MODEL ANSWER

SUMMER – 17 EXAMINATION

Subject Title: Pharmacology & Toxicology Subject Code: 0813

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.

Q. No.	Sub Q. N.	Answer	Marking Scheme
1		**Define any Eight of the following terms with two examples of each**	1m def.
	a)	**Local anaesthetics** Local Anaesthetics : Are the pharmacological agents which when applied or injected block the conduction as well as generation of impulses in localized area & cause reversible loss of sensation without affecting degree of consciousness Examples : Cocaine, Procaine, Amethocaine, , Cinchocaine ,Lignocaine (Lidocaine)	1m for two ex.

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	b)	**Parasympatholytics** Parasympatholytics: These are the drugs which block the cholinergic receptors in the effector organs supplied by cholinergic nerves or they reduce the activity of the parasympathetic nervous system or they block acetyl choline activity at parasympathetic neve endings. Examples: Atropine, Hyoscine(Scopolamine), Homatropine, Dicyclomine etc	
	c)	**Antiseptics** These are the agents which are used to prevent the growth of microorganisms and can be applied to living tissues. Examples: Alcohol, Iodine, Mercurochrome, Potassium permanganate, Boric acid, Benzalkonium chloride, Crystal violet etc.	
	d)	**Tranquilizers** Tranquilizers are the pharmacological agents which are used to reduce tension or anxiety or are the agents used to cause calming effect. E.g Chlorpromazine, Haloperidol, Reserpine, Clozapine	
	e)	**Haematinics** Haematinics: Are the drugs which when administered favor erythropoiesis i.e. synthesis of red blood cells and increase the oxygen carrying capacity of the blood. Eg: Cynocobalamine, Folic acid, Iron as Ferrous sulphate or Ferric ammonium citrate etc.	
	f)	**Miotics** Miotics: These are the agents which produce miosis i.e. constriction of pupil. Eg. Parasympathomimetics like Physostigmine, Pilocarpine,Carbachol	

	g)	**Antidepressants** Antidepressants are the pharmacological agents which are used in treatment of depressive disorders. Eg:Phenelzine,Isocarboxazid,Fluoxetine,Duloxetine,Imipramine,Amitryptiline,Clomipramine	
	h)	**Antiasthmatics** Antiasthmatics are the pharmacological agents which are used in treatment of asthma Eg. Adrenaline,Salbutamol,Isoprenaline,Orciprenaline,Aminophylline	
	i)	**Thrombolytics** These are the pharmacological agents that are used to dissolve the blood clots in blood vessels and improve blood flow. Eg. Streptokinase,Urokinase,Reteplase,Duteplase	
	j)	**Anthelmintics** Anthelmintics are the pharmacological agents used to treat helminthiasis.(worm infestation) Examples: Piperazine,Albendazole, Mebendazole, Pyrantel pamoate, Tetramisole etc	
2.		**Attempt any <u>Four</u> of the following:**	
	a)	**Define pharmacokinetics. Write in short about important channels of excretion of drugs.** 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. Important Channels of drug excretion are Kidneys ,Lung, Intestines ,Skin, Bile, Saliva & milk **Kidneys:** Most of the drugs are excreted in urine	1m def. 2m for any four channels

		Weak acids are 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. It prolongs the action.	
	b)	**Explain triple response of histamine.** When histamine is applied locally or injected intradermally on skin it produces a typical response known as "triple response" which is characterised by three distinguished signs: i. Flush- it is redness at the site of application because of hypereamia 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 is called as wheal (swelling formation).	3m.
	c)	**Mention 1 therapeutic use & 1 adverse effect of each:**	

		i) Isoniazide Therapeutic use :As anti TB agent Adverse effect: Peripheral neuritis, hepatitis, depletion of Vitamin $B_{6,}$psychosis,seizures **ii) Dapsone** Therapeutic use: As antileprotic agent, As anti TB agent. Adverse effect: Hemolytic anemia, Methemoglobinemia, Anorexia, Nausea, Vomiting, Dermatitis, Drug fever, liver damage, haematuria **iii) Cotrimoxazole** Therapeutic use: In treatment of Pneumonia, Urinary tract infection, Respiratory tract infections, bacterial gastroenteritis, Typhoid, Effective against several gram positive & gram negative organisms Adverse effect: Anaemia, allergic skin rash, glossitis, nausea, vomiting, headache, stomatitis, Steven Johnson syndrome	0.5 for use and adverse effect each.
	d)	**Explain pharmacological actions of aspirin.** **i**) Analgesia- aspirin relieve pain by acting centrally as well as peripherally by inhibiting the formation of prostaglandins. , epigastric distress, gastric bleeding and ulcers. ii) Antipyrexia- aspirin reduce body temperature by acting on hypothalamus (central effect) iii) Action on Gastrointestinal Tract: Aspirin causes nausea, vomiting, dyspepsia, epigastric distress, gastric bleeding and ulcers. iv) Uricosuric effect- In large doses it inhibits reabsorption of urate by nephron. This results in uricosuria	3m. for any six.

