WINTER– 2023 EXAMINATION

MODEL ANSWER - ONLY FOR THE USE OF RAC ASSESSORS

Subject Title: PHARMACOGNOSY- THEORY Subject Code: **20113**

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.
8) As per the policy decision of Maharashtra State Government, teaching in English/Marathi and Bilingual (English + Marathi) medium is introduced at first year of AICTE diploma Programme from academic year 2021-2022. Hence if the students write answers in Marathi or bilingual language (English +Marathi), the Examiner shall consider the same and assess the answer based on matching of concepts with model answer.

Q. No.	Sub No.	Answers	Marking Scheme
1		**Answer any SIX of the following:**	**30M**
1	a	**What are nutraceuticals and antioxidants? Give their therapeutic applications of both** **Marking Scheme: Definition of nutraceuticals – 1M; Antioxidants -1M; Therapeutic applications of each: 1.5M each (0.5M for each application)** **Answer:** **Nutraceuticals:** Nutraceuticals is defined as a substance which can be considered as food or part of food which in addition to its normal nutritive value provides health benefits including prevention and treatment of disease. **Therapeutic applications:** *(Consider any three applications)* 1) Nutraceutical provide several benefits in arthritis, cold and cough, sleeping disorder, digestion etc. 2) Nutraceuticals are used to prevent certain cancers. 3) They are used in osteoporosis, blood pressure, cholesterol control, pain killers, depression and diabetes. 4) Nutraceuticals are also used in the management of diverse clinical conditions such as Allergy, Eye infection, Alzheimer's disease, Parkinsonism, Cardiovascular diseases, diabetes, etc. 5) Nutraceuticals are widely used in the food and pharmaceutical industries. **Antioxidants:** Antioxidants or inhibitors of oxidation are compounds which retard or prevent the oxidation in general and prolong the life of the oxidisable matter.	**5M** **1M** **1.5M (0.5M for each point)** **1M**

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		Therapeutic applications: (Consider any three applications) 1) Antioxidants are substances that may protect cells from the damage caused by unstable molecules known as free radicals. 2) They prevent heart and liver diseases, some cancers, arthritis, accelerated aging, eye sight deterioration and neurodegenerative diseases. 3) Beta- carotene and vitamins are shown to cause antioxidant effects and immune enhancement. 4) Antioxidants play vital role in life of living system. 5) Antioxidants are abundant in fruits and vegetables and other foods including nuts, grains and some meats, poultry and fish. 6) Common antioxidants include: Green leafy vegetables, including collard green, spinach etc. beta-carotene is found sweet potatoes, pumpkins, mangoes etc. 7) Lycopene is a potential antioxidant found in tomatoes, watermelons, guava etc. 8) Some natural antioxidants like Ascorbic acid, tocopherol, Superoxide, adenosine transferrin is used therapeutically. 9) Vitamin E (Tocopherol) is major radical trapper in lipid membrane and clinically useful in cardiac damage. 10) Selenium is important dietary anticarcinogen corn oil, wheat germ oil is rich Source of vitamin. 11) Various plant material like Amla, lemon myrobalan Contain Antioxidant in the form of Ascorbic acid (Vitamin-C) it prevents formation of oxygen free radical.	**1.5M (0.5M for each point)**
1	**b**	**Write Biological Source, Chemical Constituents, Commercial Preparations, therapeutic uses and cosmetic uses of Almond oil.** **Marking Scheme:** Biological source:1M; Chemical constituents:1M; Commercial preparation:1M; Therapeutic uses: 1M; Cosmetic uses of Almond oil: 1M. **Answer:** **Almond Oil** **Biological Source:** Almond oil is a fixed oil obtained by expression from the seeds *of Prunus amygdalus* (sweet almonds) *or P. amygdalus var. amara (bitter almonds)* belonging to family: *Rosaceae.* **Chemical Constituents:** *(Consider any two correct constituents)* • Both varieties of almond contain 40-55% of fixed oil, about 20% of proteins, mucilage and emulsion. • The bitter almonds contain in addition 2.5-4.0% of the colourless, crystalline, cyanogenelic glycoside amygdalin. • Almond oil consists of a mixture of glycerides of oleic (62-86%), linoleic (17%), palmitic (5%), myristic (1%), palmitoleic, margaric, stearic and linolenic acid.	**5M** **1M** **1M**

