

HOSPITAL AND CLINICAL PHARMACY (2136)

Diploma in Pharmacy second year

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(b) Tuberculosis

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Question No. 01 Define hospital. Write the functions of hospital and hospital organization in detail.

Ans: 01 (a) Hospital: - Hospital is a complex organization which makes use of groups of complicated and special scientific equipments and functioning through a team of educating trained staff to solve the problems of modern science. They are coordinated together to provide the good health and all the facilities so that patient can get relief from disease or disorder.

Functions of a modern hospital:-

- i) A modern hospital helps to raise the quality of law and general standards of medical practice.
- ii) It help to provide the means and methods by which persons can work together in groups with the object of care of hospital department, patient and community.
- iii) It lowers the incidences of disease through early detection and treatment.
- iv) A Modern hospital provides a common link between the general public and policy makers.
- v) They develop and maintain an effective system of clinical and administrative records and reports.

Organization of hospital: Organization is a process to achieve the objectives by grouping the people in order to get work done efficiently..

Organization:

Board of Director

Associates/ Assistant	Administer of services	Ambulatory services
[Director of different branches]	[Include director of different services]	
1. Blood bank	1. Credit	
2. Clinical laboratory	2. Telephone services	
3. Research laboratory	3. Purchasing and storing	
4. Nursing services		

The governing body is responsible for framing of all major policies plans and programmes. The various services performed by any organization are given as under:

- i) **Nursing services:** - This department is the largest and an important part of any hospital as it functions for all the 24 hours. Nurses are assigned for specified number of beds. They are brained for patient care, observation comfort of the patient during labour etc.
- ii) **Out-patient services:** Out -patient services include comfort for out patients as they come for their major or minor illness. These services make the hospital truly a community institution.

- iii) **Radiological Services:** These services are performed under the direction of competent radiologist. It includes utilization of various equipments like X- Ray, E.C.G, and C.T Scan.
- iv) **Central supply services:** All the medical and surgical supply services are meant for diagnosis treatment, prevention, research and education.
- v) **Hospital pharmacy services:** - It controls the pharmacy operations in any hospital. This department fills prescription and dispenses a number of requisitions from the wards.
- vi) **Medical Records:** Medical records are the valuable reference material as they help medical and paramedical staff for evaluation.
- vii) **Stores:** Stores generally receive and issue the materials against requisition forms of various departments and wards. Hospital being a large organization has many stores like medical store, store for general items, surgical stores. Besides the above-mentioned services of hospitals, they also provide dietary services laundry, transport, mortuary, library etc for overall benefit and patient care.

Question. 02 Enumerate the various classification system of hospital.

Ans: 02 Classification of Hospitals:-

Type - I classification: On the clinical basis:

Clinical-basis			Non-clinical-basis	
Medicine	Surgery	Maternity	Governmental	Non-governmental
1) Paediatrics 2) Psychiatric and nervous diseases 3) T.B 4) General medicine	1) Orthopaedic 2) Gyanaecology 3) ENT	1) Short-term maternity 2) Long-term maternity	1) Army hospital 2) Navy hospital 3) City hospital 4) Civil hospital 5) Big hospital 6) AIIMS/PGI	1) Private hospitals for profit 2) Non-Profit 3) Church hospital 4) Community hospital 5) Missionary hospital 6) Charitable hospital

Type – II classification: On the basis of size

- 1) Large hospitals – For the beds 1000 and above
- 2) Medium hospitals – For the beds between 500-1000
- 3) Small hospitals – For the beds between 100 - 500
- 4) Very small hospitals – For the beds less than 100.

Type – III classification: On the basis of cost

- 1) **Elite hospitals:** These are symbols of high technology and advances in medical sciences. They have deluxe rooms equipped with T.V., telephones and refrigerator. The room rates vary from Rs. 500 to 1200 per day. Therefore they are called as five star hospitals. These elite institutions have provision for some poor people for their treatment and stay also.
- 2) **Budget hospital:** These hospitals are meant for moderate budget and low budget persons e.g., civil hospitals and charitable hospitals.

Type- IV classification: On the basis of system of medicines

(1) Allopathic hospitals (2) Ayurvedic hospitals (3) Homoeopathic hospitals (4) Unani hospitals.

Question No. 03 Which staff/personnel requirement is needed in Hospital Pharmacy? Describe the ability of Hospital Pharmacist in detailed.

Ans: Staff requirements: The organized hospital pharmacy department has an integrated setup consisting of dispensing section, manufacturing section, quality control section and clinical pharmacy.

(1) There are no standard rules regarding the requirement and it is the nature and quantum of services to be provided that governs the personnel requirement.

Head of Pharmacy services [M. Pharm.]

Dispensing Chemist stores [D. Pharm.] Pharm.]	Monufacturing Chemist [M. Pharm.]	Clinical Pharmacist [B. Pharm.]	Quality Control Pharmacist [M. Pharm.]	Medical Pharmacist [B. Pharm. or D.
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Inpatient Out patient

Manufacturing of I.V. Fluids [B. Pharm. / M. Pharm.]	Other manufacturing Services [B. Pharm.]
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(2) The number of pharmacist required for hospital are calculated on the basis of work load, like the number of prescriptions received and dispensed and also depends on the number of beds.

(3) The pharmacists should possess adequate pharmacy qualification and experience. The overall charge of the inpatient department should remain with the Chief Pharmacist.

Bed strength	Pharmacist Requirement
Up to 50 beds	3
Up to 100 beds	5
Up to 200 beds	8
Up to 300 beds	10
Up to 500beds	15

(4) If the pharmacy is also involved in the manufacturing of drugs an adequate number of pharmacy technicians, assistants and peons may be required.

Abilities of hospital pharmacist:

i) **Technical ability:** In this type the Pharmacist should have thorough knowledge of basic science, pharmacology, toxicology, route of administration, stability. The pharmacist must provide information regarding proper handling of drugs.

ii) **Ability to develop a manufacturing section:** Manufacturing within a hospital requires control over supply, quality, equipment and raw material cost. Hospital Pharmacist has to organize manufacturing function by doing proper cost benefit analysis. Quality maintenance is also essential.

iii) **Administrative ability:** Hospital Pharmacist should be able to plan, organize and control various functions of hospital pharmacy. He should prepare work schedule for his staff. He should frame various policies and procedures to get the work done. He should interact with his staff daily. Hospital Pharmacist must maintain the legal and administrative records properly.

iv) **Ability to control inventory:** Chief Pharmacist has to exercise his duties on inventories of drugs which are lying at nursing stations, supply rooms and clinical units.

v) **Ability to conduct and participate in research:** The pharmacist is required to maintain information about pharmaceutical journals. He must advise about new methods of preservation, preparation and to improve the taste and efficacy of drug.

vi) **Ability to conduct teaching programmes:** The pharmacy staff can act as trainers for the nursing staff. He must prepare suitable teaching material for the nursing staff covering various aspects like storage of drugs, proper use of drugs, and dosage form. The Chief Pharmacist is also responsible for the practical training of pharmacy students.

Question No. 04 What is Hospital Pharmacy? Describe its functions and objectives in detail.

Ans: Hospital Pharmacy may be defined as that department of hospital, which deals with procurement, storage, compounding, dispensing, manufacturing, and distribution of drugs. It is also concerned with education and research in pharmaceutical services.

Objectives of Hospital Pharmacy: The Objectives of Hospital Pharmacy: -

i) To ensure the availability of right medication, at the right time, in right dose at the minimum possible cost.

ii) To professionalize the functioning of medical staff nurses and for patient.

iii) To act as a counseling department for medical staff nurses and for patient.

iv) To act as a data bank on drug utilization.

v) To participate in research projects.

vi) To plan, organize and implement pharmacy policy procedure.

Function of Hospital Pharmacy: Hospital Pharmacy helps to

- i) Provide specifications for the purchase of drugs, chemicals and biological product.
- ii) Manufacturing and distribution of medicaments such as transfusion fluids, parenteral products.
- iii) Dispensing of sterilizing parenteral preparations, which are manufactured in hospital?
- iv) Dispensing of drugs as per the prescriptions of the medical staff of the hospital.
- v) Filling and labeling of all drugs containers from which medicine are to be administered.
- vi) Management of stores, which include purchase of drugs, proper storage and maintenance of records.
- vii) Establishment of drug information center which provide information regarding medications to the physician, nurses.

Question No. 05 (a) Describe the various systems of drug distribution for inpatients.

(b) Give a short note on ambulatory patient services

.Ans: 05 (a) There are four systems for inpatient drug distribution departments:

- i) Individual prescription order system
- ii) Complete floor stock system
- iii) Combination of 1 and 2
- iv) Unit dose dispensing method

i) Individual prescription order system: This system is generally used in small private hospitals because of its economics consideration and reduced manpower requirement.

Advantage: -

- a) All the medication orders are directly reviewed by pharmacist, so there are less chances of medication error.
- b) This system also provides closer control of inventory.

Disadvantage: -

- a) There may be possible delay in obtaining the required medications for administration to the patient.
- b) There may be increase in the cost of drugs which are supplied to the patient.

ii) The “complete floor stock” system: Under this system the nursing station carries both “charge and non charge” patient medication. According to this system the drugs are stored at the nursing station and are administered by a nurse according to the chart order of physician. Only the commonly used drugs in considerable quantities are stocked on the floor stock or in the ward. Rarely used or costly drugs are not included in the floor stock but dispensed when order is received for the individual patient. Since these drugs are used in large quantities they are prepackaged in standard containers.

Advantage: -

- i) The drugs are readily available for administration.
- ii) Minimum return of drug.

iii) Reduced in patient prescription order.

iv) Reduction in number of pharmacy personnel required.

Disadvantage: -

i) Increase in chances of medication error due to lack of review by pharmacists.

ii) Greater opportunity for misuse of drugs resulting in financial loss.

iii) Increase in drug inventory.

iv) Increased chances of drug deterioration due to lack of proper storage facilities.

v) Increased chances of drug deterioration due to unnoticed drug degradation.

vi) Increased work load on nurses due to medication activities.

The drugs on the nursing station are known as “floor stock drugs”

They are classified into two parts:

a) Charge floor stock drugs.

b) Non-charge floor stock drugs.

Dispensing of charge floor stock drugs: The charge floor stock drugs are those, for which the patient is charged for every single dose administered to him. S Charge floor stock drugs are stored at various nursing stations. An envelope is used to dispense such drugs at nursing stations.

