**TIRUPATI COLLEGE OF POLYTECHNIC AND PHARMACY, RATIA**
**D. PHARMACY SECOND YEAR**

## PHARMACEUTICAL CHEMISTRY – II

**Part-A, B and C all questions carry one marks. 1X10=10**

1) Barbiturates are derivatives of **barbituric acid.**

2) Clofibrate is a **lipid lowering** agent.

3) Aspartamate is used as **table sweetner.**

4) Sulphadiazine is a derivative of the heterocycle **pyrimidine**.

5) **Mebendazole** is used to treat filariasis.

6) Chloroquine is an **antimalarial**, and is also used in the treatment of **rheumatoid arthritis.**

7) Chemical name of paracetamol is **p-hydroxy acetanilide**.

8) Mannitol and urea is used as **diuretic**.

9) **Vitamin $B_{12}$** is cobalt containing substance

10) Heparin is **anticoagulant** given by **parenteral** route.

11) Aminophylline is the salt of **theophylline** with **ethylenediamine**.

12) Vinblastine is an alkaloid which has **antineoplastic activity.**

13) Metronidazole is used in the treatment of **vaginal yeast infection**.

14) Aspirin is the derivative of **salicylic acid**.

15) **Ampicillin** is semi synthetic penicillin.

16) **Vitamin A** is a fat soluble vitamin.

17**) Quinidine** is a cinchona alkaloid which is used as antiarrhythimic drug.

18) **Antiseptics** are the chemical agents which are employed to destroy or inhibit the growth of pathogenic micro-organism.

19) **Insulin** is a protein hormone secreted by the beta cells of the Islets of Langerlans of Pancreas.

20) Nitrazepam is used as a **hypnotic**.

21) **Reserpine** is an alkaloid useful in hypertension.

22) Aspirin hydrolyses in contact with moisture to **salicylic acid** and **acetic acid.**

23) Cardiac glycosides are used in the treatment of **congestive heart failure**.

24) Ascorbic acid is used in treatment of **scurvy**.

25) Tetracycline is a **broad** spectrum antibiotic.

26) Heparin is an **anticoagulant**.

27) Amaranth is used as **antiulcer.**

28) **Leafy vegetable** is the richest source of vitamin B complex.

29) Isoniazid is used in the treatment of **pulmonary tuberculosis**.

30) Halothane is a **halogenated** hydrocarbon.

31) Quinine is used as an **antimalarial**.

32) The solution of adrenaline contains **metabisulphite** as an antioxidant.

33) The generic name of sulphonamide is **sulphadiazine**.

34) Insulin is **hypoglycemic** agent.

35) Deficiency of vitamin D produces **rickets**.

36) Barbiturates are derivatives of **barbituric acid** formed by condensation of **urea** and **malonic acid.**

37) Omeperazole is a derivative of **benzimidazole**.

38) The sulphonamide **sulphadiazine** has pyrimidine heterocycle.

39) **Sulphone** belongs to the group of dapsones.

40) Chloroquine and amodiaquine are derivatives **4-amino quinolines**.

41) Deficiency of vitamin D is associated with occurrence of **rickets** in children and of **osteomalacia** in adults.

42) Chemically, Isoniazid is **pyridine-4-carbohydrazide**.

43) The barbiturates which are selectively used in the control of epilepsy are **phenobarbitone**.

44) Pyridine heterocycle is present in the drug **vitamin $B_6$**.

45) The chemical name of benzocaine is **ethyl p-amino benzoate**.

46) Piperazine is effective against **pinworm infestation**.

47) **Thyroxine** is used for the treatment of hypothyroidism.

48) Sulphamoyl group is present in the drug **frusemide**.

49) Paraldehyde is a trimer of **formaldehyde**.

50) Ethacrynic acid is **α, β unsaturated** ketone.

51) Sodium cromoglycate used in the prophylactic treatment of asthma is administered by **inhalation**.

52) Diazepam is a **benzodiazepine** derivative.

53) Nikethamide is an **analeptic**.

54) Chemically ether is **diethyl ether**.

55) Testosterone is generally administered by **injection**.

56) Because of its **toxicity** phenylbutazone should not be used routinely as an analgesic.

57) Cynocobalamine is effective in the treatment of **pernicious anemia**.

58) Methyldopa is used in treatment of **hypertension**.

59) Phenylbutazone is derivative of heterocycle **pyrazolidine**.

60) Sulphadiazine is a derivative of **pyrimidine** heterocycle.

61) Isoniazid is a **pyridine** derivative.

62) Thyroxine is **thyroid hormone** isolated from **thyroid gland**.

63) Benzocaine is ethyl **p - amino benzoate**.

64) Desipramine is a main active metabolite of **imipramine**.

65) Verapamil is used in control of **supraventricular tachyarrhythmias**.

66) Chloral hydrate has a **pungent** odour.

67) Phenytoin is used in the treatment of **generalized tonic-clonic seizures**.

68) Pyrimethamine and Trimethoprim are derivatives of **pyrimidine.**

69) One of the earlier symptoms of deficiency of vitamin A is **blurring of eyes**.

70) The principle use of dapsone is in the treatment of **leprosy**.

71) **Sulphalene** sulphonamide is a Pyrazine derivative.

72) **Haloperidol** is a derivative of butyrophenone.

73) Certain diuretics lead to hypocalcaemia, so administration of **potassium** in diet is necessary.

74) Barbiturates are derivatives of **hexahydro-pyrimidine-2, 4, 6-trione**.

75) **Phenytoin** is a hydantoin and is used as anticonvulsant.

76) **Pilocarpine** is an alkaloid obtained from leaflets of pilocarus species.

77) **Amiloride** is a Pyrazine derivative and a potassium sparing derivative.

78) Chlorambucil and Cyclophosphamide have **nitrogen mustard** moieties in their structure.

79) Miconazole is an **imidazole** derivative.

80) Promethazine is a **phenothiazine** derivative.

81) Organic compounds in which iodine is covalently bonded are used as **topical antiseptics**.

82) **M. leprosea** is responsible for causing leprosy in humans.

83) Chemically name of sulphanilamide is **P - amino benzene sulphonamide**.

84) **Emetine** is an alkaloid and useful in amoebic hepatitis.

85) **Heparin** is the drugs which prolong the coagulation time of blood.

86) Amitriptylline belongs to the class of **tricyclic antidepressant drug**.

87) **Morphine** is the most widely used narcotic analgesic.

88) Nitrofuratoin has **furan** and **imidazolidine-2, 4-dione** heterocycles as part of its structure.

89) **Quinidine** is a cinchona alkaloid, which is used as antiarrhythimic drug.

90) **Warfarin** sodium is used as anticoagulant.

91) Caffeine is a derivative of **xanthine** and is used as **analeptic**.

92) Quinine contains **quinoline** nucleus and is used in malaria.

93) Diazepam is used in treatment of **epilepsy**.

94) Aloxiprin is a condensation product of **aluminium oxide** and **aspirin**.

95) Clofibrate is used to reduce **cholesterol**.

96) Quinoline structure is present in **quinine**.

97) Tamoxifen is specifically used for the treatment of **advanced carcinoma of breast**.

98) Folic acid is necessary in the body for **maturation of red blood cells**.

99) Chemically, nictinamide is **pyridine-3-carboxamide**. .

100) While atropine is a racemic mixture, hyoxyamine is **(-) isomer**.

101) Furosemide is specifically used as **diuretic**.

102) Heparin is given by **intravenous** route.

103) The drugs to block action of acetylcholine are called as **anticholinergic**.

104) Testosterone is an **androstane** derivative.

105) Chemical name of chloroform is **trichloromethane**.

106) **Ergocalciferol** is the official name of vitamin $D_2$.

107) **Furosemide** is an example of high ceiling diuretic.

108) Folic acid is **yellow to orange** in color.

109) Structurally caffeine is **purine**.

110) Insulin is administered through **intravenous route.**

111) Chemical name of dapsone is **Bis - (amino phenyl) sulphone**.

**(Part – B) Give the uses of following drugs.**

**1) Cyclopropane**: It is most potent gaseous anaesthetic.

**2) Testosterone:** It is used as substitute or replacement therapy in male hypogonadial disorder.

**3) Neostigmine:** It is used to treat and diagnose myasthenia gravis and paralytic ileus.

**4) Chloroquine:** It is used to treat malarial infection and treat amoebic hepatitis.

**5) Noscapine:** It is used in treatment of unproductive cough.

**6) Dapsone:** It is mainly used to treat both forms of leprosy. However, it is a drug of choice to treat leprosy in combination with rifampicin.

**7) Nalidixic Acid:** It is mainly used in the treatment of uncomplicated lower urinary tract infection.

**8) Propylthiouracil:** It is an antithyroid drug and used for long term control of hyperthyroidism such as Grave's disease, thyrotoxicosis.

**9) Troxidone (Trimethadione):** It is used an antiepileptic to treat absence (petitmal) seizure.

**10) Neomycin:** It is active against many strains of gram negative but is devoid of activity against *Pseudomonas aeruginosa and* strains of *Staphylococcus aureus*.

**11) Thiopental Sodium:** It is very short acting barbiturate. It is used as an anticonvulsant and for induction of general anaesthesia

**12) Mannitol:** It is used as diuretic and reduces raised intra cranial and intra ocular pressure.

**13) Ibuprofen:** It is used to elevate symptoms of rheumatoid arthritis, osteoarthritis, acute gout and relieve neck pain, myalgias.

**14) Metronidazole:** it is used to treat amoebic dysentery, amoebic hepatitis, diarrhoea and dysentery symptoms.

**15) Caffeine:** It is a CNS stimulant and stimulates the respiratory centre, increasing the rate and depth of respiration.

**16) Phenobarbitone:** It is used as a sedative in nervous insomnia, anxiety states, dysmenorrhoea and thyrotoxicosis.

**17) Ethosuximide:** It is a drug of choice to treat petitmal epilepsy (absence seizure).

**18) Morphine:** It is used for control of moderate to severe, acute and chronic pain especially associated with neoplasm and as a premedication prior to surgery.

**19) Chlorpromazine:** It is used to treat Schizophrenia, Mania and Hypomania.

**20) Levodopa:** It is used in the treatment of parkinson's disease and to control the neurological symptoms of chronic manganese poisoning, which is resemble those of parkinsonism.

**21) Pilocarpine:** It is used as miotic and to reduce intraocular pressure in glaucoma.

**22) Dicyclomine:** It is used as eye drops to produce cycloplegia and mydriasis.

**23) Mefenamic Acid:** It is used for the relief of mild to moderate pain.

**24) Tolbutamide:** It is used to control blood glucose in previously untreated non-insulin dependent diabetes mellitus.

**25) Ethambutol:** It is used in the treatment of tuberculosis.

**26) Cephalexin:** It is used to treat the respiratory tract infections, skin and soft tissue infections and otitis media.