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		Commercial preparation: *(Consider any two correct constituents)* It is one of the ingredients of the preparation known as Baidyanath lal tail (Baidyanath Company), Himcolin gel, Mantat, Tentex Royal (Himalaya Drug Company) and Sage badam Roghan (Sage Herbals)	**1M**
		Therapeutic uses: *(Consider any two correct constituents)* • Almond oil is used as a laxative, emollient, in the preparation of toilet articles and as a vehicle for oily injections. • The volatile almond oils are used as flavouring agents.	**1M**
		Cosmetic uses: *(Consider any two correct constituents)* • Expressed almond oil is an emollient and an ingredient in cosmetics. • Sweet almond oil may be applied directly to the skin and hair. It may also be easily incorporated an active ingredient or an excellent carrier in skin and hair care products as it offers deep penetration and significant moisture retention together with high nourishing properties. • It can also be used directly as massage oil.	**1M**
1	**c**	**Give principle in detail about Homeopathic system of medicine.** **Marking Scheme: Each principle – 1M. Consider any five principles.** **Answer:** **Homeopathic system of medicines:** **Principle:** Homeopathic medicine system works on the principle of "Similia Similibus Curentur" It means that like diseases are cured by like medicine. (Means 'Likes are cured by likes'). Drugs produce similar symptoms as the disease (in healthy human beings) are administered. **Fundamental principles of Homeopathy:** **1) Law of Simillia:** Drug used in the disease (if given to a healthy person) which produces similar symptoms in a healthy person as found in the diseases. Thus, the symptoms of the disease are to be matched with the pathogenesis caused by the drug. **2) Individualization-** No two individuals are alike in the world. Two individuals suffering from the same disease show different responses hence medicine should be different. **3) Law of Simplex:** Single and simple medicine are prescribed at a time. (Combination is not allowed)	**5M**

Q. No.	Sub No.	Answers	Marking Scheme
		4) Law of minimum dose: Drugs are administered in minimum quantity to prevent any hypersensitivity. Also, chances of adverse effects are reduced or avoided if minute dosage is used. **5) Drug proving:** Curative power of a drug is judged by its ability to produce disease-like symptoms in a healthy individual. Thus, exhibition of disease-like symptoms in a healthy individual by the drug proves its curative power. **6) Drug dynamization or Perennialization –** Potency of drugs can be enhanced by dilution. Dilution removes the unwanted toxic principles of drugs. Hence no adverse effects (but dynamically more effective) **7) Vital force-** Disease: disharmonious flow of the vital force. Treatment: restore disordered vital force to normal. Disease and health are two different quantitative states of this vital force.	
1	**d**	**Define Laxatives. Give examples of it. Give synonym, Biological Source, Chemical Constituents of any one drug**	**5M**
		Marking Scheme: Definition – 1M; Examples – 1M (Consider any 2 examples); For any one drugs - Synonym – 1M; Biological Source – 1M; Chemical Constituents – 1M. **Answer:** **Laxatives:** • Drugs that loosen the bowels (intestine) **OR** • The drugs producing, increasing, and hastening intestinal evacuation. **OR** • The drugs which promote defecation	**1M**
		Examples: Aloes, Castor oil, Ispaghula, Senna leaves or Senna fruits (Synonym – 1M; Biological Source – 1M; Chemical Constituents – 1M for any one drug)	**1M**
		Aloes • **Synonyms –** Korpad, Aloe, Musabbar, Kumari.	**1M**
		• **Biological Source –** Aloe is dried juice of the of the leaves *Aloe barbadensis (Cucrcao aloes), Aloe perryi (Socotrine aloes), hybrides of Aloe ferox* & *Aloe africana or Aloe spicata* (Cape aloes) belonging to Family Liliaceae.	**1M**
		• **Chemical constituents** – o Barbaloin is yellow color, crystalline glycosides, soluble in water, present in all variety of aloe. It also contains Aloe emodin, resin. o Isobarbaloin is present in Curaco and cape aloes. o Cape aloes are characterized by the presence of an amorphous compound, Beta barbaloin aloinosides A and B, Capaloresinotannol with p-coumaric acid.	**1M**

Q. No.	Sub No.	Answers	Marking Scheme

- The resin of curacao variety contains barbaloresinotannol with cinnamic acid.

