



**MODEL ANSWER**  
**SUMMER– 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		<b>Answer any <u>EIGHT</u> of the followings: ( 2marks each)</b>	<b>16M</b>
1	a)	<b>Define Pharmacognosy. Name the scientist who coined the term Pharmacognosy. (1 mark each for definition and name of the scientist)</b>  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.  A German scientist, C. A. Seydler coined the term pharmacognosy.	<b>2M</b>
1	b)	<b>Write name of drug of the following synonym:( ½ Mark each)</b>  i) <b>Crow fig-</b> Nux vomica ii) <b>Ma-Huang-</b> Ephedra iii) <b>Periwinkle-</b> Vinca iv) <b>Banda soap-</b> Nutmeg	<b>2M</b>
1	c)	<b>Define with examples:( ½ Mark for definition &amp; ½ Mark for any 1 example)</b>  i) <b>Cardiotonics:</b> These are the drugs which gives strength or energy to the activity of the heart. <b>OR</b> Cardiotonics are the drugs which gives strength or energy to the cardiac muscles. <b>Ex. Digitalis, Arjuna</b>  ii) <b>Antiseptic:</b> Antiseptics are the chemical sterilizing agents which are used to kill pathogenic microbes or for prevention of their growth. <b>Ex. Neem, Turmeric, Myrrh, Benzoin</b>	<b>2M</b>
1	d)	<b>Which part of plant is used as drug in case of :( ½ Mark each)</b>  i) <b>Rauwolfia-</b> Roots ii) <b>Arjuna-</b> Bark iii) <b>Rhubarb-</b> Rhizomes iv) <b>Turmeric-</b> Rhizomes	<b>2M</b>



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1	e)	<p><b>Write any four characteristics of Umbelliferous fruits ( 2 Marks for any four characteristics)</b></p> <ol style="list-style-type: none"><li>1. Schizocarp (splliting fruits)- Dry fruits from syncarpus ovary that splits at maturity into 2 portions.</li><li>2. Mericarp- Each portion of Schizocarp (cremocarp) is called as mericarp.</li><li>3. Two mericarp join together by a thread like structure called as carpophore</li><li>4. Primary ridges are 5 or more runs from apex to base.</li><li>5. Each mericarp has a disc like structure at the apex called as stylopod.</li><li>6. Each mericarp has 2 surfaces i.e. a) Outer dorsal or curved surface b) Inner ventral or commissural surface.</li><li>7. Each mericarp contains 6 vittae- 4 on dorsal surface and 2 on commissural surface.</li><li>8. Each mericarp contains a single seed. The seed contains- 1. An apex 2. Endosperm</li><li>9. All umbelliferous fruits contain Volatile oil.</li></ol>	2M
1	f)	<p><b>Draw well labelled diagram of macroscopy of ginger rhizome (2 Marks)</b></p>	2M



<b>1</b>	<b>g)</b>	<b>Name two drugs belonging of following family:( 1 mark for any two drugs of each family)</b>  i) <b>Apocynaceae:</b> Rauwolfia, Vinca  ii) <b>Liliaceae:</b> Aloe, Garlic, Colchicum, Shatavari	<b>2M</b>
<b>1</b>	<b>h)</b>	<b>Write significance of:( 1 Mark each)</b>  i) <b>Swelling index:</b>  The volume occupied by the seeds after 24 hours of swelling in water is called Swelling factor of the drug. It is a quantitative swelling due to mucilage present in the drug. Swelling factor is supposed to be criterion of purity of the drug.  ii) <b>Ash value:</b>  The residue remaining after incineration is the ash content of the drug, Ash content simply represents the inorganic salts naturally occurring in drug or adhering to drug or deliberately added to it as a form of adulteration. Therefore it is a criterion to judge the identity or purity of crude drugs.	<b>2M</b>
<b>1</b>	<b>i)</b>	<b>Name the drug which contain following active chemical constituents:( ½ Mark each)</b>  i) <b>Shogaol - Ginger</b>  ii) <b>Harman - Gokhru</b>  iii) <b>Ajmalicine - Rauwolfia</b>  iv) <b>Rhein - Rhubarb</b>	<b>2M</b>
<b>1</b>	<b>j)</b>	<b>Write method of preparation of cotton fibres. ( 2 Marks)</b>  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.	<b>2M</b>



