Clinical Pharmacy & Hospital Pharmacy

Introduction: Hospital and its function; classify hospitals based on various criteria, organization, management and delivery system in Nepal. **Hospital Pharmacy:** functions and objectives of hospital pharmacy services. Layout design of hospital with flow of materials and men. Regulatory and professional requirement for hospital pharmacy practice **and** requirements and abilities required for hospital pharmacists.

Drug distribution system in hospital: Explain drug distribution system in hospitals with emphasis on: Outpatient services. In-patient services. Types of services. Discussion of unit dose system. Floor/ward stock system. Satellite pharmacy system.Central sterile services. Bedside pharmacy.

Extemporaneous compounding and dispensing: Requirements for compounding: Personnel, Sources for chemicals and drugs, Equipments (Measuring, Moulding, Mixing, Packaging), Location of compounding area and Sources of information.Expiry date of different preparations. Concept of Total Parenteral nutrients.

Medicine and Therapeutic Committee: Hospital Pharmacy Service Guidelines 2070, Medicine and Therapeutic committees (Goals, objectives, structure, principle and Functions of the MTC)

Formulary (formulary list (essential medicines list), formulary manual, Standard treatment guidelines (STGs))

General concept on Surgical and Sterilization: Understanding of Surgical dressing like cotton, gauze, bandages and adhesive tapes, Sutures, I.V. sets, Ryle's tubes, Catheters, Syringes. Health Accessories. Sterilization and CSSR.

Store management: Stock maintenance and Demand. Materials (drugs including narcotics, non-drugs, consumables), Medicine cycle, ABC analysis, VED Analysis, FSN analysis, FIFO, FEFO.

Application of computers in Pharmacy: Explain application of computers in maintenance of records, inventory control, medication monitoring, drug information and data storage and retrieval in hospital and retail pharmacy establishments.

Clinical Pharmacy: Introduction to clinical pharmacy practice. Demographic information, Dietary information, Social habits, Current and Past Prescription Medications, Current and Past Non prescription. Medication Allergies, ADR. Knowledge Common Laboratory and Diagnostic tests. Drug interactions: Mechanism of drug interaction, details of drug-drug interaction (pharmacokinetics and pharmacodynamics) with reference to analgesics, diuretics, cardiovascular drugs, Gastro-intestinal agent, vitamins and hypoglycemic agents. Drug-food interaction

Adverse drug reaction: Adverse drug reactions, Type of ADR, ADR monitoring and pharmacovigilence**.** Drug induced diseases and teratogenicity.

Responding to Symptoms: Disease, manifestations and pathophysiology including salient symptoms to understand the disease like Tuberculosis, Hepatitis, Rheumatoid Arthritis, Cardio-vascular diseases, Epilepsy, Diabetes, Peptic Ulcer, Hypertension, COPD, Asthma, Gout, Thyroid Disease, Psoriasis. Cold and flu, Cough, sore throat, allergic rhinitis, mouth ulcers, motion sickness, constipation, diarrhoea, acne, cold sores, warts, headache, musculosketal problems, women's health (dysmennorea, ECP) common eye and ear problems**. Drug Monitoring:** Importance of monitoring and the Techniques of monitoring. **Dispensing pharmacy:** Prescriptions: parts of prescription and its handling steps, orient with Latin terms commonly used, describe modern methods of prescribing and solve numerical involved in dispensing.

Pharmaceutical Incompatibilities in prescriptions: physical, chemical and therapeutic incompatibilities. Posology: dose and dosage form, describe the factors influencing dose, and calculate doses on the basis of age, sex and surface area.

Community Pharmacy and Pharmaceutical Jurisprudence

Community pharmacy

Profession & professionalism. Pharmacy as profession, role of community pharmacy in the society, Primary Health Care, public Health and role of community pharmacist. different steps of dispensing of prescription and dispensing techniques. Extemporaneous dispensing. Labeling of dispensed products. Patient counseling. Patient compliance, patient profile. Drug profile.

Management of a community pharmacy

Establishing and financing a community pharmacy. Development of the business plan.

pharmacy layout design.legal structure of ownership.business law for community pharmacy.risk management and insurance.pricing decision for products and services.purchasing and inventory control.Good Pharmacy Practice.development and innovative services. Credit management efficiency.computerization of pharmacy

Communication skills

Nonverbal communication. Patterns of behavior in communication. Questioning and listening skill. Barriers of communication. Confidentially.

Good community pharmacy practice

The requirements of premises/layout. Requirements of equipments, Material, manpower, storage and inventory control, service and documentation.

Pharmaceutical Jurisprudence

History of pharmaceutical legislation, pharmaceutical industry, pharmaceutical education system of Nepal. Study of the following: Drugs Act, 2035 /1978, Drug Consultation Council and Drug Advisory Regulation 2037(1980).Drug Registration Regulation 2038(1981).Drug Inspection Regulation 2040(1983).