OR

Castor oil

- **Synonyms –** Oleum Ricini, Ricinus oil, Castor bean oil
- **Biological source –** Castor oil is the fixed oil obtained by cold expression of the kernels of seeds of *Ricinus communis* belonging to Family Euphorbiaceae.
- **Chemical Constituents –**
  - It contains Fixed oil mainly triglycerides of Ricinoleic acid, isorecinoleic acid, linoleic acid, stearic acid, isostearic acid.
  - The viscosity of castor oil is due to ricinoleic acid.

OR

Ispaghula

- **Synonyms** – Isapgol, Isabgol, Spongel seeds
- **Biological Source** – Isapgol consists of dried seeds of the plant known as *Plantago ovata* belonging to Family Plantaginaceae.
- **Chemical Constituents –**
  - Husk and seeds contain mainly Mucilage.
  - Chemically it contains pentosan & aldobionic acid.
  - The products of hydrolysis are xylose, arabinose, galactouronic acid and rhmnose.
  - Fixed oil & proteins are also present.

OR

Senna Leaves

- **Synonyms** – Indian senna, Tinnevelly senna
- **Biological Source** –It consists of dried leaflets of *Cassia angustifolia*, belonging to family Leguminosae. It contains not less than 2.0% of hydroxyanthracene derivaties calculated as sennoside B.
- **Chemical Constituents –**
  - Senna contains Anthraquinone glycosides mainly – Sennoside A, Sennoside B, Sennoside C, Sennoside D
  - Kaempferol, aloe-emodin, isorhamnetin.
  - Myricyl alcohol,phytosterol,Salicylic acid, Mucilage, Resin etc.
  - Aglycone of senna is Sennidin. It contains Mucilage.

OR

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Q. No.	Sub No.	Answers	Marking Scheme
		Senna Fruit • **Synonyms** –senna pods, senna fruits • **Biological Source** –It consists of dried pods of *Cassia acutifolia* belonging to family – Leguminosae. Fruit contains not less than 1.5% of hydroxyanthracene derivaties calculated as sennoside B. • Chemical constituents – o It contains Sennoside A and Sennoside B o The pods are superior over leaves because they do not contain more percentage of glycosides.	
1	e	**Give Biological Source, Chemical Constituents of Vasaka leaves and Rauwolfia.** **Marking Scheme:** Biological Source: 1M for each drug; Chemical Constituents: 1.5M each drug. **Answer:** **Vasaka leaves** • **Biological Source** – Vasaka consists of dried as well as fresh leaves of *Adhatoda vasica* belonging to family *Acanthaceae*. It contains not less than 0.6% of vasicine on dried basis. • **Chemical Constituents –** Vasaka contains Quinazoline alkaloids. They are Vasicine, Vasicinone and Hydroxy vasicine. It also contains Vasakin (Yellow coloring matter), resin, sugar, mucilage, beta sitisterol and Vitamin C. **Rauwolfia** – • **Biological source –** It consists of dried roots of the plant known as *Rauwolfia serpentina* belonging to family *Apocynaceae*. It contains not less than 0.14% of alkaloids calculated as reserpine. **Chemical constituents:** Main alkaloid – Reserpine Other alkaloids – Ajmalicine, ajmaline, rauwolfinine, rescinnamine, reserpinine, yohimbine, serpentine & serpentinine. Also contains oleo-resin, phytosterol, fatty acids, unsaturated alcohol & sugars.	**5M** **1M** **1.5M** **1M** **1.5M**
1	f	**What is the crude drug evaluation? Enlist various types of evaluation of crude drug and explain in detail about physical evaluation of crude drug.** **Marking Scheme:** Definition – 1M; List of types of evaluation of crude drugs – 1M; Physical evaluation of crude drug – 3M (Consider any three physical evaluation method with explanation).	**5M**

Q. No.	Sub No.	Answers	Marking Scheme

Answer:

Crude drug evaluation: — 1M

Evaluation of a drug means confirmation of its identity and determination of its quality and purity of drugs.

Various types of evaluation of crude drug — 1M

1. Organoleptic Evaluation
2. Microscopical Evaluation
3. Chemical Evaluation
4. Physical Evaluation
5. Biological Evaluation

Physical evaluation:

- Physical standards are to be determined for the drugs,wherever possible.
- These are rarely constant for crude drugs, but may help in evaluation, specifically with reference to moisture content, specific gravity, density, optical rotation, refractive index, melting point, viscosity, and solubility in different solvents.