Dispensing of Non-charged floor stock drugs: Non-charged floor stock drugs are the medicaments that are placed at the nursing stations for the use of all patient on the floor. “Drug basket method” is adopted where nurses check the medicines in all rooms and in the refrigerator and prepare a masterlist for the pharmacy. Nurses fill a requisition from for delivery of drugs at their floor. When there is an empty container, the nurses place it in the drug basket. Once the procedure is completed, it is delivered to pharmacy. Alternatively a “**Mobile Dispensary Unit**” can be utilized.

iii) Combination for individual drug order and floor stock system: This system is used in those hospitals where patient pay for their hospitalization and the hospital use the individual prescription order system as their primary means of dispensing, but have several drugs in the floor stock.

iv) Unit dose dispensing: In unit dose dispensing the multiples of single dose administration of medication are prepared by the pharmacist which are ready for administration to a particular patient by the prescribed route and the prescribed time rather than supplying container of drugs to nursing units where the nurses is required to prepare the drug for administration. A single unit package is one which contains one complete pharmaceutical dosage from e.g. one tablet, one capsule.

Two methods of dispensing unit doses are:

a) Centralized unit-drug distribution system [CUDD]

b) Decentralized unit-drug distribution system [DUDD]

Ans: 05 (b) Ambulatory patient services: Ambulatory patient are those patient which are able to walk.

Dispensing of drugs to ambulatory patient: - Depending upon the kind of hospital, ambulatory patient get themselves registered at registration counter of that hospital.

The various steps involved in dispensing are: -

- i) After the registration is over, the patients are directed for a particular department.
- ii) Physician then diagnoses the disease and writes a prescription, bearing name, age and registration number.
- iii) Patient produces the same prescription before the Pharmacist in a Pharmacy.
- iv) While dispensing a prescription, Pharmacist should take every precaution to eliminate errors.
- v) Pharmacist checks the ingredients and collects the materials for compounding and dispensing.
- vi) The compound prescription is filled in a container and labelled with detailed instructions including name, age, and sex registration number.
- vii) The pharmacist shall maintain a register for the purpose accounting.
- viii) Prescription is given back to the patient so that the same can be produced by him during his next visit

Question No. 06 Give short note on: (a) Central sterile services (b) Hospital formulary

Ans: 06 (a) Central sterile services [CSS]: The main objective of sterilisation process is to remove or destroy all micro-organism in or on a preparation and to ensure that the preparation is free from micro-organism. As the name indicates, it is the central department which provides all the professional equipments i.e. sterile or non-sterile to the special departments. It is also called sterile processing department and central supply department.

Functions of the CSS: -

- i) The majority of apparatuses dispensed by the CSS are disposable like syringes, needles, urine collection sets, gloves, blood bags etc.
- ii) CSS also involved in cleaning storage and dispensing of special equipments such as suction pumps, cardiac apparatus, surgical dressings.
- iii) CSS also serve some function such as sterilization, washing and drying of equipments.

Management of CSS: -

The head of CSS department may directly report to the administrator of CSS. Various departments are divided in CSS as:

- i) Department under nurses.
- ii) Department under the pharmacist.
- iii) Department under the control of nurses as well as pharmacist.

Objectives of CSS: -

The main objectives of the CSS are: -

- i) CSS is totally responsible for direct operation room supply.
- ii) It assumes total responsibility for processing the hospital items. e. g. sterilisation & cleaning
- iii) It maintain accurate and current inventory of the equipment in different department.
- iv) It maintains the effectiveness of various process of cleaning, disinfection and sterilisation and maintaining its records.
- v) It contributes to handle the educational program with in hospitals related to infection control.

Location of central sterile supply room- It should be centrally located but considerations must be given to the fact that this room must be able to receive large quantities of linen from the laundry, surgical dressing from the laundry and surgical dressing from the store room.

Ans: 06 (b):- Hospital formulary is a list of pharmaceutical preparation including important information, which reflects the current clinical views of the medical staff. The hospital formulary system is a method whereby the medical staff of hospital evaluates and selects from among numerous available medicinal agent and dosage from that are considered most useful in the patient care in the particular hospital.

Guiding principles: -

- i) The hospital formulary system shall not contain any policies or procedures, which before the time of prescribing provide the consent by the physician to the dispensing of non-proprietary drug.
- ii) The medical staff shall adopt the policy for including the drugs by their non-proprietary names.
- iii) In the absence of written policies approved by medical staff, the Pharmacist shall dispense the brand prescribed.
- iv) The hospital shall make it certain that the nursing personnel must be informed existing in the hospital.
- v) If there is any change in hospital system or in the contents, it must be informed to the medical staff.
- vi) The Pharmacist with the advice and guidance of PTC shall make arrangements for all the drugs, chemicals, biological and pharmaceutical preparations used for diagnosis and treatment of patients.
- vii) To develop an effective formulary system, PTC has to consult various references on a drug regarding its pharmacokinetic profile, drug food interactions and poisoning etc.
- viii) While discussing a particular proprietary name, physician's interest must be solely based upon its pharmacological activity.

The contents of formulary: The primary objective of the formulary is to provide the information to hospital staff for:

- i) Information of drug products approved by PTC and provides basic therapeutic information.
- ii) Information of hospital policies and procedures governing the use of drugs.

iii) Special information regarding drug dosage schedule, hospital approved abbreviation and special information about drugs.

**Question No. 07 Give short note on: (a) Drug information services and drug information bulletin
(b) Application of computers in Hospital Pharmacy**

Ans: 07 (a) The concept of drug information services [DIS] or drug information center [DIC] is an attempt to document drug by abstracting information about them.

The information about drugs is collected from various sources, which are available, can be categorized as under:

i) **Primary sources:** - It is the original information presented by the author without any evaluation by the second party e. g, articles published in journals, dissertations, conferences.

ii) **Secondary sources:** - In this original information is modified, condensed, commented upon by other persons like review articles, abstracts, text books etc.

iii) **Tertiary sources:** - In this information is gathered from primary and secondary sources and arranged in such a manner to give coupled information. The compiled information is available for reference purpose and it help in answering specific queries regarding both old and new drugs from doctors and patients. The information can also be compiled to meet the needs of the deliberations of the PTC.

Functions of DIC [Drug information center]:

i) DIC helps to establish and maintain a system for providing information for drug literature.

ii) A system for providing information for the use of drugs in the hospital.

iii) Answering request for specific items of drug information for the drug therapy of the individual patient.

iv) DIC offer unsolicited drug information for the drug therapy of individual patient.

v) DIC also handle to answer request for providing information of various complications like poison control information centers, pharmacy research projects, Pharmacy and Therapeutic committee.

vi) DIC help to produce and distribute periodic compilations of information directed towards special audiences such as drug information bulletins for medical and paramedical staff.

vii) DIC helps to maintain the drug formulary list.

Drug information bulletin: - Communication of information to medical and paramedical staff is very essential. A drug information center should produce a bulletin and distribute it. The bulletin should provide new advancement in medicines, new researches, and detailed analytical procedures, abstract for new development. It forms a bridge between the information and application to clinical practice. It is the duty of the clinical pharmacist to provide information about drugs to all members of "Patient Care Team". The bulletin should be updated with the latest developments from time to time.

Ans: 07 (b) Application of computers in Hospital Pharmacy:

i) Maintenance of records: Various patient records like medication history, current treatment and financial records etc. are maintained in computers by feeding accurate data. Data is collection of facts. Computers works as data base manager. **"MEDLINE"** is a data base package used for such purpose. It gives the current information of the patient regarding patients name, age, sex, room no., weight, allergies, diagnosis, & special precautions to be taken for the patient. These records are stored in a "File" like "Physician name" file, Direction file, Drug interaction file etc.

ii) Inventory control: - Inventory control is very essential because it maintains the balance between stock in hand and excessive capital investment. Computers are used to detect the items which had attained minimum order level. It then prepares a list and purchase orders for suppliers. Generally there are two system for inventory control.

(a) Periodic inventory control system: In this systems stock levels are checked manually and the amount of inventory in hand is compared with minimum and maximum stock maintained in the computers

(b) Perpetual system: In this system computers tells us about the present position of all the drugs because when they are received, they are entered in the initial stocks to get the current stocks. As the drugs are delivered to various departments the quantities are subtracted accordingly.

iii) Medication monitoring: - To meet the goal of optimum drug therapy, medication monitoring is essential. The prescription of a particular patient received over a period of time is entered and serves as chronological patient drug file. Computer provides two types of informations about medical monitoring.

a) Pharmacokinetic information: **"NONLIN"** is a computer program which can predict pharmacokinetic parameters very easily. These parameters include volume of distribution bio-availability, rate of clearance etc.

b) Non-Pharmacokinetic information: It includes the various allergic reactions, adverse drug reactions etc. For such information two computer programmes are available. (1) **MEDIPHOR** (Monitoring and evaluation of drug interactions by a pharmacy oriented reporting) (2) **PAD** (Pharmacy Automated drug interactions screening)

iv) Drug information service: - Computers have become an important tool for clinical pharmacist in drug information service. Computer aided drug design help the chemist to formulate a new drug molecule possessing desired pharmacological action. 'Micromedex' provides informations on drugs, their identification, poisons, emergency drugs etc. in a single compact disk.

v) Marketing and distribution: - Computers are used for marketing and distribution of drug. It involves processing of order, invoicing maintenance of records, billing etc.

vi) Hospital Pharmacy and Retail Pharmacy: - Computers help hospital pharmacist in keeping overall patient care like maintenance of patient's records, entry of prescription, list of preparations to be manufactured, consumption of drugs, cost analysis updation of drugs information etc. For a retail pharmacist, computers have been of valuable assistance in the prescription processing.

vii) In pharmaceutical industries: - Complete computerized programmes are available for drug manufacture and for quality control management information for the beginning of the process till the finished product is available. Various instruments and apparatuses can be adjusted and calibrated using computers.

viii) Data storage and retrieval: - In 1960's National Library of Medicine created a computerized medical information retrieval systems "MEDLARS" (Medical Literature Analysis and Retrieval system).

Question No. 08 What is PTC (Pharmacy and Therapeutic Committee)? Discuss its composition objectives and functions in detail.

