SUMMER-16 EXAMINATION

Subject Code: **0813** **Model Answer** Page No: 1/ 23

Important Instructions to examiners:

1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills.
4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any
equivalent figure drawn.
5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
7) For programming language papers, credit may be given to any other program based on equivalent concept.

1. **Define the following terms with two suitable examples of each (any FIVE) 10**
   Definition 1 Mark and 2 examples 1 Mark

a)Synergism:

Synergism is the phenomenon where interaction between two or more drugs produces an effect greater than the sum of their individual effects.

Eg: Codeine & aspirin as analgesics, Aminophylline & mersalyl as diuretics, Sulphamethoxazole & trimethoprim as antibacterials, Reserpine & hydrochlorthiazide as antihypertensives or antiTB combinations

b) Hypolipidaemic drugs

These are the agents that help in lowering increased lipid levels.

Examples: statins (atorvastatin, pravastatin, lovastatin), fibrates(clofibrate, ciprofibrate), cholestyramine, niacin

c) Haematinics : Are the agents which raise the number of RBCs & the amount of haemoglobin to normal level when they are below normal.

Examples: Iron, Folic acid, Vit $_{B12.}$

d) Anti- epilepticus

These are a diverse group of pharmacological agents used in the treatment of epileptic seizures.

Examples: Phenytoin, Methoin, Valproate, Diazepam, Ethosuximide, Lamotrigine

e) Antiemetics:

These are the agents used in treatment of vomiting.

Eg: Phenothiazine derivative(Chlorpromazine), Hyoscine, Meclizine, Promethazine, Domperidone, Ondansetron

f) 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.

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, cefaclor et), aminoglyoside antibiotics(Streptomyin,Kanamycin etc) Erythromyin,Azitromycin etc

h) Mydriatics

Mydriatics are agents that induce dilation of the pupil.

Examples: Atropine, Homatropine, Adrenaline, Ephedrine

2. Attempt any FOUR of the following **14**

a) Classify routes of administration of Drugs. What are the Advantages of IV route? (2+1.5)

Routes of administration;

- Enteral
- Parenteral
- Local applications

Enteral - drug placed directly in the GI tract:

sublingual - placed under the tongue

oral - swallowing

rectum - Absorption through the rectum (enema)

Parenteral: Injections & Inhalations

Injections: Intravascular, Intramuscular ,Intradermal, Subcutaneous ,

Intrathecal , Intraperitoneal , Intramedullary , Intraarticular

Inhalation -

Local Applications

Or tabular format

Enteral			**Parenteral**		**Local applications**
Oral	Sublingual	Enema	Injections	Inhalations	
		Retention Evacuant	Intravenous		
			Intraarterial		
			Intramuscular		
			Subcutaneous		
			Intraperitoneal		
			Intrathecal		
			Intramedulllary		
			Intraarticular		

Advantages of IV: (any three points)

- Useful for Unconscious or uncooperative patients
- Useful in case of Vomiting, diarrhoea
- No irritation of stomach
- Provides rapid onset of action
- Useful in case of Emergencies (life saving route)
- Accuracy of dosage is achieved.

b)List & explain the channels of drug excretion (List 1+2.5 for Explanation)

Channels of drug excretion

I)Kidneys II)Lungs III) Intestines

IV)Skin V)Saliva & milk VI) Bile

Kidneys:

Most of the drugs excreted in urine

Weak acids quickly excreted in alkaline urine & vice versa.

Lungs:

- Excretion of gaseous inhalants.
- Volatile general anesthetics, alcohol, paraldehyde.
- Easily detected by breath smell

Intestines:

- Purgatives like senna are partly excreted in intestine
- Heavy metals also through faeces.

Skin:

- Metalloids like arsenic, lead

Saliva & milk:

- Antibiotics, sulphonamides, morphine excreted in milk..

Bile:

Erythromycin, novobiocin eliminated in bile & reabsorbed in intestine. So prolong action.

C) What is the importance of pre- anaesthetic medication? Explain with suitable examples.