1M for each method (consider any 3 methods for 3 marks)

1. Moisture content-

a) The moisture content of a drug will be responsible for decomposition of crude drugs either producing chemical change or microbial growth.
b) So, the moisture content of a drug should be determined and controlled.
c) The moisture content is determined by heating a drug at 1050C in an oven to a constant weight.
d) Crude Drugs with limits of Moisture content:

Drugs	Moisture content (%) w/w (Not more than)
Aloes	10.0
Ergot	08.0
Starch	15.0

2. Viscosity-

a) Viscosity of a liquid is constant at a given temperature and is an index of its composition.
b) It can be used as a means of standardizing liquid drugs
c) Ex. Pyroxylin kinematic viscosity- 1100-2450 centistokes.
d) Liquid paraffin: kinematic viscosity not less than 64 centistokes.

3. Melting point -

a) In case of pure chemicals or phytochemicals melting points are very sharp and constant.

Q. No.	Sub No.	Answers	Marking Scheme

b) As far as crude drugs are concerned, melting point range has been fixed due to the mixed chemicals.

Drugs	Melting point (^{0}C)
Beeswax	62-65
wool fat	34-40
Cocoa butter	30-33

4. Optical rotation-

a) The ability of substances to rotate the plane of polarised light, is called optical active.

b) Substances that have the ability to rotate the plane of the polarized light passing through them are called optically active substances.

c) An enantiomer that rotates plane-polarized light in the positive direction, or clockwise, is called dextrorotary (+).

d) while the enantiomer that rotates the light in the negative direction, or anticlockwise, is called laevorotary (-).

e) Normally Optical rotation is determined at 25^{0}C using sodium lamp as the source of light.

Drugs	Angle of Optical rotation
Caraway oil	$+70^0$ to $+80^0$
Clove oil	0^0 to -1.5^0
Honey	$+3^0$ to -15^0

5. Refractive Index:

a) Refractive index is defined as the ratio of the velocity of light in vacuum to velocity in the substance.

b) Depending upon purity it is constant for liquid and can be considered as one of the criteria for its standardization.

c) Refractive index a compound varies with wavelength of incident light temperature and pressure.

Drugs	Refractive index
Caraway oil	1.4838 to 1.4858
Clove oil	1.5300 to 1.5310

d) Thus, to prove its acceptability as a drug, the following tests can be applied to it, wherever possible.

Q. No.	Sub No.	Answers	Marking Scheme

6. **Ash content**

a) The Residue remaining after incineration is the Ash content of the drug which are the inorganic salt naturally occurring in drug or adhering to it or deliberately added to it as a form of adulteration.

b) It is one of the criteria to identify purity of the drugs.

c) Acid insoluble ash which is the part of total ash insoluble in dilute hydrochloric acid and recommended for certain drugs.

Drugs	Total Ash
Ginger	06.00
Clove	07.00

7. **Extractives**

a) The extracts obtained by exhausting crude drugs with different solvents are approximate measures of their chemical constituents.

b) Various solvents are used according to the type of the constituents to be analyzed.

c) Water soluble extractive is used for crude drugs containing water-soluble constituents like glycosides, tannins, mucilage etc.

Drugs	Water soluble extractive not less than
Aloes	25.0
Ginger	10.0

d) **Alcohol- soluble extractive** is used for crude drugs containing tannins, glycosides, resins, etc;

Drugs	Alcohol soluble extractives
Aloes	Not more than 10.0
Ginger	Not less than 4.5

e) **Ether-soluble extractives** are used for drugs containing volatile and non-volatile ether soluble fractions.

f) **Alcohol- insoluble extractive:** applicable to some resinous drugs

Drugs	Alcohol in soluble extractives
Myrrh	Not more than 70.0
Benzoin	Not more than 24.0

8. **Volatile Oil content:**

a) Efficacy of several crude drugs is due to their odorous principles (i.e. volatile oil)

b) Such drugs are standardized on the basis of their volatile oil contents.

Q. No.	Sub No.	Answers	Marking Scheme

Drugs	Volatile Oil content not less than
Clove	15.0
Fennel	01.4

9. Foreign organic Matters-

a) The parts of the organ or organs other than those parts of drugs mentioned in the definition and description of the drug are known as foreign organic matters.

b) The maximum limit for the foreign organic matter is a given in the monograph crude drugs.

c) If it exceeds the limit deterioration in quality of the drug takes place

1 g Describe in detail about chemical method of classification of crude drugs with suitable merits and demerits. **5M**

Marking Scheme: Chemical method of classification - 3M; Merits – 1M (0.5M for each point); Demerits - 1M (0.5M for each point).