**27) Betamethasone:** It is used to control all forms of eczema and treat severe acute photosensitive reaction including sunburn.

**28) Propranolol:** It is used to treat cardiac arrhythmia, auricular fibrillation, angina pectoris, arterial hypertension and hyperthyroidism in children.

**29) Chlorthiazide:** It is used as a diuretic and treat oedema associated with congestive heart failure, cirrhosis of liver and renal diseases.

**30) Cetrimide:** It is used to treat burns and wounds and to remove scabs. It is used to disinfect utensils, vessels and also used as preservative.

**31) Vincristine:** It is effective in Hodgkin's disease and other lymphomas.

**32) Tolnaftate:** It is topical antifungal agent and is used for prophylaxis and treatment of various forms of ringworms.

**33) Halothane:** It is a general anaesthetic and is used to induce and maintain general anaesthesia.

**34) Acetazolamide:** It used in treatment of glaucoma and an antiepileptic.

**35) Verapamil:** It is used in control of supraventricular tachyarrhythmias.

**36) Frusemide:** It is used as a diuretic and to treat oedema.

**37) Niclosamide:** It is effective against most tapeworms including the beef tapeworm and pork tapeworm.

**38) Nitrofuratoin:** It is abroad spectrum antibacterial agent. It is used in the treatment of urinary tract infection.

**39) Tamoxifen:** Tamoxifen is specifically used for the treatment of advanced carcinoma of breast.

**40) Triameterene:** It is used a mild natriuretic activity.

**41) Thiabendazole:** It is effective against most nematode worms.

**42) Ciprofloxacin:** It has been used in the treatment of wide range of infections including biliary tract infections, infected bites and stings, bone and joint infection.

**43) Diclofenac:** It is used for relief of pain and inflammation in condition such as rheumatoid arthritis, renal colic and acute gout.

**44) Codeine:** It is used to suppress, mild to moderate pain and diarrhoea.

**45) Salbutamol:** It is mainly used to treat bronchospasm in bronchial asthma and in chronic bronchitis.

**46) Omeperazole:** It is used in treatment of aspirational syndromes, dyspepsia and peptic ulcer.

**47) Diethylcarbamazine:** It is used to treat round worm infestation (ascariasis), filarial infection, loiasis (infection due to loa loa) and topical eosinophilia.

**48) Acyclovir:** It is an antiviral drug used against herpes simplex virus and chicken pox.

**49) Thiopentone:** It is used as an anticonvulsant. It is used for induction of general anaesthesia. It is used for prevention and treatment of cerebral ischaemia.

**50) Doxycycline:** It is wide spectrum of activity and is used to treat chronic bronchitis, urinary tract infection and syphilis.

**51) Ephedrine:** It is used to relieve acute asthma.

**52) Indomethacin:** It is used in the treatment of arthritis, osteoarthritis, gout and relieve neck pain, myalgia.

**53) Chloramphenicol:** It is used in the treatment of typhoid and paratyphoid, meningitis, urinary tract infections, eye and ear infection, skin infection, septicemia (infection of blood) and rickettsial infection.

**54) Meprobamate:** It is used as a centrally acting muscle relaxant.

**55) Rifampicin:** It is used in combination with Isoniazid and Pyrazinamide, for the treatment of tuberculosis.

**56) Benzocaine:** It is used often in combination with other drugs for temporary local relief of pain associated with dental procedure, sore throats and pruritits.

**57) Piperazine:** It is used in the treatment of threadworm infestation.

**58) Pholcodine:** It is a cough suppressant with mild sedative, but little analgesic action.

**59) Lignocaine:** It is mainly used for its local anesthetic activity for topical application, infiltration and produce dental analgesia**.**

**60) Atenolol:** It is used to treat angina (chest pain) and hypertension (high blood pressure), lower the risk of death after a heart attack.

**61) Chlorophenaramine:** It is used as an antihistamine used to relieve symptoms of allergy, hay fever, and the common cold. These symptoms include rash, watery eyes, itchy nose/throat/skin, cough, runny nose, and sneezing.

**(Part –C) write the structure of following drugs.**

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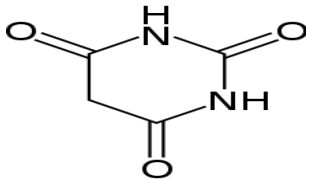
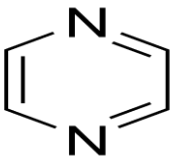
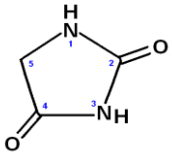
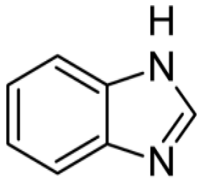
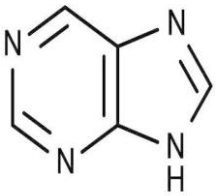
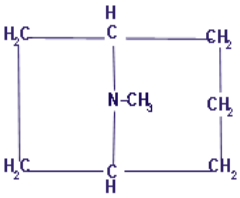
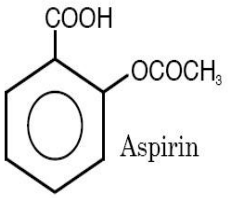
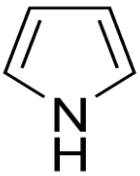
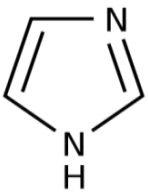
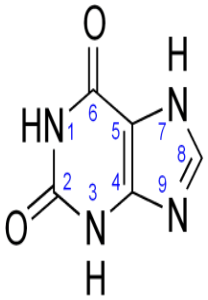
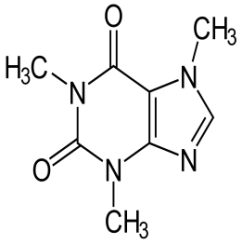
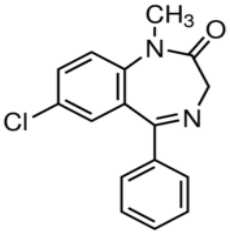
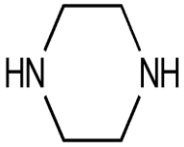
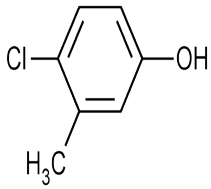
|---|---|---|---|
| **Barbituric Acid**  | **Pyrazine**  | **Aziridine**  | **Hydratoin**  |
| **Benzimidazole**  | **Purine**  | **Tropane**  | **Aspirin**   |
| **Furan**  | **Pyrrole**  | **Imidazole**  | **Xanthine**  |
| **Caffeine**  | **Diazepam**  | **Piperazine**  | **Chlorocresol**  |

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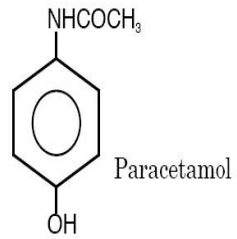
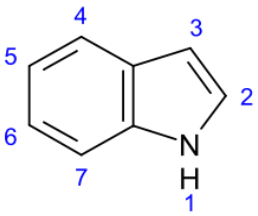
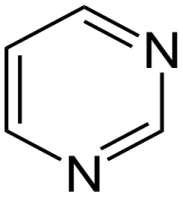
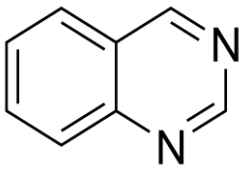
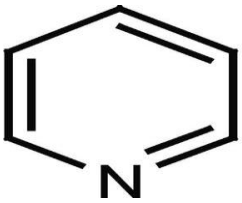
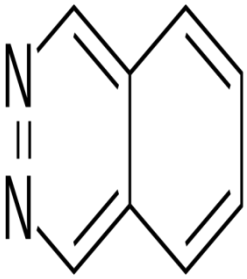
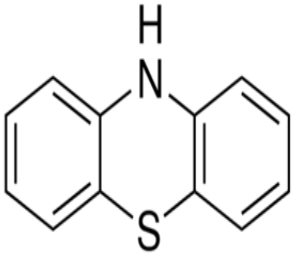
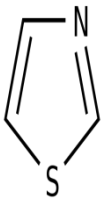
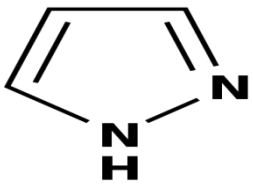
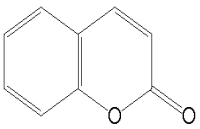
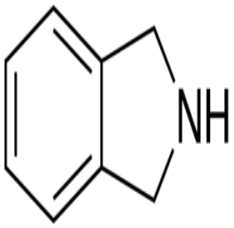
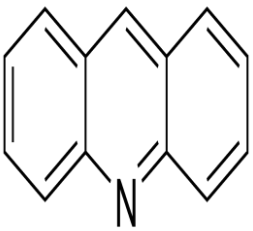
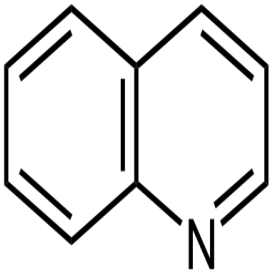
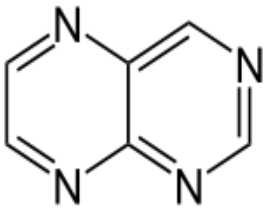
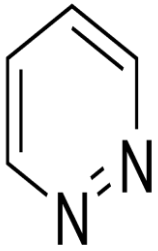
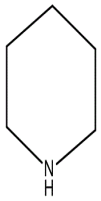
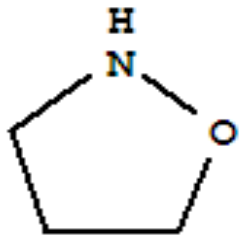
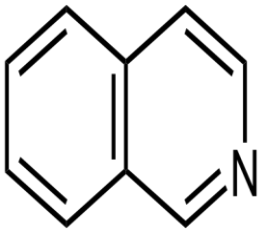
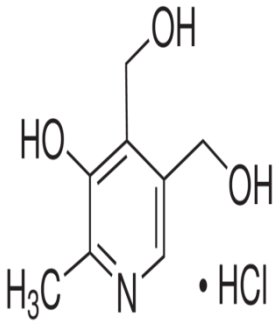
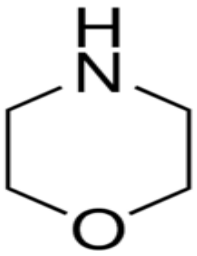
|---|---|---|---|
| **Paracetamol**   | **Indole**   | **Pyrimidine**   | **Quinazoline**   |
| **Pyridine**   | **Phthalazine**   | **Phenothiazine**   | **Thiazole**   |
| **Pyrazole**   | **Coumarin**   | **Isoindoline**   | **Acridine**   |
| **Quinoline**   | **Pteridine**   | **Pyridazine**   | **Piperidine**   |

| Isoxazolidine | Isoquinoline | Pyridoxine | Morpholine |
|---|---|---|---|
|  |  |  |  |

**Section- B**

**All questions carry three marks.**

**Question No. 01** what are local anaesthetic agents? Give one example.

**Question No. 02** Define vitamin. Give examples of fat and water soluble vitamins.

**Question No. 03** What are antispasmodic drugs? Name two such drugs.

**Question No. 04** Write short notes on: Analeptics.

**Question No. 05** Write the structure, chemical name and uses of Pethidine.

**Question No. 06** Write the structure, chemical name and uses of Trimethoprim.

**Question No. 07** Write the structure, chemical name and uses of Paracetamol.

**Question No. 08** Write the structure, chemical name and uses of Salbutamol.

**Question No. 09** Write the structure, chemical name and uses of Morphine.

**Question No. 10** Write the structure, chemical name and uses of Diazepam.

**Question No. 11** Write the structure, chemical name and uses of Glutethamide.

**Question No. 12** Write the structure, chemical name and uses of Metronidazole.

**Question No. 13** Give Write the structure, chemical name and uses of Diphenhydramine.

**Question No. 01 what are local anaesthetic agents? Give one example.**

**Answer:** Local anaesthetics are the drugs which produce reversible loss of sensation in limited area without loss of consciousness. They act by blocking the conduction of sensory nerve impulses near to the site of their application. They produce loss of pain without loss of consciousness.