Ans: The Pharmacy and Therapeutic Committee [PTC] is a group of persons which formulate policies regarding therapeutic use of drug. The committee is composed of physician, pharmacists and other health professionals with the inclusion of the medical staff. It has dual role to play as:

i) Advisory: - The committee assists in the formulation of professional policies regarding evaluation, selection and therapeutic use in hospital.

ii) Educational: - The committee recommends and assists in various functions, designed to meet the needs of the professionals' staff, the physicians, nurses, pharmacist and other health care personnel for the complete current of the matters pertaining to drugs.

Functions: PTC plays an important role:

i) To serve as an advisory council to medical staff and hospital administration in all matters related to the use of drugs.

ii) To develop and compile a formulary of drugs and prescriptions accepted for use in various hospitals. The selection of the items to be included in the formulary is based on their therapeutic use safety, cost etc. The committee should minimize duplication of the same basic drugs or their products

iii) The committee recommends written policies and procedures for selection, procurement, storage distribution and use of drugs.

iv) To establish or plan suitable educational schemes for the hospital professional's staff on the matter related to the use of drugs.

- v) To make recommendations concerning the drug to be stocked in wards and emergency.
- vi) To study problems related to the distribution and administration of medication.
- vii) To advice the pharmacy in the implementation of effective drug distribution and control procedures.

Composition of PTC:- The Pharmacy and Therapeutic committee is composed of representative from all walks of health care systems. It can be elaborated schematically as below:

Pharmacy and Therapeutic Committee

Physician	Pharmacist	Nurses	Administrators
General medicine	General surgeon	Anesthetist	

Question No. 09 Write a short note on: (a) Clinical Pharmacy (b) Role of Pharmacist in clinical Pharmacy

Ans: 09 (a) Clinical Pharmacy: - Clinical Pharmacy is used to describe role of pharmacist. It comprises functions necessary to discharge a particular set of social responsibilities related to therapeutic drug use in following categories: -

- i) Prescribing drugs
- ii) Dispensing and administering drugs
- iii) Direct patient involvement
- iv) Education
- v) Consultation

In short Clinical Pharmacy is the branch of pharmacy, which deals with various aspects of patient care, dispensing of drugs and advising patient about the safe and rational use of drugs.

Aim of Clinical Pharmacy: -

- i) To assist the physician in doing a better job of prescribing and monitoring drug therapy for the patient
- ii) To assists medical and para- medical staff and documenting medication incidents correctly.
- iii) To maximize the patient's compliance in drug use process.

Qualities of Clinical Pharmacist: A clinical pharmacist should have proper knowledge about communication skill, clinical skills professional relationship, empathy and monitoring of drug therapy.

Scope of Clinical Pharmacy: -

- i) **Drug information:-** The field realises the importance of keeping information, use of information retrival techniques to make any data available in an efficient manner. The drug information center acts as a data bank.
- ii) **Drug utilization:-** clinical pharmacy helps in the study of drug abuse, drug misuse, medication error etc. so as to overcome such rational and safe use of medicine.

- iii) **Patient care:-** It is a prime duty of clinical pharmacy area to monitor the drug therapy.
- iv) **Education and training programmes:-** A role has been played in educating medical and para – medical staff on rational drug therapy.

Ans: 09. (b) Role of clinical pharmacist in a health care team: -

- i) **Taking medication history of the patient: -** A clinical pharmacist must take and maintain the medication history of patient by interaction with him. He should document the hypersensitivities or allergy to certain drugs, food habits, drug dependence etc.
- ii) **Drug information: -** Many over the counter drugs have potential to interact with prescription drugs. After receiving the prescription, pharmacist checks the drug interaction and patient's habits with the help of patient's history record
- iii) **Selection of proper drug therapy: -** Clinical Pharmacist can assist in selection of a proper drug product/generic formulation depending on the consideration of bio-availability and bio-equivalence of such products.
- iv) **Drug monitoring: -** Clinical pharmacist can help in monitoring drug therapy for safety and efficacy. Therapeutic drug monitoring is very essential for drugs with narrow therapeutic index or those which are administered chronically.
- v) **Adverse drug Reactions: -** Patients with hepatic disorders or Kidney impairment are more prone to adverse drug reactions. Clinical Pharmacist can help in detection, prevention and reporting of adverse drug reaction.
- vi) **Management of drug policies: -** Clinical Pharmacist can participate in formulating health and drug policies and serve as sources of information for health care professionals and to the public.

Question No. 10 (a) Patient counseling and compliance (b) Drug interaction (c) Teratogenicity.

Ans: 10 (a) Patient counselling and compliance: -

Patient compliance: Patient compliance can be defined as adherence to prescriber instruction by the patient. Compliance can be calculated as follows:

$$\text{Percent compliance} = \frac{\text{NPD} - \text{NME}}{\text{NPD}} \times 100$$

Where NPD = Number of prescribed doses, NME = Number of medication errors

Patient counselling: Patient counseling in pharmacy is more than simply providing information about medicine and health. The term counseling is defined as giving.

- i) **Removal of the drug from the package: -** For a patient who is not aware of packing, pharmacist must practically demonstrate its removal from the package, so as to avoid any confusion.
- ii) **How to administer: -** The patient should be advised about the route to be followed so as to prevent faulty administration of the drug.

iii) **Time of administering a drug:** - The pharmacist must instruct the patient about its administration timing, since the drug may cause GI upset. He may be required to be advised to take the drug with food, without food or with milk, fruit juice or water.

iv) **Duration of use:** - The Pharmacist must emphasize the patient to take the medication regularly for his major or minor illness. Whether the therapy is of short or long duration, pharmacist must ensure that the patient follows the prescribed doses and doses regimen in order to derive the maximum therapeutic advantage.

v) **Storage of drugs:** - Proper storage of drugs is very essential for its safety and stability. They should be kept in proper covered cupboards and away from the reach of children.

vi) **Allergies:** - Drug capable of causing allergies like penicillins, sulfonamides, must be carefully detailed to the patient. It reduces the incidences of drug-induced allergies.

vii) **Side effect:** The Pharmacist must tell the patient about common side effect of medicine like constipation may occur with aluminium hydroxide, ampicillin and amoxicillin may cause diarrhoea, metronidazole may cause headache in some people.

Ans: 10 (b) Drug Interaction: - A drug interaction occurs whenever the diagnostic, preventive or therapeutic action of a drug is modified in or on the body by another exogenous chemical [interactant]. A drug's interaction are of two types: Pharmacokinetic interactions and pharmacodynamic interactions.

(1) Pharmacokinetic interactions: -

a) Alteration of gastrointestinal absorption: -

i) **Pentobarbital and Antacids:** - Acidic drug are absorbed from the upper region of GIT where they exists mostly in non-ionized form. An antacid will raise the pH of GIT so the absorption of acidic drugs can be delayed. So antacids delay the absorption of pentobarbital, so hypnotic effect may not be achieved.

ii) **Aspirin and Antacid:** - Antacid delays the absorption of aspirin.

b) Complexation and Adsorption: -

i) **Tetracycline with metal ions:** - Tetracycline can combine with metal ions such as Ca^{+2} , Mg^{+2} , Al^{+3} in GIT to form complexes that are poorly absorbed. So tetracycline should not be administered with milk.

ii) **Vitamins and oral contraceptives:** - Use of oral contraceptives may results in deficiency of folic acid. Folic acid deficiency is more important. The contraceptive may interfere with deconjugation of polyglutamate forms of folic acid.

c) Alteration of Distribution:

i) Warfarin and phenylbutazone: - Both the drugs are extensively bound to plasma proteins. Phenylbutazone has greater affinity for binding sites resulting in displacement of warfarin from protein binding sites.

d) Alteration of Metabolism:

- i) Warfarin and Phenobarbital: - Phenobarbital increases the rate of metabolism of warfarin resulting in decrease in anticoagulant activity.
- ii) Doxycycline and phenytoin: - Phenytoin can decrease the half-life of doxycycline by hepatic enzymes.
- iii) If one drug inhibit metabolism of another drug, it results in prolonged action or intensified activity. For example Isoniazid may inhibit the metabolism of phenytoin and results in its toxic effect.

e) Alteration of Excretion: -

- i) Sulfonamide and methenamine: - The acidic urinary pH is required for methenamine activity. This pH could cause precipitation of sulfonamide and produce crystalluria.
- ii) Acidifying and alkalinizing agents: - Urinary pH will influence ionization of weak acids and weak bases and thus affects the extent to which agents are re-absorbed and excreted.

(2) Pharmacodynamic interactions: -

- a) **Antagonistic effect:** - Acetylcholine and nor adrenaline are antagonistic in nature. Acetylcholine lowers the heart rate while nor-adrenaline shows increase in heart rate.
- b) **Synergistic effect:** - Trimethoprim and sulphonamide resulting in additive antimicrobial effects.

Ans: 10 (c) Teratogenicity: - Any drug of a chemical substance which produces deviations or abnormalities in the development of embryo is called a teratogen. Drugs are teratogenic only at specific times during embryogenesis. For example: Thalidomide is best example to explain the pattern of pathogenesis of anomalies.

Important points may be noted for teratiogenesis: -

- i) A teratogen may exert the effect on a developmental structure upto the time of its critical differentiation.
- ii) A single teratogen may produce a variety of abnormalities.
- iii) A variety of teratogen may produce similar abnormalities.
- iv) A drug's effect can be very damaging to a foetus.

Principles: Teratogenicity of a drug is generally depends on various points like specificity of drug, timing of exposure, genotype of mother and foetus and simultaneous drug exposure.

- i) **Specificity:** - A drug may be teratogenic to one species but not to another e.g thalidomide is teratogenic to rabbits and human but not in rats.

ii) **Timing of exposure:** - Depending on the stage of development may show difference in adverse effects or even no effect.

Example: - Thalidomide if

- 1) Taken 21-22 days of gestation: - Absence of external ears and paralysis of cranial nerves.
- 2) Taken 24-27 days: - Maximum effect on arms.
- 3) A day or two later: - Defects in legs.

Question No. 11 Write a short note on: (a) Adverse drug reactions (b) Treatment of narcotic drug poisoning.

Ans: 11 (a) Adverse drug reactions: - Adverse drug reactions are “any noxious and unintended effects of drug which occurs at doses normally used in man for prophylaxis, diagnosis or therapy of disease or for the modification of physiological functions.