Answer:

Chemical classifications:

Here, the crude drugs are divided into different groups according to the chemical nature of their most important constituent present in the drug towhich the pharmacological/therapeutic activity of drug is attributed.

Type of Chemical	Examples
Alkaloids	Vinca, Cinchona, nux-vomica, Ipecac, opium
Glycosides	Senna, Digitalis, Liquorice, Aloe
Lipids	Castor oil, Peanut oil, Cod liver oil
Volatile oil	Eucalyptus, Peppermint, Clove
Tannins	Myrobalan, Kino, Catechu
Vitamins	Shark liver oil, Cod liver oil
Resins and resin combinations	Myrrh Colophony, Benzoin, Asafoetida, Guggul, Balsam, Tolu
Carbohydrates and derived products	Acacia, Agar, Honey, Starch,

Advantages:

- It is useful for phytochemical studies of crude drugs.
- This type of classification is applicable to crude drugs containing similar type of chemicals.
- Combination of drugs can be done for more or better therapeutic action.

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		Disadvantages: • Drugs of different origin are grouped under similar chemical titles. • This type of classification makes no proper placement of drugs containing two different types of chemicals. Eg: Certain drugs are found to contain alkaloids and glycosides (Cinchona), Fixed oil and volatile oil (Nutmeg) of equal importance together and hence it is difficult to categorize them properly.	
2		**Answer any <u>TEN</u> of the following:**	**30 M**
2	**a**	**Explain qualitative test for Alkaloids in detail. (Any three)** **Marking Scheme:** 1M for each test (Consider any three test) **Answer:** **1) Mayer's reagent (Potassium mercuric iodide solution):** When alkaloids are treated with Mayer's reagent gives cream or pale-yellow precipitate. **2) Dragendorff's reagent (Potassium bismuth iodide solution):** When alkaloids are treated with Dragendorff's reagent gives brown or reddish-brown colour or precipitate. **3) Wagner's reagent: (Iodine and potassium iodide solution):** When alkaloids are treated with Wagner's reagent gives brown or reddish-brown colour or precipitate. **4) Hager's reagent: (Saturated solution of picric acid):** When alkaloids are treated with Hager's reagent gives yellow precipitate.	**3M** **1M for each test. Consider any three tests.**
2	**b**	**Describe novel drug delivery of herbal formulation with its advantages and disadvantages.** **Marking Scheme:** Description- 1M; Advantages – 1M (Any 2 points), Disadvantages – 1M (Any 2 points) **Answer:** **Novel drug delivery of herbal formulation:** Novel drug delivery of herbal formulation approaches technologies, and system which provide a therapeutic amount of drug to the appropriate site in the body. It may help in increasing the efficacy and reducing the side effect of variety of novel herbal formulation like nanoparticle, nanocapsules, liposomes, nanoemulsion, phytosomes, microsphere and ethosomes. **Advantages:** 1) Bioavailability, distribution, pharmacological effect of phytoconstituents can be increased. 2) Release of drug can be targeted at specific site.	**3M** **1M** **1M (0.5M for each point)**

Q. No.	Sub No.	Answers	Marking Scheme
		3) Targeted drug delivery avoid accumulation of drug in all tissues and toxicity can be avoided. **Disadvantages:** 1) Unavailability of medicine. 2) Formulation trials are at laboratory level. 3) Industrial scale need modernization	**1M (0.5M for each point)**
2	**c**	**Five role of medicinal and aromatic plant in national economy.** **Marking Scheme: Any five role – 3M.** **Answer:** **Role of medicinal and aromatic plants in the national economy:** 1) Medicinal and aromatic plants form a numerically large group of economically important plants which provide basic raw materials for medicines, perfumes, flavours and cosmetics. 2) A recent study indicates that the herbal drug market continues to grow at the rate of 15% annually. 3) Several hundred genera are used in herbal remedies and in traditional or folklore medicines throughout the world. 4) The World Health Organization (WHO) estimated that 80% of the population of developing countries rely on herbal medicines for their treatment. 5) Medicinal and aromatic plants and their products not only serve as a valuable source of income for small land holder farmers and entrepreneurs but also earn valuable foreign exchange by way of export. 6) Medicinal and aromatic plants are a good resource to develop new medicines and treat the body and mind which is known as naturopathy. They are useful for improving health and life. 7) Many synthetic medicines are based on plant extracts, which are used to create new modern medicines.	**3M** **03 marks for any five roles**
2	**d**	**Write synonym, biological source and chemical constituent of coriander.** **Marking Scheme:** Synonym - 1M; Biological Source - 1M; Chemical constituents-1M. **Answer:** **Synonym:** Dhania, Coriander fruit **Biological Source:** It is dried ripe fruits of plant *Coriandrum sativum Linn* belonging to family Umbelliferae. It should contain not less than 0.3 % of volatile oil. **Chemical Constituents:** ✓ It contains volatile oil, fixed oil and Protein.	**3M** **1M** **1M** **1M**