Drug Standard Regulation 2043(1986).Drug Manufacture Codes 2041(1984).Drug Sale and Distribution Codes 2041(1984).Good Manufacturing Practices (Ausadi Utpadan Sangita 2041) Pharmacy Council Act (NPC- 2057(2000).Regulatory provisions for veterinary, ayurvedic and other system of medicines, Company Act of Nepal, Patent Act of Nepal 1970, National Health policy, National Drug policy 1995 and Consumer Protection Act 2054(1998).

1. Pharmaceutics

2. Different pharmaceutical preparations and dosage forms

Define and classify Tablet, Capsules, Aromatic Water, Cachets, colloids, Creams, Draughts, Dusting Powders, Dentifrices, Ear Drops, Elixir, Emulsions, Enemas, Eye Drops, Eye Lotions, Gargles, Gels, Glycerines, Granules, Effervescent Granules, Implants, Infusions, Inhalations, Injections, Insufflations, Irrigations, Jellies, Linctuses, Liniments, Lotions, Lozenges, Mixtures, Mouthwashes, Nasal Drops, Ointments, Ophthalmic Ointments, Paints, Paste, Pessaries, Powders, Solutions, Dispersible Tablets, Chewable tablets, Spirits, Sprays, Suppositories, Suspensions, Syrups, Tinctures. Introduction to veterinary dosage forms.

2.Pharmacopeias and formularies used in Nepal

Brief introduction about pharmacopoeias and their uses. Introduce British Pharmacopoeia, United States Pharmacopoeia, Indian Pharmacopoeia, British Pharmaceutical Codex, Japanese pharmacopoeia, International Pharmacopoeia, European Pharmacopoeia etc.

3. Weight and measures

Classify weight and measure and convert from one system to another and one unit to another.

Percentage and ratio strength, allegation method and isotonic solutions.

4. Processing and manufacturing

Comminution, Size Separation, Mixing and Homogenization, Filtration and clarification, Extraction, heat process, Distillation, Drying.

Rheology and flow of liquid, surface and interfacial tension, Dispersed System.

Dosage forms: Monophasic liquid dosage form, Biphesic dosage forms, Solid dosage forms, Semisolid doaage forms, parentrals, Aerosols. Packing of pharmaceutical dosage form and Biological products. Stability of pharmaceutical products. Introduction to Cosmetics**.** Concept of bioavailability and biopharmaceutics.

Pharmacognosy and Pharmaceutical Chemistry

Pharmacognosy

1. Introduction to Pharmacognosy. Classification of crude drugs. Complementary and alternative system of medicine and its different dosage forms (focusing on Ayurveda and Homeopathic system of medicine).
2. Method of cultivation of plants. Collection, drying and storage of crude drugs.
3. Introduction to parts of plants and Quality control and evaluation of crude drugs
4 Phytochemistry: Alkaloids ,Glycosides, Volatile oil,Tannin and Fixed oil
5 Pharmacognostic study of crude drugs- Microscopical features of stramonium, Ephedra, Digitalis, senna, Chiraita, Fennel, Clove, Mentha, Ginger,
6 Pharmaceuticals Aids (focusing on source, properties, and uses) Starch, Gum Acacia, Tragacanth, Agar, Cod liver oil, Gelatin, Beeswax, Honey and Liquid paraffin.
7. Status of medicinal plants of Nepal : vernacular name, English name, botanical name, family, distribution, habitat, parts used and morphological characteristics of following ten medicinal plants of economic important found in Nepal.Panchaunle (Dactylorhiza hatagirea), Sugandhakokila (Cinnamomum glaucescens),Yarshagumba (Cordycep sinensis), Harro (Terminalia chebula), Pipla (Piper longum), Barro (Terminalia balerica), Satawari(Asparagus racemosus), Timur (Zantoxylum armatum),Gurjo (Tinospora sinensis) and Amala (Emblica officinalis).

Pharmaceutical Chemistry

Acid, Base, Buffer, Antioxidants – HCl, NaOH, Citric acid, Sod.Benzoate, Sod Metabisulphide. Gastrointestinal Agents- HCl, $Al(OH)_3$, , Charcoal, Kaolin. Topical Agents – Talc, H_2O_2, $KMnO_4$, Povidine Iodine, $ZnSO_4$. Major Intra & extra Cellular electrolytes – Acid base balance, Replacement Therapy, NaCl, KCl, Ringer Lactate, ORS

Nomenclature of organic compounds with special reference to heterocyclic system. Explain the numbering system different position of benzene ring.

