii) Infra red spectroscopy: Energy levels of simple harmonic oscillator, molecular vibration spectrum, selection rules.

Determination of force constant. Qualitative relation of force constant to bond energies. Anharmonic motion of real molecules and energy levels. Modes of vibrations in polyatomic

molecules. Characteristic absorption bands of various functional groups. Finger print nature of infrared spectrum.

(iii) Raman spectroscopy: Concept of polarizability, selection rules, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.

(iv) Proton magnetic resonance spectroscopy (1H-NMR): Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals – spin-spin coupling, coupling constants. Applications of NMR with suitable examples – ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate, toluene and acetophenone.

(v) Mass Spectrometry:

Basic principles – Molecular ion / parent ion, fragment ions / daughter ions. Theory – formation of parent ions. Representation of mass spectrum. Identification of parent ion, (M+1), (M+2), base peaks (relative abundance 100%) Determination of molecular formula – Mass spectra of ethylbenzene, acetophenone, n-butyl amine.

Total Bits: 100

Total marks: 100

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PROGRAMMES IN PHARMACY OF RAMKY ACADEMY OF CULTURE &
EDUCATION, RAMKY PHARMA CITY, VISAKHAPATNAM
(FOR B. PHARM. CANDIDATES)**

Total Bits: 100

Max. marks: 100

I. PHYSICAL PHARMACY (10 bits)

1. **States of matter:** the gaseous state, the liquid state, solids and the crystalline state, polymorphism, phase equilibria and the phase rule.
2. **Thermodynamics:** Laws of thermodynamics. Some physical properties of drug molecules, dielectric constant, induced polarization, dipole moment, refractive index and molar refraction, Optical rotation, optical rotatory dispersion.
3. **Solutions:** Concentration, expressions, solutions of nonelectrolytes, ideal and real solutions, colligative properties, molecular weight determinations. Properties of solutions of electrolytes. The Arrhenius Theory of electrolytes and other coefficients for expressing colligative properties.
4. **Ionic equilibria:** Modern theories of acids and salts. Sorensen's pH scale, calculation of pH, acidity constants. Buffers, buffer capacity and buffered isotonic systems. Buffers in pharmaceuticals and biologics.
5. **Viscosity:** Poiseuille's formulae for liquids, experimental determination of viscosity, Ostwald viscometer, comparison of viscosities.
6. **Interfacial phenomena:** Surface Tension: Definition, method of determination. Significance in Pharmacy. Surface active agents classification, properties, HLB value. Adsorption at solid interfaces. Zeta potential and its importance.
7. **Solubility:** Solvent – solute interactions, factors influencing solubility, methods of increasing solubility, distribution coefficient.
8. **Kinetics:** Rates and orders of reactions, determinations of order of a reaction influence of temperature and other factors on reaction. Methods and principles of stabilization. Accelerated stability analysis.
9. **Coarse dispersions:** Interfacial properties of suspended particles, settling in suspensions. Formulation and evaluation of flocculated and deflocculated suspensions.
10. **Emulsions:** Types of emulsions, physical stability of emulsions and emulsifying agents, preservation of emulsions.
11. **Rheology:** Newtonian systems. Thixotropy measurement and its applications in pharmacy.

II. PHARMACEUTICAL ENGINEERING (10 bits)

A study of the following topics with particular reference to pharmaceutical industry.

1. **Fluid Flow:** Definitions, Material balance, energy balance, Bernoulli's equation, stream line and turbulent flow, Reynolds number, Measurement of pressure and fluid flow. Different types of manometers, orifice meter, venturi meter, pilot tube and Rotameter.

2. **Heat transfer:** Conduction, Fourier's law. Heat transfer from condensing vapours. Drop wise and film type condensation. Heat exchangers. Parallel and counter current flow. Radiation, Stephan's and Kirchoff's law. Heat conservation and insulation.
3. **Evaporation:** General principles, methods of supply of heat, types of evaporators, jacketed evaporators, film evaporators, forced circulation evaporators, evaporator accessories, wet and dry condensers, vacuum pumps, gauzes, steam traps.
4. **Distillation:** Theory applied to binary mixtures, boiling point and equilibrium diagrams, constant boiling mixtures, equilibrium distillation, differential distillation, steam distillation, rectification, distillation stills, automatic water stills, molecular distillation and its application.
5. **Filtration:** Filtration media and filter aids, types of filters, filter presses, rotary continuous filter and Meta filters. Sterile filtration of liquids, air filters. Effect of pressure and temperature on rate of filtration. Centrifuges: theory, equipment and applications.
6. **Drying:** Introduction, classification of drying equipment - static bed, moving bed and fluidized bed systems – spray dryer, infrared drying, freeze drying, choice of dryers. Factors influencing the rate of drying, Mechanism of drying with carrier gas, typical drying curve.
7. **Crystallization** : Crystal forms and Crystal habit – supersaturation and formation of crystals and crystal growth, Mier's supersaturation theory of crystallization and its limitations, solubility curves.
8. **Mixing:** Solid – solid mixing, mechanism of mixing. Mixers: V type, drum, paddle and Rotocube mixers, mixing of viscous masses: kneading machines and ointment mills. Liquid – liquid and gas – liquid mixing equipment.
9. **Size reduction** : Classification of equipment – cutting roll, edge runner and end runner mills, disintegrators, hammer mills, ball and tube mills, colloid mills – impact mills, fluid energy mill, choice of size reduction machinery – theory of size reduction.
10. **Size separation:** Screens and screening equipment – air and hydraulic separators, sedimentation, particle size distribution and its measurement.