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		✓ Volatile oil contains D-linalool (coriandrol), L-borneol, geraniol, pinene. ✓ Leaf of coriander contains vitamin A.	
2	e	**What are cardiotonics? Enlist 2 examples of crude drug of it and name the drug which gives killer killani test positive.** **Marking Scheme:** Definition - 1M; Examples -1M (0.5M each); Name of drug gives keller killani test positive – 1M. **Answer:** **Cardiotonic:** These are drugs which provide strength or energy to heart muscle. Drugs increase force of contraction of cardiac muscles and stimulates the activity of heart muscles. **Examples: Digitalis, Arjuna** **Drug gives Keller killani test positive**: Digitalis	**3M** **1M** **1M** **1M**
2	f	**Write Biological source, chemical constituent and therapeutic uses of cardamom.** **Marking Scheme:** Biological Source – 1M; Chemical constituents - 1M; Uses – 1M (0.5M for each use) **Answer:** **Biological Source:** It consists of dried ripe fruit of plant ***Elettaria cardamomum*** belonging to family Zingiberaceae. The seed should contain not less than 4 % of volatile oil. **Chemical Constituents:** It contains Volatile oil, Fixed oil and Protein. Volatile oil contains (cineole) Eucalyptol, borneol, terpinene. **Uses:** Carminative, Stimulant, aromatic, flavouring agent. It is used in form of compound tincture.	**3M** **1M** **1M** **1M**
2	g	**Give difference between antiseptic and disinfectants.** **Marking Scheme: Each point of difference – 1M; Consider any three points on each side.** **Answer:** **Antiseptic** | **Disinfectants** 1) Antiseptic are the chemical sterilizing substance which are used to kill pathogenic microbes or for prevention of their growth. | 1) Disinfectants are the substance which is used to destruction or to make a surface free from pathogenic organisms. (kill bacteria and their spores)	**3M** **03 marks for any three differences**

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		2) It is used to prevent Sepsis. | 2) It is used to sterilize the non- living things. 3) It is used in lower concentration. | 3) It is used in higher concentration. 4) They are non-toxic, hence applied superficially on living tissues. | 4) They are toxic, hence not directly applied to tissues. 5) They are applied to broken skin after burns and wounds or to intact skin before surgical operation or injection. | 5) They are used for decontaminating drains and faecal matter and for the sterilization of instruments and apparatus. 6) Example: Neem, Turmeric, Benzoin | 6) Example: Neem oil, Pyrethrum	
2	**h**	**Define sutures and ligatures. Write ideal requirements of sutures.** **Marking Scheme: Each definition – 0.5M; Ideal requirements- 2M (0.5M for each point)** **Answer:** **Sutures:** Sutures are sterile thread like strings or strands specially prepared and sterilized and used in surgery for sewing, stitching tissues like skin, muscles, tendons etc. by a needle. **Ligatures:** Ligatures are used for tying the tissues and blood vessels without needle. **Ideal Requirements:** 1) They should be stored in dry, well-ventilated place at a temperature, not exceeding 25°c. 2) It must be sterile before use. 3) It should not cause irritation. 4) It should have finest possible gauze. 5) It should have adequate strength. 6) If absorbable suture, time of absorption should be known. 7) It is used only single time. 8) It must be non-toxic to tissue.	**3M** **0.5M** **0.5M** **2M** **0.5M for each point**
2	**i**	**Define glycosides. Classify glycosides on the basis of linkage.** **Marking Scheme: Definition – 1M; Classification – 2M** **Answer:** **Glycosides** Glycosides are an organic compound obtain from plants and animal source, which on enzymatic hydrolysis gives one or more sugar moieties along with a non-sugar moiety,	**3M** **1M**