Casues or reasons of adverse drug reactions: -

- i) Over prescribed to a patient with potent drug by physician.
- ii) Self-medication by patient.
- iii) Failure to set therapeutic end point for drug like diuretics.
- iv) Differences in bio- availability from various.

Classification: Adverse drug reaction may be classified as (1) Predictable (2) Non or unpredictable.

(1) Predictable adverse drug reaction: -

- i) Excessive pharmacological activity: - This type occurs due to excessive pharmacological activities of drug. Commonly seen in CNS depressant, hypothesizes.
- ii) Secondary pharmacological effect: - A drug may have many pharmacological effects at normal dosage. Example: - A patient receiving an antihistamine for prevention of motion sickness may become drowsy.

(2) Unpredictable Adverse drug reactions: -

Idiosyncrasy: - It is defined as abnormal drug response. It covers unusual or unexpected drug response, which cannot be explained or predicted. For example: - Analgesics may induce tumor of kidney which occurs in genetically abnormal subjects.

Ans: 11 (b) Treatment of Narcotic drug poisoning: - Narcotics are the drugs which produce unconsciousness in the body. For example paraldehyde, barbiturate, CO₂ in high amount. Narcotics from plant sources are Opium, Cannabis

Opium poisoning: -

Symptoms: -

- i) If opium is consumed in large doses, respiration becomes shallow, constriction of pupil take place and heart rate decrease.

ii) Body temperature drops, cyanosis and ultimately death occurs due to respiratory depression and cardiac arrest.

Fatal dose: Morphine -200 mg

Treatment: -

i) Naloxone 0.4 mg is given either by I.M / I.V route immediately.

ii) Gastric leavage is done to remove any unabsorbed drugs.

iii) Patients may be kept awake, as in awaked condition ventilation and basic metabolic rate is more which is responsible for detoxification of the opium.

Cannabis poisoning: -

Symptoms: - First excitement then necrosis is followed. Chronic poisoning results in anorexia, loss of weight, weakness and tremors.

Fatal dose: Charas 2000 mg/kg body weight

Treatment: - The stomach must be washed with warm water. Hypodermic injection of strychnine and saline purgatives are very useful.

Question No. 12 Write a short note on: (a) Drug abuse (b) Systemic antidotes

Ans: 12 (a) Drug abuse: - Drug abuse may be defined as consumption of a drug repeatedly to produce profound effect on mood, and feeling of behaviour.

The drug of abuse can be occurred due to the:

i) Drugs used or present in commonly used beverages like caffeine in tea, coffee and cold drinks.

ii) Nicotine taken in a number of different forms of tobacco e.g. for smoking, for chewing and internal administration.

iii) Ethyl alcohol has very few medical uses but it is widely used socially in the form of beverages. Heavy and repeated consumption of alcohol leads to both dependence and tolerance.

iv) Prescribed drugs like morphine, barbiturates, amphetamine are to be used only on doctor's prescription for the treatment of a malady but quite a few persons, who have an easy reach to the drugs i.e. doctors, nurses tend to, misuse these drugs.

v) Banned drugs: by use of banned drugs like Heroin is the most dangerous drug because of its addiction liability, which includes both physical and psychological dependence. For this reason manufacture, sale and distribution of this drug is banned. Similarly, cocaine is obtained from plant sources and is also highly addicting.

Treatment aspects: Drug abuse treatment has two major steps :

i) Detoxification

ii) Rehabilitation of the patient

1) **Detoxification:** - It is done by stopping the drug and treatment is done for withdrawal symptoms. It takes 10-21 days can be done either by providing inpatient services or by outpatient services.

2) Rehabilitation: - It is a long-term treatment. It depends upon the patient's need after detoxifications. Various therapies like psychotherapy, family therapy, behavior therapy, are tried during this treatment.

Ans: 12 (b) Systemic antidotes: - They produce the actions, which are opposite to that of the poison e.g. chloroformed for strychnine, caffeine for morphine. The antagonism is not always complete and the remedy may itself produce most undesirable results.

Certain chelating agents are widely used as specific antidotes against some heavy metals. They form stable, soluble non-toxic complexes with heavy metals. The important among them are BAL, EDTA, N-Pencillamine for lead, mercury and copper and Desferrioxamine [D.F.M.] for iron.

BAL [Dimercaprol]: - Most of the enzymes in body have-SH groups which are essential for their activity. Many heavy metals like arsenic and mercury have a great affinity for these groups. Thus after combining with these -SH groups these compounds reactivate them. BAL has many -SH groups, which combine with these metals leaving the -SH group of enzymes free. The compound formed by the heavy metals and the di-Thiol, dimercaprol is relatively stable and is excreted without causing damage to the excreting mechanism. BAL is given intramuscularly as a 5% solution in arachis oil with benzyl benzoate.

Question No. 13 Write the manifestation and pathophysiology of following disease:-

(a) Hepatitis (b) Rheumatoid arthritis (c) Hypertension

Ans: 13 (a) Hepatitis [Jaundice]: It is Water-borne disease caused by hepatitis virus [type- A]

Symptoms: - i) Fevers, shivering, fatigue, weakness, aches, nausea, vomiting along with passage of dark yellow urine:

ii) Patient who develops Jaundice after a few days fever comes down but other symptoms continue.

iii) After 3rd week, patient starts improving and recovers in 4 - 6th week.

iv) However damage to the liver takes long time to heal.

v) In few cases liver does not get repaired and cause excessive degeneration of parenchymatic cells of liver leading to hepatic encephalopathy.

There are four different types of viruses causing different type of hepatitis:

i) Hepatitis A virus causing hepatitis A

ii) Hepatitis B virus causing hepatitis B

iii) Delta virus

iv) Non-A Non- B virus

Mode of transmission: -

i) It is transmitted mainly through contaminated water and food.

ii) It gets transmitted from person to person through contacts, because the carriers are the main source of infection.

iii) Germs are also transmitted indirectly through files, by coming in contact with stool, vomit and urine of infection.

iv) Transmission may also occur through blood transfusion and use of contaminated syringe or needle.

Pathophysiology- Hepatitis B virus replicated in liver cells and virus cells get incorporated in liver cells membrane. Antibodies are formed against this virus. These antibodies attack foreign plasma membrane. The immune system damages the liver.

Ans: 13 (b) Rheumatoid arthritis:- It is a chronic disease manifested by inflammation of joints. It may occur at any age, affecting either sex.

Pathophysiology: - It is an autoimmune disease. It is influenced by body immune system reaction towards certain body proteins. As they are foreign substances and produce antibodies it has been observed that patient's body considers human gamma globulin [IgG] as the antigen and produces antibodies for that rheumatoid factor. IgM, IgG and IgA are called as IgM rheumatoid factor respectively. Antigen reacts with antibodies to form an immune complex which then reacts with complement and leads to inflammation.

Manifestations - A feeling of fatigue, weakness, anorexia a weight loss, fever, inflammation of joints, hands, feet and wrists occurs initially. Morning stiffness in joints, which lasts for more than 30 min. to many hours is observed.

Ans: 13 (c) Hypertension - Hypertension is an abnormal elevation of arterial blood pressure. If blood pressure is above 140/90 it is declared as hypertension. It can be classified into two types:

1) Primary/ essential hypertension

2) Secondary hypertension

(1) Primary/essential hypertension- It is characterized by elevation of diastolic blood pressure and increase in peripheral resistance. There are several factors which are responsible for primary hypertension:

(a) Genetics (b) Obesity (c) Endocrine disorders (d) High salt intake (e) Stress

(2) Secondary hypertension: - It is due to some disorders like cushing syndrome, hyperthyroidism or due to kidney impairment.

Sign and symptoms: - Although headache is very common but constant headache, dizziness occurs when diastolic blood pressure exceeds 110 mm occipetal headache in morning is associated with severe hypertension. If renal failure occurs, heart problems become severe.

Pathophysiology- Hypertension may cause damage of kidney, eyes, heart and brain. Hypertension leads to renal failure and also visual disturbance. Impaired left ventricular deteriorates heart failure.

Question No. 14 Write the manifestation and pathophysiology of following disease:-

(a) Diabetes (b) Tuberculosis (c) Peptic ulcer

Ans: 14 (a) Diabetes: - Diabetes mellitus is a disorder characterized by hyperglycemia due to deficiency of insulin and possibly high amounts of glucagons. It can be classified into following categories:

(1) Juvenile onset type (2) Adult or maturity onset type

Pathophysiology: - Insulin deficiency is the main cause of diabetes, which may be due to diseases of pancreas, defective production of insulin, destruction of beta cells, and genetic disorders.

In diabetic patient, blood glucose concentration remains high after a meal because the uptake utilization and storage of glucose by adipose tissue and muscle are diminished due to absence of insulin. Glucose is not available to cells in spite of high blood glucose concentration and on fasting it further increases blood glucose concentration through glycogenolysis and gluconeogenesis.

Hyperglycemia results in glucosuria. Due to the loss of calories and water patients experience symptoms of polyuria, polydipsia, fatigue and weight loss despite normal or excessive food intake. Excess ketones are also excreted in the urine as strong acids. This results in urinary loss of bicarbonate and potassium.

High glucose level provides an excellent medium for bacteria growth and in this phagocyte does not function properly. Other infections may take place.

Signs and symptoms: - Onset of Juvenile diabetes is sudden and characterized by polyuria, polydipsia, weight loss, decreased muscle strength, irritability. Adult onset diabetes may show weight loss, nocturia, blurred vision, anemia, fatigue other symptoms include tingling, numbness in the feet, slow healing and skin infections.

Complications of diabetes mellitus: -

i) **Ketoacidosis:** - It occurs in diabetic patients who develop high level of glucose and ketones plus metabolic acidosis showing severe dehydration, nausea, vomiting and hypotension.

ii) **Retinopathy:** - It occurs after 15-20 years of disease. Diabetes is the second leading cause of blindness. glaucoma and cataracts

iii) **Neuropathy:** - Symptoms include sexual dysfunction in the male, nocturnal diarrhoea, hypotension and loss of sensation.

