MODEL ANSWER

WINTER -19 EXAMINATION

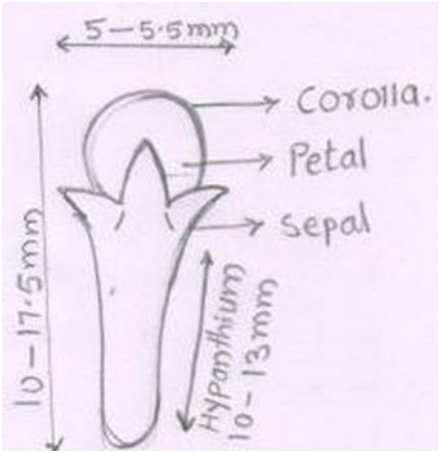
Subject Title: PHARMACOGNOSY **Subject Code:** 0807

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 anyequivalent figure drawn.
5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q. No.	Sub Q. N.	Answer	Marking Scheme
1		**Attempt any Eight of the followings: (2marks each)**	**16 M**
1	**a)**	**Define the following (any two) (1 Mark for each definition)** **i) Laxatives:** Laxatives are the substances that loose stools and increase bowel movements. **ii) Pharmacognosy:** Pharmacognosy is defined as scientific and systematic study of physical, chemical, structural and biological characters of crude drugs along with their history, method of cultivation, collection and preparation for the market. **iii) Balsam:** Balsams are aromatic resinous substances of plant origin containing balsamic acids (benzoic and cinnamic acid).	**2M**
1	**b)**	**Write the role of 'Dioscoride' and 'Seydler' in the development of Pharmacognosy. (01 mark for each scientist's role)** **Dioscoride**: A Greek physician described several plants of medicinal importance along with some mineral and animal products in his famous drug treatise; **"De Materia Medica"**. **Seydler** : Seydler coined the term Pharmacognosy in 1815 in his work entitled as **"Analecta Pharmacognostica"** from combination of two Greek words viz, Pharmakon - a drug and gignosco - to acquire the knowledge of.	**2M**
1	**c)**	**State which part of the plant is used in case of (½ mark each)** **i) Belladona –** Dried leaves and other aerial parts **ii) Rauwolfia -** Roots	**2M**

		iii) Ipecac -Rhizomes and roots **iv) Colchicum-** Dried seeds / Corm	
1	**d)**	**Write example of Pharmaceutical aid obtained from: (1 mark each)** **i) Animal source :** Bees wax/ Lanolin (hydrous wool fat)/ Honey/ Gelatin **(any one)** **ii) Mineral source :** Kaolin / Talc/ Bentonite/ Chalk **(any one)**	**2M**
1	**e)**	**Mention synonym of the following crude drug: (½ mark each)** **i) Asafoetida :** Devil's dung/ Hing/ gum Asafoetida **(any one)** **ii) Liquorice:** Mulethi/ Liquorice root / Glycyrrhiza **(any one)** **iii) Aconite: B**achnag/Monkshood/ mithazahar/ Mouse bane /Wolf's bane/ Friar's cowl/Radix aconite **(any one)** **iv) Tulsi :** Holy basil/ sacred basil **(any one)**	**2M**
1	**f)**	**Explain Galenical pharmacy. Who discovered it? (1 mark for Galenical pharmacy and 1 mark for name of scientist)** **Galenical pharmacy:** Various methods of preparation containing active constituents of crude drugs, and even at present the branch dealing with the extraction of plant and animal drugs is known as galenical pharmacy. **Name of scientist :** Galen (A Greek physician)	**2M**

1	**g)**	**Give the name of the drug which passes the following chemical test. (½ mark each)** **i) Vitali morin test -** Datura **ii) Swelling factor test:** Ispagol **iii) Modified brontrager's test:** Aloe **iv) Fiehe's test :** Honey	**2M**
1	**h)**	**Describe morphological characters of clove with diagram. (1 Mark for diagram and 01 Mark for naming)**  **Corolla:** Dome shaped **Petal :** 4 membranous **Sepal:** 4 thick diversant **Shape:** Sub cylindrical slightly flattened	**2M**