III. INDUSTRIAL PHARMACY & COSMETIC TECHNOLOGY (10 bits)

1. **Pre-formulation:** Objectives – Protocols – Physical, chemical, Micromeritic studies in pre – formulation, stability considerations, drug – excipients compatibility.
2. **Formulation Development:** A study of the formulation, process and equipment used in the large scale manufacture, evaluation, and quality control of the following dosage forms.
 - (i) Suspensions (ii) Emulsions (iii) Liquid orals (Syrups and Elixirs).
 - (iv) Tablets: Tablet Coating – sugar, film and enteric coating (v). Capsules: hard and soft.
 - (vi) Parenterals and Other sterile products – eye ointments, eye drops.
 - (vii) Sustained release products; Microencapsulation and microcapsules
 - (viii) Aerosol preparations
3. **Formulation and preparation of the following cosmetics** – Hand lotions, face powders, dentifrices, shampoo, lipstick, shaving preparations, hair dyes, skin creams.

IV. FORENSIC PHARMACY (10 bits)

A study of the following acts and amendments.

- a) Pharmacy Act
- b) Drugs and Cosmetic Act and Rules
- c) Narcotic Drugs and Psychotropic Substances Act (1986)
- d) Drugs and Magic Remedies Act
- e) Drugs (Price Control) Order
- f) Patents Act and Intellectual Property Rights
- g) Code of Pharmaceutical Ethics

V. PHARMACEUTICAL ANALYSIS (30 Bits)

1. Principles and procedures for the limit test of chlorides, sulphates, iron, lead, arsenic and heavy metals.
2. Principles and pharmaceutical applications (assays) of the following volumetric titrations: Acid-Base titrations, Redox titrations, Complexometric titrations, Precipitation titrations, Non-aqueous titrations and Nitrite titrations.
3. Determination of moisture by Karl-Fisher method.
4. Principles and examples of Gravimetric and Gas analysis.
5. Chromatographic methods: Principles, theories, instrumentation and applications of
a) Column chromatography b) Paper chromatography c) Thin layer chromatography
d) Gas chromatography e) High performance liquid chromatography
6. Spectrophotometric analysis: Principles of UV-Visible and IR spectroscopy – instrumentation and applications - quantitative analysis of drugs.
7. Principles, instrumentation and pharmaceutical applications of flame photometry, fluorimetry, turbidimetry and nephelometry.
8. Electrochemical Analysis: Principles, instruments and applications of potentiometry, conductometry and polarography.
9. Principles involved in NMR and Mass spectroscopy.

VI. MICROBIOLOGY & BIOTECHNOLOGY (10 Bits)

1. Morphology of bacteria, yeasts, actinomycetes, fungi and viruses. Structure of bacterial cell.
2. Culture media for bacteria and fungi. Bacterial growth curve, physical factors affecting bacterial growth. Methods for isolation of bacteria in pure cultures.
3. Staining of bacteria including Gram's staining.
4. Sterilization methods: Dry heat, moist heat, filtration, gaseous and radiation methods. Disinfection: Evaluation of disinfectants – Rideal-Walker and Chick-Martin tests; Assay of antibiotics.
5. Pathogenic organisms associated with some common diseases: Cholera, Typhoid, Diphtheria, Tuberculosis, tetanus, syphilis, gonorrhoea and AIDS

6. Immunity – Types – Antigen-antibody reactions – Preparation of Immunological products: Vaccines – BCG, DPT, Poliomyelitis and Typhus; Toxoids: Diphtheria and Tetanus.

Antitoxins: Diphtheria and Gas-gangrene

VII. MEDICINAL CHEMISTRY & NATURAL PRODUCTS (10 Bits)

1. Chemistry, mode of action and importance of the following classes of drugs:

- a) General anaesthetics: Halothane, thiopental sodium and diethyl ether.
- b) Local anaesthetics: Benzocaine, procaine, lignocaine and dibucaine.
- c) Hypnotics and tranquillizers: Phenobarbital, buspirone, diazepam, alprazolam.
- d) Nonsteroidal anti-inflammatory analgesics and antipyretics- Paracetamol, aspirin, indomethacin, diclofenac sodium, ibuprofen and piroxicam.
- e) Antihistaminic agents: Diphenhydramine HCl, chlorpheniramine, cetirizine, meperamine, ranitidine and omeprazole.
- f) Antidiabetic agents: Insulin, tolbutamide and Glibenclamide
- g) Antitubercular agents: PAS, isoniazid ; Antileprotic agents: dapsone
- h) Anthelmintics: Diethyl carbamazine citrate, mebendazole, tinidazole, thiabendazole
- i) Diuretics: Acetazolamide, frusemide, and hydrochlorthiazide.
- j) Antihypertensives: Methyl dopa, amlodipine and propranolol.

2. Carbohydrates: Classification and properties of glucose, fructose, and sucrose, maltose, lactose, starch, cellulose, dextrin, and glycosides.

3. Proteins and Amino acids: Classification and general reactions of amino acids, proteins and polypeptides. Methods of preparation of amino acids

4. Lipids: Fixed oils and fats. Fatty acids: chemistry and analysis of oils and fats.

VIII. PHARMACOGNOSY (10 Bits)

1. Source, histology, active constituents, chemical tests and uses of the following plant drugs: Senna, Digitalis, Vasaka, Cinchona, Cinnamon, Ipecac, Rauwolfia, Ephedra, Vinca, Ergot, Clove and Umbelliferous fruits.

2. Source, constituents, chemical tests and uses of Opium, Benzoin and Asafoetida.

3. Lycopodium in quantitative microscopy.

Total Bits: 100

Total marks: 100