**Classification**: Chemically they are classified as:

**1) Esters:**

(a) Esters of benzoic acid e.g cocaine

(b) Esters of p-amino benzoic acids e.g benzocaine, procaine

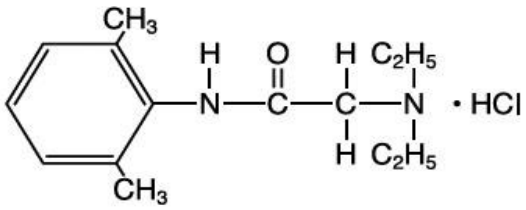
**2) Amides:**

(a) Anilide amides e.g xylocaine (lignocaine)

(b) Non-anilide amides e.g. cinchocaine

**3) Miscellaneous compounds:** e.g. Phenol, Chlorobutanol, Eugenol, Benzyl alcohol

**Example: Lignocaine**



**Chemical Name:** N-diethyl amino acetyl 2, 6 –xylidine

**Properties:** Its hydrochloride salt occurs as white crystalline powder which is odourless and has slightly bitter taste followed by sensation of numbness. It is very soluble in water.

**Stability and Storage:** It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

**Dosage forms:** Lignocaine injection, Lignocaine eye drops. Lignocaine gels.

**Uses:** It is mainly used for its local anesthetic activity and is used for topical application for infiltration, to produce dental analgesia, for nerve block and for treatment of arrhythmias.

**Question No. 02 Define vitamin. Give examples of fat and water soluble vitamins.**

**Answer:** Vitamins may be regarded as organic compounds required in the diet in small amounts to perform specific biological functions for normal maintenance of optimum growth and health of the organism.

**Classification:**

1) **Fat soluble vitamins:** Vitamins A, D, E, and K

2) **Water soluble vitamins:** Vitamin B complex, Vitamin C

{Vitamin B complex i.e., Thiamine ($B_1$), Riboflavin ($B_2$), Pantothenic acid ($B_3$), Niacin ($B_4$), Pyridoxine ($B_6$), Biotin, Folic acid, Lipoic acid, Cyanocobalamine ($B_{12}$)}.

**Question No. 03. What are antispasmodic drugs? Name two such drugs.**

**Answer:** The drugs used for the treatment or prevention of spasm is called as antispasmodic drugs.

**1) Atropine:** It is an alkaloid obtained mainly from hyoscyamus muticus, duboisia species or extracted from *Atropa belladona.*

**Chemical Name:** tropan - 3yl (±) tropane

**Properties:** It occurs as colourless crystals or white crystalline powder. It is odourless and has a bitter taste. It is sparingly soluble in water and freely soluble in chloroform.

**Stability and Storage:** It effloresces in dry air due to presence of water of crystalline. It is slowly affected by light.

**Uses:** It is used as an antispasmodic. It is used as a mydriatic in ophthalmologic practice.

**2) Hyoscine:** It is an alkaloid extracted from various members of solanaceous species

**Properties:** It occurs as colourless crystals or white crystalline powder. It is odourless. It is freely soluble in water.

**Stability and Storage:** It effloresces in dry air due to presence of water of crystalline. It is slowly affected by light.

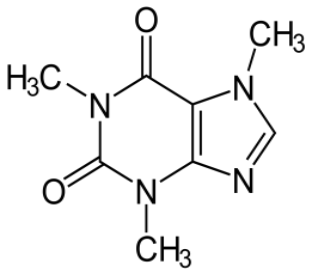
**Uses:** It is used as a sedative, prophylaxis against motion sickness and an amnesic agent in obstetrics.

**Question No. 04 Write short notes on Analeptics.**

**Answer: Analeptics:** The drugs which increase the activity of various subunits or parts of central nervous system are called as CNS stimulants (Analeptics).

**Examples**

**1) Caffeine:** It is a xanthine derivative. It is obtained chiefly from tea waste or coffee, or from the dried leave of *Camellia Sinesis* or it is obtained by synthesis.



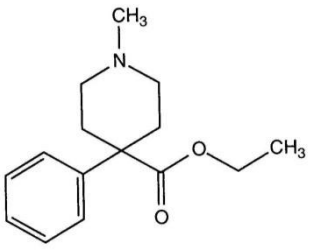

**Chemical Name:** 1, 3, 7-trimethyl xanthine

**Physical Properties:** It occurs as white crystalline powder or silky white crystals. It is odourless and bitter in taste.

**Uses:** It is a CNS stimulant. It may stimulate the respiratory centre, increasing the rate and depth of respiration. It has weak diuretic activity. It is used in the analgesic preparation with aspirin, codeine and propoxyphene. It is treatment of migraine.

**Question No. 05. Write the structure, chemical name and uses of Pethidine.**

**Answer:** Pethidin**e** is a piperidine derivation.



**Chemical name:** Ethyl-1-methyl, 4-phenyl, Piperidine-4-carboxylate

**Properties:** It occurs as white crystalline powder which is odourless and has a bitter and slightly acid taste.

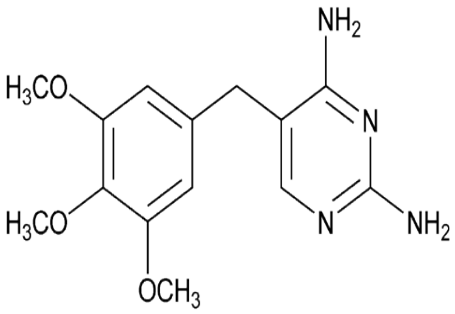
**Uses:** i) It is used to relieve moderate to severe pain.

ii) It is used as pre-anaesthetics.

iii) It is used as an obstetrical analgesic.

**Question No. 06. Write the structure, chemical name and uses of Trimethoprim.**

**Answer:** Trimethoprim: It is a pyrimidine derivative in which two amino groups are present at 2 and 4 positions and 3, 4, 5-trimethyl benzyl group at $C_5$. The presence of methoxy groups in phenyl nucleus reduces the lipophilicity and thus optimum activity is obtained. It is not only antimalarial but also has antibacterial activity.




**Chemical name:** 5-(3, 4, 5-trimethoxybenzyl) pyrimidine-2, 4-diamine

**Properties:** It is white powder or yellowish-white powder. It is very slightly soluble in water.

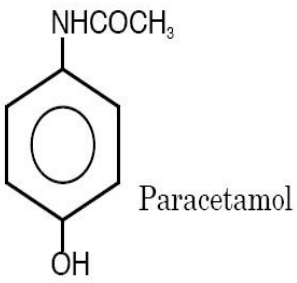
**Stability and storage:** It is affected by air, moisture and light and hence it is stored in tightly closed light-resistant containers.

**Uses:** It is used for treating pneumonia. It is used for treatment of infections of urinary and respiratory tracts.

**Question No. 07. Write the structure, chemical name and uses of Paracetamol.**

**Answer: Chemical Name:** p-hydroxy acetanilide

**Physical Properties:** It occurs as white crystals or white crystalline powder which is odourless and has a bitter taste. It is sparingly soluble in water and soluble in alcohol.



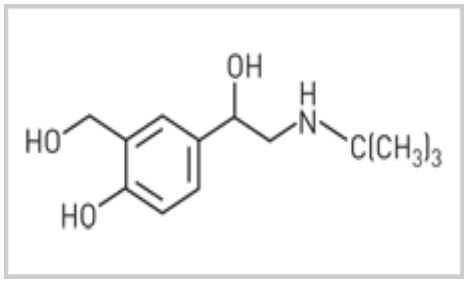
Paracetamol

**Uses:** i) It is used as antipyretic.

ii) It is used as an analgesic for relief of pain such headache, toothache and rheumatism.

**Question No. 08. Write the structure, chemical name and uses of Salbutamol.**

**Answer:**




**Chemical Name:** 1-(4-hydroxy-3-hydroxymethylphenyl)-2-butyl-amino) ethanol

**Physical Properties:** It is white or almost white, crystalline powder, sparingly soluble in water.

**Uses:** Salbutamol is typically used to treat bronchospasm (due to any cause, allergen asthma or exercise-induced), as well as chronic obstructive pulmonary disease. Salbutamol has been used to treat acute hyperkalemia.

**Question No. 09. Write the structure, chemical name and uses of Morphine.**

**Answer:** Morphine: It is the principal alkaloid obtained from opium. It belongs to phenanthrene class of alkaloid. It contains morphinan heterocycle.

**Physical Properties:** It occurs as white, needle-like crystals. It has bitter taste. It is very slightly soluble in water, slightly soluble in alcohol.

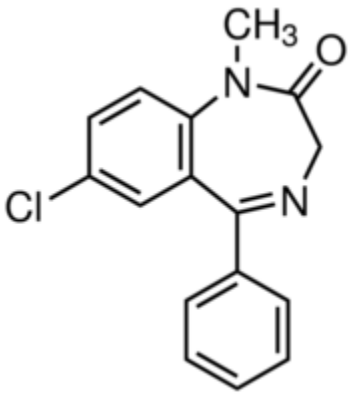
**Uses:** It is used for control of moderate to severe, acute and chronic pain especially associated with neoplasm. Morphine is also used to suppress responses to intra-operative surgical stimuli.

**Question No. 10. Write the structure, chemical name and uses of Diazepam.**

**Answer:** Diazepam: It is a benzodiazepine derivative.

**Chemical Name:** 7-chloro, 2, 3-dehyro, 1-methyl, 5-phenyl, 1H-1, 4-benzodiazepine -2- one

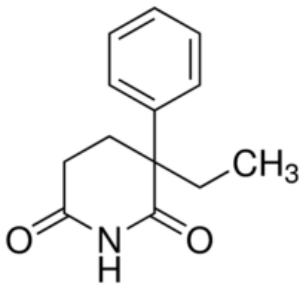
**Physical Properties:** It occurs as a white or pale yellow crystalline powder. It is odourless or almost odourless and tasteless at first followed by bitter taste.