1	k)	<p><b>Write contribution of following scientist in the development of pharmacognosy:</b> ( 1 Mark each)</p> <p>i) <b>Dioscorides:</b> Dioscorides was a Greek Physician who described several plants of medicinal importance in “De Materia Medica”</p> <p>ii) <b>Galen:</b> Galen was Greek pharmacist; he worked on extraction of chemical constituent from the plants. He developed various methods of extraction therefore the branch of pharmacy which deals with extraction of chemical constituent from plants &amp; animals is called as Galenical Pharmacy</p>	2M												
1	l)	<p><b>Differentiate between leaf and leaflet.( ½ Mark each for any 4 differentiating points)</b></p> <table border="1" data-bbox="225 819 1428 1435"> <thead> <tr> <th data-bbox="225 819 767 875">Leaf</th> <th data-bbox="767 819 1428 875">Leaflet</th> </tr> </thead> <tbody> <tr> <td data-bbox="225 875 767 987">1) Lamina is one entire piece</td> <td data-bbox="767 875 1428 987">1) Lamina is completely divided into separate segment called leaflets</td> </tr> <tr> <td data-bbox="225 987 767 1099">2) In case of leaf, bud or branch is present in the axil.</td> <td data-bbox="767 987 1428 1099">2) It is absent in leaflets.</td> </tr> <tr> <td data-bbox="225 1099 767 1211">3) Leaves are arranged spirally and they are solitary in nature.</td> <td data-bbox="767 1099 1428 1211">3) Leaflets are arranged in pairs.</td> </tr> <tr> <td data-bbox="225 1211 767 1267">4) Lamina lie in different planes.</td> <td data-bbox="767 1211 1428 1267">4) Lamina lie in one planes.</td> </tr> <tr> <td data-bbox="225 1267 767 1435">5) Lamina generally symmetrical at the base. .Ex. Digitalis, Belladonna, Vasaka</td> <td data-bbox="767 1267 1428 1435">5) Lamina is asymmetrical at the base. Ex. Senna, Neem</td> </tr> </tbody> </table>	Leaf	Leaflet	1) Lamina is one entire piece	1) Lamina is completely divided into separate segment called leaflets	2) In case of leaf, bud or branch is present in the axil.	2) It is absent in leaflets.	3) Leaves are arranged spirally and they are solitary in nature.	3) Leaflets are arranged in pairs.	4) Lamina lie in different planes.	4) Lamina lie in one planes.	5) Lamina generally symmetrical at the base. .Ex. Digitalis, Belladonna, Vasaka	5) Lamina is asymmetrical at the base. Ex. Senna, Neem	2M
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2		<p><b>Attempt any FOUR of the following: ( 3 marks each)</b></p>	12M												
2	a)	<p><b>Define resins. Write resin combinations.( 1 Mark for definition of Resin &amp; 2 marks for any 2 Resin combinations)</b></p> <p>Resins are amorphous mixture of essential oils, oxygenated product of terpenes and carboxylic acid and found as an exudation from the trunk of trees.</p> <p><b>RESIN COMBINATION</b></p> <p>Homogenous combinations of resins with other plant products like volatile oil, gum etc. are known as resin combinations.</p> <p>The different resin combinations are.....</p>													



		<p><b>1.Oleo resin</b> –(volatile oil + resin)</p> <p>e.g Ginger, capsicum etc</p> <p><b>2.Oleo gum resin</b> –( volatile oil + gum + resin)</p> <p>e.g. Asafoetida, Myrrh</p> <p><b>3.Glycoresins</b> (Sugar + resin)</p> <p>e.g jalap , ipomoea</p> <p><b>4.Balsam</b>-(Benzoic acid +cinnamic acid)</p> <p>e.g tolubalsam, peru balsam</p>	
<b>2</b>	<b>b)</b>	<p><b>Explain different methods of adulteration with examples.( 1 Mark each for any 3 methods with example)</b></p> <p><b>Methods of Adulteration :</b></p> <p><b>1. Replacement by exhausted drugs:</b></p> <p>Ex.1.Exhausted saffron is coloured artificially</p> <p>2.Exhausted Ginger is mixed with starch &amp; coloured.</p> <p><b>2.Substitution with superficially similar but inferior drugs:</b></p> <p>Ex.1. Adulteration of cloves by mother cloves.</p> <p>2. Saffron with dried flower of carthamus tinctorius.</p> <p><b>3.Substitution by artificially manufactured substituent:</b></p> <p>Ex.1. Paraffin wax is tinged yellow &amp; substituted for yellow bees wax.</p> <p>2. Artificial invert sugar is mixed with honey.</p> <p><b>4.Substitution by sub- standard commercial varieties:</b></p> <p>Ex.1. capsicum frutescens( capsicum minimum), substituted by capsicum annum.</p> <p>2. Alexandrian senna with Arabian senna.</p> <p>3. Strychnos nux-vomica adulterated with Strychnos nux-blanda/ S. potatorum seeds.</p> <p><b>5. Presence of organic matter obtained from the same plant :</b></p> <p>Ex.1. clove are mixed with clove stalks.</p> <p>2. Caraway &amp; Anethum fruits are mixed with other parts of inflorescence</p>	<b>3M</b>