		v) Anti inflammatory- aspirin acts as potent anti inflammatory agent by inhibiting prostaglandin synthesis. It decreases capillary permeability, reduces exudation of fluid & reduces development of inflammatory edema. vi) On blood- aspirin reduces platelet aggregation vii) On respiration- Aspirin stimulates respiration by direct action on medullary respiratory centre. It increases oxygen consumption by skeletal muscles thereby increasing plasma CO_2 concentration. viii) Hepatic and renal effects- may damage liver and kidneys in large doses. ix) Metabolic effects- aspirin causes conversion of large part of energy into heat. So it may cause hyperpyrexia in large doses. It may also cause hypoglycemia.	
	e)	**What are gastric antacids? Mention properties of good antacid.** Gastric Antacids are the agents which neutralize the gastric acid & raise the pH of gastric contents **Properties of good antacid:** • Should provide prompt relief from the symptoms of hyperacidity& action should be sustained • Should not cause electrolyte imbalance, rebound acidity • Should not interfere with process of digestion • Should not disturb absorption of other drugs • Should not cause diarrhoea or constipation • Systemic absorption of an antacid should be minimal.	Def. 1m. 2m. properties

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	f)	**Discuss Oral hypoglycemic agents.** Oral hypoglycemic agents are usually used in Type 2 Diabetes mellitus. **Sulphonylureas:** These agents act on pancreas and stimulate insulin secretion. They are effective only if some Beta cells are functional. Side effects include hypoglycemia and weight gain. Eg; Tolbutamide, Glibenclamide,Gliclazide **Biguanides**: These agents act on liver. Increase glucose uptake in muscles & inhibit gluconeogenesis They cause anorexia & lead to weight loss. Can be combined with Sulphonylueas. Eg: Metformin,Phenformin **Thiazolidinediones**: Increase insulin sensitivity. Can cause weight gain & edema Eg; Pioglitazone,Rosiglitazone **Alpha glucosidase inhibitor**: Reduce carbohydrate absorption. Cause flatulence & diarrhea Eg;Acarbose **Newer agents** include Gliptins,Meglitinides etc.	3m.
3.		**Attempt any four of the following**	
	a)	**Mention route of administration of following drugs.** i) Salbutamol: - oral, inhalation. ii) Cynocobalamin: - IM, Oral, IV. iii) Heparin:- IV	1m.each
	b)	**Name one drug each which produces following effect**. i) Salicylism:- , Aspirin, Sodium salicylate, Methyl salicylate, ii) Teratogenic effect:- Thalidomide, Cocaine, Alcohol, ACE Inhibitor, Tetracycline, Phenytoin, Valproic acid, Warfarin iii) Deafness:- Quinine, Streptomycin, Kanamycin	1m each.

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	c)	**Name the drug of choice in following conditions**. i) Motion sickness:- Hyoscine,Promethazine, Meclizine,Cyclizine ii) Grandmal epilepsy:- Pheyntoin sodium, Fospheyntoin, Valproic acid, Phenobarbitone, Carbamazepine, Methoin iii) Parkinson's disease:- Levodopa, Amantidine, Carbidopa, Bromocriptine,Benztropine	1m each.
	d)	**Explain the terms:-** a) Hypolipidemics: These are the pharmacological agents that help in lowering increased blood lipid levels. or These are the pharmacological agents which lower the levels of lipids and lipoproteins in blood. Examples: Statins (Atorvastatin, Pravastatin, Lovastatin), Fibrates(Clofibrate, Ciprofibrate), Cholestyramine, Niacin, b)Antipyretics:- These are the agents which reduce the elevated body temperature. Examples:- Paracetamol, Phenacetin, Aspirin	Def. 1m Ex.0.5 m each.
	e)	**Name one drug contraindicated in following condition.** i) Myasthenia gravis:- Streptomycin, Kanamycin ii) Pregnancy: - Tetracycline, Chloramphenicol, Cisplatin , Cyclophosphamide, Alcohol, Thalidomide, Barbiturates	1m each.