**Uses:** Diazepam also is used for the treatment of agitation, tremors, seizures, and hallucinations resulting from alcohol withdrawal. It is used for relief of muscle spasms in some neurological diseases and for sedation during surgery.

**Question No. 11. Write the structure, chemical name and uses of Glutethamide.**

**Answer:** Glutethamide: It is a piperidine - 2, 6-dione derivative in which ethyl and phenyl groups are present at $C_3$.




**Chemical name:** 3-ethyl, 3-phenyl piperidine – 2, 6 - dione

**Properties:** It is white powder or colourless crystals. It is odourless with bitter taste.

**Stability and storage:** It is affected by air, moisture and light and hence it is stored in tightly closed light-resistant containers.

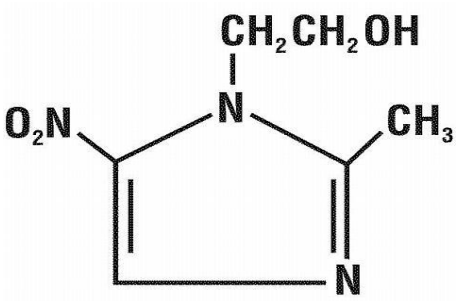
**Uses:** It is hypnotic and sedative. It is used to induce sleep. It was also been used to relieve anxiety and tension.

**Question No. 12. Write the structure, chemical name and uses of Metronidazole.**

**Answer: Chemical name:** 2 - (2-methyl, 5-nitro imidazol-1-yl) ethanol.

**Physical properties:** It is white or creamy white crystalline powder with bitter and saline taste. It is slightly soluble in water but soluble in alcohol.

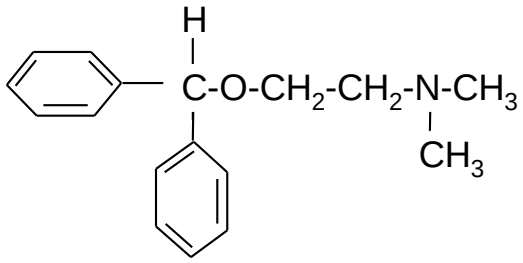
**Stability and storage:** It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.




**Uses:** It is used to treat amoebic dysentery, amoebic hepatitis, diarrhoea and dysentery symptoms. It is also used in septicemia.

**Question No. 13. Give Write the structure, chemical name and uses of Diphenhydramine.**

**Answer: Diphenhydramine**




**Chemical name:** 1-dimethylamino, 2-diphenylmethoxy ethane

**Properties:** It is available as hydrochloride salt, white crystalline powder. It is odourless and bitter. It is freely soluble in water, alcohol and chloroform.

**Stability and storage:** It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

**Uses:** It is used to treat allergic skin reactions like urticaria, pruritis, perennial rhinitis, vasomotor rhinitis. It is used for motion sickness and post-operative vomiting. It is used for cardiac arrhythmia in combination with antazoline. It has sedative property also.

## SECTION- C

**All questions carry five marks.**

**Question No. 01**. What are hypnotics and sedatives? Give examples.

**Question No. 02.** Write a note on Local anesthetics.

**Question No. 03.** Write a note on Antithyroid drug.

**Question No. 04.** What are steroids? Give example of female hormones.

**Question No. 05.** Write short notes on: (a) Antitubercular (b) Adrenergic drugs

**Question No. 06.** Give an account of histamine $H_1$ – receptor antagonist.

**Question no. 07.** Write the structure, nomenclature and uses of (i)Coramine (ii)Chlorpheniramine (iii) Hydrochlorothiazide

**Question No. 08.** Write chemical structure, chemical name, category and uses of the following drugs.

(a) Furosemide (b) Propranolol (c) Menadione

**Question No. 09.** Define cholinergic drugs and give a details account on neostigmine or physostigmine.

**Question No. 10.** Write a note on Tranquilizers.

**Question No. 11.** Write a note on Antileprotic drugs.

**Question No. 12.** Write a note on Antifungal agents.

**Question No. 01. What are hypnotics and sedatives? Give examples.**

**Answer:** These are the drugs, which calms the patients and induces sleep.

**Hypnotic** are the drugs which depress CNS and produce sleep, resembling natural sleep in normal dose.

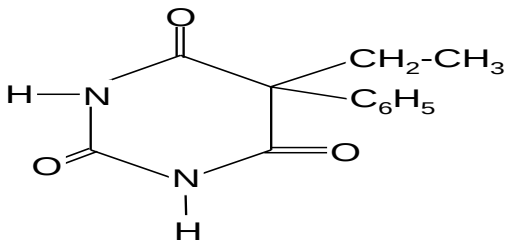
**Sedatives are** CNS depressants but do not induce sleep in normal dose but calms the nerves.

**Classification**

1) **Barbiturates:** Barbitone, Phenobarbitone, Thiopental.
2) **Benzodiazepines:** Diazepam, Nitrazepam
3) **Aldehydes and derivatives:** Paraldehyde
4) **Alcohols and derivatives:** Triclofos sodium.

**Examples:**

**1) Phenobarbitone**




**Chemical name:** 5-ethyl, 5-phenyl barbituric acid

**Properties:** It is white, bitter crystalline powder, which is slightly soluble in water but soluble in alcohol.

**Stability and storage:** It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

**2) Butabarbitone**

**Properties:** It is white, bitter crystalline powder, which is slightly soluble in water but soluble in alcohol.

**Stability and storage:** It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

**Question No. 02. Write a note on Local anesthetics.**

**Answer:** Local anaesthetics are the drugs which produce reversible loss of sensation in limited area without loss of consciousness. They act by blocking the conduction of sensory nerve impulses near to the site of their application. They produce loss of pain without loss of consciousness.

**Classification**: chemically they are classified as:

**1) Esters:**

i) Esters of benzoic acid e.g. cocaine

ii) Esters of p-amino benzoic acide e.g. benzocaine, procaine

**2) Amides:**

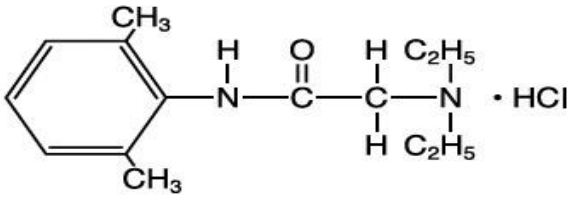
i) Anillide amides e.g xylocaine (lignocaine)

ii) Non-anilide amides e.g. cinchocaine

**3) Miscellaneous compounds: e.g.** phenol, chlorobutanol, eugenol, benzyl alcohol

**Some examples of local anesthetics are explained below:**

**(1) Lignocaine**



Chemical name: - N-diethyl amino acetyl 2, 6 –xylidine

Physical properties: - Its hydrochloride salt occurs as white crystalline powder which is odourless and has slightly bitter taste followed by sensation of numbness. It is very soluble in water.

Stability and storage: - It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

Uses: - It is mainly used for its local anesthetic activity:

i) It is used for topical application.

ii) It is used for infiltration.

iii) It is used to produce dental analgesia.

iv) It is used for nerve block.

v) It is used for treatment of arrhythmias.

**(2) Benzocaine**

It is ester of p-amino benzoic acid.

Physical properties: - It is colourless or white, bitter powder which is slightly soluble in water and soluble in alcohol.

Stability and storage: - It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

**Question No. 03. Write a note on Antithyroid drugs.**

**Answer:** Thyroid gland secret various hormones in body such as thyroxine and tetraiodothyronine and calcitonine which play very important role in metabolism, synthesis and regulations of body functions. The increase in secretions of thyroxine hormone in body cause increase basal metabolic rate and the condition is called hyperthyroidism.

**Antithyroid drugs:** The increased secretion of thyroid hormone results in hyperthyroidism, where metabolic rate is increased. It is characterized by increased heart rate, glucosuria and anorexia. The drugs which prevent the biosynthesis of thyroid hormones by acting on gland are generally called as antithyroid drugs or intrathyroidal inhibitors.

**Classification: -**

**Iodide ions** e.g. inorganic iodides

**Thioamides or thionamides** e.g. propyl thiouracil, carbimazole

**Aromatic amine or phenols** e.g. sulphaguanidine, PAS and phloroglucinol

**Lithium salt** e.g. lithium carbonate

**Some examples of antithyroid drugs are explained below:**

**Inorganic iodides**

Large doses of iodide inhibit the synthesis and release of thyroid hormones. The use of radioactive iodine ($I^{131}$) is an alternative to surgery in treatment of hyperthyroidism.

**(1) Methimazoles**

It is 4-imidazole derivative and it is active metabolite of carbimazole.

Physical properties: - It is white to pale buff colour powder, having faint characteristic odour, freely soluble in water.

**(2) Propylthiouracil**

It is 6-methyl-2-thiouracil i.e. it contains hexahydro pyrimidine heterocycle.

Physical properties: - It is white or pale colour crystalline powder, odourless, bitter in taste, very slightly soluble in water.

Stability and storage: - It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

**Question No. 04. What are steroids? Give example of female hormones.**

**Answer:** Steroid are polycyclic organic compounds containing 1, 2-cyclopentano-perhydrophenanthrene skeleton i.e. it contains four fused rings viz A, B, C and D and thus are polycyclic hydrocarbons.

**Female hormone:** Oestradiol and progesterone are main female hormones. Oestradiol is the oestrogrnic hormone secreted by ovary. It is mainly concerned with development and maintenance of secondary female characters and growth and development of female reproductive organs.

**Example:**

**1) Oestradiol:** It is used in hormone replacement therapy in females i.e. after menopause or overiectomy. It is used to treat menopausal symptoms. It is used to treat primary amenorrhoea, delayed

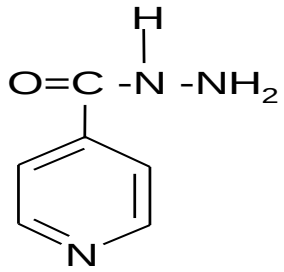
onset of puberty. It is used to treat breast cancer in post menopausal women. It is used to treat prostatic carcinoma in men.

**2) Progesterone:** It contains a steroid nucleus viz. pregnane. It is used to treat dysfunctional uterine bleeding, dysamenorrhoea and endometrosis. It is used to treat habitual or threatened abortions and to maintain pregnancy. It is also used to treat premenstrual syndrome, breast cancer and endometrium cancer.

**Question No. 05. Write short notes on: (a) Antitubercular (b) Adrenergic drugs**

**Answer: (a) Antitubercular:** Tuberculosis is highly infectious disease caused by various species of genus mycobacterium but most of cases are due to tubercule, bovine and avian species. These bacteria highly affect the respiratory system and in later stage it also affects joints, brain and other parts of body also. Antitubercular drug are the drugs, which are used in the treatment of infection caused by Mycobacterium tubercule.