		<p><b>6.Synthetic chemical:</b></p> <p>Ex.1. Benzyl benzoate to balsam of Peru.</p> <p>2. Citral to oil of lemon grass.</p> <p><b>7.Waste from market:</b></p> <p>Ex.1. Limestone in asafoetida.</p> <p>2. Pieces of amber coloured glass in colophony.</p>	
2	c)	<p><b>Define oxytocics. Explain life cycle of ergot.( 1 Mark for definition &amp; 2 Mark for life cycle )</b></p> <p><b>Oxytocics:</b> Are the drugs which have stimulant effects on the motility of the uterus. <b>OR</b> Are an agent that causes expulsion of the contents of uterus by contracting the uterine smooth muscles.</p> <p><b>The stages of life cycle of Ergot can be described as-</b></p> <p>(i) Over wintering stage.</p> <p>(ii) Stage of sexual reproduction, and</p> <p>(iii) Stage of asexual reproduction</p> <p>The sclerotia are produced in the late summer. They fall on the ground in autumn. When the favourable conditions for the germination are available, these sclerotium germinate in the spring to produce small purple coloured stalks which on further growth form a flattened spherical stromatic head at the top. The head of the stroma contains several perithecia. Each perithecium contains several elongated asci. Each ascus contains eight thread like ascospores. The ascospores come out of the perithecium and get dispersed by the air current. The dispersal of ascospores takes place at the time of flowering of rye plant which is the host. The ascospores become entangled with the feathery stigmas of host and produce mycelia which penetrate through the ovary. The mycelia give rise to conidia, produced from the surface of the ovary. The honey dew is sweet in taste and attracts the insects. Along with honey dew, conidia are carried from one place to another by insects. The stage is either known as the honey dew stage or sphacelia stage.</p> <p>In the second stage, hyphae penetrate deeply into the ovary and develop into a mass covering the entire ovary which results in the formation of elongated sclerotium. This stage is known as sclerotium stage. Sclerotium develops further, attains the maximum size and falls on the ground along with the seeds of the host.</p>	3M



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Fig:- Life cycle of Ergot

2

d) Write morphological method of classification of crude drug along with merits and demerits. ( 1 mark each for description of morphological method of classification, merits and demerits)

3M

**Morphological Method of classification:**

In this type of classification, the crude drugs are divided into the parts of plants like leaves, fruits, flowers, wood, barks, dried latex, extracts, gums, etc.

**Parts of plant and examples of crude drugs**

**Root :** Rauwolfia, aconite

**Rhizome:** Turmeric, Ginger

**Stem:** Ephedra





		<p><b>Leaf:</b> Digitalis, Senna, Datura</p> <p><b>Seed:</b> Nux- vomica</p> <p><b>Bark:</b> Cinnamon, Cinchona</p> <p><b>Dried Juices:</b> Aloe, Pterocarpus</p> <p><b>Gum:</b> Acacia, Tragacanth</p> <p><b>Merits: ( Any two)</b></p> <ol style="list-style-type: none"><li>1) It is most useful for practical purpose</li><li>2) Any additional entry of drug can be easily done.</li><li>3) It is very useful to identify the adulterants.</li><li>4) It is useful to identify the drug either of organised or unorganised.</li></ol> <p><b>Demerits :( Any two)</b></p> <ol style="list-style-type: none"><li>1) It does not give true chemical nature of drug.</li><li>2) Many drugs are not in exact morphological form. Therefore it is difficult to classify.</li><li>3) Drugs from animal and mineral origin are difficult to classify.</li><li>4) When different parts of plant contain different chemical constituents, it is difficult to classify them.</li></ol>	
2	e)	<p><b>Define alkaloids with examples. Write identification test for alkaloids.( 1 Mark for definition with examples &amp; 2 Marks for identification tests)</b></p> <p><b>Alkaloids:</b> Alkaloids are basic, nitrogenous, organic compounds or products of plant origin having marked physiological action when it is administered by oral route in small dose.</p> <p><b>Ex.</b> Quinine, Ephedrine, vincristine, vinblastine, Strychnine, morphine, Nicotine, etc.</p> <p><b>Identification tests for alkaloids by precipitation method:</b></p> <p><b>1. Mayer's reagent (Potassium mercuric iodide)</b></p> <p>It gives cream or pale yellow precipitate.</p>	3M