Ans: 14 (b) Tuberculosis: Tuberculosis is caused by rod shaped mycobacterium tuberculosis. There are three types of tubercle bacilli which are pathogenic to human's viz.: (a) bovine (b) human (c) avian

Pathophysiology

As the bacillus is an aerobe and requires high oxygen tension for its optimum growth, the infecting organism enters into the body via lungs. This is the **Primary Tuberculosis**. From the lungs, it further spreads to various organs of lymphatic system and the blood stream called **Pulmonary Tuberculosis**. After several weeks cellular immunity develops which prevents the spread of disease. The organism

may remain inactive for the whole life of host or may get reactivated at any time. Reactivation leads to **Miliary Tuberculosis**.

Manifestations

- 1) **Primary tuberculosis:** In most of cases it is without symptoms. Incubation period is 4 to 8 weeks. Only mild fever, malaise is observed after 4 weeks.
- 2) **Pulmonary tuberculosis:** Fever, irritability weight loss, malaise is observed. Excessive fatigue in the evening and sweat during sleep. Cough early in the morning, green or yellow sputum with blood spots are the common symptoms.
- 3) **Miliary tuberculosis:** Weight loss, fatigue, weakness, fever, night sweats, GIT disturbances are very common. Lesions are found at lymph nodes, kidney and spleen.

Ans: 14 (c) Peptic ulcer:- It can be defined as an acute or chronic disorder characterized by ulceration of the digestive tract, which is accessible to gastric secretions. This disorder commonly occurs due to too much acid secretion and pepsin activity for the degree of local tissue resistance. Ulcers most commonly occur between the ages of 20 to 50 years.

Pathophysiology:

- 1) **Duodenal ulcers:** - Patients with these ulcers have excessive secretion of hydrochloric acid. It also occurs more frequently in patients with hyperparathyroidism and rheumatoid arthritis. They may have high vagal tone and excessive humoral stimulation to gastric acid.
- 2) **Gastric ulcers:** - Although some patients of gastric ulcers are hypersecretors of hydrochloric acid, but most of them secrete either normal or less than normal quantity. Hence it is more important to pay more attention towards gastric mucosal resistance than on acid and pepsin secretion. It may also result from poor gastric emptying. It is less common than duodenal ulcer. Gastric ulcer is more prevalent in men than women and occurs after fifty years of age.

Manifestations:

- i) **Duodenal ulcers.** The main symptom is a steady or burning pain in upper central region of abdomen which is relieved by ingestion of food, antacid or cold milk. This pain generally begins about 2 hours after the meal and may awaken the patient during midnight. As the pain is relieved by eating, and patients often gain weight.
- ii) **Gastric ulcer.** It includes symptoms like burning sensation but is less localized than duodenal ulcer and generally does not occur at night. Complications like vomiting, sepsis, pancreatitis may occur in extreme cases.

Question No. 15: Explain the nomenclature and uses of surgical instruments and hospital equipments.

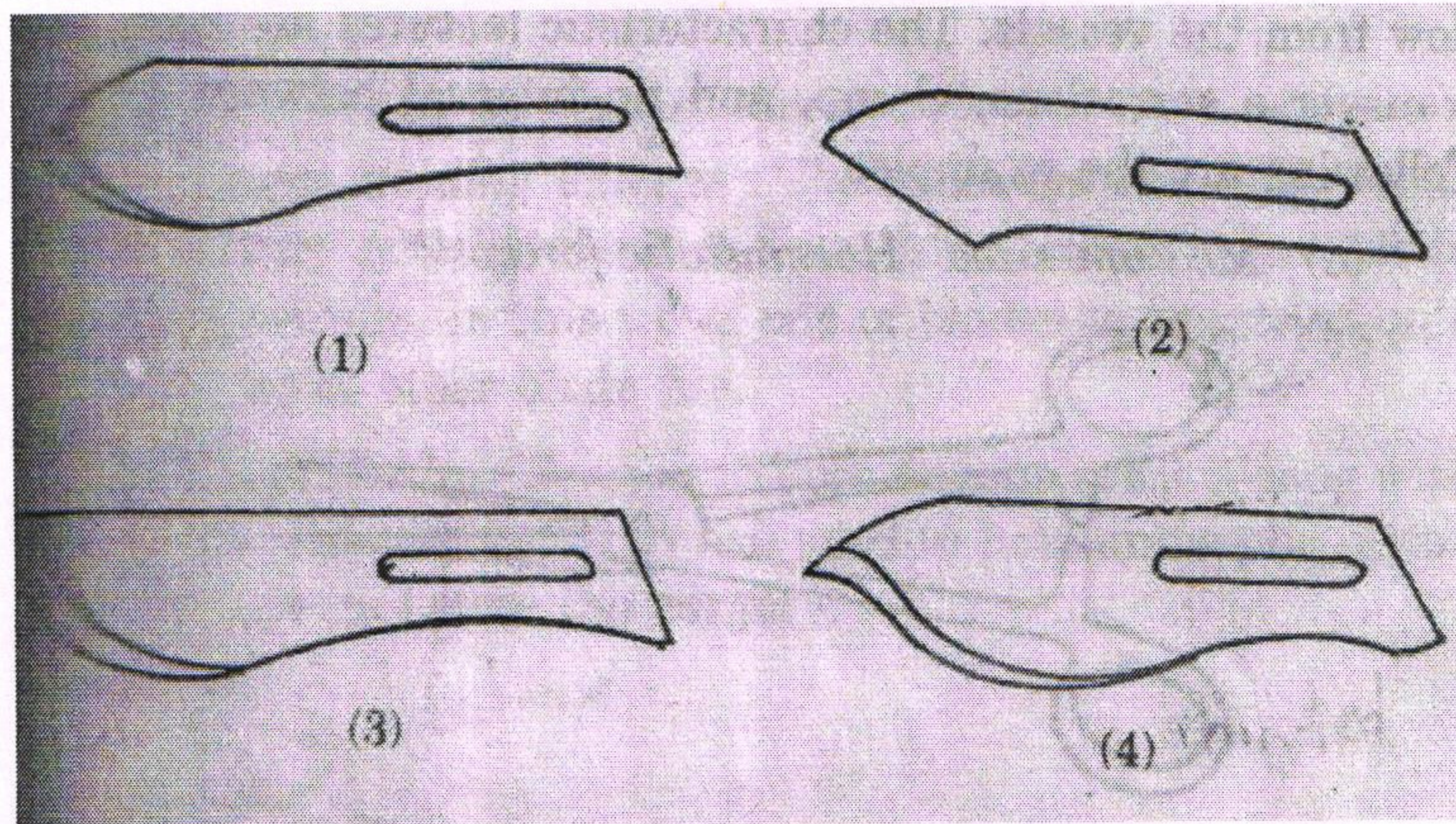
Ans 15: Surgical instruments are very essential for any pharmacist working in a hospital. They are meant for surgical purposes. It includes wide variety of surgical instruments and the pharmacist is expected to handle the surgical instruments at the drug stores or in a hospital.

(1) Towel clips or corner clips: - These are used as surgery accessories to fix surgical towels in such a manner which reduces the risk of contamination. Corner clips are following types:-

(a) Gray's type (b) Backhaus type (c) Moynihan's tetra towel forceps

These forceps has four teeth in which two are present on each side of blade. It is used to fix towel to the skin flap to prevent entry of micro- organisms from the skin.

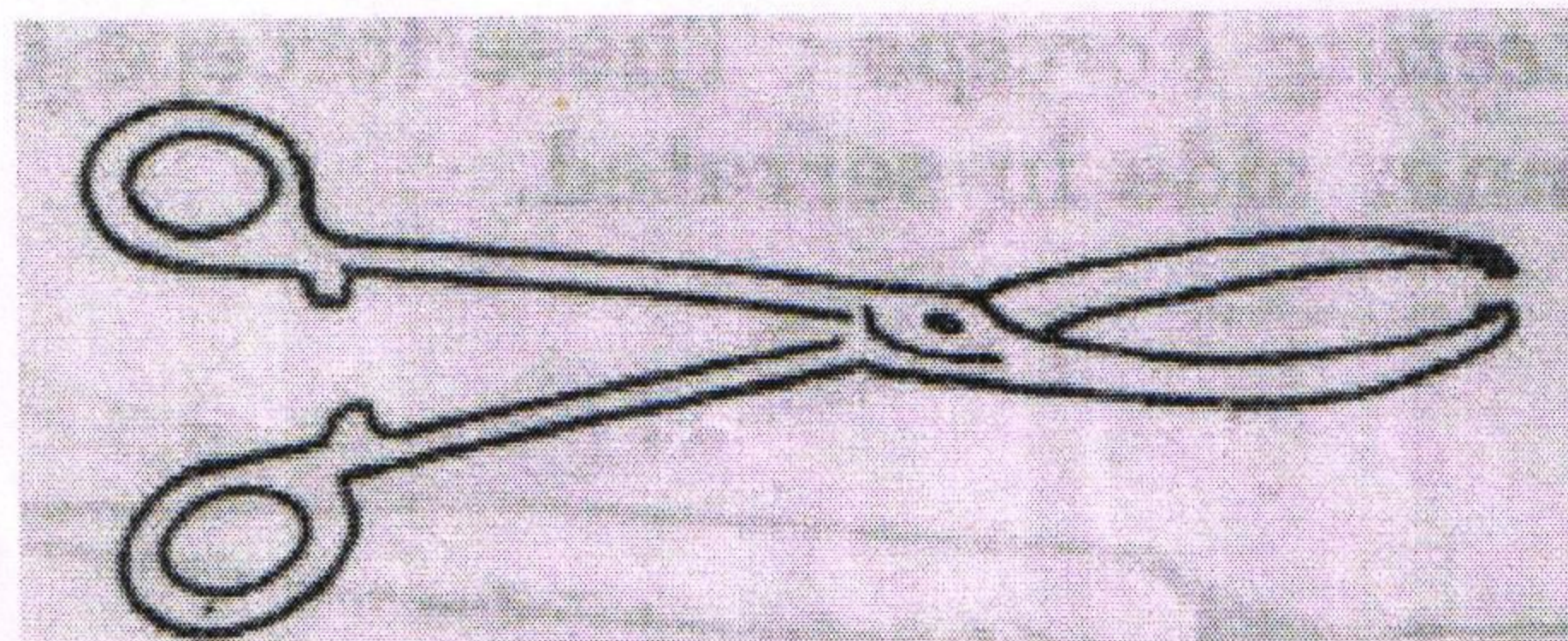
(2) Scalpels and their blades:- Scalpels are used to make an incision. it is a blade with a handle and



blades are detachable type.