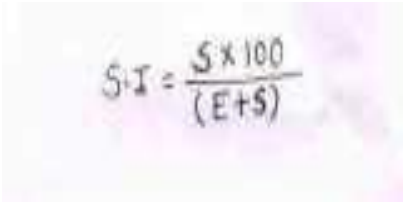
1	**i)**	**What is Garbling? (Description - 02 Marks)** **Garbling (Dressing):** Garbling is the final step in the preparation of a drug which consists of the removal of extraneous matter, such as other parts of the plant, dirt, and added adulterants.	**2M**
1	**j)**	**Name the drug having following microscopical characters (any two) (1 mark each)** **i) Lignified trichome:** Nux vomica **ii) Fibrovascular bundle:** Ginger **iii) Paracytic stomata:** Senna	**2M**
1	**k)**	**Write the name of the drug which has following use: (½ mark for each)** **i) Galactogogue -** Shatavari **ii) Dental analgesic** -Clove **iii) Diuretics-**Gokhru / Punarnava **iv) Brain tonic –** Shankhpushpi	**2M**
1	**l)**	**Write official requirements of surgical dressings. (½ mark each)** **Official requirements of surgical dressings are: (any 4 requirements)** 1. They should be sterile before use. 2. They should be stored in dry well ventilated place at a temperature not exceeding 25 ^{o}c. 3. They should not be dyed unless mentioned in the monograph. 4. They should not have any loose thread , fibres end in the dressing.	**2M**

		5. Adhesive products should not be allowed to freeze. 6. Permitted antiseptic should be used in prescribed concentration only.	
2		**Attempt any <u>THREE</u> of following (4 marks each)**	**12M**
2	**a)**	**Explain chemical method of classification of crude drug with its merit and demerits.** **Chemical method of classification of crude drug:** **(2 marks for any four classes with 1 example of each class, 1 mark each for merits and demerits)** This type of classification is based on type of chemicals present in the drugs.	**4M**

Class	**Examples**
1. Alkaloids	Aconite, cinchona, nux-vomica, vinca, ipecac, belladonna, opium , tea
2. Glycosides	Digitalis, senna, squill, aloe, dioscorea, liquorice, wild cherry.
3. Lipids	Castor oil. Peanut oil, mustard, wool fat, cod -liver oil.
4. Volatile oils	Peppermint, clove, eucalyptus, valerian.
5. Tannins	Myrobalan, kino, catechu, galls
6. Vitamins	cod –liver oil, shark-liver oil
7. Resin and resin combinations	Benzoin, balsamof tolu, storax, asafoetida, myrrh , colophony, guggul , shellac.
8.Carbohydrates and derived products	Yeast, Agar, honey, starch, tragacanth, acacia, Guar gum, sterculia.

		Merits: (any two) 1. This type of classification is applicable to crude drugs containing similar type of chemicals. 2. It is useful for phytochemical studies of crude drugs. 3. Combination of drugs can be done for more or better therapeutic action. **Demerits:** 1. It is difficult to categorise the drug when it contains two or more active chemical constituents 2. The drugs from various sources are grouped together.	
2	**b)**	**Define Glycosides. Classify it on the basis of Glycosidic linkage with example. (Definition 01 Mark and classification 03 Marks).** Glycosides are organic compounds of plant and animal origin which yield on either acidic or enzymatic hydrolysis, one or more sugars and non-sugar residue. **Classification on the basis of glycosidic linkage: (any 3 classes of the following with 1 example of each)** **i) O- glycosides: They** are very commonly in higher plants. They are hydrolysed by treatment of acid or alkali into aglycone and sugar. **e.g.** Senna, Rhubarb. **ii) C- glycosides:** They are not hydrolysed by heating with dilute acids or alkalies, but by oxidative hydrolysis with ferric chloride. e.g. Aloe, Cascara **iii) S- glycosides**: they are occurring only in isothiocyanate type of glycoside. They are formed by interaction of sulfhydryl group of aglycone and hydroxy group of glycone moiety. e.g. Black mustard. **iv) N- glycosides** : N- glycoside is nucleosides where amino group of base react with hydroxyl group of base ribose or deoxyribose and ultimately give N- glycosides form. e.g. Cinchona	**4M**