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		iii) Liver cirrhosis: - Phenobarbitone sodium, Acetazolamide, Alcohol.	
	f)	**Mention the antidote in cast of poisoning due to:-** i) Morphine:- Naloxone, Nalorphine ii) Lead: - BAL(dimercaprol), EDTA. iii) Organophosphorous compound: - Pralidoxime (PAM), Atropine sulphate. Diacetyl mono oxime (DAM),Obidoxime	1m each.
	g)	**Mention dose of following drugs:-** i) Propranolol: - 10 to 40 mg t.i.d. ii) Paracetamol: - 0.5 to 1 g every 4hrs. max. 4g/day. iii) Streptomycin:- 0.75 to 1g daily, 0.5 to 2 g daily in divided dose	1m each.
4.		**Attempt any four of following**	
	a)	**Mention different routes of administration of drugs. Give advantages of inhalation route.** – Enteral – Parenteral – Local applications **<u>Enteral</u>** - 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	1.5 m. for routes 1.5m for any three

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 inhalation routes:-

-Large area is available for absorption

- Absorption is quick

- Self administration is possible

-First pass metabolism is avoided.

b) **Explain pharmacological actions of adrenaline.**

1.On Heart: - Adrenaline with its action on B-receptors of heart increases heart rate, force of contraction and cardiac activity.

2.On Blood vessels and blood pressure: - The blood vessels of skin and mucous membrane are

3m.any 6 points

		constricted. Adrenaline dilates blood vessels of skeletal muscles by acting on B-receptors. The net result is thus decrease in peripheral resistance. It show biphasic response in moderate dose 3.On Smooth muscles:-It causes relaxation of smooth muscles of bronchi, GIT, uterus etc. It is a powerful bronchodilator 4.Central Nervous system:- Therapeutic doses of adrenaline may give rise to tremors, restlessness, palpitation and apprehension 5. Metabolism:- It produces hyperglycemia by accelerating glycogenolysis in the liver. 6.Antiallergic action: - Adrenaline is a physiological antagonist of histamine and counters the bronchoconstriction and hypotension of anaphylactic shock. 7. If combined with local anesthetic prolongs its action locally.	
	c)	**Classify general anesthetics with examples.** 1) Volatile general anaesthetics i) Liquids:- Ex. Diethyl ether, Chloroform, Halothane, Methoxyflurane, Gases:- Ex. Nitrous oxide, Cyclopropane 2) Non-volatile general aneasthetics i) Short acting barbiturates:- ex. Thiopentone sodium, Methohexitone sodium ii) Non barbiturates:-ex. Ketamine, Etomidate, Propofol **OR** **1) Inhalational:-** a) Gas:- nitrous oxide b) Volatile liquids:-Ex. Ether, Halothane, Enflurane, Isoflurane 2) **Intravenous:-** **a)** Inducing agents:- Thiopentone sodium, Methohexitone sodium, Propofol,. **b)** Slower acting drugs:- i) Benzodiazepines:- Diazepam, Lorazepam, Midazolam	3m.

		ii) Dissociative anaesthesia:-Ketamine iii) Opioid analgesia:-Fentanyl.	
	d)	**Mention factors influencing absorption of drugs. Explain <u>any one</u> factor.** 1) Physical state of the drug 2) Particle size 3) Concentration 4) Absorbing surface 5) Functional integrity of Gastrointesinal tract 6) pH of drug 7) Formulation 1.Physical state of the drug: Liquids better absorbed than solids, soluble medicaments than insoluble. 2. Particle size: Smaller the particle size, better is the absorption since it provides greater surface area for absorption. 3. Concentration: Higher the concentration better is the absorption. 4. Absorbing surface: Larger the surface area better is the absorption. Drugs are generally better absorbed from small intestine than stomach. 5. Functional integrity of gastrointestinal tract: Increase in peristalsis reduces residence time of drug in g.i.t. so reduced absorption. Anticholinergics favour absorption by reducing gut motility. 6. pH of drug: Acidic drugs rapidly absorbed from stomach (salicylates) Basic drugs from intestine (ephedrine- so delayed action)	2m. factor 1m.for Expln.