Q. No.	Sub No.	Answers	Marking Scheme
		which are attached by glycosidic bond. Sugar moiety is called glycone and non-sugar moiety is called aglycone.	
		Classification on basis of linkage	2M
		1) **C–Glycosides**: Carbon atom combines with sugar. Glycone-OH+HC-Aglycone-----Glycone-C-Aglycone	
		2) **O-glycosides**: Oxygen atom combines with sugar. Glycone-OH+HO-Aglycone-----Glycone-O-Aglycone	
		3) **S-Glycoside:** Sulphur atom combine with sugar. Glycone-OH+HS-Aglycone-----Glycone-S-Aglycone	
		4) **N–Glycosides:** In this glycoside nitrogen of NH group combines with sugar. Glycone-OH+HN-Aglycone-----Glycone-N-Aglycone	
2	**j**	**Define 'Adulteration'. Describe any two methods of adulteration.**	**3M**
		Marking Scheme:	
		Definition – 1M; Each Method of adulteration – 1M (Consider any 2 methods)	
		Answer:	
		✓ Adulteration is defined as debasement of an article or substituting original drugs partially or fully with other similar looking substance.	**1M**
		OR	
		✓ The substance which are mixed is free from or inferior in chemical and therapeutic and chemical properties or addition of low grade or spoiled drugs or entirely different drugs similar to that of original drugs substituted with an intention of enhancement of profit.	
		Methods of adulteration:	**2M**
		1) Substitution with substandard commercial varieties:	
		The adulterants used may have same morphological appearance to that of original drug standard variety. For example- *Strychnos nux blanda* mixed with original *Strychnos nux vomica*.	
		2) Substitution with morphologically same but inferior drug:	
		If the drug does not have minimum standard quality, then it is called inferior drug. It is produced due to improper method of cultivation, environmental condition, temperature etc. Example- Clove adulterated with Mother Clove.	
		3) Substitution by artificial manufactured drug:	

Q. No.	Sub No.	Answers	Marking Scheme
		Substance which are artificially prepared having similarity with original drug. It is used for costly drug. Example- Honey is mixed with sugar solution. **4) Replacement with exhausted drug:** Exhausted drug means from which active chemical constituent has been removed. It is mostly used for volatile oil containing drugs. Example- Clove, Fennel, Coriander is mixed with exhausted drug. **5) Substitution by organic matter of plant:** The parts of plant are mixed with original drug. Example -Clove stalk is mix with clove buds. **6) Addition of harmful agent:** The waste collected from market is mix with the drug which may be harmful. For example, i) Brown stones are mixed with Groundnut seeds. ii) Limestones are mixed with Asafoetida. **7) Adulteration with powder drug: The drugs in powder form are mixed with powder adulterant.** Example -Brick powder is mixed with powder of bark.	
2	**k**	**Define 'Pharmacognosy'. Who coined the term pharmacognosy and when?**	**3M**
		Marking Scheme: Definition: 1M; Name of Scientist who coin term: 1M; When coin the word :1M	
		Answer:	
		Definition:	**1M**
		Pharmacognosy is defined as the scientific and systematic study of structural, physical, chemical and biological characters of crude drugs along with their history, method of cultivation, collection and preparation for the market.	
		C.A. Seydler coined the term Pharmacognosy.	**1M**
		Seydler coined the word in 1815.	**1M**