		<p><b>2. Dragendorff's reagent (Potassium bismuth iodide)</b></p> <p>It gives brown or reddish brown colour or precipitate.</p> <p><b>3. Wagner's reagent (Iodine in Potassium iodide),</b></p> <p>It gives brown or reddish brown colour or precipitate.</p> <p><b>4. Hager's reagent (Saturated solution of picric acid)</b></p> <p>It gives yellow precipitate.</p>	
2.	f)	<p><b>Write biological source, chemical constituents and uses of Cinchona (1 Mark each for Biological Source, Chemical Constituents &amp; uses)</b></p> <p><b>CINCHONA:</b></p> <p><b>Biological source:</b> Cinchona is the dried bark of cultivated trees of Cinchona calisaya, Cinchona ledgeriana, Cinchona officinalis, Cinchona succirubra etc or hybrid of either of last two species with either of the first two belonging to family Rubiaceae.</p> <p><b>Chemical constituents:</b> 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.</p> <p>In addition to the alkaloids cinchona bark also contains bitter glycosides quinoic, cinchofulvic, cinchotannic acid and quinic acid. It also contains red colouring matter known as cinchona red, tannins, calcium oxalate and starch.</p> <p><b>Uses: (Any two)</b></p> <p>Cinchona bark is used as- 1) Antimalarial 2)Antipyretic 3) Bitter tonic 4)Stomachic</p> <p>5) Cinchonidine is used in rheumatism and neuralgia. 6) Quinidine is employed as cardiac depressant.</p>	3M



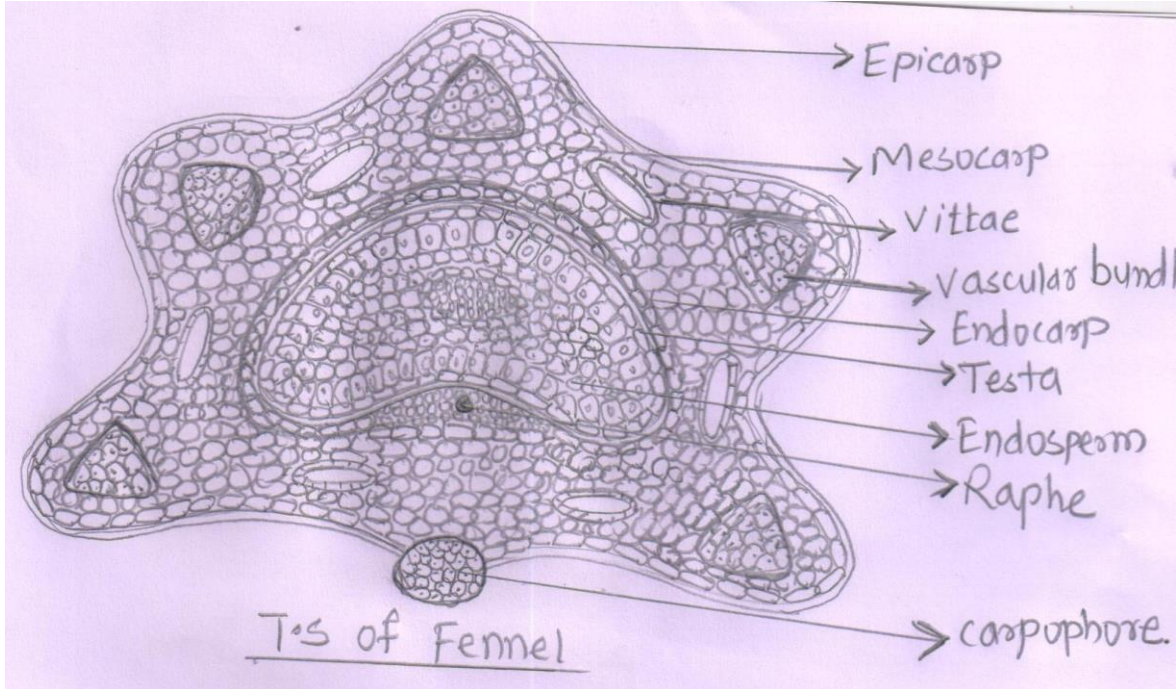
<b>3</b>		<b>Attempt any FOUR of the following: ( 3 marks each)</b>	<b>12M</b>
<b>3</b>	<b>a)</b>	<b>Write microscopical method of evaluation of crude drug.</b>  This method allows more detailed examination of a drug and it can be used to identify organised drugs by their known histological characters.  Microscope magnify its property, permits the minute structure under study to be enlarged and can be used to confirm the structural details of the drugs from plant origin. For the effective results various stains or reagents can be used to distinguish the cellular structure. The characteristics of cell wall, cell contents, trichomes, fibres etc can be studied in details, e.g. lignified trichomes in Nuxvomica .  The following few constant illustrate the importance of microscopic measurements for leaf drug:  i Stomatal number,  ii. Stomatal index  iii. Vein islet number  iv. Palisade ratio  Quantitative microscopic method like Lycopodium spore method is a very important method of evaluation of qualities of crude drug. These analytical technique are used for powdered drug.	<b>3M</b>

