1.**Define the following terms with two examples of each : (any Five)** One mark for definition & 0.5 mark for each example. In case, examples are not expected or not available, full 2 marks for definition.

a) **Cumulation**: Accumulation of the drug in the body following its repeated administration is termed as cumulation & it is usually seen with the drugs or chemicals which are excreted slowly. Cumulation may lead to drug toxicity or desired therapeutic effect. e.g Heavy metals like lead, Arsenic,Merury or anti-malarial like chloroquine can lead to cumulative toxicity Phenobarbitone cumulation leads to desired therapeutic effect

b) **Time synergism** :Synergism is the phenomenon where interaction between two or more drugs produces an effect greater than the sum of their individual effects. When synergism results in prolongation of action of one of the drugs, then it is termed as time synergism.

E.g Procaine & Adrenaline

Trimethoprim & Sulpha drugs

c) Bioavailability: It is the amount of drug which actually reaches systemic circulation or site of action from a given dosage form after its administration. This amount of the drug is responsible for its therapeutic effect. Depending on the dosage forms, bioavailability differs . E.g after Intravenous route bioavailability is 100%

d) **Pharmacokinetics**: It is the study of movement or passage of drug across the body. It is what body does to the drug. It includes study of Absorption, Distribution, Metabolism & Excretion (ADME) of drug.

e) Emetics: These are the pharmacological agents which induce vomiting by acting centrally or peripherally.E.g Copper sulphate, Ipecac Syrup, Concentrated Salt Solution, Apomorphine,Morphine,Mustard

f) Vermifuge: These are the pharmacological agents which cause paralysis of intestinal parasitic worms/heliminths & expel them out in the faeces.

E.G Piperazine,tetramisol, pyrantel pamoate

g) Antibiotics: These are the chemical substances produced by microorganisms having the property of inhibiting the growth of, or destroying other microorganisms in high dilution. E.g Penicillins,(Penicillin G,Amoxicillin etc) cephalosporins(cefadroxil, cefalor et), aminoglyoside antibiotics(Streptomyin,Kanamycin etc) Erythromyin,Azitromycin etc

Q 2.Attempt any Four of the following: 3 & half marks each

a) What is drug tolerance ?(1 mark) Describe its type with example.(2.5 marks)

ANS: Drug Tolerance- On repeated administration of some drugs, they may prove ineffective in usual therapeutic dose.

Types of tolerance:- a) Natural or Congential:-It is by birth.

1)species tolerance:- eg. Belladona alkaloid like atropine is toxic to human being when given in high dose but rabbits can tolerate high amount of atropine because they have enzyme known as atropine esterase which metabolises high amount of atropine very rapidly hence no toxicity is seen.

2)Racial Tolerance:- eg. After administration of drug Ephedrine ,Mydriasis is not produced in Negros because they are tolerant to drug ephedrine and related amines.

b) Acquired tolerance:- Repeated administration of some drugs leads to acquired tolerance.

1) Tissue Tolerance: In case of tissue tolerance ,tolerance is developed to certain effects of the drugs.e.g Morphine is able to produce its euphoria effect but the pupil & gastrointestinal tract effects never develop tolerance.

2)Cross tolerance: this phenomena when tolerance is developed to a drug belonging to particular group then there could be tolerance to all other drugs in the same group. Eg. when tolerance is developed to alcohol, patient may develop tolerance for use of general anesthetic and other CNS depressants.

3) Pseudo tolerance: Observed only in oral route. When small dose of poison is taken repeatedly, tolerance to it is developed by the gastrointestinal tract. But if other route is chosen, poisoning will occur.