Structure, storage, handling and quality assurance of the molecules of following organic drugs:

Local and Systemic Antimicrobials

Antiseptic & disinfectants, Sulpha Drugs & Antileprotics, Penicillins and Cephalosporins, Chloramphenicol and Tetracycline: Aminoglycosides and Macrolides:Quinolones and Fluoroquinolones. Antitubercular medicines:Anti-amoebic and Anthelmentics,

Introduction to Psychotropic Agents

Chlorpromazine, Haloperidol,Dizepam, Lorazepam.,Nitrazepam.Amitryptilline, Imipramine, Alprazolam, Carbamazepine, Phenytoin, sodium Valproate, Trihexyphenydyl.Drugs acting in CNS, ANS: Halothane, Methohexital, Trichloroethylene, Ketamine.Lignocaine, Benzocaine, Ethyl Chloride.

Adrenergic Drugs, Adrenaline, Noradrenaline, Salbutamol, Ephedrine,Pseudoephedrine.

Define Cholinergics: Neostigmine, Pyridostigmine, Pilocarpine

Cholinergic Antagonist: Atropine sulphate group including Tropicamide.

Cardiovascular drugs

Frusomide, Amlodepine, Atenolol , Enalapril and Aspirin. Thiazides, Urea, Mannitol, Nitrate anti-anginals, Quinidine, Procainamide, Heparin, Warferin, Dypyridamol, Ticlopidine, Aspirin, Ethamsylate, Cumarins,Digitalis, Simvastatin.

Hormones & related drugs

Insulin, Chlorpropamide, and dexamethasone. Gliblenklamide,Metformin, Phenformin, Rosiglitazone, Thyroxine, Carbimazole, Methylthiouracil, Steroids (Dexamethasone, Prednisolone, Betamethasone), Testosterone, estrogens and Progesterone.

Histamines and Antihistamines: chlorpheniramine and cetrizine, Pheniramine, , Diphenhydramine, Promethazine, Cyproheptadine.

Opoid Analgesics, NSAIDS and Muscle Relaxants

Codeine, Paracetamol and Ibuprofen. Pethidine, Tramadol, Petazocin, Diclofenac, Mefenamic acid, Nimesulide and Glucosamine., Chlorzoxazone and Tizanidine.

Anti neoplastic

Cisplatin, Mercaptopurine, Fluorouracil, Tamoxifen, Vincrestine, Taxol, Doxorubicin and mitomycin.

6.16. Vitamin, Minerals & enzyme (roles & deficiency): Vitamin A, Vitamin B group, Vit. C, Vitamin D, Niacinamide, D-panthenol,Iron salts and iron soluble polymers, Folic acid. Vitamin E, Vitamin K, Calcium, Zn, Cu, Mn,, Diastase, Pepsine, Pancreatin, Serratiopeptdase, Chemotrypsine.

Diagnostics: BaSO4, Iopanoic acid, Propylidone and Meglumine.

Concentration of a solution: molarity, molality, mole fraction, percent Volume, percent mass, PPM, PPB, normality. Introduction to Chemical Equilibria: Types of Equilibria. Bronsted Definition of Acids and Bases. Monoprotic Acid-Base Equilibria. Distinctinction between Strong Acids and Strong Bases. Distinctinction between Weak Acids and Weak Bases. Volumetric Analysis and Titration Principles. Monoprotic Acid-Base Titration. Polyprotic acid-base equilibria and titrations. Includes:Neutralisation titration ,Redox titration (Permangmometric titration,iodometric and iodimetric titration),Precipitation titration,complexometric titration with examples and applications).

3. PHARMACOLOGY AND PHARMACOTHERAPEUTICS

1.General pharmacological principles

Terminologies used in pharmacology,Drug nomenclature ,Routes of drug administration, pharmacokinetics: Defenition; process of absorption , distribution , biotransformation , elimination; factors affecting on these processes, pharmacodynamics, mechanism and principle of drug action, Receptor theory of Drug Action, Half life , plasma concentration of drug and bioavailability, Types of adverse drug reactions and Concept of Essential Drugs and criteria of selection.

2 **: GASTRAOINTESTINAL: Management of Peptic ulcer, vomiting, diaarrhoea, and constipation**

General mechanism of action , use , side effect , contraindication , precaution and dose of commonly used : antacids, ulcer healing drugs , ulcer protectives an anti H.pylori drugs, antiemetic drugs: Metoclopramide, Domperidone, Ondensetrone, antidiarrheal: Diphenoxylate, ORS. drug used in constipation: Bulk forming laxatives, irritant Laxative, Stool softners, Lactulose

3 **NSAIDS AND ANTIPYRETIC ANALGESICS**

Define pain, pyrexia and inflammation: General mechanism of action, use, side effect, contraindication, precaution and dose of commonly used: Analgesic , antipyretic and anti-inflammatory drugs: Ibuprofen, Indomethacin, Diccofenac, Nimesulide, drugs used in rheumatoid arthritis: NAAIDS, Disease modifying agents: Steroids, Methotraxate, Azothiopne**,** drug used in gout: Allopurinol, Febusosat