3

b) Draw a well labelled diagram of T. S. of Fennel or Nux- Vomica seed and explain it.  
( 1 ½ marks for Description and 1 ½ marks for Diagram with labels)

3M

**Fennel**



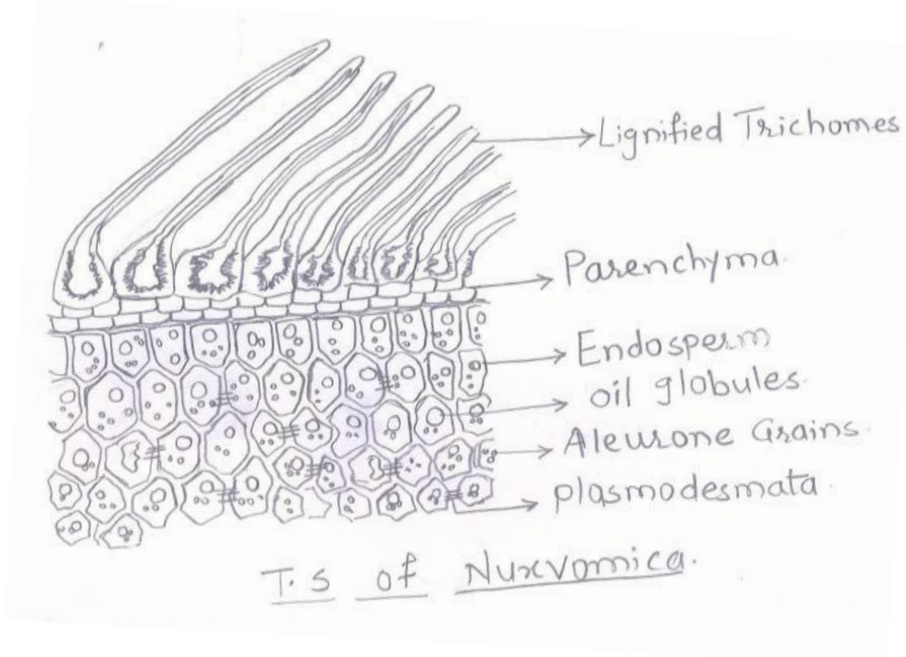
**PERICARP:**

1. Epicarp: A layer of quadrangular 2 polygonal cells.
2. Mesocarp: Reticulate, lignified parenchyma surrounding the vascular bundles.  
Vascular bundles: 5 in number, bicollateral, present below each primary ridge.  
Vittae: Oil cells, 4 on dorsal side, 2 on ventral surface.
3. Endocarp: Consist of narrow elongated cells having parquetary arrangement.

**SEED :**

1. Testa : Single layered yellowish brown in colour.
  2. Endosperm : thick walled , polygonal ,cellulosic paranchyma containing oil globules( fixed oil ) aleurone grains and rosette crystals of calcium oxalate.
- Raphe : A single ridge of vascular strands, appear in the middle of ventral surface.
- Carpophore : With very thick walled sclerenchyma in 2 strands.