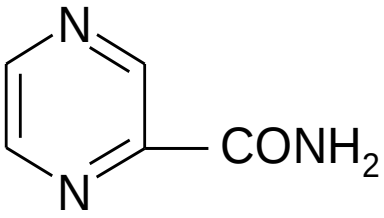
**Example: 1) Isoniazid**




**Chemical name:** Pyridine-4-carbohydrazide.

**Properties:** It is colourless or white crystalline powder. It is odourless and soluble in water.

**2) Pyrazinamide**




**Chemical name:** Pyrazine-2-carboxamide

**Properties:** It is colourless or white crystalline powder. It is odourless and soluble in water.

**Stability and storage:** It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

**(b) Adrenergic drugs**: The drugs which bring about stimulation of adrenergic nerves are called as adrenergic drugs or adrenomimetics or adrenergic stimulants.

**Classification:** -

1) **Catecholamines:** adrenaline, nor-adrenaline, and isoprenaline
2) **Non-Catecholamines:**

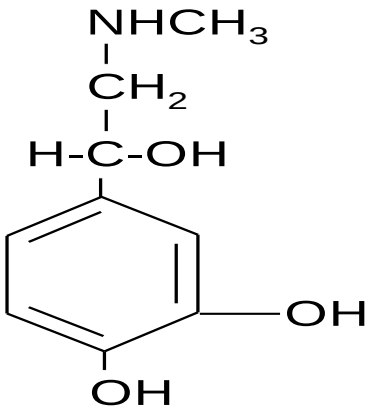
i) Containing phenyl ethylamine skeleton e.g. sulbutamol, phenylephrine, ephedrine

ii) Aliphatic amines e.g. cyclopentamine

iii) Midazoline derivatives e.g. naphazoline

**Examples**

**Adrenaline**




**Question No. 06. Give an account of histamine $H_1$ – receptor antagonist.**

**Answer: Histamine $H_1$-receptor antagonist:** The drugs that abolish or diminish some of the actions of histamine in the body are called as Antihistamines.

**Classifications:**

**1) $H_1$-blockers:**

i) Amino alkyl ethers e.g. diphenhydramine, doxylamine

ii) Ethylene diamine e.g. mepyramine

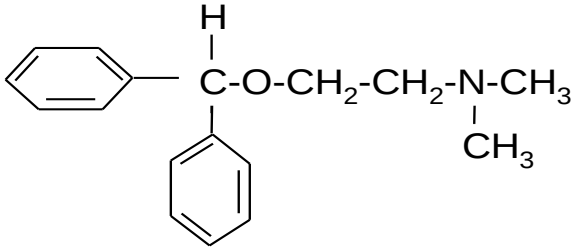
iii) Alkyl amines or propyl amines e.g. pheniramine, chlorpheniramine, triprolidine.

iv) Phenothiazines e.g. promethazine

**2) $H_2$-blockers:** ranitidine

**Examples:**

**Diphenhydramine**



**Chemical name:** 1-dimethylamino, 2-diphenylmethoxy ethane

**Physical properties:** It is available as hydrochloride salt, white crystalline powder. It is odourless and bitter. It is freely soluble in water, alcohol and chloroform.

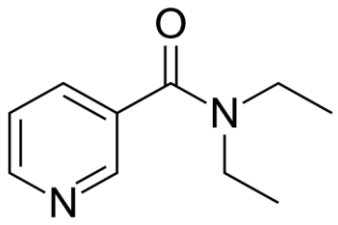
**Stability and storage:** It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

**Question no.07 Write the structure, nomenclature and uses: (i)Coramine (ii) Chlorpheniramine iii) Hydrochlorothiazide**

**Answer: i) Coramine:**

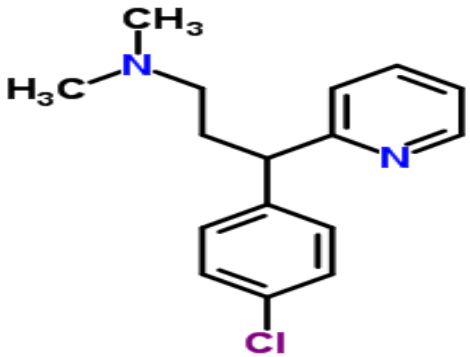
**Nomenclature:** N, N-diethyl-1-oxidopyridin-1-ium-3-carboxamide

**Structure:**




**Uses:** It is a stimulant which mainly affects the respiratory cycle. Widely known by its former trade name of Coramine, it was used in the mid-twentieth century as a medical countermeasure against tranquilizer overdoses, before the advent of endotracheal intubation and positive-pressure lung expansion.

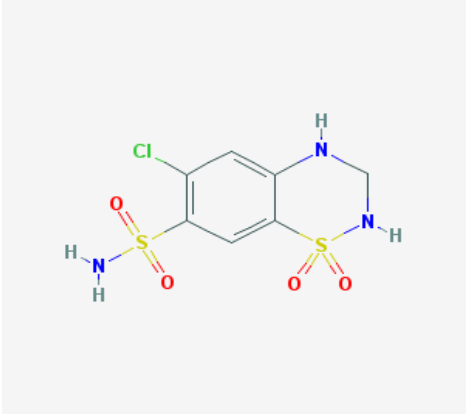
**ii) Chlorpheniramine:**




**Nomenclature:** but-2-enedioic acid; 3-(4-chlorophenyl)-N, N-dimethyl-3-pyridin-2-ylpropan-1-amine

**Uses:** It is an antihistamine that reduces the effects of natural chemical histamine in the body. Histamine can produce symptoms of sneezing, itching, watery eyes, and runny nose. Chlorpheniramine is used to treat runny nose, sneezing, itching, and watery eyes caused by allergies, the common cold, or the flu.

(iii) **Hydrochlorothiazide:**



**Nomenclature:** 6-chloro-3, 4-dihydro-2H-1, 2, 4-benzothiadiazine-7-sulfonamide 1, 1-dioxide.

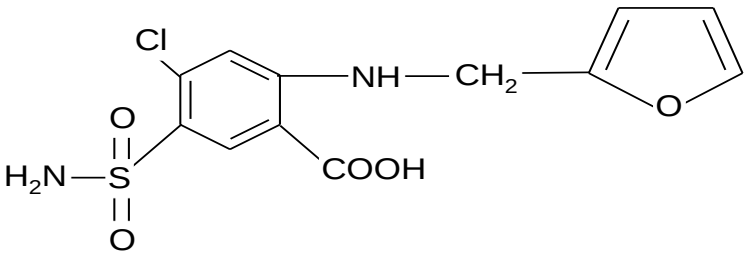
**Uses:** It is used to treat high blood pressure (hypertension). Hydrochlorothiazide is also used to treat fluid retention (edema) in people with congestive heart failure, cirrhosis of the liver, or kidney disorders, or edema caused by taking steroids or estrogen.

**Question No. 08. Write chemical structure, chemical name, category and uses of the following drugs.**

**(a) Furosemide (b) Propranolol (c) Menadione**

**Ans (a) Furosemide**

Category: - Diuretics




Chemical name: - 4-chloro, 2-furfurylamino, 5-sulphamoyl benzoic acid

Uses: -

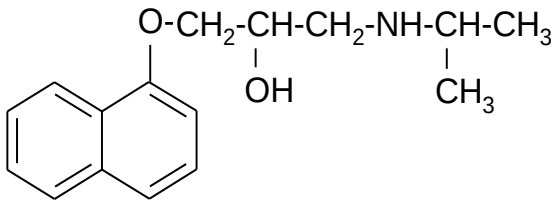
i) It is used as a diuretic.

ii) It is used to treat oedema.

iii) It is used for management of hypertension.

**(b) Propranolol**

Category: - Adrenergic antagonist

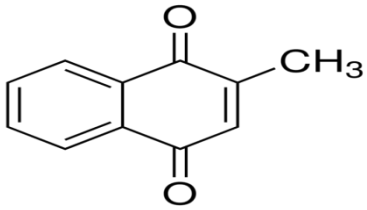



Chemical name: - 1-isopropylamino, 3-(1-napthyloxy) propan-2-ol

Use: It is used to treat cardiac arrhythemia, angina pectoris, hypertension, anxiety and hyperthyroidism in children.

**(c) Menadione**

Category: - Vitamin $K_3$



Chemical name: - 2-methyl-1, 4-naphthoquinone

Uses:

i) It is used to prevent vitamin k deficiency in patients with malabsorption syndromes.

ii) It is used to prevent and cure of neonatal haemorrhage.

iii) It is used as radiosensitizer to treat cancer.

iv) It is used to treat haemorrhage.

**Question No. 09. Define cholinergic drugs and give a details account on neostigmine or physostigmine.**

**Ans:** Cholinergic drugs are those drug which exert pharmacological action like acetylcholine drugs which bring about stimulation of cholinergic nerve.

**Classification: -** They are classified as:

**1) Cholinergic agonists (direct action)**

i) Esters of choline: - e.g. acetylcholine

ii) Alkaloids: - e.g. pilocarpine

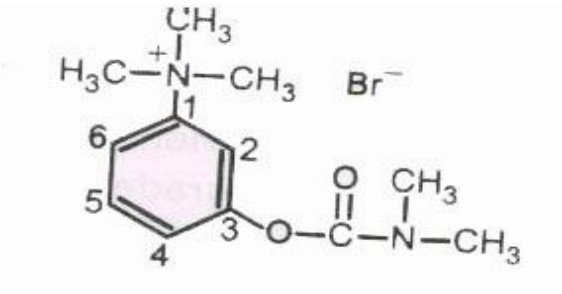
**2) Indirect acting cholinergic agonists**

i) Cholinesterase inhibitors: - e.g. neostigmine, physostigmine

**Some examples of cholinergic drugs are explained below:**

**(1) Neostigmine**

It is quaternary ammonium anticholineesterase.



Chemical Name: 3 - (dimethylcarbamoyloxy) N, N, N- trimethyl anilinium bromide

Physical properties: It occurs as colourless crystals or white crystalline powder. It is odourless and has a bitter taste. It is very soluble in water.

Uses:

i) It is used to treat to diagnose myasthenia gravis.
ii) It is used to treat to treat paralytic ileus.
iii) It is used to treat for post operative urinary retention.
iv) It is used to treat to promote expulsion of intestinal flatus.
v) It is used to treat to antagonize muscular relaxation due to curare like drugs or muscle relaxants used in anaesthesia.

**(2) Physostigmine**

It is an alkaloid obtained from seeds of physostigmine species.

Physical properties: It occurs as colourless crystals. It is odorless. It is sparingly soluble in water.