Preanaesthetics importance 2 marks (any 4 points), 1.5 marks (any 3 categories with examples)

Importance

- → To induce sedation
- → To reduce anxiety& apprehension without producing much drowsiness
- → For smooth induction and recovery
- → To make anesthesia safer and agreeable to the patient
- → To obtain an additive or synergistic effect.
- → To relieve pre & post operative pain.
- → To suppress respiratory secretions & to reduce reflex excitability.

Explanation

- Narcotic analgesics Like Morphine, Pethidine depress CNS & also produce analgesia.
- Anticholinergic agents like Atropine , Hyoscine reduce body secretions
- Antihistaminic like Promethazine for antiemetic action
- Tranquilizers like Diazepam to reduce anxiety.

d) Define and classify Antihypertensives.

Defn 1 mark, Classification 1.5 marks, Examples 1 mark (any 6 correctly written categories)

Antihypertensive drugs are the agents used in treatment of hypertension or abnormal elevation in blood pressure.

Classification (According to site of action):

1. Centrally acting Drugs: Clonidine, Methyl Dopa
2. Drugs acting on autonomic ganglia: Hexamethonium
3. Drugs acting on post ganglionic sympathetic nerve endings
   a) Adrenergic neuron blockers; Guanethidine
   b) Catecholamine depletors: Reserpine
4. Drugs acting on adrenergic receptors:
   a)Alpha adrenergic blockers: Phentolamine
   b) Beta adrenergic blockers: Propranolol
5. Vasodilaors: Hydralazine
6. Drugs acting reflexly by stimulating baroreceptors: Veratrum
7. Oral Diuretics: Thazides, Frusemide, spironolactone, amiloride etc
8. Calcium Channel Blockers: Nifedipine, Amlodipine, Felodipine
9. Drugs acting on rennin angiotensin system:
   a) ACE inhibitors: Enalapril, ramipril
   b) Angiotensin Receptor Blockers: Losartan, Telmisartan
10. Miscellaneous: MAO inhibitors (Pargyline)

e) What are hypoglycemics? Give the Differences between sulphonyl urea derivatives & biguanides (1 M for definition and 2.5 M for any 5 differences)

Oral hypoglycemics are the agents used in treatment of diabetes mellitus. These drugs can be taken by oral route & help in lowering elevated blood sugar level.

Both these derivatives are used as oral hypoglycemic agents.

1. Sulphonyl ureas stimulate beta cells of islets of langerhans in pancreas to secrete insulin.

Biguanides don't stimulate beta cells, they act on liver

2. Sulphonyl ureas are effective in patients who have residual insulin.

Biguanides are effective in absence of functioning pancreatic beta cells or residual insulin

3. Sulphonyl ureas don't accelerate peripheral utilization of glucose.

Biguanides inhibit glucose absorption & accelerate peripheral utilization of glucose & inhibit gluconeogenesis

4. Sulphonyl ureas may stimulate appétite. Biguanides are anorexiants

5.Sulfonylureas can cause hypoglycemia as side effect. Biguanides don't cause such side effect

6.Sulphonylureas Eg: Tolbutamide, Chlorpropamide, Glibenclamide

Biguanides Egs; Phenformin, Metformin.

Combination of biguanides & sulphonyl ureas can be used.

f) What are the symptoms and treatment of organphosphorus poisoining.

b) Organophosphorous compound poisoning:

Symptoms 1.5 mark, Treatment 2 marks

Symptoms:

nausea, vomiting, diarrhoea, anorexia on ingestion

miosis, bronchospasm , tightness in chest

Death due to respiratory failure.

Treatment:

Rapid treatment is necessary to prevent fatal effect.

Patient needs to be hospitalized ideally in I.C.U.

Gastic lavage, Endotracheal intubation for proper respiration to be done

Atropine sulphate injection by I.V.

Injection of Pralidoxime (cholinesterase regenerator) by I.V.