**Nux vomica :**



**1. TESTA:**

Lignified trichomes: Thick walled, bent and twisted lignified trichomes, immersed from epidermis, parallel in one direction. Length: 600 to 1000, diameter about 25 $\mu$

Epidermal cell: Single layer, forms lignified trichomes, large thick walled with oblique linear pits (base of trichomes). Collapsed parenchyma: 2 layers, flattened parenchyma.

**2. ENDOSPERM:**

Thick walled cellulosic parenchymatous cells. Cell shows hemicelluloses in the cell wall and following characteristics:

Plasmodesma: fine protoplasmic strands between the walls of endospermic cells.

Aleurone grains: About 30 $\mu$  in diameter. Only globoids are presents.

Oil globules: fixed oils as small oil droplets in the cells.



3	c)	<p><b>Write about .( 1 mark each)</b></p> <p><b>i) Vitali –Morin test:</b></p> <p>The tropane alkaloid is treated with fuming nitric acid, followed by evaporation to dryness and to the residue methanolic potassium hydroxide solution is added .It gives a bright purple (violet) colouration that changes to red and finally fades to colourless.</p> <p><b>ii) Modified Borntrager test:</b></p> <p>To the 0.1g of drug add 2ml of 5% ferric chloride solution and 2ml of dil. HCL.Heat on a boiling water bath for 5mins, cool and shake it with benzene. Separate the benzene layer and add equal volume of dil. Ammonia pinkish red color is produced with all varieties of aloe.</p> <p><b>iii) Killer –Killani test :</b></p> <p>The test consists of boiling about 1gm finely powdered digitalis with 10ml of 70% alcohol for 3mins. The Extract is filtered. To the filtrate 5ml of water and 0.5ml of strong lead acetate solution is added, again filtered. Filtrate is treated with equal volume of chloroform and evaporated to yield extract. The extract is dissolved in glacial acetic acid ,cooled and then added 2drops of ferric chloride solution. These contents are transferred to a test tube containing 2ml of concentrated sulphuric acid. A reddish brown layer acquiring bluish green colour after standing is observed due to presence of digitoxose.</p>	3M
3	d)	<p><b>Write diagnostic characteristics of leaf ( leaf constant) . ( 1 mark each for any 3 leaf constants)</b></p> <p>The various leaf constant used for drug evaluation are as follows –</p> <p>i. Stomatal number</p> <p>ii. Stomatal index</p> <p>iii. Vein islet number</p> <p>iv. Palisade ratio</p>	3M



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i. **Stomatal number** – It is the average number of stomata present per square mm. of the epidermis. Stomatal number is constant for particular species of same age which grows in same environment.

Species	Stomatal number
<i>Datura stramonium</i>	087 (upper epidermis)
<i>Hyoscyamus niger</i>	125 (upper epidermis)

ii. **Stomatal index** - It is the percentage which the number of stomata form to the total number of epidermal cells, each stoma being counted as one cell. It can be calculated by the formula :

$$S-I = \frac{S \times 100}{(E+S)}$$

Where, I - Stomatal index

S – Number of stoma per unit area

E – Epidermal cells in same area

Species	Stomatal Index (lower surface)
<i>Atropa belladonna</i>	20.2 to 23.0
<i>Atropa acuminata</i>	16.2 to 18.3
<i>Indian senna</i>	17.0 to 20.0
<i>Alexandrian senna</i>	10.8 to 12.6



iii. **Vein islet number** – It is the number of Vein islets per square mm. of leaf surface.

Species	Vein islet number
<i>Digitalis purpurea</i>	02 – 5.5
<i>Digitalis thapsi</i>	8.5 – 16
<i>Cassia angustifolia</i>	19 – 23
<i>Cassia acutifolia</i>	25 - 30

iv. **Palisade ratio** – It is the average number of palisade cells, beneath one epidermal cell, using four continuous epidermal cells for the count.

Species	Palisade ratio
<i>Atropa belladonna</i>	06 – 10
<i>Datura stramonium</i>	04 – 07
<i>Digitalis purpurea</i>	3.7 – 4.2