2	**c)**	**Write synonyms, biological source, chemical constituents of 'Gokhru' OR 'Gymnema'. (Synonyms 01-mark, biological source 1 ½ marks, chemical constituents1 ½ marks)** **Gokhru** **Synonyms: Puncture vine** **Biological source:** It consists of dried fully ripen fruits of the plant Tribulas terrestis. Family – Zygophyllaceae. **OR** It consists of dried fully ripen fruits of the plant Pedalium murex. Family – Pedaliaceae. **Chemical constituents:** alkaloids- Harman and harmine. Also contain saponins, which on hydrolysis yield steroidal sapogenins like diosgenin, chlorogenin, gitogenin, ruscogenin. Saponin, flavonoids, kaemferol, tribuloside and its derivatives have also been isolated from leaves and fruits. Other chemical constituents are fixed oil, resin, essential oil and nitrates. **OR** **Gymnema** **Synonyms:** Gudmar, madhunashini **Biological source:** It consists of leaves of the plant Gymnema sylvestre. Family-Asclepiadaceae. **Chemical constituents:** hentriacontane, pentriacontane, phytin, alpha and beta chlorophylls, resin, tartaric acid, formic acid, butyric acid, mucilage, inositol, gymnemic acid, anthraquinone derivative.	**4M**
2	**d)**	**d) Write method of cultivation and collection of 'Rauwolfia'.** **(method of Cultivation- 02 Marks and method of collection- 02 Marks)** **Cultivation:** Loamy soil with large amount of humus and good drainage are ideal for cultivation of Rauwolfia. The P^H of the soil should be acidic and around 4. The temperature range for cultivation is 10^0C to 38^0C. Rainfall should be in the range of 250 to 500 cm. It can be propagated by various methods, such as by seeds, roots, cutting, root stumps etc. The healthy seeds are sown into nursery beds. The rate of germination of seed is very low, hence sufficient quality of the seeds be sown. Sowing is done in the month of May or at break of mansoon. The seedlings are transplanted in the month of August at distance of 16 to 30 cm. the	**4M**

		plants are kept free from weed. The plants are fertilised with various chemical fertilizer and manure. **Collection:** Rauwolfia roots are harvested during autumn from 3-4 years old plants, as it consist of higher proportion of alkaloids during winter, when shrub is about 1 m in height with white or rose coloured flowers and purplish black fruits and plants are about 3-4 years, the roots which penetrate deeply are cut, washed properly so as to remove earthy matter and dried in air and packed in air tight container. Care is taken to keep the root bark intact as the bark has higher alkaloidal content.	
2	**e)**	**e) Explain with example (any two) (01 mark for Explanation and 01 mark for example of each)** **i) Stomatal index**: It is percentage in which number of stomata form to the total epidermal cells. Each stoma is being counted as one cell. It can be calculated by a formula:  I = Stomatal index S= number of stomata per unit area E= epidermal cells in the same area Stomatal index is constant and therefore, of diagnostic significance for given species. It is useful in differentiation of closely related species and also for detection of adulterants. **Example (any 1)** Species | Stomatal index Atropa belladonna | 20.2 to 23.0 Atropa acuminata | 16.2 to 18.3	**4M**

Indian senna	17.0 to 20.0
Alexandrian senna	10.8 to 12.6

ii) Optical rotation: Certain substances are found to have the property of rotating the plane of polarised light in pure state or in the solution, thus they are described to be optically active and this property is known as optical rotation. Plane of polarised light rotated towards right (dextrorotatory) or left (laevorotatory). Thus, this method is used to determine the purity of the substance.

Example (any 1)

Drug	**Optical rotation**
Clove oil	0^{o} to -1.5^{o}
Honey	$+3^{o}$ to -15^{o}
Caraway oil	$+70^{o}$ to $+80^{o}$
Castor oil	Not less than $+3.5^{o}$

iii) Organoleptic method of evaluation

Organoleptic evaluation refers to evaluation of drug by colour, odour, taste, size, shape and special features like touch, texture, sound etc.

Morphology of the crude drug is described in official books and is considered as guideline for their study. But morphology of the crude may vary by several factors like

1. When crude drugs are exposed to sunlight then colour of the crude drug may fade.

2. Size of the crude drug may vary depending upon adverse climatic condition and proper treatment during cultivation like irrigation, fertilizers etc.