Intravenous fluids to restore volume

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Q.3 Attempt any four of the following.(3.5 M each)

a) Define & classify anticancer drugs.(Defn: 0.5M, Classification with examples:3M)

Definition : Anti-cancer drugs are the agents which are used in treatment of cancer.

Classification with examples:

I. Alkylating agents:

- Nitrogen mustards:E.g.: Chlorambucil, Mechlorethamine , Chlorambucil
- Ethylenimines:E.g.: Triethylenemelamine, Triethylene thiophosphamide
- Alkylsulphones:E.g. : Busulphan

II. Antimetabolites:

- Folic acid antagonists:E.g.: Methotrexate
- Purine Antagonist:E.g.: 6-mercaptopurine
- Pyrimidine Antagonist:E.g.: 5-Flurouracil, Cytosine

III. Radioactive Isotopes: E.g.: Radioiodine, Radiophosphorous

IV. Antibiotics: E.g.: Actinomycin-D, Mitomycin

V. Hormones: E.g.: Androgens, Estrogens, Corticosteroids

VI. Enzymes:E.g.: L-asparaginase

VII. Miscellaneous Agents:

Vinca alkaloids: E.g.: Vincristine, Vinblastin

Others:E.g.: Hydroxyurea, Cis- platin

b) Define tranquilizers. Why is chlorpromazine known as largactil?

(Defn: 1 M, Reasoning:2.5M)

Tranquilizer is a drug taken to reduce tension or anxiety or a drug used to reduce mental disturbance or the drugs used in Schizophrenia.

Chlorpromazine is the major tranquilizer possessing large no. of pharmacological actions. Hence called as largactil.

In patients with major psychosis it produces psychomotor slowing, emotional quieting and diminishes initiative and anxiety.

It acts as Antihistaminic,

It depresses the CTZ and acts as antiemetic.

It is anti hiccup agent

Anti-cholinergic actions include dryness of mouth, reduced blood pressure, constipation etc

It may produce weight gain and pseudo pregnancy (lactation) condition.

c) Differentiate between Tolerance & Tachyphylaxis.

Tolerance	**Tachyphylaxis**
1. It's the phenomenon of reduced response to normal therapeutic dose on repeated administration for prolong time of some drug	1. It's a phenomenon of reduced response to normal therapeutic dose on repeated administration at short interval of time. Also called as Acute Tolerance
2. Progressive increase in dose is required to produce same therapeutic effect	2. Even on increasing dose no therapeutic effect is shown
3. Dose dependent	3. Non Dose dependent
4. Receptor gives less response to the drug	4. Neurotransmitter depletion is involved
5. **Examples:** Heroin, Morphine	5. **Examples:** Ephedrine

d) What is bronchial asthma? Write the treatment for status asthmaticus.(defn:1 M;treatment:2.5 M)

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

Or

It is a condition of bronchoconstriction leading to difficulty in breathing

Treatment for status asthmaticus

It is a medical emergency and prompt hospitalization is essential in case of status asthmaticus .

1. Bronchodilators like Adrenaline or aminophylline by parenteral administration
2. Hydrocortisone 100 mg i. v.
3. Oxygen therapy
4. Antibiotic if any infection

e) Explain the mechanism of action of digitalis. What are its adverse effects? (2M+1.5M)

Digitalis directly acts on myocardium & increases conductivity, automaticity, rhythmicity & causes forceful contraction of heart. Digitalis derivatives block Na^+--K^+ ATPase enzymes & improve levels of Na^+ & acts as shown below:

Digitalis blocks Na^+ -- K^+ ATPase enzyme

↓

Increases Na^+ level

↓

Activates sarcoplasmic reticulum, also stimulates Na-Ca exchange

↓

Releases Ca^{++}

↓

Increase intracellular calcium

↓

Combines with cardiac muscles

↓

Causes forceful contraction

↓

Leads to complete emptying of heart ⟶ Thus relieves congestion

It restores myocardial function. Thus heart can do work with less energy expenditure.