**3** e) **Write chemical constituents of : ( 1mark each )**

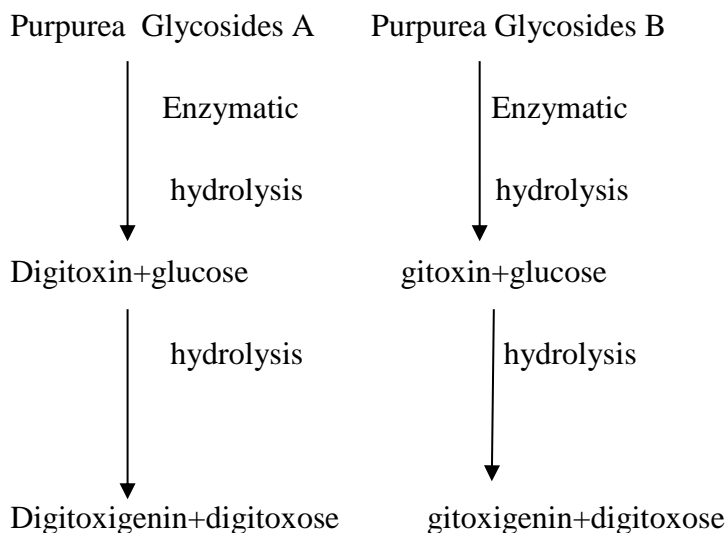
**3M**

- i) **Ephedra**
- ii) **Digitalis**
- iii) **Sandalwood**

**i)Ephedra:** 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

- iii) **Digitalis:** Digitalis contains cardiac glycosides, purpurea glycoside A and B. Digitalis also contains other glycoside such as Odoroxide H, Glucogitaloxin, gitaloxin, verodoxin and glucoverodoxin.





Additionally it also contains 2 saponin G. viz Digitonin and gitonin. and also contain hydrolytic enzymes.

### iii) Sandalwood

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,  $\alpha$ - santalol and  $\beta$  – santalol. The oil also contains an aldehyde santalal, santene, santenone, teresantol.