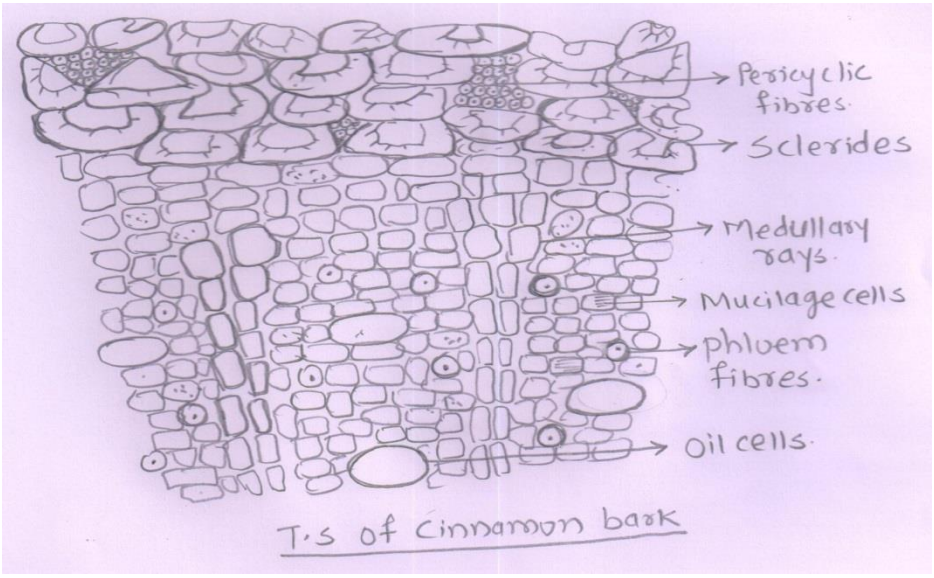
3. Shape of the crude drug may vary due to improper treatment of drying, storage, packing.

Examples

The fracture surface in Cinchona, Quillia, Cascara bark.

Wavy shape of Rauwolfia.

		Pungent taste of Capsicum, Ginger. Odour and taste of Asafoetida, Black pepper, Nutmeg, Caraway.	
3		**Attempt any <u>THREE</u> of following(4 marks each)**	**12M**
3	**a)**	**Describe the different techniques(any three) for isolation of volatile oils.(4 Marks)** **Methods of isolation of volatile oil:** **A) Distillation :** Most of the oils are obtained by distillation which are of following 3 types 1.Water distillation -is mostly applicable to such plant material, which is dried initially in air and the constituents are not degraded by boiling upto 1000C e.g Turpentine oil 2.Water and steam distillation – It is often suitable for such plant material whether fresh or dried the constituents of which undergo degradation by direct boiling e .g Clove oil 3.Direct steam distillation- it is invariably applicable to fresh drugs that is loaded with sufficient natural moisture and hence no maceration is required e.q. peppermint oil. **B) Solvent Extraction :** Extraction is done by using some organic solvents like ether, benzene, petroleum etc. **C) Ecuelle Method:** In this method the oil cells of the citrus fruits are ruptured mechanically using pointed projections and thus citrus oil is extracted. **D) Enfleurage Method:** It is used in the extraction of delicate perfumes. The fresh flower petals are spread on a fatty material. The spread petals are exhausted after sometime as the fatty material absorbs the oil. These exhausted petals are replaced by fresh petals and then the oil is collected from the fatty material.	**4M**

3	**b)**	**Draw a well labelled diagram of T. S. of cinnamon bark and describe any four microscopical characters.(2 Marks for labelled T. S. diagram & 2 Marks for any 4 microscopical characters)**  **Microscopy:** 1. Pericyclic fibre: Small group of about 6 to 15 pericyclic lignified fibres 2. Sclerides: 3 to4 layers of pitted sclerides, thickened lignified walls, isodiametric slight elongated tangentially (U-shaped thickening), with starch grains. 3. Secondary Phloem: Parenchyamatous: few cells contain acicular calcium oxalate crystals and starch grains 4. Medullary rays: Biseriate, narrow at inner sight, wider in the scleride band side, contain starch acicular raphides. 5. Phloem fibres: single, isolated, circular lignified with stratification 6. Mucilage cells: can be identified after staining with rheuthenium red 7. Oil cells: Big& isolated	**4M**
3	**c)**	**Write the chemical constituents and uses of the following drug-(any two) (1Mark each for Chemical constituents & uses of each drug)** **i) Cinchona:** **Chemical constituents:** Cinchona contains about 25 alkaloids in the range of 5 to 10%.. Out of 25 alkaloids , only four are therapeutically important and are named as quinine, quinidine, cinchonine and cinchinidine. Also contain cinchofulvic, cinchotannic acid and quinic acid. It	**4M**