Adverse effects: (Any 3 for 1.5 m)

Cardiac toxicity: Cardiac arrhythmia, Ventricular fibrillation

Hypokalemia

Gastrointestinal toxicity: Anorexia,Vomitting

Neurologiacal toxicity: Vertigo,headache,confusion

Miscellaneous: Skin rash, Eosinophilia

f) Write in general about the mechanism of action of diuretics.

Diuretics are among the most commonly used drugs. They act by diminishing sodium reabsorption at different sites in the nephron, thereby increasing urinary sodium and water losses.

Loop diuretics inhibit the sodium-potassium-chloride cotransporter in the thick ascending limb

Thiazide diuretics, which are the most commonly used diuretic, inhibit the sodium-chloride transporter in the distal tubule

Potassium-sparing diuretics. Unlike loop and thiazide diuretics, some of these drugs do not act directly on sodium transport. Some drugs in this class antagonize the actions of aldosterone (**aldosterone receptor antagonists**) at the distal segment of the distal tubule.

Carbonic anhydrase inhibitors inhibit the transport of bicarbonate out of the proximal convoluted tubule into the interstitium, which leads to less sodium reabsorption at this site and therefore greater sodium, bicarbonate and water loss in the urine.

Mechanism in short for different classes can be considered

Q.4 Attempt any four of the following.

a) Name the drug which shows following side effect: (0.5 M for any one example)

i) Headache: Digitalis, NSAIDs, Griseofulvin, BAL, Mannitol, Nitroglycerin

ii) Photophobia: Atropine, Homatropine

iii) Euphoria: Morphine, Heroine, methadone, Codeine, hydrocodone

iv) Methaemoglobinaemia: Aspirin, Paracetamol, Trimethoprim, Dapsone, Benzocaine, Aniline dyes

v) Cumulation: Heavy metals like Arsenic, Mercury, Lead ; Antiepilepics like Phenobarbitone; antimalarials like chloroquine

vi) Teratogenecity: Thalidomide, Cocaine, Alcohol, ACE Inhibitor, Tetracycline

vii) Hypoglycemia: Insulin, Oral hypoglycemic agents(Tolbutamide, Metformin), Alcohol

b) Name two drugs used in following conditions:

i) Insomnia : Diazepam, Benzodiazepins, Barbiturates

ii) Glaucoma: Physostigmine, Pilocarpine

iii) Malaria: Quinine, Chloroquine, Primaquine, Pamaquine, Mepacrine

c) Name the drug of choice for the following conditions: (0.5 M each)

i) Myasthenia gravis: Neostigmine, pyridostigmine

ii) Plague: Streptomycin, Tetracycline

iii) Pheochromocytoma: Phentolamine, Propranolol

iv) Bronchial asthma: Adrenaline , Salbutamol, Orciprenaline

v) Arrythmia: Quinidine, Procainamide

vi) Anaphylaxis: Adrenaline, Diphenhydramine, Antihistaminic

vii) Leprosy: Dapsone, Thiambutasine, Clofazimine

d) Name the drug contraindicated in following conditions:

i) Pregnancy: Tetracycline, Chloramphenicol, Thalidomide, Morphine, Anticancer

ii) Peptic ulcer: Ibuprofen, Aspirin, salicylates, Diclofenac

iii) Head injury: Morphine

e) Give the major side effects of the following:

i) Chloramphenicol: Bone marrow depression, Gray baby syndrome

ii) Streptomycin: Damage to auditory nerve(ototoxicity), Deafness, Intolerance

iii) Quinine: Cinchonism, Tinnitus, Deafness, Black water fever

f) Mention the route of administration & uses of the following:

i) Trinirtroglycerin: Sublingual

In treatment of Angina Pectoris, Raynaud's disease

ii) Insulin: Parenteral, SC, IM, IV

In treatment of Diabetes mellitus

iii) Diclofenac: Oral, local, rectal, parenteral

In treatment of musculoskeletal disorder, rheumatoid arthritis, osteoarthritis, postoperative pain

Q.5 Attempt any four of the following

a) Define Hypnotics. (1m) Classify them.(2.5M)

Hypnotics- These are the drugs that produce sleep that resembles to natural sleep.