		7. Formulation: Method of formulation influences absorption.	
	e)	**Classify diuretics with examples.** 1.**Weak diuretics** i) Osmotic diuretics a) Electrolytes-Sodium and Potassium salts b) Non electrolytes- Mannitol ii) Acidifying salts-Ammonium chloride iii) Xanthine derivatives- Theophylline iv) Carbonic anhydrase inhibitors- Acetazolamide **2. Moderately potent diuretics or Thiazide Diuretics**-Thiazides like benzothiazide ,Hydrochlorothiazide **3. Very potent diuretic or Loop Diuretics**- Frusemide, ethacrynic acid **4. Potassium sparing diuretics**- Spironolactone, Aldosterone antagonist Classification as per mechanism of action can also be considered.	3m.
	f)	**Explain Mechanism of action of sulphonamides.** **Sulfonamides:-** Folic acid derived from PABA is essential for growth and multiplication of microorganism. Sulphonamides have structural similarity to PABA. Sulfonamides inhibit folic acid synthetase enzyme and inhibit conversion of para-aminobenzoic acid to folic acid. Because of deficiency of folic acid, microorganism cannot multiply and grow, thus growth and multiplication of microorganisms is stopped.	3m.

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		OR Sulphonamide administered ↓ Structural similarity with PABA ↓ Removal of PABA from site ↓ Prevent synthesis of folic acid ↓ Causes deficiency of folic acid ↓ Results in Bacteriostastic action	
5.		**Attempt any four of the following**	
	a)	**Write a note on Drug tolerance.** **Definition:** On repeated administration of some drugs they may prove ineffective at the usual therapeutic dose OR insensitivity towards the use of drug is called as tolerance. Progressive increase in the dose is required to produce the desired effect. This phenomenon is described as drug tolerance. Types of tolerance:- **a) Natural or Congenital:-**It is by birth. 1) Species tolerance: - e.g. Belladonna alkaloid like atropine is toxic to human being when	3m.

		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:- e.g. 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 phenomenon when tolerance is developed to a drug belonging to particular group then there could be tolerance to all other drugs in the same group. E.g. when tolerance is developed to alcohol, patient may develop tolerance for use of general anesthetic and other CNS depressants. **c) 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)	**What are broad spectrum antibiotics? Mention two therapeutic uses and two adverse effects of any one broad spectrum antibiotics.** **Broad spectrum antibiotics:** This term refers to antibiotics that act against wide range of disease causing bacteria. These are active against both gram positive and gram negative bacteria including Rickettsiae and Chlamydia. E.g. Tetracycline, Chloramphenicol, Ampicillin, Cephalosporins etc **(Any related examples can be considered)** **Therapeutic uses and side effects of the tetracycline.** Tetracyclines are antibiotics and are used in following conditions: Cholera , Pneumonia , Rickettsial infection ,Chlamydia infection , Urinary tract infection	1m. def. 1m. each Use & Adverse Effect.

		Bacillary infection ,Plague ,Sexually transmitted diseases , Dysentery ,Acne vulgaris **Side effects**- anaphylaxis, acute hepatic dysfunction, skin rash, dermatitis, fever, retardation of bone growth and tooth discolouration. Yellow staining of teeth, weakening of teeth & bones, teratogenicity. **Therapeutic uses of the chloramphenicol.** **Used in following condition:** Eye/ear infections, Thyroid Fever, Septicemia **Side effects**: Bone marrow depression, anemia, hypersensitivity reactions like skin rashes, glossitis, stomatitis. Gray baby syndrome. **Therapeutic uses of Ampicillin:** **Used in following conditions:** Whooping cough Respiratory tract infections Meningitis typhoid fever Bacillary dysentery **Side effects**: skin rashes, gastrointestinal disturbances, Diarrhoea	
	c)	**Explain the cause, symptoms and treatment for barbiturate poisoning**. **Cause:** Accidental overdose consumption, suicidal intention, medication error **Symptoms** – marked excitement, renal failure, pulmonary oedema, cardiac irregularities, cold skin, paralytic dilation of pupil, weak but rapid pulse, respiratory failure. **Treatment –** 1) If patient is conscious and within 4 hrs of ingestion, patient can be induced Vomiting with concentrated salt solution or syrup of ipecac. If patient is unconscious, simple stomach wash ie gastric lavage is performed. 2) If respiration is slightly affected, oxygen can be given by nasal catheter. If	0.5 cause 1m.sym. 1.5m. Treatment