		also contains red colouring matter known as cinchona red. Tannins, calcium oxalate and starch are also present. In addition to the alkaloids cinchona bark also contains bitter glycosides quinoin, **Uses:** Cinchona bark is used as- 1) Antimalarial 2)Antipyretic 3) Bitter tonic 4)Stomachic 5) Cinchonidine is used in rheumatism and neuralgia. 6) Quinidine is employed as cardiac depressant. ii) **Sandalwood oil:** **Chemical constituents:** The main product of sandal wood is the volatile oil (2.5%) called sandal wood oil. All the wood elements of this drug contain volatile oil. Sandal wood oil contains about 95% of two isomeric sesquiterpene alcohols, α- santalol and β – santalol. The oil also contains an aldehyde santalal, santene, santenone, teresantol. **Uses:** The oil is used for symptomatic treatment of dysuria and in diminishing the frequency of micturition marked in the tuberculosis of the bladder. The oil is mainly used as a perfume in cosmetic and incense sticks. **iii)Ephedra:** **Chemical constituents:** Contains about 1-1.5% Phenyl ethyl amine type of alkaloid-Ephedrine(30-90%). Other alkaloids are pseudo ephedrine, L- methyl ephedrine, Dimethyl ephedrine, Norephedrine. It also contain glucaric acid & leucodelphidine. **Uses:** Ephedrine is Sympathomimetic drug used as bronchodilator, CNS Stimulant,due to Vasoconstriction shows rise in B.P., diuretic, anti-inflammatory activity due to presence of oxazolidone.	
3	**d)**	**Explain with example of the following(any two)(1½ Marks for explanation & ½ Mark for Example)** **i) Latex:** The latex is a product contained in special secretory tissues of certain plants. It is usually, a white aqueous suspension, wherein microscopically small particles of oil globules are suspended. These natural suspension of milky consistency may contain proteins, sugars, minerals and alkaloidal salts in the true solution, whereas gums, starch and resins in the suspended form. e.g. Opium, Papain. **ii) Condensed tannin:** These are the true tannins, which on acid or enzyme treatment get decomposed into red insoluble compounds known as phlobaphenes. On dry distillation, they yield catechol tannin.	**4M**

		e.g. Pterocarpus (Kinotannic acid), Catechu (catechutannic acid) and Cinchona (cinchotannic acid) **iii) Characteristics of umbelliferous fruit** 1. Schizocarp (splitting fruits)- Dry fruits from syncarpus ovary that splits at maturity into two portions. 2. Mericarp- Each portion of Schizocarp (cremocarp) is called as mericarp. 3. Two mericarps are joined together by a thread like structure called as carpophore 4. Primary ridges are 5 or more runs from apex to base. 5. Each mericarp has a disc like structure at the apex called as stylopod. 6. Each mericarp has 2 surfaces i.e. a) Outer dorsal or curved surface b) Inner ventral or commissural surface. 7. Each mericarp contains 6 vittae- 4 on dorsal surface and 2 on commissural surface. 8. Each mericarp contains a single seed. The seed contains- 1. An apex 2. Endosperm 9. All umbelliferous fruits contain Volatile oil. **Example**-Fennel, Coriander, Ajowan	
3	**e)**	**Define bark. Describe the methods of collection of bark.(1 Mark for definition & 3 Mark for methods of collection of bark)** **Bark:** The secondary external tissues lying outside the cambium in stem or root of dicotyledonous plants are known as the bark. **Methods of collection:** 1.**Felling method:** The tree is cut at base and bark is peeled out. **2. Uprooting method:** The root of the plant is dug out of soil and bark is stripped off from root and branches. This method is applied for collection of root bark of cinchona in java. **3. Coppicing method**: In this method, plant is allowed to grow for a definite period and then it is cut off at specific distance from soil. The stumps, which remain in ground are allowed to send shoots, which develop further yielding aerial parts. These new parts are cut off and bark is collected from shoots.	**4M**