Classification-

I) Barbiturates-

a) Long acting barbiturates e.g. Phenobarbitone

b) Intermediate acting barbiturates e.g. Cyclobarbitone

c) Short acting barbiturates e. g. Hexobarbitone

d) Ultra short acting barbiturates e. g. Thiopentone

II) Non barbiturates

a) Benzodiazepine e.g. Diazepam

b) Alcohols e.g. Chloral hydrate

c) Aldehydes e. g. Paraldehyde

d) Miscellaneous e.g. Hysocine

b) What do you mean by "Dales Vasomotor Reversal". (Explanation 2, diagram 1.5 marks**)**

In low doses, Adrenaline causes peripheral vasoconstriction, increase in resistance, output, and thereby rise in peripheral and systolic BP.

In high doses, Adrenaline activates both alpha and beta receptors. It causes peripheral Vasoconstriction and leads to rise in systolic BP. This is followed by skeletal muscle dilation of blood vessels, decrease in resistance and output, fall in diastolic BP. This response of Adrenaline is known as biphasic response.

Its vasoconstriction action is blocked by alpha blocker like ergotoxin, Adr causes only fall in BP. This reversal action of conversion of biphasic to monphasic response on Blood pressure is called as Dale's vasomotor reversal.

Diagram

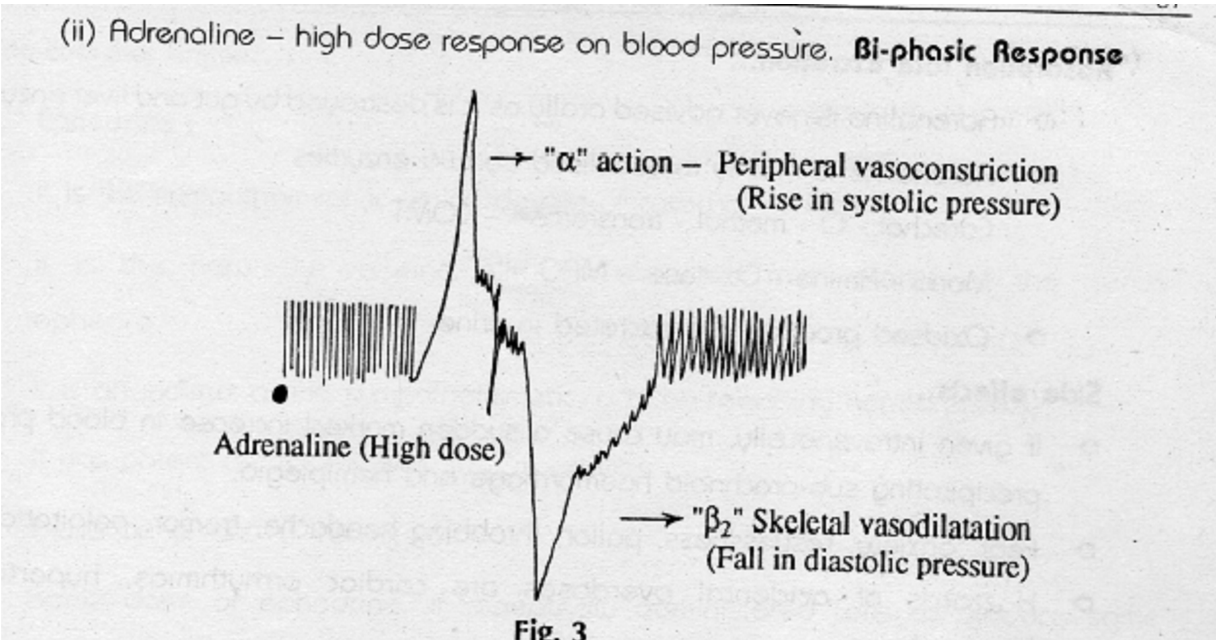
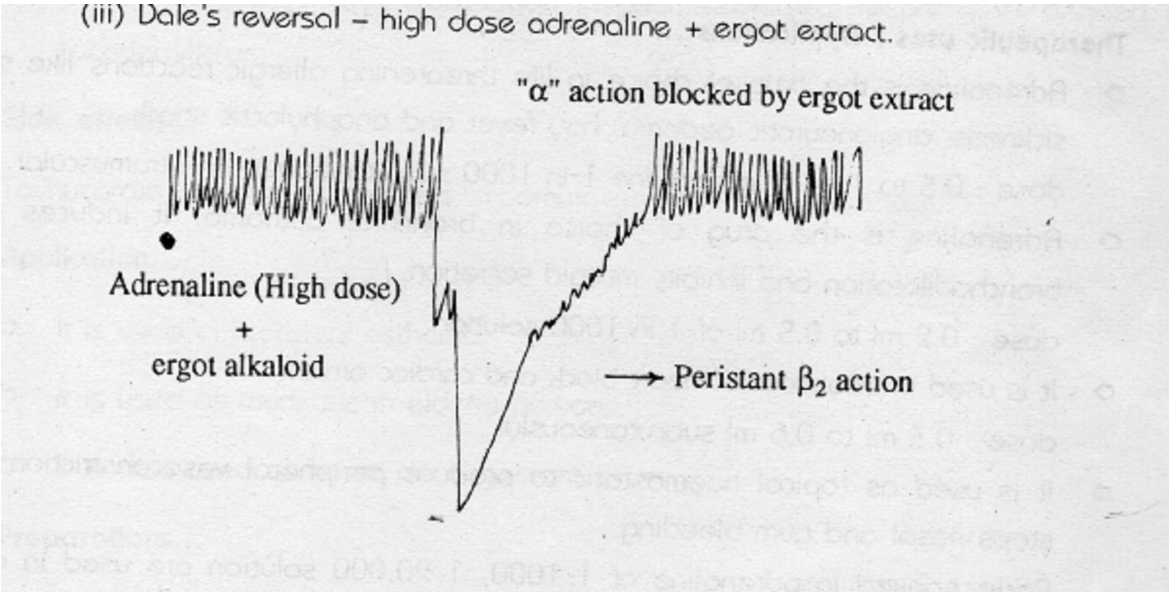