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Q. No.	Sub No.	Answers	Marking Scheme
3		**Attempt ALL questions**	**20 M**
		Important Instructions: In case, multiple answer options are observed for the same sub question of question No. 3, the option (Answer) appearing first in the answer book shall be treated as answer and assessed accordingly.	
3	a	**Write two chemical constituents of Aloe Vera gel.** **Marking Scheme: Any two should be considered for 1M** **Answer:** Anthraquinones like rhein, aloin, emodin, minerals and mucilage. It contains amino acids like leucin, isoleucine, saponin glycosides, vitamin A, C, E, B, Choline, B12 and folic acid. It also contains aloesone, aloetic acid, chrysophanic acid, chrysamminic acid, galacturonic acid, choline, coniferyl alcohol.	**1M**
3	b	**Spirulina belong to which family.** **Marking Scheme- 1M for correct family name.** **Answer**: *Oscillatoriaceae*	**1M**
3	c	**Define Gutika.** **Answer:** These are medicine in the form of pills. They contain single or combination of herbal, minerals or animal drugs.	**1M**
3	d	**Silk contains a protein known as _____** **Answer**: Fibroin	**1M**
3	e	**Define carminative.** **Answer:** A carminative, also known as carminativum (plural carminative) is a herb or herbal preparation intended to either prevent formation of gas or facilitate the expulsion of gas from the gastro intestinal tract, so as to use to treat flatulence.	**1M**
3	f	**Synonym for black pepper is _____** **Marking Scheme: Anyone should be considered for 1M.** **Answer:** Pepper, Common pepper, pepper vine, Kali Mirch, peppercorn	**1M**
3	g	**Family of Asafoetida is _____** **Answer:** *Umbelliferae*	**1M**
3	h	**Hog Wood is used as synonym for _____** **Answer**: Punarnava	**1M**
3	i	**Write two examples of antiseptic crude drug.** **Marking Scheme:** Consider any two drugs for 1M (0.5M for each). **Answer:** Benzoin, Myrrh, Neem, Turmeric,	**1M**

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Q. No.	Sub No.	Answers	Marking Scheme
3	j	**Synonym for Ginger is _____** **Marking Scheme: Anyone should be considered for 1M.** **Answer:** Rhizoma, Zingiberis, Zingibere, Sonth, Jamica ginger, Adrak	1M
3	k	**Give one different between volatile oil and fixed oil.** **Marking Scheme: Any one difference should be considered** **Answer:**	1M
3	l	**Palisade ratio is** i. Average number of palisade cells below each upper epidermal cell. ii. Total number of Parenchyma cells. iii. None iv. Total number of stomata cells. **Answer:** i. Average number of palisade cells below each epidermal cell.	1M
3	m	**Give significance of Ash value.** **Marking scheme – Any one significance – 1M.** **Answer:** Ash value is the criteria to judge the purity or identity of the powder drugs. Ash value represents inorganic salts, naturally occurring in drug or adhering to it or deliberately added to it as form of adulteration.	1M
3	n	**Oleoresins are mixture of following two** i. resin and volatile oil ii. resin and gum iii. resin and benzoic acid iv. resin and cinnamic acid **Answer:** i. resin and volatile oil	1M

Particulars	Volatile oil	Fixed oil
Definition	Volatile oil is concentrated hydrophobic liquid consisting of volatile chemical compound from plant.	Fixed oil is non-volatile oil or animal or plant origin.
Evaporation	Evaporate under room temperature.	Does not evaporate under room temperature.
Primary source	Leaves, roots, petals and bark	Seeds of plants
Extraction	Easy	Difficult
Composition	Derived from terpenes and their oxygenated derivatives.	Esters of fatty acid with glycerol
Saponification	Cannot be saponified.	Can be saponified
Refractive index	Have high refractive index	Have low refractive index

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Q. No.	Sub No.	Answers	Marking Scheme
3	o	**Name two antimalarial drugs.** **Answer:** Cinchona, Artemisia.	1M
3	p	**Following part of vinca is used as medicine source.** i. Flower ii. Stem iii. Root iv. Entire plant. **Answer:** iv. Entire plant	1M
3	q	**Family of Hyoscyamus is _____** i. Solanaceae ii. Umbelliferae iii. Combretaceae iv. Rubiaceae **Answer:** i. Solanaceae	1M
3	r	**Lavender oil belongs to which family.** i. Oleaceae ii. Rosaceae iii. Liliaceae iv. Labiate **Answer:** ***Lamiaceae is the family for Lavender oil.*** *If the students write any option or the correct answer as the question does not provide a correct option, award 1 mark to such students. (Consider any option or correct answer for 1M)*	1M
3	s	**Give two examples of probiotics.** **Marking scheme – One example – 0.5M. Any two examples – 1M.** **Answer:** Lactobacillus in Yoghurts and other fermented food, Sour milk, Sour milk, Peppermint oil, Pomegranate, Apple juice, Sugarcane Juice.	1M
3	t	**Unani system of medicine based on which theories.** **Marking scheme: Each theory – 0.5M** **Answer:** Unani system is based on two theories. i. Hippocratic theory of four humours ii. Pythagoreans theory of four proximate qualities	1M