4) Tachyphylaxis: It is also known as acute tolerance, observed with certain drugs such as Ephedrine when administered repeatedly at very short intervals & the pharmacological response to that drug decreases

b) Describe plasma protein binding of drugs (1.5 marks) & mention its significance(2 marks):

This is the phenomenon seen when the drug gets distributed in the blood plasma. Some drugs have affinity to get bound to plasma proteins depending upon their physicochemical properties. So drugs may exist as Free drug (i.e Unbound) & bound Drugs. Some drugs are highly protein bound :e.g Sulpha drugs, Aspirin, warfarin,diazepam etc

Significance:

1) Increase in duration of action of drugs: Plasma protein binding is reversible & the bound drug cannot escape the blood capillary and hence it would not be available for further distribution or metabolism and excretion. Only the free unbound drug diffuses out of the blood capillary and is available for further distribution and thus its concentration in blood would continuously decrease to maintain dynamic equilibrium between free and bound drug there would be release of drug from protein bound fraction. Hence highly protein bound drug would have longer duration of action and its dose & dosing frequency should be decided accordingly

2. Possibility of drug interactions: can occur when 2 or more drugs having high protein binding affinity for the same plasma protein are given simultaneously. This may result in displacement of one drug by the other & may result in toxicity.

(c)What is Mysthenia Gravis ?(2 marks) Suggest 3 drugs used in Mysthenia Gravis with dose.(1.5 marks)

Myasthenia Gravis is a progressive weakness of the skeletal muscles. It is an autoimmune disorder &there is decrease in cholinergic activity at the neuromuscular junction in the skeletal muscles.

Symptoms: eye weakness, difficulty in facial expressions,, and difficulty swallowing Overall muscle weakness

Drugs used: Anticholinesterases such as

Neostigmine,dose: Oral route: 60 to 120 mg

Pyridostigine,dose:Oral Route:60 mg

Ambenonium chloriode: Oral Route: 5 to 25mg

d) Give advantages (1.5 marks) and disadvantages(2 marks) of oral route of administration?

Ans: This is the most commonly used route of administration.

Advantages

1.it is simple and most convenient.

2.self medication is possible

3.it is cheaper

4. no complications

Disadvantages

1.slow onset of action

2.100% absorption is not possible &bioavailability is variable & get affected by presence of food, other drugs

3.the irritant and unpalatable drugs can't be given.

4. in case of severe vomiting or in unconsciousness , uncooperative patient ,oral route can't be used.

5. Few drugs which cannot be absorbed from GIT cant be given by this route.

6.Drugs which get degraded in GIT can't be given .e.g Insulin

e) How the following factors modify action of drugs?

i)Age: (1 mark)The drug response changes significantly in infants & in old age. This is due to less developed metabolic &excretory systems in infants & less functioning systems in the old people.

ii)Time of Administration.(1 mark) The time when a drug is administered can affect drug action, especially in case of orally administered drugs. Some orally administered medications should be taken before meals (that is, on an empty stomach) to increase the amount of drug absorbed into the system. Some oral medications should be taken after meals on a full stomach.

iii) Drug Combination (1.5 mark) Combination of drugs can increase or decrease the drug action. e.g Tetracycline given with antacids or calcium will reduce action of tetracylines

Many Anti-biotics & anti-TB drugs are given in combination for synergistic effect to achieve better therapeutic action.

f) Classify Antihypertensive drugs with examples.(3.5 marks)

Antihypertensive are the drugs used in treatment of hypertension to reduce the level of elevated blood pressure. They are classified as according to site of action:

1) Drugs acting centrally : clonidine, methyl DOPA
2) Drugs acting on adrenergic nervous system:

a) Drugs which are beta blockers: Propranalol,metoprolol

b) Drugs acting on alpha blockers: Phenoxybenzamine,Prazocin

c) Adrenergic blocking neuron blockers: e.g Guanethedine

d) Catecholamine depletors: E.g Reserpine

3) Drugs acting directly on vascular smooth muscles: Vasodilators such as Hydralazine,Diazoxide,Minoxidil

4) Drugs acting reflexly by stimulating baroreceptors: Veratrum

5) Drugs which block rennin angiotensin aldosterone axis

e.g Enalapril,losartan,captopril

6) Oral diuretics: e.g Frusemide,Hydrohlorothiazide

7) Miscellaneous: E.g MAO Inhibitors e.g Pargylin

Q3 Attempt any four of following.

(a) Name drug contraindicated in(0.5 marks each)

i)Pregnancy: Tetracycline, chloramphenicol

ii)Renal failure: Sulfonamides

iii) Insomnia: caffine , Theophylline

iv) Hyperthyroidism: Adrenaline

v) Prostate enlargement: adrenergic drugs

vi) Odema: estradiol ,NSAIDs, All steroids

vii) Head injury: Morphine.