(3) Forceps: (i) Tissue forceps: These forceps are used to hold the tissues. They may be toothed or non-toothed.

(a) Toothed tissue forceps: These forceps are long with short blades. The main function of such forceps is to catch bleeding periosteal vessels.



(b) Untoothed tissue forceps: These forceps are used to hold delicate structures like the peritoneum, appendix etc.

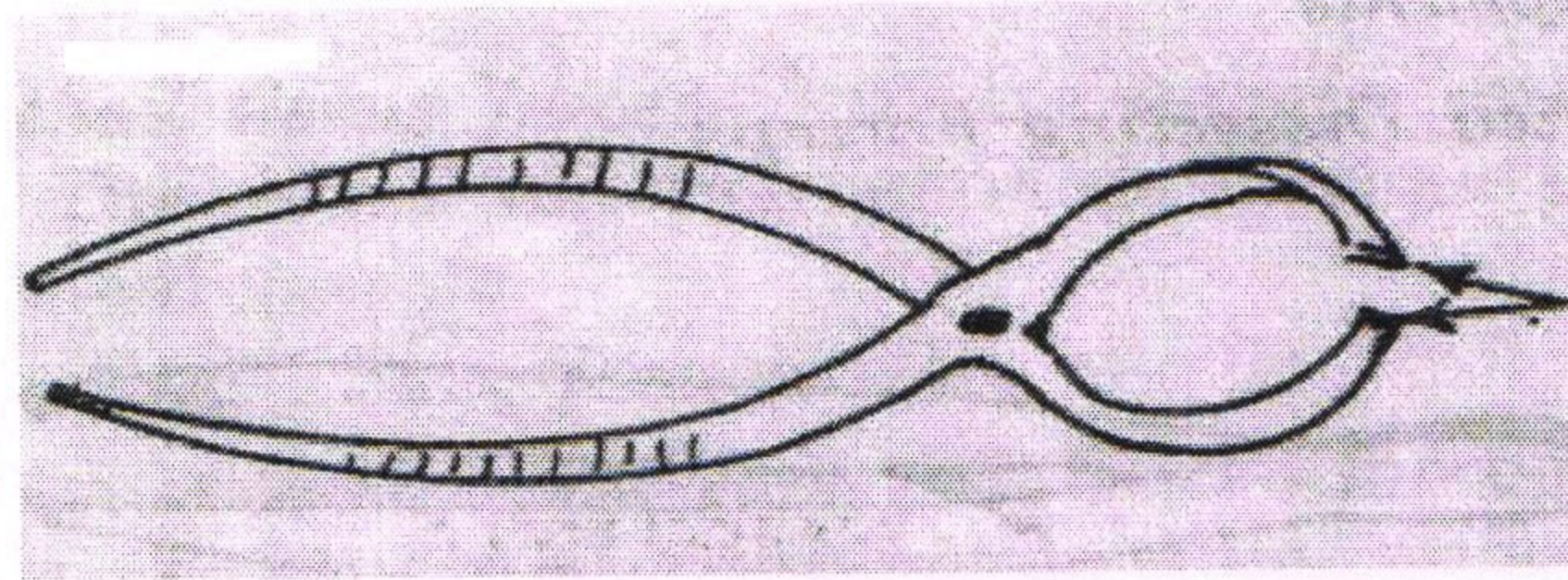
(ii) Haemostatic forceps: They are used to check the blood flow from the vessels. The characteristics features are blunt tip, clamp, and no interval between blades. e.g Medium sized haemostatic, Mosquito type and haemostatic forceps.

(iii) Dissecting forceps: These are used to hold various tissues and structures. They help in surgical operations. They are of either plain or toothed type.

(a) Plain dissecting forceps- These forceps have spring like handle and the inner side in serrated.

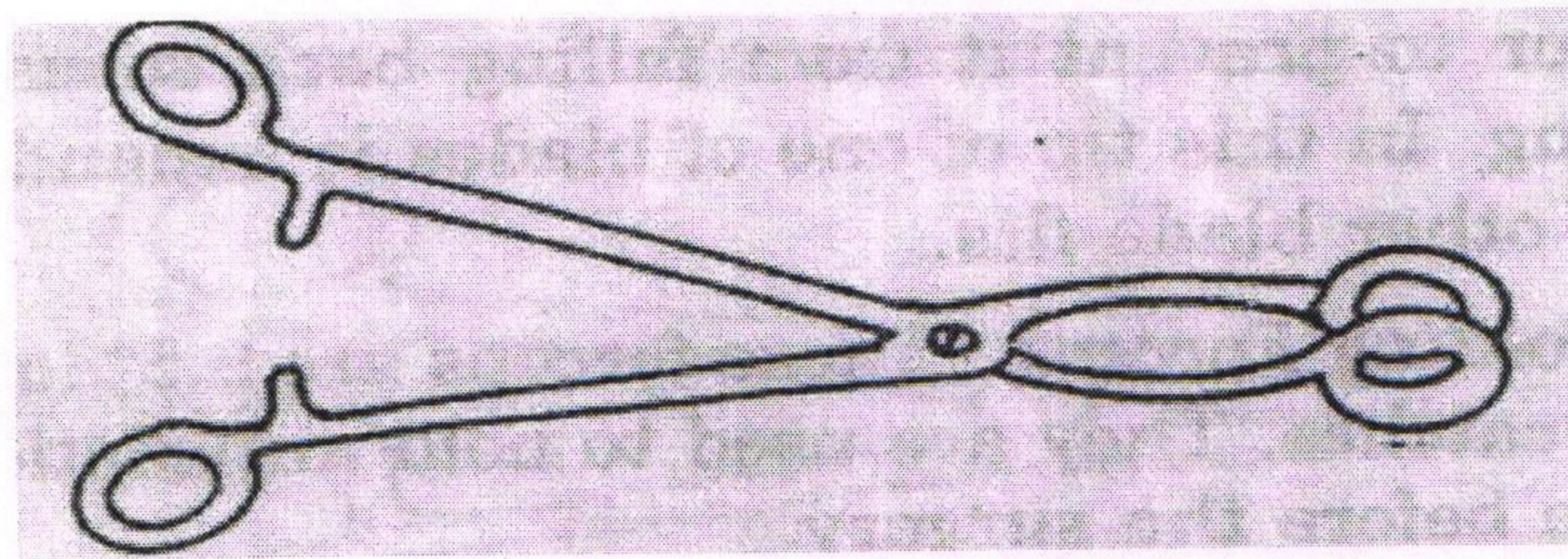
(b) Toothed dissecting forceps

- (c) Tongue holding forceps- These forceps hold to tongue during surgery. In this tip of one of blades is expanded onto which the tip of other blade fits.
- (d) Sponge holding forceps- These forceps are 9.5'' long with finger bows and catches. They are used to hold antiseptic cotton swabs and gauze before the surgery.
- (e) Bone cutting forceps- They have sharp blades and handle, which are used to cut bones.
- (f) Bone holding forceps- This forceps resembles like a lion jaw and hence called lion's forceps.



Bone holding forceps

- (g) Piles holding forceps- They have oral shaped jaws with grooves inside but no serrations. It is used to hold piles mass.

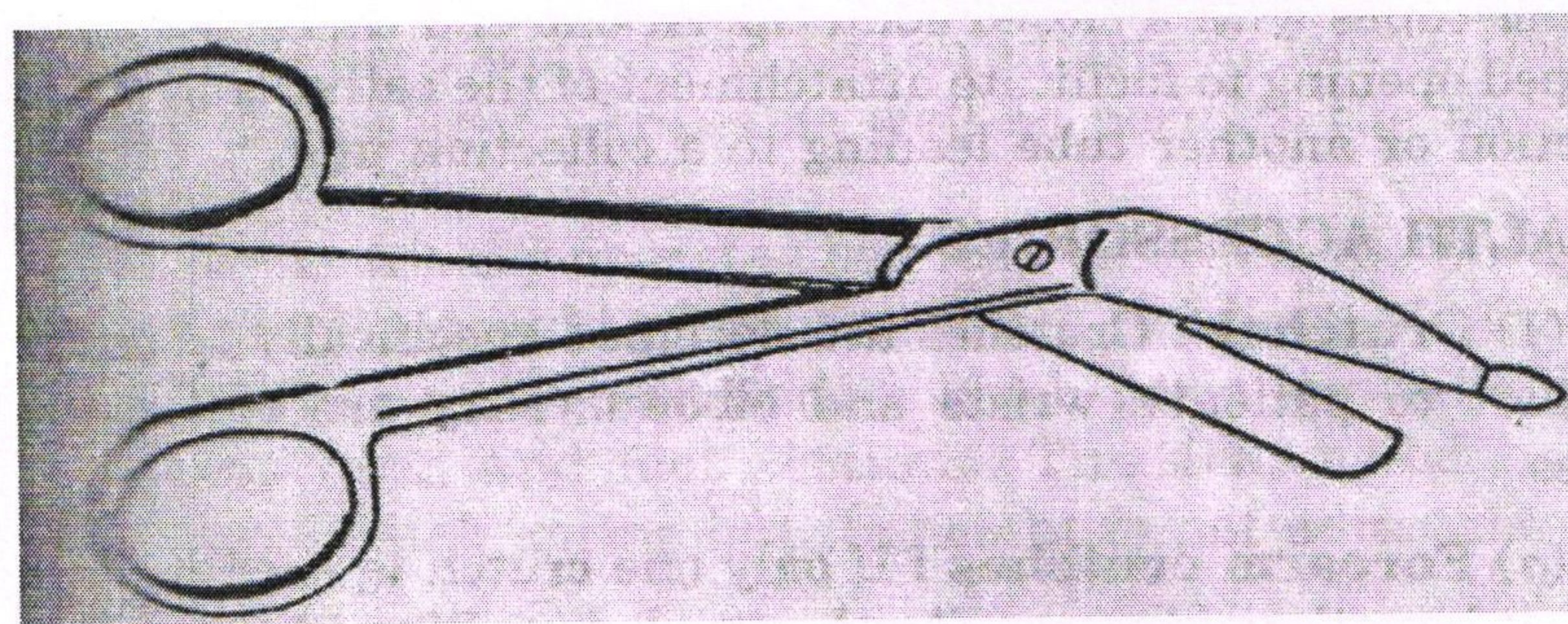


Piles holding forceps

- (4) **Needles:** Needles are of four types: (a) Straight needle (b) Round shaft curved needle (c) Triangular shaft curved needle (d) Flat shaft curved needle.