Uses:

1) It is used to treat glaucoma.
2) It is used to treat poisoning with anticholinergic drugs and tricyclic antidepressant drugs.
3) It is used for reversal of postoperative over sedation.
4) It is used to treat some psychiatric and neurologic disorder.
5) It is used as miotic.

**Question No. 10. Write a note on Tranquilizer.**

**Ans: Tranquilizers:** Antipsychotics is a group of CNS depressants which calms and sedates the nerves. They have an ability to calm severe disturbed psychiatric patients and to lessen symptoms of their illness without loss of consciousness or without causing other neurological side effects. Since, these drugs do not cure the basic disease; they are not, in strict sense, antipsychotics. As they reduce the psychotic symptoms and patient feels comfortable, hence they, more commonly, are called as tranquillizers.

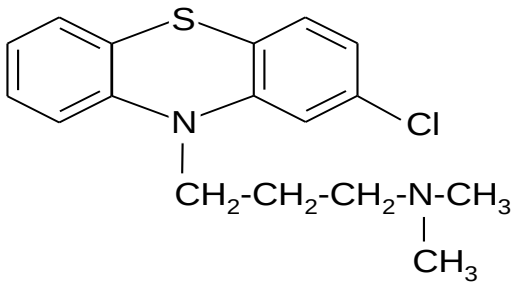
**Classification: -**

1) **Phenothiazine derivatives and related tricyclic compounds** :
   i) Phenothiazine derivatives : e.g. chlorpromazine, prochloperazine, trifluoroperazine
   ii) Thioxanthenes : e.g. chlorprothixene, flupenthixol
2) **Butyrophenones** e.g. haloperidol, trifluoperidol
3) **Dibenzodiazepines** e.g. clozapine
4) **Benzamides and salicylamides** e.g. sulpiride
5) **Diphenylbutyl piperidine derivatives** e.g. pimozide

**6) Miscellaneouse** e.g. reserpine

**Some examples of antipsychotic agents are explained below:**

**(1) Chlorpromazine**




**Chemical name: - 2-Chloro, 10-(3-dimethyl amino propyl) phenothiazine.**

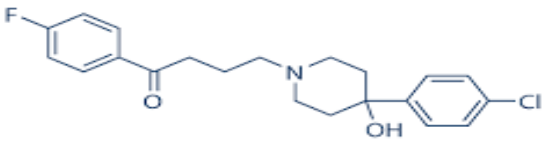
Physical properties: It is a white or cream white colouring powder with slight odour. It is very soluble in water and freely soluble in alcohol.

Uses:

i) It is used to treat schizophrenia, mania and hypomania, to control nausea and vomiting.
ii) It is used to produce pre and post operative sedation. It enhances the effects of barbiturates and analgesics.
iii) It is vasodilator and brings about reduction in B.P.
iv) It also reduces salivary and gastric secretion.
v) It also shows local anaesthetic property.

**(2) Butyrophenones**

Chemical Name: - 4-[4-(p-chlorophenyl),4-hydroxy piperidine] 4'-flouro butyrophenone




Physical properties: - It is a white to faint yellowish or microcrystalline powder. It is odourless and tasteless. It is practically insoluble in water, sparingly soluble in alcohol.

Uses:

i) It is used to treat acute schizophrenia, mania and hypomania, behavioral disturbances and severe anxiety.
ii) It is antiemetic.

iii) It potentiates the action of CNS depressants like analgesics, barbiturates and analgesics.

**Question No. 11. Write a note on Antileprotic drugs.**

**Ans:**

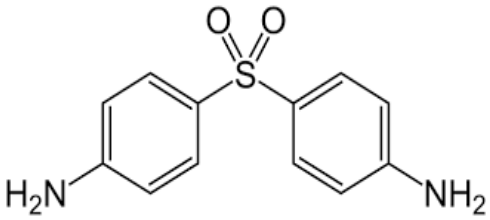
**Classification: -**

1) **Sulphones** e.g. dapsone
2) **Thiosemicarbazone derivatives** e.g. thiambutosine
3) **Phenazine derivatives** e.g. clofazimine

**Some examples of antileprotic drug are explained below**:

**(1) Dapsone**

It is a sulphone. The term sulphone is used for all the derivatives containing4, 4'-diamino diphenyl sulphone. In this class, the amino group of sulphamyl group of sulphonamides is replaced by p-aminophenyl group.




Chemical name: 4, 4'-diamino diphenyl sulphone

Physical properties: It occurs as a white or creamy white crystalline powder. It is odourless and slightly bitter taste. It is slightly soluble in water, and soluble in acetone and in dilute mineral acids.

Uses:

i) It is mainly used to treat both forms of leprosy. However, it is a drug of choice to treat leprosy in combination with rifampicin.
ii) It has a suppressive action on malaria parasites.
iii) It is also used in the treatment of dermatitis and relapsing polychondritis.
iv) In combination with trimethoprim or pyrimethamine, it is used to treat pneumonia.

**(2) Clofazimine**

It contains 2, 10-dihydrophenazine heterocycle.

Physical properties: It occurs as dark red crystals or as orange-red micro-crystalline powder. It is practically insoluble in water, and soluble in dimethylformaide and in macrogol 400.

Uses: It is used to treat leprosy, especially for dapsone resistant bacilli.

i) It is also used to treat lepromatous leprosy of recent onset.

**Question No. 12. Write a note on Antifungal agents.**

**Answer: Antifungal agents:** A drug used to treat fungal infections is called antifungal agents or drugs. It is also known as antimycotic medication.

**Classification:**

**(A) Synthetic compounds:**

(i) Carboxylic acids and their metallic salt e.g. undecylenic acid, zinc undecenonate.

(ii) Dyes e.g. gentian violet, malachite green.

(iii) Phenolic compounds e.g. salicylic acid.

(iv) Diamidines e.g. stilbamidine.

(v) Thiocarbanilic acid derivatives e.g. tolnaftate.

(vi) Azoles e.g. miconazole, clotrimazole.

**(B) Natural products:**

(i) Antibacterial antibiotics e.g. Griseofulvin

(ii) Polyene antifungal antibiotics

(a) tetraenes e.g. nystatin, amphotericin A.

(b) pentaenes e.g. pentamycin.

(c) heptaenes e.g. amphotericin B, hamycin.

**Some examples of antifungal agents:**

**(1) Undecylenic acid**- It mainly consists of undec- 10- enoicacid.

$CH_2 = CH - (CH_2)_8 - COOH$

Properties: It occurs as colourless or pale brownish clear liquid. It has characterstic odour.It is practically insoluble in water.

Uses : (i) It is used as topical fungicidal.

(ii) Internally, it is used to treat psoriasis, neurodermatitis.

## SECTION: D

**All questions carry ten marks.**

**Question No. 01.** Write a note on the following with examples: -

(a) Hypoglycaemic agents (b) Antimalarial drugs

**Question No. 02.**Define antibiotics. Classify them and write an account of penicillin, tetracycline and chloramphenicol.

**Question No. 03.**Write a note on following:-

Non-steroidal anti-inflammatory drugs. (NSAID's)

**Question No. 04.** Discuss diuretics in detail.

**Question No. 05.** Write a note on anticonvulsants or antiepileptic drugs.

**Question No. 06.** Write classification, chemical structure and uses of sulfonamides.

**Question No. 07.** Write a note on the (a) Cardiotonic drugs (b) Anticoagulants

**Question No. 08.** Write chemical structure, chemical name, category and uses of the following drugs.

(a) Chloroquine (b) Ephedrine (c) Chlorpromazine (d) Proflavine

**Question No. 09.** Write a note on hypnotics and sedatives.

## ANSWERS:

**Question No. 01. Write a note on the following with examples: -**

**(a) Hypoglycaemic agents (b) Antimalarial drugs**

**Ans 01: (a)** The normal level of glucose in blood after fasting is 80-110mg/100ml of blood in body which is also called fasting blood glucose. The increase in blood glucose level above this range is called hyperglycaemia which is also called diabetes mellitus.

**Hypoglycaemic agents: -** The drugs which are used to lower blood sugar level are called as hypoglycaemic agents. They are used to treat diabetes mellitus.

**Classification: -**

1) **Hormones**: - insulin
2) **Oral hypoglycaemic agents**:

i) Sulphonylureas: - chlorpropamide, tolbutamide

ii) Biguanides: - phenformin, metformin

iii) Meglitinides: - repaglinide, nateglinide

3) **Plant product**: - guar gum

**Some examples of hypoglycaemic agents are explained below:**

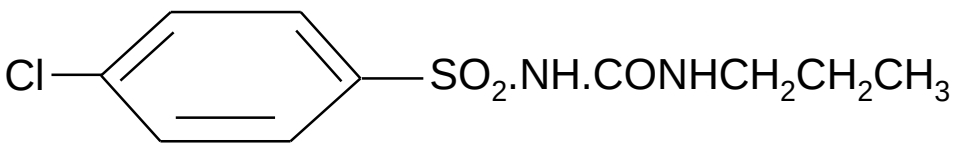
**(1) Insulin**

It is a polypeptide of 51 amino acids, obtained from pancreas of pig or ox.

Physical properties: - It is white crystalline powder, slightly soluble in water but soluble in solution of alkali hydroxides.

Stability and storage: - It is sensitive to heat and light and hence it is stored in a well closed container at a temperature below

**(2) Chlorpropamide**




Chemical name: - 1-(p-chlorobenzene sulphonyl), 3-propyl urea

Physical properties: - It occurs as white crystalline powder, which is odourless and tasteless. It is practically insoluble in water but soluble in alcohol and solutions of alkali hydroxides.

Stability and storage: - It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

**Ans 01: (b)** Malaria is caused by four species of plasmodium i.e. P. falciparum, P. vivax, P. ovale, P. malariae which occurs due to bite of female anopheles mosquito. The body temperature rises periodically after a specific interval time with chilling and body ache. The drugs used for the treatment or prevention of malaria are called as antimalarial agents.

Classification: - **On the basis of chemical structure antimalarial drugs are classified as: -**

1) **Quinoline derivatives: -** quinine, chloroquine, and primaquine
2) **Acridines: -** mepacrine
3) **Biguanidines: -** proguanil
4) **Pyrimidine derivatives: -** pyrimethamine, trimethoprim.
5) **Others: -** prontosil, dapsone

**Some examples of antimalarial agents are explained below:**

**(1) Quinine**

It is an alkaloid present in cinchona bark.

Physical properties: - It is white or yellow white powder, which is bitter in taste. It is very low soluble in alcohol.

Stability and storage: - It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

Uses: -

i) It is used to treat malaria caused by P. falciparum.
ii) It is used to treat cerebral malaria.
iii) It is used to relive muscle cramp.
iv) It is also shows mild analgesic property.