(b) Name the drug producing following effects: (0.5 marks each)

(i) Cinchonism- Quinine

(ii) Alopecia- Anticancer drugs, Heparin

(iii) Ototoxicity- streptomycin, Kanamycin

(iv) Euphoria- morphine, Meprobamate

(v) anorexia- Amphetamine, Metronidazole

(vi) Pin point pupil- Morphine

(vii) Drowsiness- Acetazolamide, spirinolactone

c) State two drugs for each condition: (1+1+1.5 marks)

(i) Miosis- Physostigmine,neostigmine,pyridostigmine

(II)Antigout- Diclofenac,piroxicam,colchicin, probenecid, corticosteroids.

(iii) Peptic ulcer- Aluminium hydroxide, magnesium trisilicate and other antacids.

(d) Mention antidote in case of poisoning due to.(0.5 marks each)

(i)Organo phosphorus compound- Atropine sulphate inj ,pralidoxime, diacetylmonooxime

(ii) Morphine- Naloxone / Nalorphine

(iii)Atropine- Physostigmine
(iv) Barbiturate- No specific antidote(sodium bicarbonate is administered which will increase urinary excretion of drug)
(v)Mercury- BAL
(vi)Arsenic- BAL
(vii) Salicylism- No specific antidote. (sodium bicarbonate is administered which will increase urinary excretion of drug)

(e)Give the drug of choice of following: (0.5 marks each)

(i)Syphilis-Penicillin

(ii) Atherosclerosis- Atorvastatin (All statins & other hypolipidemics)

(iii) Angina pectoris- Glyceryltrinitrate

(iv) Pyrexia- Paracetamol, aspirin.

(v) Typhoid- Chloramphenicol

(vi) Grandmal epilepsy- Phenytoin, carbamazepine.

(vii)Obesity- Amphetamine

(f) What are Preanesthetic Medication(1 mark)?Give their suitable example and its use(2.5marks).

It refers to use of drugs before anesthesia to make it more pleasant and safe. They are administered before, during and after the administration of anaesthetic agents for variety of reasons i.e. relief of pain, to reduce excitement etc.

The aims are:

1) RELIEF OF ANXIETY AND TO FACILITATE SMOOTH INDUCTION:

   Example: Diazepam or chlorpromazine.

2) To relieve pre and post-operative pain:

   Example: Morphine and pethidine

3) To counteract some of the adverse effects of anaesthetic agent:

   Example: Atropine or hyoscine (anticholinergic) reduces body secretions.

   Antiemetic effect extending to the postoperative period: Example: Promethazine.

Q4 attempt any FOUR of the following:

(a)Describe pharmacological profile of Oral contraceptives.(0.5+1.5+1+0.5 marks)

These are the pharmacological agents which are used orally to prevent conception. They contain estrogen/ progesterone either alone or in combination.

Mode of action:

They decrease the secretion of gonadotropin releasing factor by hypothalamus and the release by the pituitary of both LH and FSH and thus ovulation stops. Endometrium finally become thin, hypoplastic and unsuitable for implementation.

Progesterone affects the cervical mucus to become thick, tough and impermeable by spermatozoa.

Adverse effects:

Nausea,vomiting, headache, breast discomfort. Weight gain , acne, increased body hairsetc.

Contraindications:

Coronary and cerebro-vascular disease, active liver disease,porphyria etc.

(b)Define general anaesthetics(1 mark). Explain stages of anaesthesia(2.5 marks)

Defination: General anaesthetics are the agents used to produce reversible loss of consciousness and sensation.

Stages of anaesthesia:

STAGE 1- Stage of analgesia --- This stage is characterized by loss of consciousness, gradual depression of cortical centers. Minor surgical operations and dental extractions are performed in stage

STAGE 2-Stage of delirium --- This stage is characterized by excitement thus no surgical procedures are performed in this stage.

STAGE3- stage of surgical anaesthesia -- This stage is further divided in four different planes showing different degree of anaesthetic effects they are namely Plane-I, Plane-II, Plane-III and Plane-IV . The surgical procedures are performed in this stage.