4 DRUGS ACTING ON AUTONOMIC NERVOUS SYSTEM

Physiology of ANS: General mechanism of action, use, side effect, contraindication, precaution and dose of commonly used, Cholinergic drugs: Pilocarpine, Neostigmite, Pyridostigmine,Anticholinergic drugs: Atropine, Dicyclomire, Trihexyphenidol, Adrenergic drugs: Adrenaline, Noradrenaline, Dopamine and Antiadrenergic drugs: Prazoxin, Terrazosin, Tamsulosive, Propranolol, Atenolol, Timolol

4 **RESPIRATORY SYSTEM DRUGS**

Define cough, asthma, COPD

General mechanism of action, use, side effect, contraindication, precaution and dose of commonly used

Drugs used in cough: Anti-tussives (Codeine, Dextromethrophan) Expectotrunts: (Am. Chloride, Bromhexine, Guafensin). Drugs used in asthma and COPD: Bronchodilators: Salbutamol, Theophyllin-Aminophyllin

6 ANTIMICROBILA DRUGS

Classification of antimicrobilas according to their mechanism of action, spectrum of activity, type of action, type of organism against which the antibiotics are active, General principles of antimicrobial therapy, microbial resistance, mechanism and types

General mechanism of action, use, side effect, contraindication, precaution and dose of commonly used

- Sulphonamides: Co-trimoxazole, Sulphasalazine, Sulphacetamide, Silver sulfadiazine

- Penicillin (including new generation penicillin eg, meropenems and monobactams): Benzylpencillin, Phenoxymethylpencillin, Ampicillin, Cloxacillin
- Cephalosporins: Amoxycillin, Clavulinic acid, Sulbactam, Azesteram, Cphalexin, Cefaclor, Cefotaxime, Cefuroxime. Tetracyclines: Tetracycline, Doxycycline
- Aminoglycosides: Streptomycine, Gentamycin, Kanamycin
- Macrolides: Erythromycin, Azithromycin, Clarithromycin
- Quinolones and fluoroquinolones: Norfloxacin, Ciprofloxacin, Ofloxacin, Nitrofuromtain, Levofloxacin
- Antitubercular drugs: First line: INH, Rifamicin, Pyrazinamide, Ethambutol
  2nd line: PAS, Cycloserine, Ciprofloxin. Antileprotic drugs

- Antifungal : Nystatin, Gresioflulvive, Clotrimazole, Ketoconazole, Fluconazole
- Antiviral : Amantadine, Antiretroviral drugs. Antimalarial
- Antiprotozoal : Metronidazole, Diloxanide Furorate, Tinidazole
- Antihelmentics: Parmtal pamoate, Niclosamide, Praziquintel

7. Vaccines and Sera: BCG, DPT, Polio, Mefeals, TT, Hepatitis, Anti Rabies, Anti-snake

Social pharmacy & public health

Concept of health: Define health. Differentiate promotive, preventive, curative and rehabilitative. Principles and scope of health education: Describe scope of health education, health education needs related to pharmacy conducting educational diagnosis survey.

Health education methods: different methods for providing health education.

Individual method: Interview and Counseling.

- Group method: Group discussion, Role-play, Brain storming, Work-shop etc.
- Mass Method: Lecture, exhibition, Advantages and disadvantages of each method.

Health education media: audio-visual aids. Different health education media.

·List advantages and disadvantages of each media. Criteria for the selection of media.

Planning of health education: concept and importance of planning. Health education program planning process. health education program implementation. Health education program evaluation and differentiate formative and summative evaluation. Health education program evaluation process.

Factors affecting health education: factor-affecting learning. Biological factors such as condition of sensory organs. Physical factors. Socio-culture factors. Physiological factors. Learning: Different way of learning such as; by hearing, by seeing, by doing, by

Repetition, and by imitation.

· **Health care system**

History of health care delivery system in Nepal. Health care delivery system in Nepal.

Traditional health care -Dhami, Jhankri, Lama, Guvaju. Ayurvedic, Homeopathy, Unani. – Accupuncture / naturopathy

Modern health care - National Health Policy. National Health Sector Support Program II. Millenium development goal. Organogram of Ministry of Health (MoH).

Explain healthcare management models. Process of patient care in community.

Primary Health Care: Alma-ata Declaration, concept of Primary Health Care. Principles of Primary Health Care. Elements of Primary Health Care. Implementation of PHC (in terms of WHO and government of Nepal).Role of pharmacist in PHC.

Source of vector / vector carrying diseases

Malaria/Filiarisis/Kala-azar/Influenza 1 & 2/Dengue Fever/Japanese Encephalitis/