Fig. 3



C) Define local anaesthetics(1 mark) . Why adrenaline added to local anaesthetics?(2.5 mark)

Definition: Local anesthetics are pharmacological agents which when applied or injected, block the conduction as well as generation of impulses in localized area and bring reversible loss of sensation without affecting degree of consciousness.

OR

They are the compounds that when applied in appropriate concentration, block nerve conduction in the area of application.

Adrenaline acts as a vasoconstrictor and constricts the blood vessels which prolongs the duration of action of local anesthetic by reducing the systemic absorption of local anesthetics. It also reduces systemic toxicity of local anesthetic. Therefore, adrenaline is combined with local anesthetics

d) Classify anticoagulants (1.5M) Give mechanism of action of Warfarin(1.5M)

Classification

I) Intravenous anticoagulants-

e.g. Heparin

II) Oral anticoagulants

a) Coumarin derivatives

e.g. Warfarin

b) Indanedione derivatives

e. g. Phenindione

Other correct classification can be considered

MOA of Warfarin:

Warfarin act by reducing synthesis of Prothrombin, factor VII, IX, and X. the normal synthesis of these four factors requires vitamin K. Thus oral anticoagulants inhibit the activity of vitamin k and prevent the coagulation.

e) Define Autocoids.(1M) Explain triple response? (2.5M)

Autocoids- These are the local hormones with high biological activity & are naturally found in body in active or inactive form e. g. Histamine, bradykinin, prostaglandins

TRIPLE RESPONSE

When histamine is applied locally or injected intradermally on skin histamine produces a typical response known as “triple response” which is characterized by three distinguish sign:

i. **Flush**- it is redness at the site of application because of hyperemia.

ii. **Flare**- Patch formation in the vicinity of 1.5 cm of flush occurs due to vasodilation & this is called as flare.

iii. **Wheal**- around 1.5cm of flare permeation of fluid occurs, raising the surface and its called as wheal (swelling formation)

f) Sulfa combinations are preferred over single sulfa drug .Why?