4		**Attempt any THREE of the following (4 marks each)**	**12M**
4	**a)**	**Explain the general chemical test for the identification of alkaloids(1 Mark for each test)** **Identification tests for alkaloids by precipitation method:** 1. Mayer's Reagent (Potassium mercuric iodide) Cream or pale yellow ppt. 2. Dragendorff's Reagent (Potassium bismuth iodide) Brown or reddish brown colour or ppt. 3. Wagner's Reagent (Iodine in Potassium iodide), Brown or reddish brown colour or ppt. 4. Hager's Reagent (Saturated solution of picric acid) Yellow ppt.	**4M**
4	**b)**	**Define the following with example.(1 mark for each)** i)**Oxytocics:** These are the drugs which have stimulant effect on the motility of the uterus. OR An agent that causes expulsion of the contents of uterus by contracting the uterine muscles. **Example**- Ergot **ii)Cardiotonic**: are the drugs which give strength or energy to the activity of the hearth. **OR** Cardiotonics increases the force of contraction of cardiac muscles and stimulates the overall activity of the heart. **Example:** Digitalis ,Arjuna **(any 1)** iii) **Antitussive**: are the agents which act upon the pulmonary membrane that hasten or alter expectoration. OR These are the agents which relieves or suppreses the cough. **Example-** Vasaka, Tulsi, Tolu balsam, **(any 1)**	**4M**

		iv)Astringents: Astringents are the agents which precipitate proteins and causes contraction of smooth muscles. **Example**: Black catechu , pale catechu , Amla ,Clove ,Cinnamon **(any 1)**	
4	**c)**	**Describe the method of preparation of fibre obtained from plant source.(4 marks for method of preparation)** **The fibre obtained from plant source is Cotton** Fruits (capsules) are 3-5 celled,, which contain numerous seeds. Seeds covered with hair, known as Balls. Balls are collected, dried & taken to ginning press, where in trichomes are separated from seeds. Raw cotton obtain from above is subjected to a process called combing. This separates the long and short fibres .The long fibres are spun and woven as cloth and short fibres are called linters. This is used for manufacturing of absorbent cotton. Remove impurities (vegetable debris) from raw cotton. To remove wax, fatty material & colouring matter, raw cotton is taken to the machine, cotton opener & followed by treatment with dil. Soda solution or soda ash solution under pressure for about 10-15 hrs. Washed with water & treated with suitable bleaching agent. Again washed, dried & make a flat sheet .Finally packed in paper wrappers & sterilized.	**4M**
4	**d)**	**Write the biological source, chemical constituents and uses of Garlic (1 mark for biological source, 1 ½ marks each for chemical constituents & for uses)** **Biological source:** It consist of bulbs of the plant Allium sativum, Family: Liliaceae **Chemical constituents:** Garlic bulbs contain 29%carbohydrates, 56%proteins (albumin), fat, mucilage and volatile oil. It also contains phosphorous, iron, and copper. Volatile oil of the drug is the chief active constituent, and contain allyl propyl disulphide, diallyl disulphide, alliin and allicin. Alliin by the action of enzyme allinylase, is converted into allicin. **Uses:** Garlic is used as carminative, aphrodiasiac, expectorant, stimulant, and disinfectant in the treatment of pulmonary condition. Use as condiment. Oil of garlic is used as anthelmintic and rubifacient. Allicin is antibacterial. Garlic oil is useful in high blood pressure and atherosclerosis. It is reported to possess cholesterol suppressing properties.	**4M**

4	**e)**	**Differentiate between Organised and unorganised crude drug.(4 Marks for any four points)**	**4M**

Organized crude drug	**Unorganized crude drug**
1. It is obtained from definite anatomic parts of the plants such as flowers, leaves, fruits etc.	1. It is obtained from plants or animals by means of physical process such as drying, incision, extraction such as juices, resins.
2. It is made up of definite tissue and cell.	2. It does not have cellular structure.
3. It is solid in nature	3. It is solid, semi-solid and liquid in nature.
4. Microscopical characters are used for identification.	4. Chemical tests and physical standards are used for identification.
5.Botanical and zoological terminology can be used to describe the drug	5. Botanical and zoological terminology is inadequate. To describe these drugs, physical characters such as solubility, optical rotation, refractive index are used.
6.Ex. Coriander , fennel, datura, etc	6. Ex. Aloe , bees wax, tragacanth, asafoetida etc.