		respiration is depressed considerably, endotracheal intubation is done. 3) Forced diuresis- diuretics like mannitol or frusemide is given to increase urinary excretion of barbiturates. 4) Alkalinization of urine – Sodium bicarbonate is used for alkalinization of urine which helps in excretion of barbiturates. 5) Prophylactic antibiotics – To prevent infection, antibiotics are used in case of catheterization or tracheostomy 6) Administration of IV fluids –Forced diuresis may result in dehydration. So, administration of fluids is advised.	
	d)	**Define antineoplastic agents. Mention side effects of antineoplastic agents.** **Antineoplastic:** Drugs that attack malignant (cancerous) or neoplastic cells in the body OR these are the agents which are used in treatment of cancer. **Side effects:** Low blood counts causes an increased possibility of developing infection or anemia. Tiredness. Mouth soreness. Nausea, vomiting. Loss of appetite. Constipation or diarrhea. Hair loss.(Alopecia) Skin changes or reactions, Joint Pain or nerve changes	Def. 1m. Side Effect 2m.
	e)	**What are Narcotic analgesics? How does Pethidine differ from Morphine?** These are the agents which relive pain by acting on CNS and act on opiate receptors.	

Ex. Morphine, Codeine, Pethidine,Fentanyl,Methadone etc. 1m. def.

. 2m. diff.

Morphine	Pethidine
Absorption is unpredictable by oral route	Well absorbed on oral administration
Potent analgesics and narcotic	Less potent analgesic
Spasmogenics	spasmolytic
Depress the cough center	Does not depress cough center
Constrict pupil	No effect
Depress the respiration in new born hence not useful to relieve labor pains	Comparatively less respiratory depression

f) **Classify antihypertensive with examples** 3m.

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:

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		a)Alpha adrenergic blockers: Phentolamine b) Beta adrenergic blockers: Propranolol 5. Vasodilators: Hydralazine 6. Drugs acting reflexly by stimulating baroreceptors: Veratrum 7. Oral Diuretics: Thiazides, 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)	
6.		**Give reasons for any Four of the following.**	
	a)	**Ephedrine is used as mydriatic in elderly people.** • Ephedrine interact with alpha adrenergic receptors in eye and produces mydriasis. • It does not cause paralysis of cilliary smoth muscles or tightening of suspensory ligament. • It does not result in to cycloplegia or photophobia as in case of atropine. • So to avoid these visual complications Ephedrine is preferred to produce mydriasis in elder patients.	4m. each

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	b)	**Insulin is not given orally.** • Insulin is a polypeptide hormone secreted by beta cells of islets Langerhans of pancreas. • Commercially it is extracted from pancreas of cattle or pigs • When given orally proteolytic enzymes, gastric juice and HCL from GIT cause its degradation • Because of degradation therapeutic effect is lost. • So Insulin is not given orally.	
	c)	**In tuberculosis treatment, drug combination is preferred than single drug treatment.** 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.	
	d)	**Combination of atropine and ether is used for general anesthesia.** • Ether vapours are too irritant to the respiratory passage when used as general anesthetic. • It causes excessive secretion of mucus in the bronchi, lachrymal glands and nasopharynx. • These secretions interfere with the normal respiration as well as with anesthetic process.	

		• To avoid this disadvantage of ether, antisecretory agents like atropine is combined with ether. • Atropine blocks all secretions and assists in the anesthesia.	
	e)	**Use of purgatives is essential with piperazine** • Anthelmintic 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 anthelmintic. • Thus combination acts synergistically.	
	f)	**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.	
	g)	**Probiotics are sometimes administered with antibiotics.** • Probiotics are microorganisms that are believed to provide health benefits when consumed. • E.g. Yogurt, butter milk and Lactobacillus preparations are the well-known Probiotic and important for health of small intestine. • Antibiotics may destroy the normal GI flora which causes opportunistic pathogens to grow and that can lead to diarrhea. • Probiotics are given to restore the normal GI flora and to avoid the diarrhea.	

		• Probiotics prevent overgrowth of pathogenic bacteria. • Probiotics improve patient compliance for antibiotics, hence ensures Completion of treatment.	