- (5) **Scissors:** These are cutting instruments which are categorized into following categories:-

- (1) Straight blunt scissors (2) Straight pointed scissors (3) Lister's bandage scissors to cut the bandage



Lister's bandage scissors

- 6. Rubber catheters:-** Rubber catheters are of different sizes. They are either

- (i) Flexible rubber catheter (ii) Self retaining rubber catheter

They are used to drain off a bladder in case of urine retention. They are used to collect urine from those who are unable to void naturally. Flexible soft rubber catheters are small rubber tubes with a closed

solid tip. At one end there is a funnel shaped opening to facilitate attachment of the catheters to a glass junction or another tube leading to a collection unit.

Other equipments-:

(1) **ECG Machine (Electrocardiogram)** - This machine is a must for any hospital. Now a day's multi channel ECG analyzer machines are available which give complete ECG interpretation and extensive measurements for instant diagnosis.

(2) **X- ray Machine**- It is a diagnostic tool. It takes internal photographs and is a part of radiological department.

(3) **CT Scanner**- Latest technology CT scanner (computed tomography) produce advanced morphological analysis of all organs. CT Scanners find it difficult to analyze a constantly moving structure like heart etc.

(4) **Magnetic Resonance Imaging (MRI)**- This technique is used in many hospitals for diagnosis of complicated cases.

(5) **Ultrasound Sonography**- These equipments give a sonograph of uterus which is very helpful in gynecology to know the reasons of repeated abortion, fetal abnormalities, menstrual disorders etc.

Question No. 16 Explain surgical dressings.

Ans: Surgical dressing is a term applied to a wide range of material used for the dressing of wounds. They are employed as coverings, absorbents, protectives or supports for injured or diseased tissues. They can be classified into following categories:

(1) Fibers- plain and medicated (2) Fabrics- plain and medicated (3) Bandages (4) Self adhesive plaster

Classification of fibers

1. **Fibers-** (A) Cotton- Unmedicated e.g. Absorbent cotton wool

Medicated e.g. Capsicum cotton wool

Lustrous (Regenerated cellulose)

(B) Rayon-

Matt (Delustered regenerated cellulose)

(C) Wool cellulose- Cellulose wadding

Absorbent cotton wool (Absorbent cotton)

It consists of epidermal trichomes from the seeds of cultivated species of gossypium. It is available as rolls or small balls. It absorbs water and wound exudates rapidly. Ideally fibers of absorbent cotton wool should be well carded, bleached to a good white, free from leaf, seed coat, and must be free from optical whiteness. They are used for following purposes-:

1. To absorb wound exudates.

2. To clean and medicated the wounds using bactericidal solution to the skin.
3. To give physical protection and warmth to the area.

(2) Fabrics:- (a) Surgical gauzes:- The function of surgical gauze is to provide an absorbent material of sufficient tensile strength for surgical dressing. In the process of making surgical gauze the raw cotton fibre is mechanically cleaned and then spun or twisted into thread. This cloth is gray in appearance and non absorbent.

(b) Absorbent gauze or unmedicated gauze:- It is a soft cotton cloth of plain weave, open texture. It is usually folded lengthwise and in various lengths. Hence it is usually covered with a more absorptive and protective dressing.

(c) Gauze pad or gauze swab:- Absorbent gauze is folded into a square pad. The gauze may be dyed with a harmless dye. Small gauze pads are used for swabbing during surgery.

Classification of fabrics



lint (3) Bandages:- Bandages are four types:-

- (A) Elastic bandages: (i) Twisting certain wrap threads (ii) Rubber threads (iii) crimping
- (B) Non- elastic: (i) Cotton (unbleached calico) (ii) Cotton (heavy weft)
- (C) Impregnated: (i) Leno (ii) Open wove bandage

(D) Adhesive: (i) Warmed for adhesion (ii) Self adhesive

Crepe bandages-: It is an elastic bandage made by an elastic fabric of plain weave in which the warp threads are of cotton and wool and weft thread are of cotton. It contains no rubber thread.

Uses: Crepe bandage conforms well to body contours allowing limited movements and stretching if swelling takes place. Hence are very useful for giving light support to sprains and strains and as a compression bandage.

Plaster of paris bandage-: This is a cotton cloth of leno weave, impregnated with dried calcium sulphate consisting of a mixture of the amorphous and crystalline forms and suitable adhesives such as methyl cellulose of high methoxy content and hypromellose.

Uses: It is used for immobilization and correction of fracture, and for the construction of body support or for similar purpose.

(4) Self adhesive plasters-: These consist of a self adhesive mass spread on a supporting material that may be plain or elastic cloth or a plastic film. The support may be tinted in flesh colour.

(I) Belladonna self adhesive plaster-: A belladonna plaster consists of a rectangular or circular piece of cotton, rayon or mixed cotton and rayon cloth spread evenly with mass containing an extract of belladonna herb or root. The plaster may be perforated and the mass made porous or permeable to air. The adhesive surface is covered with a protector.

Uses-: This plaster is used as a counter irritant in rheumatism, lumbago and neuralgia.

(II) Water proof microporous self adhesive plaster-: This is similar to the previous dressing but both film and mass is permeable to air and water vapour. This film is in the form of a microporous plastic filter that allows passage of air and water vapour but not liquid water. Hence compared with the other two plastic plasters, this is intermediate in properties

Uses: It is used to cover sites of infection when free passage of air and water vapour is desired but exclusion of water is necessary.

Question No. 17 Define the term bioavailability. Discuss the various factors affecting the bioavailability.

Ans: Bioavailability-: It is defined as the rate and extent of the active drug that is absorbed from a dosage form and becomes available in the systemic circulation.

Factors affecting drug bioavailability-:

(1) Physical properties of drugs-:

(a) Particle size: It determines the surface area which will be in contact with liquid. The smaller the particle size, larger would be the surface area, hence quicker will be dissolution and absorption rate.

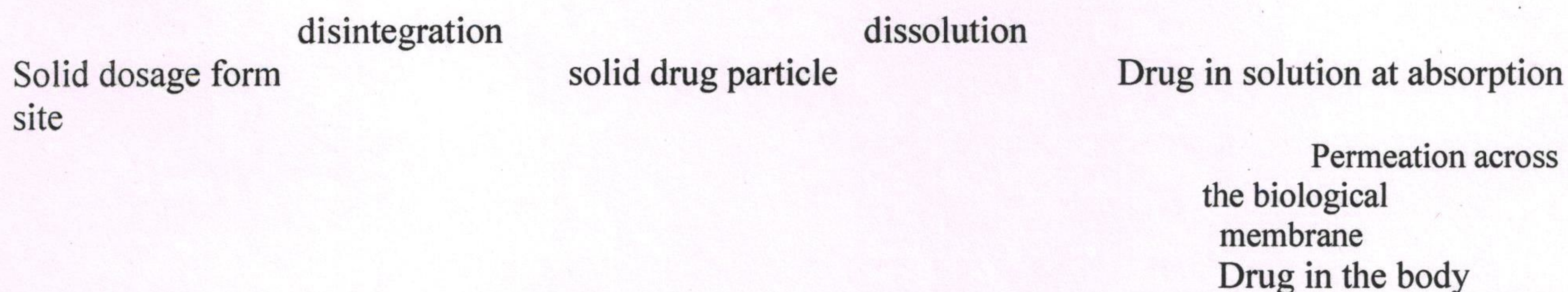
(b) Partition coefficient: Partition coefficient of a drug is the ratio of its solubility at equilibrium in a non- aqueous solvent to its solubility in an aqueous solvent. Hydrophilic drugs have higher water solubility and dissolution rate than lipophilic drugs. Non- ionized drugs are better absorbed.

(c) Physical form: Most of the chemical substances are available either in crystalline or amorphous form. The crystalline form has definite shape, whereas amorphous form does not have any definite shape. These two forms of drug exert a great influence on the bioavailability and stability of pharmaceutical formulation.

(2) Pharmaceutical factors

(a) Dissolution rate

For a drug to reach in the systemic circulation it has to undergo the process of disintegration and dissolution.



Bioavailability of different dosage forms generally follows the following order.

Solution > suspension > powder > capsule > tablet > coated tablet.

(b) Drug dosage form

Most drugs are not taken as pure chemicals but are formulated into pharmaceutical dosage form, such drug products may be simple solutions, a compressed tablet containing binders, fillers, lubricants, a colouring agent, or a capsule dosage form containing the active medicament, diluents lubricants etc. The following are few formulation and manufacturing variables that could influence the bioavailability of drug product:-

1. The properties of the salt of drug (salt form, crystalline structure).
2. Manufacturing variables (tablets compression force, processing variables)
3. The composition of the finished dosage form (presence or absence of excipients, special coating).

(3) Physiological and other factors affecting bioavailability

The rate and extent of drug absorption can be affected by a wide variety of factors related to the characteristics of the subject receiving the drug product. Some examples include:-

1. Contents of the GIT tract (fluid volume and pH, bacterial activity etc.)
2. Rate of GIT transit. This is influenced by disease, physical activity, drugs and emotional status of subject and composition of GIT contents.
3. Local blood flow, condition of GIT membrane, metabolism or degradation in the GIT or during the first pass of the drug through the liver.
4. Age, sex, race, body size, time of day, and bed rest VS ambulatory status.

The above factors are important to consider because they can contribute to intrasubject and intersubject variability in the treatment of patients.

(4) Other factors-: It is already well known that a substance will be well absorbed, if it is liposoluble and at the same time also soluble to some extent in water. Finally the drug substance should not have excessively high molecular weight for better absorption.

Question No. 18 Explain about general treatment of poisoning.

Ans: For general treatment of poisoning following steps should be considered:-

(1) Immediate removal from the environment: When poisoning appear to have occurred due to gases like carbon monooxide or from surface absorption, the patient must be immediately removed to fresh air. Poisons introduced due to snake bite needs tournicating which prevent the poison from reaching vital organs like heart, kidneys, brain through circulating blood. Make an incision (cut) and the tissues bleeds. Neutralise the poison by a suitable method..