5		**Attempt any THREE of following(4 marks each)**	**12M**
5	**a)**	**Define "Drug Adulteration". Describe any four methods of adulteration with suitable examples. (1 mark for definition and 3 marks for methods of adulteration with examples)**	**4M**

Definition: Adulteration is the debasement of an article.

Methods of Adulteration :

1. Replacement by exhausted drugs

Ex. a).Exhausted saffron is coloured artificially

b)Exhausted Ginger is mixed with starch & coloured.

		2.Substitution with superficially similar but inferior drugs Ex.a). Adulteration of cloves by mother cloves. b). Saffron with dried flower of carthamus tinctorius. **3.Substitution by artificially manufactured substituent** Ex.a) Paraffin wax is tinged yellow & substituted for yellow bees wax. b). Artificial invert sugar is mixed with honey. **4.Substitution by sub- standard commercial varieties** Ex. a) capsicum frutescens (capsicum minimum), substituted by capsicum annum. b) Alexandrian senna with Arabian senna. c) Strychnos nux-vomica adulterated with Strychnos nux-blanda/ S. potatorum seeds. **5. Presence of organic matter obtained from the same plant** Ex .a) clove are mixed with clove stalks. b) Caraway &Anethum fruits are mixed with other parts of inflorescence **6.Synthetic chemical** Ex. a) Benzyl benzoate to balsam of peru. a) Citral to oil of lemon grass. b) Camphor oil and eucalyptus oil in oil of rosemary. **7.Waste from market** Ex .a) Limestone in asafoetida. b) Pieces of amber coloured glass in colophony. c) White oil in oil of Coconut. d) Stearin or paraffin in cocoa butter.	
5	**b)**	**Name the adulterants and substitute of -** **i) <u>Nux- Vomica</u>** **Adulterants:(1 mark)** 1) Strychnos nuxblanda 2) Strychnos potatorum **Substituents:(1 mark)** 1) Strychnos wallichiana 2) Strychnos ignatii **ii) <u>Digitalis</u>** **Adulterants: (any 2 for 1 mark)**	**4M**

		1) Verbascum Thapsus 2) The Primrose leaves 3) Comfrey leaves **Substituents: (any 2 for 1 mark)** 1) Digitalis lanata 2) Digitalis lutea or straw foxglove 3) Digitalis thapsi or Spanish foxglove	
5	**c)**	**Enlist the Indigenous system of medicine .Describe the ' Siddha system of medicine'.** **The Indigenous systems of medicine are: (2 marks for any four of the following, i.e. ½ mark for each)** 1. Ayurveda 2. Siddha 3. Unani 4. Naturopathy and Yoga 5. Homeopathy **<u>' Siddha system of medicine': (2 marks)</u>** The term 'Siddha' means achievement and 'Siddhars' were saintly personalities, who attained proficiency in medicine through practice of Bhakti and Yoga. This is the system of pre -vedic period identified with Dravidian culture and it is largely therapeutics in nature. Like Ayurveda, this system believes that all objects in universe are made up of five basic elements namely, earth , water , sky , fire and air. The identification of causative factors of diseases is done through pulse reading, colour of body, study of voice, urine examination, status of digestive system and examination of tongue. The literature of siddha system is mostly in Tamil. Few natural drugs used in Siddha system of medicine are : Abini : (papaver – somniferum),	**4M**

		Alari : (Nerium – indicum), Ethi : (Strychnous –Nuxvomica) Gomathi : (Datura – Stramonium) Rotha Polam : (Aloe – barbadensis)	
5	**d)**	**Write any two examples of drug belonging to following family- (1 mark each)** (i) **Rubiaceae** – Cinchona,Ipecac (ii) **Apocynaceae** – Vinca , Rauwolfia (iii) **Burseraceae** – Guggul , Myrrh (iv) **Liliaceae -** Aloe , Colchicum , Garlic , Shatavari **(any 2)**	**4M**
5	**e)**	**Define Enzymes. Write biological source, chemical constituents and uses of Papaya.** **(Definition -1 mark, Biological source-1mark , Chemical constituents-1mark and uses – 1mark)** **Enzymes**- Enzymes are the protein substances which act as catalysts in various biochemical reactions **Papaya:** **Biological source:** It consist of dried latex obtained by giving incision on unripen fruit of Carica papaya Family: Caricaceae **Chemical constituents:** Papaya latex contain proteolytic enzymes i.e. Papain & chymopapain, which acts on polypeptides & amides. Several proteolytic enzymes such as peptidase-I, rennin like milk coagulating enzyme, amylolytic enzyme are also present **<u>USES (any two):</u>** 1. Papain is proteolytic enzyme that tenderises meat & acts as clarifying agent in food industry.	**4M**