STAGE 4- stage of respiratory paralysis--- Upon excessive administration of anaesthetic patient may reach in this stage, but is never attempted.

(c) **Classify anticancer drugs with suitable examples(2.5 Marks**)

(i)ALKYLATING AGENTS: (a) Nitrogen mustards: Mechlorethamine,

cyclophosphamide, Uracil Mustard, chlorambucil.

(b)Ehylinimine: TEM, Thio TEPA.

(c) Alkyl sulfonates: Busulfan

(ii) ANTIMETABOLITES: (A) Folic Acid antagonists- Methotrexate.

(b) Purine antagonist- 6 mercaptopurine, Azathioprine.

(c) Pyrimidine antagonists- Fluorouracil, cytosine arabinoside

(iii)RADIOACTIVE ISOTOPES- Radioiodine, radiophosphorus.

(iv) ANTIBIOTICS- Actinomycin-D,Mitomycin

(v) HORMONES- Androgens, estrogen,prostaglandin.

(vi) ENZYMES- L-asparginase

(vii) MISCELLANEOUS AGENTS (A) Vinca alkaloids- Vincristin, vinblastine

(b) others- Cis plastin, hydroxurea.

(d) Explain the cardiac actions of Quinidine.(0.5 Marks each)

Quinidine is used as antiarrythmic drug

1) automaticity- Quinidine depresses the entry of Na+ in cell and decreases the diastolic depolarization and thus decreases the automaticity.

2)Excitability- it decreases the excitability

3) Refractory period- It decreases the K+ efflux. Prolongs Refractory period in atria and decreases the Refractory period in ASV node,

4) conduction velocity- It slows down the rate of rise in action potential and thus decreases the Conduction velocity of all cardiac tissue.

5) AV conduction- It decreases the conduction in atria and in His purkinje system and enhances conduction in AV node.

6) Contractility- It shows negative ionotropic effect on heart by decreasing entry of Ca++ into cardiac muscle cells.

7) B.P. - In normal subject upon IV and oral administration there is fall in B.P

(e) Define Sympatholytics(1 mark). Classify with suitable example(1 mark). Discuss beta adrenergic blockers(1.5 marks).

Defination: These are the agents which produce sympathetic blocking and antagonize the action of adrenaline and noradrenaline.

Classification:

1) Catecholamine depleters- Reserpine
2) Drug which interfere with synthesis of adrenergic transmitters- methyl dopa
3) Drugs which interferes with transmission of impulses across post ganglionic neuron-guanethidine
4) Alpha and beta blockers-Tolazoline and sotolol

Beta blockers-they block actions of catecholamine They are classified as follows:

I. Specific beta blockers- sotolol, timolol.
II. Beta blockers with memberane stabilizing activity and intrinsic symathomimetic activity-Dichloroisopernalin(DCI)
III. Beta blockers with memberane stabilizing activity: Propranalol
IV. Beta blockers with additional alpha blocking activity: labetolol.

Adverse effects: Propranalol may cause sudden hypotension and cardiac asystole. In patients with asthama may cause bronchospasm.

Therapeutic uses:

In treatment of Angina pectoris, cardiac arrhythmia, Hypertension, Pheochromocytoma.

(f) Define bronchial asthma(1.5 marks). Mention the drugs used in asthma (2 marks).

Defination: It is a clinical syndrome characterized by paroxysmal dyspnoea and wheeze due to increased airway resistance in narrowed bronchi.

Drugs used in asthma:

Adrenaline, Isoprenaline,orciprenaline, salbutamol, Aminophylline, theophyline, steroids etc.

Q5. Attempt any four of the following. (3.5 marks each)

a) Give mechanism of action (1.5 marks) and therapeutic uses of chlorpromazine (2 marks).

Mechanism of action- Chlorpromazine acts on a variety of receptors in the CNS. It is a dopamine antagonist of the typical antipsychotic class of medications possessing additional anticholinergic and antihistaminic properties.