(2) Emesis: Emesis plays very important role in poisoning on oral ingestion of material like by ingestion of corrosives, by kerosene oil and by using convulsant drug. Vomiting can also be induced by mechanically, Ipecac syrup or powder, mustard powder, 3 teaspoonful of salt in water and by Apomorphine (6mg) causes prompt vomiting usually within 3-5 mintues. The only disadvantage is that it should be administered parentally and should never be used if the poison itself is a CNS depressant.

(3) Gastric lavage-

It is necessary if the poison is ingested. The poison is washed out by inserting catheter into alimentary canal upto stomach. Washing are usually done with:

- i) NaHCO_3 , 2 gm in 300 ml water.
- ii) 30 gm (Mg or Na sulphate in $\frac{1}{4}$ litre water)
- iii) 100 ml liquid paraffin + 150 ml water.
- iv) 8 gm of activated charcoal in water.
- v) Use of emetics, *e.g.*, common salt, ipecac powder.

(4) Common antidote-

S.no	Drug	Antidotes	Mechanism
1.	Acids	Antacid or weak alkali (milk of magnesia) avoid including emesis or gastric lavage.	Chemical antagonism
2.	Acetaminophen	Acetyl cysteine	Restores depleted glutathione stores, hepatic faliure
3.	Alkaloids	Potassium permanganate	Chemical antagonism
4.	Unknown	Activated charcoal	Adsorption

(5) Accelration of elimination of poisons: it can be done by purgation, dieresis, dialysis, Peritoneal dialysis

and haemodialysis. Intravenous fluids are administered to excrete poisons. It should be kept in mind not to overhydrate the patient as it may lead to circulatory impairment or even pulmonary oedema. Force diuresis is done in amphetamine poisoning. Peritoneal dialysis involves instilling dialysis fluid into peritoneal cavity. Poison in the blood enters the dialysis fluid which is then drained and replaced. In haemodialysis, a semipermeable membrans separates blood from dialysis fluid and poison passes passively from the blood, where it is a present in high concentration into the fluid. It is useful for many poisons like bromides, boric acid, methyl alcohol.

(6) Treatment of general symptoms:-

- a) For increase in body temperature sponge with water.
- b) Morphine sulphate or pethidine relieves pain. Abdominal pains can be relieved by atropine.
- c) To overcome dehydration blood transfusion is advised.
- d) In anaphylaxis, antihistamine and corticosteroids with adrenaline are used.

Question No. 19 Write a short note on: (a) Three methods of estimating demand (b) Prepackaging of drugs (c) Types of outpatient services.

Ans: 19 (a) Estimation of demand:- The producton of sterile and non-sterile pharmaceutical preparations in hospitals depends upon the requirements of the hospitals and is directly related to the further demand. There are three methods to estimate the demand.

1. Judgemental method- This gives the judgement of clinical and pharmacy staff based on their own experience about the quantity that will be required for particular pharmaceutical product during that period.

2. Past history method- Generally we believe that future demands are based on the past demands. The past consumption pattern of a hospital is extended to future by constructing a graph of different time series and extrapolating it.

3. Casual model method- Forecasts depened upon several factors like demand for whole blood is related to number of admissions in the casuality and emergency wards, while as the demand for antibiotic is related to the number of patients with infectious diseases.

Ans: 19 (b) Pre-packaging of drugs- In hospital pharmacy the concept of pre-packing is utilized in both the large and the small hospital to fulfill the demand of for pharmaceutical services. In the smail hospital pharmacist may pre-package only those items which he considers will require more. Large hospitals it is economical to pre-package all ward stock items as well as the often prescribed tablets, capsule, syrups and creams used by both inpatients as well as outpatient clinics. It increases the

efficiency of pharmacy department. Tablets and capsules are pre-packaged in small containers of 12's, 24's, 48's, 100's etc.

Factors determining pack size:- There are no hard and fast rules for determining the pack size of a product. It depends on the local situation and the demand of a particular.

1. How many units to be packed and total number of packages to be prepared?
2. Whether the product is packed by hand or machine?
3. Whether it requires special labeling conditions?
4. What type of containers to be used so as to maintain therapeutic properties of the preparation?

Ans: 19 (c) Out-patient services-

Out-patient refers to patients not occupying beds in a hospital or in clinics, health centers and other places where out-patients usually go for health care. In short form the out-patient department is known as O.P.D. The patients with minor and common illness go to the O.P.D. for consultation to the physician. The prescription written by the physician is brought to the pharmacist for compounding and dispensing. The pharmacist also calculates the price of the filled prescription which are handed over to the patient.

Hospitals generally break down their outpatient load into four categories:

(a) Emergency (b) Referral or tertiary care (c) Primary care (d) Ambulatory

(a) **Emergency-** A person given emergency or accidental care for conditions which require immediate medical attention.

(b) **Referral or tertiary care-** He is referred directly to outpatient department by his attending medical/dental practitioner for specific treatment, other than an emergency treatment.

(c) **Primary care-** Primary care is majority care. It describes a range of services adequate for meeting the great majority of daily personal health needs. This majority includes the need for prevention, health maintenance and for evaluation and management of various symptoms, problems and chronic aspects of disease.

(d) **Ambulatory patient-** An ambulatory patient is able to walk and since outpatients receive primary health care and walk off, they are wrongly called ambulatory patients. However, majority of the outpatients are ambulatory.

Question No. 20: Explain about haematological parameters.

Ans: Haematological parameters-

(a) **Erythrocytes (red blood cells) -** Total RBC count in the blood is expressed as number of cells per mm^3 . The normal R.B.C. count in men (4.5 to 5.5 million/ mm^3), women (3.5 to 5.5 million/ mm^3) and children (4.00 to 5.5 million/ mm^3).

Significance- A relative or absolute increase in the number of circulating R.B.C. leads to polycythaemia and is observed in various pathological condition like chronic heart disease, cholera, burns. A decrease in number of R.B.C. is observed in pregnancy, anaemia etc.

(b) W.B.C- The WBC or total leucocytes count states the number of WBC in a per cumm of whole blood. The normal range is from 4000-11000 cells/mm.

Name of WBC	% count	Absolute count
Basophils	60-70%	2500-7000
Eosinophils	1-45	40-400
Basophils	0-1%	0-100
Monocytes	4-8%	150-800
Lymphocytes	20-30%	1000-3000

(c) Thrombocytes- Thrombocytes are the fractional formed element of blood and are involved in blood clotting after vascular injury. The normal range for thrombocytes count is 1,50,000- 3,00,000 per cumm. **Clotting time of blood -** The normal time of clotting time range from 4 to 10 min.

Significance:

- 1) Leucocytes (white blood cells) -** An increase in W.B.C. indicates an infection like bacterial infection, fever, tonsillitis, diphtheria, cold etc. Physiological leucocytosis is observed in pregnancy, newborn infants etc. increase shows leukaemia.
- 2) Basophils-** An increase in basophils number is indicated in various pathological conditions like mumps, chicken pox, tuberculosis, breast cancer.
- 3) Eosinophils-** Increase in eosinophils is indicative of allergic disorders, skin diseases, cholera, tumours of ovary and uterus etc. Decrease in eosinophils found in stress, cushing disease and in acute infections.
- 4) Monocytes-** These are phagocytic cells. A marked increase in monocytes is found in tuberculosis, malaria and various bacterial infections.
- 5) Lymphocytes-** Lymphocyte (increase in lymphocytes) observed in children with viral infection whooping cough & in others pathological conditions are syphilis, breast cancer. Decrease in lymphocytes is indicative of cardiac failure, stress, AIDS virus etc.
- 6) Neutrophils-** Neutrophilic leucocytosis (an increase in neutrophil) is seen in rheumatic fever, gout, myocardial infarction, gout, gangrene etc. Neutropenia (decrease in neutrophils) is seen in malaria, dengue, typhoid etc.
- 7) Thrombocytes-** Platelets are very small bodies (3 μ diameter). They play a vital role in blood coagulation.

Increase in number of thrombocytes is observed in various condition like iron deficiency anaemia, actue haemorrhage etc. Decrease in number of thrommbocytes in spleen enlargement, gaucher's disease etc.

8) **Haemoglobin-** Haemoglobin gives the idea of oxygen carrying capacity of red blood cells. Anaemia is the condition where the haemoglobin percentage is low.

9) **E.S.R. or erythrocyte sedimentation rate-** In these erythrocytes is allowed to settle in whole blood under the force of gravity over a period of time. The speed of their fall is called sedimentation rate and is measured in mm/1 hr. E.S.R. are very useful for detection of tissue damage in various conditions like myocardial infarction, angina pectoris. An increase in E.S.R. is observed in myocardial infraction, cancer, anemia, menstruation. A decrease in E.S.R. is indicative of sickle cell anaemia, polycythaemia vera etc.

Question No. 21 Write a short note on organophosphorous poisons

Ans: Organophosphorous poision- A compound containing phosphorous bound to an organic molecule is called organophosphorus compound. Some are used insecticide & other nerve gases, they are highly toxic & these block the action of acetylcholine.

Organophosphorus compounds are degradable organic compound containing carbon- phosphorus bond used primarily in pest control as an alternative to chlorinated hydrocarbons that persist in the environment. Types of organophosphours compound are

1) **Alkyl phosphate:-** (a) Hexaethyl tetraphosphate (b) Tetraethyl pyrophosphate (c) Octamethyl pyrophospharamide

2) **Aryl phosphates-** (a) Parathion (b) Diazinon

Symptoms of organophosphate poisoning- Headache, diarrhea, malaise, giddiness, profuse sweating, nausea, vomiting, abdominal cramps

Antidote- Anticholinergic, i.e., atropine to block the cholinergic reactions.

Treatment:-

1. **Decontamination-** The patients must be removed from the source of poison by washing the external surface and by inducing vomiting to remove ingested poison.

2. **Respiration therapy-** Artificial respiration is necessary in some cases. Sometime suction is applied to cause hyperventilation.

3. **Antidote Therapy-** Atropine can antagonize the peripheral action of organophosphours compounds, is administered at dose of 2mg for every 15-30 mintues I.M or I.V or may be higher as per need of the patient. Another antidote is PAM- pyridine-2-aldoxine methiodine in dose of 1gm I.V or by infusion in saline, repeated after half an hour is necessary. These are useful to prevent nicotinic symptoms.

4. **Administration of choline esterase reactivation-** The oxime compounds like paralidoxine chloride and pyridine aldoxy methiodate are given.