		2. It is a common ingredient of brewery industry. 3. These are used to clean up dead tissue from some chronic wounds. 4. It is an ingredient in some toothpastes or mints as teeth – whitener 5. It is used for degumming of silk fabrics in textile industry and in leather industry for dehairing of skins and hides. 6. It is used in cheese manufacturing ,as a substitute of rennin.	
6		**Explain the chemical tests of any <u>FOUR</u> crude drugs. (1 mark for each test)**	**16M**
6	**a)**	**Silk : (any 4 tests)** 1) Silk is soluble in cuoxam, sulphuric acid (66%) and concentrated hydrochloric acid. 2) Silk does not contain sulphur containing amino acids hence the test with lead acetate & KOH solution does not form black precipitate. 3) Warm or boil in a test tube with picric acid solution , permanent yellow colour is produced. 4) On ignition ,brown gases which are alkaline to litmus are produced.There is foul smell (like burnt hair or flesh).It burns slowly giving beads followed by white ash.) 5) With N/50 iodine solution followed by 8% sulphuric acid , it gives yellow colour.	**4M**
6	**b)**	**Benzoin: (any 4 tests)** 1) To a solution of benzoin in alcohol add water. Solution becomes milky & acidic to litmus 2) To the drug add solvent ether, decant ether layer & to it add 2/3 drops of H_2SO_4 A deep reddish brown colour in case of Sumatra Benzoin. A deep purplish-red colour in case of Siam Benzoin. 3) Heat Benzoin in a test tube with solution of KmnO4, it develops Strong odour of benzaldehyde. 4) To the alcoholic solution of Benzoin add FeCl3, Green colour develops in case of Sumatra Benzoin. 5) Heat small quantity of benzoin in dry test, cover the opening of test tube with clean dry glass slide, cool it and observe glass slide under microscope, cinnamic acid crystals are observed.	**4M**

6	**c)**	**Nux vomica (any 4)**	**4M**

Test	Observation	Inference
T. S. of drug + ammonium vanadate + H_2SO_4	Endosperm stained purple	Strychnine present
T. S. of drug + Pot. Dichromate + H_2SO_4	Endosperm stained Violet color	Strychnine present
T. S. + Conc. HNO_3	Endosperm stained Yellow to Orange	Brucine present
T.S + Phloroglucinol + conc.HCL (1:1)	Pink	Lignified trichomes

6	**d)**	**Shark liver oil: (2 marks for each test)** 1. Dissolve 1gm of shark liver oil in 1ml of chloroform and treat with 0.5ml of sulphuric acid. It acquires light violet colour, changing to purple and finally to brown (due to Vitamin A). 2. Dissolve 1ml of shark liver oil in 10 ml of chloroform and treat with saturated solution of antimony trichloride in chloroform. Shake it well. A blue colour is developed (due to Vitamin	**4M**
6	**e)**	**Gelatin: (any 4 tests.)** 1) Aqueous solution of drug gives precipitate with solution of trinitrophenol and solution of tannic acid. 2) On heating gelatin solution with soda lime, ammonia gas is evolved. 3) Aqueous solution of gelatin precipitates mercuric nitrate solution forming white colour, which turns black-red on heating. 4) Formaldehyde makes gelatin hard & insoluble after drying.	**4M**

		5) To aqueous solution of drug, add drop of picric acid or tannic acid solution, precipitate is produced.	
6	**f)**	**Starch: (any 4 tests)** 1) Boil 1 g of starch with 15 ml of water and cool. The translucent viscous jelly is produced. 2) The above jelly turns deep blue by the addition of solution of iodine. 3) The above blue colour disappears on warming and reappears on cooling. 4) Hydrolyse the starch solution with acid and then add Fehling's solution A and Fehling's solution B in equal quantity and heat it in water bath which gives brick red ppt. 5) To the solution Of starch add Molisch reagent and add H_2SO_4 from the side of test tube, violet ring is formed at the junction of two liquids.	**4M**