Therapeutic uses- i) As antipsychotic agent- It is used in the treatment of psychomotor agitation associated with various types of acute and chronic psychosis such as schizophrenia, mania etc. It removes many schizophrenic symptoms such as hallucination, delusion etc.

ii) As antiemetic- It is used to control nausea and vomiting induced by certain drugs and motion sickness.

iii) As pre-anesthetic medication.

iv) Has antihistaminic action

b) Define haematinics (1.5 mark) and classify them with suitable examples (2 marks).

Haematinics are the pharmacological agents which raise the no. of RBCs and the amount of Hb to normal level when it is below normal,used in treatment of anemia.

Classification-There is no specific classification.Various hamatinics used clinically are as follows:

i) Vitamins-

- Vitamin B 12
- Folic acid

ii) Iron-

- Oral iron preparations-

ferrous sulphate tablets IP

Ferrous fumarate tablets IP

Ferrous gluconate tablets IP

- Parenteral preparations-

Iron dextran injection

Iron sorbitol injection

Saccharated iron oxide

Colloidal ferric hydroxide

c) Write mechanism of action(2 marks) and adverse effects of Penicillin(1.5 marks).

Mechanism of action- Penicillin is bactericidal, it interferes with the synthesis of cell wall, mucopeptide of gram positive cocci. This makes the cell membrane of micro organisms susceptible to damage by solutes in surrounding medium, ie plasma.

Adverse effects –

i) Anaphylaxis- rare but serious reaction. It can develop with minute quantity of penicillin. It is characterized by cardiovascular collapse, bronchospasm.

ii) Serum sickness- with skin rash, fever, eosinophilia, asthama

iii) Renal complications- like haematuria, albuminaria

iv) Hyperkalemia

v) Intolerance which includes idiosyncrasy and allergic conditions

d) Define Autocoids. (2 marks) Classify antihistaminic drugs with example. (1.5 marks)

Autocoids are local hormones with high biological activity and naturally found in body as active or inactive forms.

Classification of antihistaminics-

H1 receptor antagonist- Eg- diphenhydramine, chlorpheniramine, mepyramine

H2 receptor antagonist- Eg- ranitidine, cimetidine

e) Which type of anti-diabetic drugs can be taken orally? (1.5 marks) Explain its advantages. (2marks)

Oral hypoglycemics are the pharmacological agents when administered orally decrease blood glucose level. The following anti diabetic drugs can be taken orally- sulphonyl urea derivatives and biguanides.

The advantages of oral anti-diabetics are-

i) These are safe

ii) Convenient

iii) Economical

iv) Easy self medication

v) Lipomata and fat atrophy can be avoided which causes erratic insulin absorption.

vi) Hypersensitivity due to insulin can be avoided

vii) Occasional resistance to insulin due to antagonizing antibodies can be avoided.

f) Give dose, route of administration and major adverse effect of

(i) Chloramphenicol- (1 mark)

Dose- 1.5- 3g daily in divided doses

Route of administration- oral, local as ophthalmic ointment

Major adverse effects- bone marrow depression causing aplastic anaemia, thrombocytopenia, neutropenia. Skin rash, drug fever, exfoliative dermatitis. Gray baby syndrome.

(ii) Tetracycline (1mark)

Dose- 1-2 g daily in 4 divided doses

Route of administration- Oral

Major adverse effects- anaphylaxis, acute hepatic dysfunction, skin rash, dermatitis, fever, retardation of bone growth and tooth discolouration.

(iii) Dapsone (1.5 marks)

Dose- 1st week – 100 mg daily

Next 4 weeks- 25 mg twice a week

5th and 6th week- 50 mg twice a week. Thereafter 100 mg thrice a week.

7th and 8th week- 100 mg twice a week. Thereafter 100 mg thrice a week.

0.2 ml of 20% w/v suspension of Dapsone in arachis oil

Route of administration- oral, IM injection.

Major adverse effect- agranulocytosis, sulphone allergy, severe haemolytic anaemia, nephritic syndrome, toxic hepatitis.

Q6. Give reasons for the following statements (any seven): (2 marks each)

a) Morphine is contraindicated in head injury.

If morphine is administered in head injury, it further increases the intracranial pressure.

This masks the useful diagnostic and prognostic signs making management of the patient difficult.

The effect of morphine such as respiratory depression, miosis and mental clouding also interferes with the diagnosis.