Because: Combined drug treatment gives synergistic effect. (cotrimaxoazole)

Combination reduces chance of crystalluria and haematouria

To produce additive effect and less irritant effect.

To prevent resistance strains of organisms.

Q.6 Give reason for following statements (2 marks each)

a) Multidrug therapy is effective in the treatment of T.B.

The combination is preferred because of following advantages:

- If single drug is used then resistance to antitubercular drug is developed very quickly.
- Combination therapy rapidly reduces the no. of multiplying bacteria
- Combined drug treatment gives synergistic effect.
- By combination therapy, the dosage of individual drug can be reduced which helps to reduce the side effects.
- It avoids cessation which tends to block the blood vessels supplying to necrotic area and making penetration by antitubercular drug difficult.

b) Aluminium hydroxide & magnesium trisilicate are given together.

- Aluminium Hydroxide and Magnesium trisilicate are antacids.
- Aluminium hydroxide reacts with gastric HCL and forms aluminium chloride in small intestine. It is converted to aluminium phosphate which relaxes smooth muscle and causes constipation.
- Magnesium trisilicate retains water in the intestine and acts as a saline purgative. Thus, to counteract each other's effect aluminium hydroxide is combined with magnesium trisilicate which neither causes constipation nor diarrhea.

c) Atropine produces photophobia.

- Atropine blocks the cholinergic nerve supply and causes dilation of pupil.
- Atropine paralyses the ciliary smooth muscles causing increase in the focal length of the lens, thus the individual can see the things only at long distance.
- As muscles of sphincter of iris are paralysed, individual cannot constrict the pupil for viewing near objects or in response to bright light
- Thus atropine produces photophobia.

d) **Tetracyclines are not used in small children**

- Tetracyclines if taken by children, leads to bone deformity and affect the overall skeletal growth.
- Tetracyclines are deposited in growing teeth and bones and if treatment is very prolonged the nail become stained by stored tetracycline.
- Children may show brown staining of teeth if administered before the appearance of first tooth.
- It affects the teeth formation in children.
- So tetracyclines are not used in small children

e) **Penicillin is a life saving as well as life threatening drug.**

- Penicillin is an antibiotic used in different diseases like Syphilis, Gonorrhea, Diphtheria, Gangrene, Tetanus, Meningitis etc. Thus it is a life saving drug.

- Penicillin in therapeutic dose if randomly administered by parenteral route to an individual without checking its allergy, then it may produce severe allergic reaction such as anaphylactic shock. Hence it is a life threatening drug.

f) Use of purgatives is essential with piperazine

- 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.

g) Streptomycin is not used orally

- If given orally it produces nausea and vomiting.
- Streptomycin not absorbed in GIT

h) Lactobacillus preparations are sometimes used with broad spectrum antibiotics.

- Lactobacillus is a useful bacteria and is normally present in gastrointestinal(g-i) tract.
- broad spectrum antibiotics may destroy the normal g-i flora which causes opportunistic pathogens to grow and that can lead to diarrhea.
- Lactobacillus preparations are given to restore the normal g-I flora and to avoid the diarrhea. Lactobacillus prevents overgrowth of pathogenic bacteria. Lactobacillus improves patient compliance for antibiotics, hence ensures completion of treatment.

i) Adrenaline is present in emergency kit of physician.

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

- Anaphylactic shock- adrenaline acts as competitive antagonist o histamine. Anaphylactic shock is due to release of histamine which causes bronchospasm.
- Cardiac shock- as it is positive inotropic and positive chronotropic agent it increases BP.
- Asthma- the bronchodilator action of adrenaline relieves asthma due to bronchospasm
- 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.
- Adrenaline is administered with local anaesthetic to increase its duration of action.

So, Adrenaline is present in emergency kit of physician.