**Question No. 02. Define antibiotics. Classify them and write an account of penicillin, tetracycline and chloramphenicol.**

**Ans 02:** Antibiotics are the chemical substances which are obtained from the living micro-organisms and which either kill or inhibit the growth of other micro-organism when used in small concentration. It also includes the synthetic compounds, which are structural analogue of naturally occurring antibiotics. There are very effective classes of antimicrobial agents used for the treatment of infections of various pathogens such as bacteria, virus, protozoan, fungi and various types of worms.

Classification: - **There are different was of classifying the antibiotics based on the spectrum and chemical structure**

**A.** Depending upon spectrum of antimicrobial activity**: - Antibiotics are classified as:**

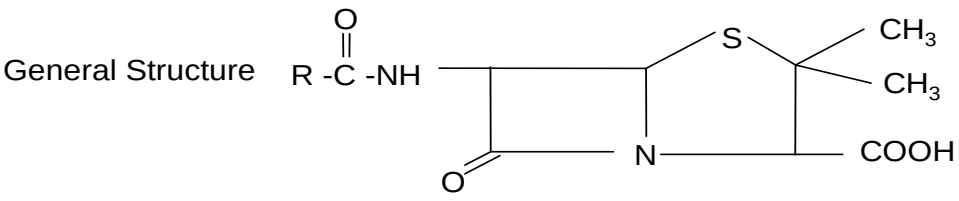
1) **Narrow spectrum antibiotics**: - Which are effective against small number of micro-organism. e.g. benzyl penicillin, streptomycin
2) **Broad spectrum antibiotics**: - Which are effective against large number of microbes. e.g. tetracyclines, chloramphenicol

**B. On the basis of chemical structure: -**

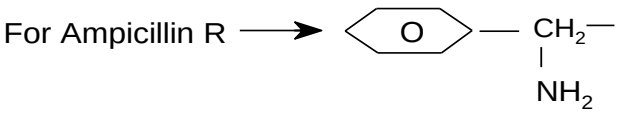
1) **Sulfonamides and related drugs**: - sulfadiazine, dapsone
2) **Quinolones**: - norfloxacin, nalidixic acid
3) **β-lactam antibiotics**: - penicillins, cephalosporins
4) **Nitrobenzene derivative**: - chloramphenicol
5) **Tetracyclines**: - oxytetracycline, chlortetracycline
6) **Aminoglycoside antibiotics**: - streptomycin, gentamicin
7) **Macrolide antibiotics**: - erythromycin
8) **Polyene antibiotics**: - nystatin, amphotericin - B
9) **Azole derivatives**: - ketoconazole, fluconazole

**(1) Penicillin**

Penicillin is obtained from fungi *Penicillium notatum*.








Physical properties: - It is white, crystalline, hygroscopic powder, which is soluble in water and alcohol.

Stability and storage**: -** Store in a dry place below $15^0$C in a well-closed air tight container. It is decomposed by moisture.

Uses**: -**

(1) It is used to treat gonorrhoea and syphilis, meningitis, tetanus, diphtheria, anthrax.

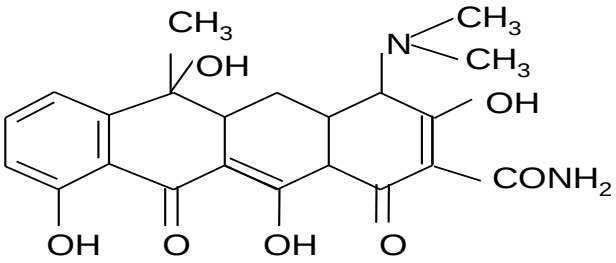
(2) It is used in respiratory tract infections.

(3) It is used to treat rheumatic fever.

Side effects: - Hypersensitivity reaction is major side effect of penicillins.

**(2) Tetracycline**

These classes of antibiotics are having 4 cyclic rings.




Tetracycline

Other examples are chlortetracycline, oxytetracycline, bromotetracycline etc.

Physical properties: - It is yellow bitter powder, which is very low soluble in water but soluble in dilute HCl.

Stability and storage**:** - Store in a dry place below $15^0$C in a well-closed air tight container. It is decomposed by moisture.

Uses: -

i) It is used to treat gonorrhoea and syphilis, meningitis, tetanus, diphtheria, anthrax.

ii) It is used in respiratory tract infections.

iii) It is used to treat rheumatic fever.

**(3) Chloramphenicol:** It is obtained from *Streptomyces venezuelae*.

Physical properties**:** - It is white or grayish or yellowish white powder. It is bitter in taste and very low soluble in water but freely soluble in alcohol.

Stability and storage**:** - Store in a dry place below $15^0$C in a well-closed air tight container. It is decomposed by moisture.

Uses**:** -

i) It is used in the treatment of typhoid and paratyphoid.

ii) It is used in the treatment of meningitis.

iii) It is used in the treatment of urinary tract infections.

iv) It is used in the treatment of eye and ear infection.

**Question No. 03. Write a note on following: -**

**Non-steroidal anti-inflammatory drugs (NSAID's)**

**Ans 03:** There have fewer side effects than steroidal drugs. The body contains an autacoid or local hormone name prostaglandin secreted during various conditions, and release it which cause increase in body temperature i.e. pyrexia. It is cause inflammation in local tissue which causes swelling, fluid logging called oedema and increase sensivity to pain i.e. analgesia.

Classification: -

**1)** Non selective COX-inhibitors:

**i)** Salicylic acids: - aspirin

**ii)** Acetic acids: - indomethacin, diclofenac

**iii)** Propionic acids: - ibuprofen, ketoprofen

**iv)** Fenamic acids: - piroxicam

**v)** Non acidic drugs: - nabumetone

**2) Preferentially COX-2 inhibitor**: - nimesulide

**3) Selective COX-2 inhibitor**: - parecoxib, celecoxib

**Some examples of non-steroidal anti-inflammatory drugs are explained below:**

**(1) Indomethacin**


Chemical Name: - 1-(p-chlorobenzoyl), 5-methoxy, 2-methyl indol-3-yl-acetic acid

Physical properties: - It occurs as a pale yellow to brownish yellow crystalline powder which is odourless and has bitter taste. It is very soluble in water and sparingly soluble in alcohol.

Stability and storage: -It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

Uses**: -**

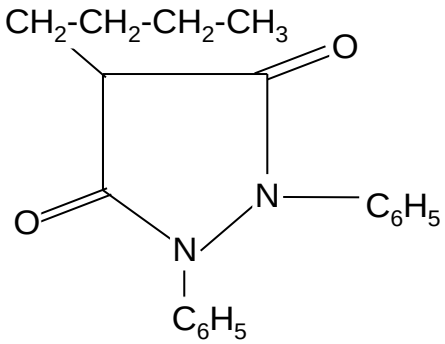
i) It is used in the treatment of arthritis.

ii) It is used in the treatment of osteoarthritis.

iii) It is used in the treatment of gout.

iv) It is used to relieve neck pain, myalgia.

**(2) Phenylbutazone**




Chemical Name: - 4-n-butyl, 1, 2, diphenyl, pyrazolidine 3, 5-dione

Physical properties: - It occurs as white crystalline powder. It is odourless and tasteless at first but has bitter after taste. It is very slightly soluble in water, freely soluble in chloroform and soluble in solution of alkali hydroxide.

Stability and storage: - It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

Uses**:** - It is

i) It is used in the treatment of arthritis.

ii) It is used in the treatment of osteoarthritis.

iii) It is used in the treatment of gout.

iv) It is used to relieve neck pain, myalgia.

**Question No. 04. Discuss diuretics in detail.**

**Ans :** Diuretics are the drugs, which increases rate of urine excretion by kidneys.

Classification: -

1) **High ceiling diuretics (loop diuretics)**: - furosemide, torsemide

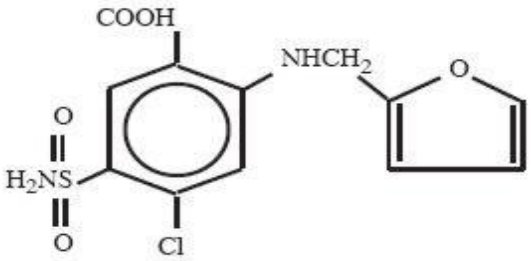
2) **Thiazides**: - chlorthiazide, hydrochlorthiazide.

3) **Potassium-sparing diuretics**: - amiloride

4) **Osmotic diuretics**: - mannitol, urea

**Some examples of diuretics drugs are explained below:**

**(1) Furosemide**




Chemical name: - 4-chloro, 2-furfurylamino, 5-sulphamoyl benzoic acid

Physical properties: - It is white crystalline powder, odourless and tasteless. It is very slightly soluble in water but soluble in solution of alkali hydroxides.

Stability and storage: - It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

**(2) Chlorthiazide**

Physical properties: - It is white crystalline powder, odourless and tasteless. It is very slightly soluble in water but soluble in solution of alkali hydroxides.

Stability and storage: - It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

Uses: -

i) It is used as a diuretic.

ii) It is used to treat oedema.

iii) It is used for management of hypertension and heart failure.

**Question No. 05. Write a note on anticonvulsants or antiepileptic drugs.**

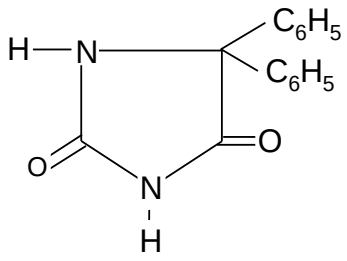
**Ans :** Epilepsy is disease of central nervous system due to sudden discharge of current and impulse in the brain which affect body to various degrees. Depending upon the cause and symptoms epilepsy is various types**.** These are the agents that prevent or diminish the severity of convulsive seizures.

**Classification: -**

1) **Barbiturates**: - phenobarbital
2) **Hydantions**: - phenytoin, ethotoin
3) **Iminostilbenes**: - carbamazepine
4) **Succinimides**: - ethosuccimide, methsuccimide
5) **Aliphatic carboxylic acid**: - valproic acid
6) **Benzodiazepines**: - diazepam, lorazepam
7) **GABA agonist**: - gabapentin

**Some examples of anticonvulsants or antiepileptic drugs are explained below:**

**(1) Phenytoin**



**Chemical name: - 5, 5-diphenyl imidazolidine - 2, 4-dione**

Physical properties: - It is colourless odourless and saline taste powder. It is slightly hygroscopic.

Stability and storage: - It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

Uses: -

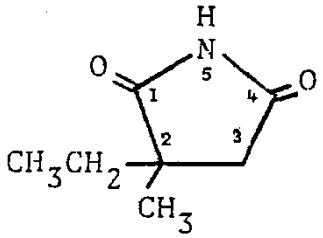
i) It is used as an antiepileptic drug.

ii) It is used to treat arrhythmia.

iii) It is used to treat myotonia.

iv) It is used to treat trigeminal neuralgia.