Hence, morphine is contraindicated in head injury.

b) Adrenaline is always present in the emergency kit of physician.

Adrenaline is a life saving drug. It is the drug of choice in following clinical conditions:

i) Anaphylactic shock- Adrenaline acts as competitive antagonist of histamine. Anaphylactic shock is due to release of histamine which causes bronchospasm.

ii) Cardiac shock- As it is positive inotropic and positive chronotropic agent, it increases B.P.

iii) Asthama- The bronchodilator action of Adrenaline relieves the asthama due to bronchospasm.

iv) Haemostatic- The peripheral vasoconstrictor property of adrenaline is used to stop nasal and dental bleeding by using nasal or dental packs soaked in adrenaline solution.

v) With local anaesthetic- Adrenaline is frequently administered alongwith local anaesthetic to prolong the duration of anaesthesia.

vi) So, adrenaline is always present in the emergency kit of physician.

c) Why sulfa drugs are inactive in pus?

PABA(p- amino benzoic acid) is required for synthesis of folic acid.

Due to structural similarity of sulfa drugs, it is a competitive inhibitor of PABA.

Since pus contains large amount of PABA, sulfonamides are ineffective in therapeutic doses.

If larger doses of sulfa drugs are used to compete with PABA, it results in renal complications such as crystaluria, haematuria and renal damage.

To avoid these renal complications, sulfa drugs are not used in large doses. Hence they are inactive in pus.

d) Salicylate therapy is always supported with vitamin K.

Salicylate therapy can cause GI bleeding resulting in haematemesis and anaemia.

Salicylates in large doses reduce the plasma prothrombin level causing hypoprothrombinaemia.

At low dose , the disturbance in blood clotting is due to interference with prostaglandin synthesis.

Hypoprothrombinaemia and haemorrhagic complications can be prevented or treated with simultaneous administration of vit K.

Hence salicylate therapy is always supported with vit K.

e) **Chloramphenicol should not be given to premature babies**.

In premature babies, the metabolic & excretory systes arenot fully developed & hence the body can not metabolize & excrete the chloramphenicol.

It causes circulatory collapse in infants due to cumulative effect.

The body becomes gray in colour called as gray baby syndrome.

So chloramphenicol should not be given to premature babies.

f) **Eating of cheese is forbidden while on MAO inhibitor therapy**.

Cheese contains tyramine which is metabolized in the liver by the enzyme monoamino oxidase.

If an individual is on MAO inhibitor therapy, then MAO inhibitors inhibit the detoxification or metabolism of tyramine.

Thus, tyramine gets accumulated in the body.

This tyramine causes release of noradrenaline from its binding sites.

Increased level of noradrenaline causes hypertensive crisis.

Therefore, eating of cheese is forbidden while on MAO inhibitor therapy.

g) **Antihypertensives are given along with diuretics**.

One of the cause of hypertension is presence of excess plasma sodium and calcium level.

To eliminate these in the form of salts, diuretics are used.

Diuretics inhibit reabsorption of sodium and its equivalent osmotic amount of water.

This causes decrease in plasma fluid which decreases BP.

Diuretics also cause vasodilation and decreases BP.

Therefore, antihypertensives are given with diuretics.

h) **Iron plays an important role as haematinic**.

A decrease in oxygen carrying capacity of blood is called anaemia. The oxygen carrying capacity of blood depends on Hb content of RBCs.

Aneamia occurs due to various reasons like deficiency of dietary factors responsible for blood formation eg- iron, folic acid, vit B12 etc.

Haematinics are the drugs which raise the no. of RBCs.Iron is required for the formation of heam part of Hb

In hypochromic and microcytic anaemia, treatment with iron is specific. Iron is used for the treatment of dimorphic anaemia along with other vit.

Since iron is an essential factor for normal haemopoiesis, ie formation of Hb, it plays an important role as haematinic.

i) **Anthelmintics are administered with purgatives**.

Anthelmintics are either wormicidal or wormifugal in action.

Thus after killing or paralyzing these worms by anthelmintic agent, these should be expelled out from the intestine.

Hence purgatives are advised as supportive treatment with anthelmintics.

Thus combination acts synergistically.