**(2) Ethosuccimide**



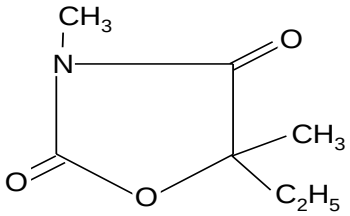

Chemical name: - α-ethyl, α-methyl succinimide

Physical properties: - It is colourless odourless and saline taste powder. It is slightly hygroscopic.

Stability and storage: - It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

Uses: - It is a drug of choice to treat petitmal epilepsy.

**(3) Paramethadone**




Chemical name: - 5- ethyl, 3, 5- dimethyl, oxazolidine –2, 4 - dione

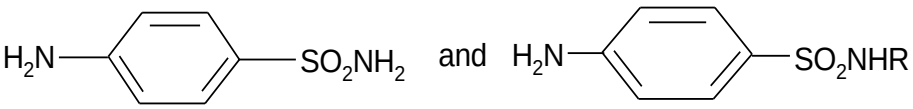
Physical properties: - It is colourless odourless and saline taste powder. It is slightly hygroscopic.

Stability and storage: - It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

Use: - It is used to treat absence (petitmal) seizure.

**Question No. 06. Write classification, chemical structure and uses of sulfonamides.**

**Ans :** Sulfonamides are antimicrobial agent, which are derivatives of sulfanilamide.

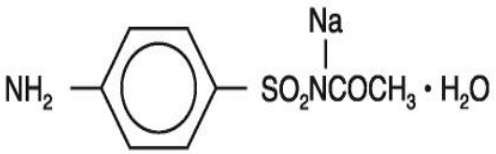



**Classification: -**

1. **Short acting sulfonamides**: - sulfadiazine
2. **Intermediate acting**: - sulfamethoxazole, sulfamoxole
3. **Long Acting**: - sulfadoxine
4. **Topically applied**: - sulfacetamide, mefenide
5. **Miscellaneous**: - sulfasalazine

**Some examples of sulfonamide drugs are explained below:**

**(1) Sulfacetamide**




Chemical name: - N-acetyl p-amino benzene

Physical properties: - It is colourless odourless and saline taste powder. It is slightly hygroscopic.

Stability and storage: - It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

**Uses** : -

i) It is used in the treatment of meningitis.

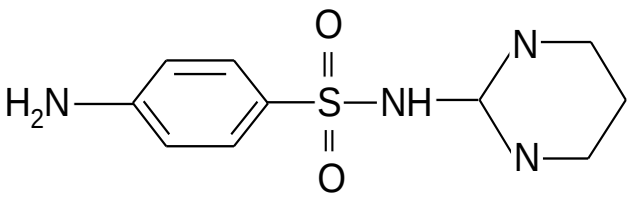
ii) It is used in the treatment of urinary tract infections.

iii) It is used topically in the treatment of burns, cuts, and wounds.

iv) It is used in the treatment of bacillary dysentery.

v) It is also used to treat eye infections.

**(2) Sulfadiazine**




Chemical name: - 2-sulphanilamido pyrimidine

Physical properties: -It is colourless odourless and saline taste powder. It is slightly hygroscopic.

Stability and storage: - It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

Uses: -

i) It is used in the treatment of meningitis.

ii) It is used in the treatment of urinary tract infections.

iii) It is used topically in the treatment of burns, cuts, and wounds.

iv) It is used in the treatment of bacillary dysentery.

v) It is also used to treat eye infections.

**Question No. 07. Write a note on the (a) Cardiotonic drugs (b) Anticoagulants**

**Ans** : (a) Cardiotonic drugs: The drug, which increases the force of muscle contraction of heart without increasing its oxygen consumption, is called as cardiotonic drugs. For e.g. digitoxin, digoxin and gitoxin

**(1) Digitoxin**

It is obtained from leaves *Digitalis purpurea* and *Digitalis lanata.*

Physical properties: - It occurs as white crystalline powder. It is insoluble in water and slightly soluble in alcohol.

Stability and storage: - It is affected by atmospheric oxygen and light and hence it is stored in tightly-closed light- resistant containers.

**(2) Digoxin**

It is a glycoside obtained from leaves of *Digitalis lanata.*

**Physical properties: - It occurs as white crystalline powder. It is insoluble in water and slightly soluble in alcohol.**

Stability and storage: - It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

**Ans : (b) Coagulation of blood:** Blood clotting is very important process. It depends on the existence of a complex system of reactions involving plasma proteins, platelets, tissue factors and calcium ion.

Blood clotting involves three important stages.

(1) Thromboplastin formation

(2) Conversion of prothrombin to thrombin

(3) Conversion of fibrinogen to fibrin

**Anti-coagulants:** Anticoagulants are the drugs which delay blood coagulation. They prolong the coagulation time of blood. They are used to prevent thrombosis, after operation or from other causes. Anticoagulants are divided into two groups.

**1) Direct coagulants** e.g. heparin.

2) **Indirect anticoagulants** as coumarin and indanedione derivatives e.g. bishydroxy coumarin, warfarin sodium.

**Some examples of anticoagulants agents are explained below:**

**(1) Heparin**

**Source:** Heparin is highly sulphate anionic mucopolysaccharide i.e. it is polysulphuric ester of mucoitin. The molecular skeleton is constructed from acetylated D-glucosamine and D-glucornic acid. The molecular weight is variable. Low molecular weight Heparin and heparinoids are also anticoagulants.

**Physical properties**: - Heparin is official as heparin sodium and heparin calcium. Both are white or creamy white moderately hygroscopic powder, which are freely soluble in water.

Stability and storage: -It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

**Uses:**

i) It is used for prophylaxis and treatment of deep vein thrombosis and pulmonary embolism.

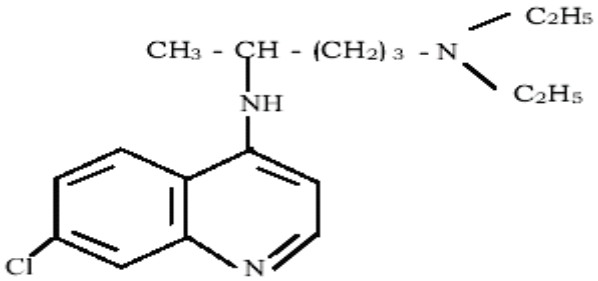
ii) It is used for prevention of thrombosis during haemodialysis (coagulation during dialysis), during open heart surgery and vascular surgery and during blood transfusion.

**Question No. 08. Write chemical structure, chemical name, category and uses of the following drugs.**

**(a) Chloroquine (b) Ephedrine (c) Chlorpromazine (d) Proflavine**

**Ans : (a) Chloroquine**

Category: - Antimalarial drug




**Chemical name: - 7-chloro, 4-(4-diethylamino, 1-methyl butyl amino) quinoline**

Uses: -

i) It is used to suppress and cure malaria.

ii) It is used to treat amoebic hepatitis.

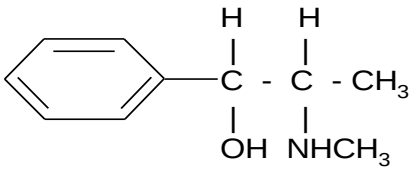
iii) It is used to treat diarrhoea and dysentry.

iv) It is used to treat chronic discoid.

v) It is used to treat rheumatoid arthritis (due to anti inflammatory property).

**(b) Ephedrine**

Category: - Adrenergic drug



**Chemical name: - D- erythro- 2-methylamino -1-phenyl propan-1-ol**

Uses**: -**

i) It is used to treat asthma.

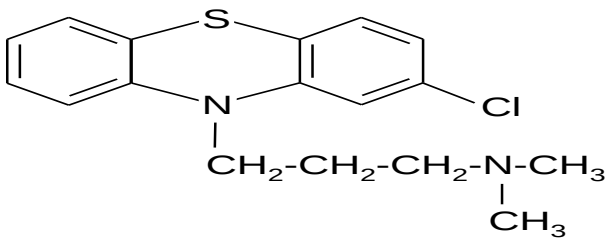
ii) It is used to treat nocturnal enuresis in children.

iii) It is used to treat nasal congestion.

(c) Chlorpromazine

**Category: - It is phenothiazine derivative which act as neuroleptics.**

**Chemical name: - 2-Chloro, 10-(3-dimethyl amino propyl) phenothiazine**



Uses: -

i) It is used to treat schizophrenia, mania and hypomania and to control nausea and vomiting.

ii) It is used to produce pre and post operative sedation. It enhances the effects of barbiturates and analgesics.

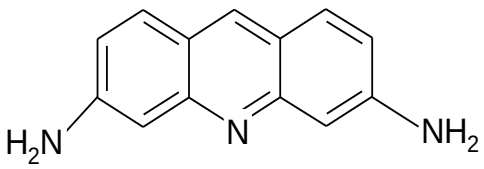
iii) It is vasodilator and brings about reduction in blood pressure.

iv) It also reduces salivary and gastric secretion.

v) It shows local anaesthetic property also.

**(d) Proflavine**

Category: - Antiseptic agent



Chemical name: - Acridine - 3, 6-diamine

Uses: - It is a slow-acting antiseptic:

i) It is used to the treatment of infected wound.

ii) It is used to for dressing of wounds and burns.

iii) It is used to for treatment of local infections of external ear, mouth, throat and skin.

**Question No09. Write a note on hypnotics and sedatives.**

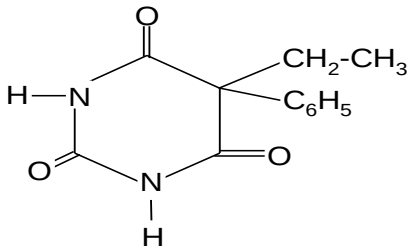
**Ans :** Hypnotics and sedatives are the drugs, which calms the patients and induces sleep.

**Classification**:-

5) **Barbiturates**: - barbitone, phenobarbitone, thiopental
6) **Benzodiazepines**: - diazepam, nitrazepam
7) **Aldehydes and derivatives**: - paraldehyde
8) **Alcohols and derivatives**: - triclofos sodium

**Some examples of hypnotics and sedatives agents are explained below:**

**(1) Phenobarbitone**




**Chemical name: - 5-ethyl, 5-phenyl barbituric acid**

Physical properties: - It is white, bitter crystalline powder, which is slightly soluble in water but soluble in alcohol.

Stability and storage: - It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

**(2) Butobarbitone**

Physical properties: - It is white, bitter crystalline powder, which is slightly soluble in water but soluble in alcohol.

Stability and storage: - It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

Dosages form: - Butobarbitone tablet

Brand name: - Soneryl

**(3) Paraldehyde: $(CH_3CHO)_3$**

Physical properties: - It is colourless or yellow liquid and solidifies at low temperature. It is freely soluble in water.

Stability and storage: - It is hygroscopic and affected by heat. Hence it is stored in tightly closed container in a cool and dry place.

**Uses of sedatives and hypnotics:**

i) It is used to treat insomnia and anxiety.

ii) Some agents are used to treat epilepsy.

iii) It is used as preanaesthetic medication.