<b>3</b>	<p><b>f) Write biological source, chemical constituents and uses of vasaka. ( 1 mark each)</b></p> <p><b>Biological source:</b> Vasaka consists of dried as well as fresh leaves of plant Adathoda vasika belongs to family Acanthaceae.</p> <p><b>Chemical constituents:</b> It contains very small amount of essential oil and quinazoline alkaloids such as vasicine and vasicinone. It also contains yellow colouring matter and vaskin, non-nitrogenous crystalline substances.</p> <p><b>Uses:</b> It is used as an expectorants, bronchodilator and as mild bronchial antispasmodic. Vasicine is reported to possess oxytocic action</p>	<b>3M</b>
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<b>4</b>		<b>Attempt any FOUR of the following : ( 3 marks each)</b>	<b>12M</b>																																				
<b>4</b>	<b>a)</b>	<b>Define pharmaceutical aids. Classify pharmaceutical aids with examples. (1 Mark for definition. ½ mark each for any 4 classes with example)</b>  <b>Definition:</b> The substances which are of little or no therapeutic value but are essentially used in manufacture or compounding of pharmaceuticals are known as pharmaceutical aids.  <b>Classification with examples : (any 4 classes )</b>  <table border="1"><thead><tr><th>Sr. No.</th><th>Class</th><th>Examples</th></tr></thead><tbody><tr><td>1</td><td>Acidulent</td><td>Tamarind, Lemon Juice</td></tr><tr><td>2</td><td>Colours</td><td>Turmeric, Saffron, Indigo</td></tr><tr><td>3</td><td>Disintegrating Agents</td><td>Starch, CMC</td></tr><tr><td>4</td><td>Diluents</td><td>Cinnamon Water, Peppermint Water</td></tr><tr><td>5</td><td>Emulsifying and Suspending Agents</td><td>Acacia, Agar, Gelatin</td></tr><tr><td>6</td><td>Filter aids</td><td>Talc, Bentonite</td></tr><tr><td>7</td><td>Flavours</td><td>Cardamom, Rose, Nutmeg, Cinnamon</td></tr><tr><td>8</td><td>Hardening Agents</td><td>Beeswax, Hard paraffin</td></tr><tr><td>9</td><td>Lubricants</td><td>Talc, Cocoa butter</td></tr><tr><td>10</td><td>Solvents</td><td>Alcohol, Glycerine</td></tr><tr><td>11</td><td>Sweetening Agents</td><td>Honey, Saccharine, Glycyrrhiza</td></tr></tbody></table>	Sr. No.	Class	Examples	1	Acidulent	Tamarind, Lemon Juice	2	Colours	Turmeric, Saffron, Indigo	3	Disintegrating Agents	Starch, CMC	4	Diluents	Cinnamon Water, Peppermint Water	5	Emulsifying and Suspending Agents	Acacia, Agar, Gelatin	6	Filter aids	Talc, Bentonite	7	Flavours	Cardamom, Rose, Nutmeg, Cinnamon	8	Hardening Agents	Beeswax, Hard paraffin	9	Lubricants	Talc, Cocoa butter	10	Solvents	Alcohol, Glycerine	11	Sweetening Agents	Honey, Saccharine, Glycyrrhiza	<b>3M</b>
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4	b)	<p><b>Differentiate between organized crude drug and unorganized crude drug with examples (½ mark for each point for differentiation)</b></p> <table border="1"><thead><tr><th data-bbox="240 546 754 629">Organized crude drug</th><th data-bbox="759 546 1410 629">Unorganized crude drug</th></tr></thead><tbody><tr><td data-bbox="240 636 754 1585"><p>1. It is obtained from definite anatomic parts of the plants such as flowers, leaves, fruits etc.</p><p>2. It is made up of definite tissue and cell.</p><p>3. It is solid in nature</p><p>4. Microscopical characters are used for identification.</p><p>5. Botanical and zoological terminology can be used to describe the drug</p><p>6. Ex. Coriander , fennel, datura, etc</p></td><td data-bbox="759 636 1410 1585"><p>1. It is obtained from plants or animals by means of physical process such as drying, incision, extraction such as juices, resins.</p><p>2. It does not have cellular structure.</p><p>3. It is solid, semi-solid and liquid in nature.</p><p>4. Chemical tests and physical standards are used for identification.</p><p>5. Botanical and zoological terminology is inadequate. To describe these drugs, physical characters such as solubility, optical rotation, refractive index are used.</p><p>6. Ex. Aloe , bees wax, tragacanth, asafoetida etc.</p></td></tr></tbody></table>	Organized crude drug	Unorganized crude drug	<p>1. It is obtained from definite anatomic parts of the plants such as flowers, leaves, fruits etc.</p> <p>2. It is made up of definite tissue and cell.</p> <p>3. It is solid in nature</p> <p>4. Microscopical characters are used for identification.</p> <p>5. Botanical and zoological terminology can be used to describe the drug</p> <p>6. Ex. Coriander , fennel, datura, etc</p>	<p>1. It is obtained from plants or animals by means of physical process such as drying, incision, extraction such as juices, resins.</p> <p>2. It does not have cellular structure.</p> <p>3. It is solid, semi-solid and liquid in nature.</p> <p>4. Chemical tests and physical standards are used for identification.</p> <p>5. Botanical and zoological terminology is inadequate. To describe these drugs, physical characters such as solubility, optical rotation, refractive index are used.</p> <p>6. Ex. Aloe , bees wax, tragacanth, asafoetida etc.</p>	3M
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4	c)	<p><b>Define Tannin. Write types and pharmaceutical applications of tannin.</b></p> <p><b>Tannins:</b> These are derivatives of polyhydroxy benzoic acid. They are high molecular weight phenolic compounds capable of precipitation of animal proteins in hides and converting them into leather.</p>	3M				



		<p style="text-align: center;"><b><u>Classification of Tannins:</u></b></p> <div style="text-align: center;"> <pre> graph TD     A[Classification of Tannins] --&gt; B[True Tannins (High molecular weight compounds)]     A --&gt; C[Pseudotannins Low molecular weight compounds e.g. Gallic acid, Flavan-3,4-diol]     B --&gt; D[Hydrolysable Tannins (Pyrogallol)]     B --&gt; E[Condensed Tannins (Catechol)]             </pre> </div> <p><b>Pharmaceutical applications:</b></p> <p>It is used as mild antiseptics, as astringent, in the treatment of diarrhoea and to check small haemorrhages. Use in leather and printing industry.</p>	
<p><b>4</b></p>	<p><b>d)</b></p>	<p><b>Write biological source, chemical constituents and uses of Rauwolfia. ( 1 mark each )</b></p> <p><b>Biological source :</b> It consist of dried roots of the plant Rauwolfia serpentine belongs to family – Apocynaceae</p> <p><b><u>Chemical constituents-</u></b></p> <p>Main alkaloid – Reserpine</p> <p>Other alkaloids – ajamalicine, ajamaline, rauwolfinine, rescinnamine, reserpinine, yohimbine, serpentine &amp; serpentinine</p> <p>Also contains oleo-resin, phytosterol, fatty acids, unsaturated alcohol &amp; sugars.</p> <p><b><u>Uses- ( any 2 – ½ mark each )</u></b></p> <ol style="list-style-type: none"> <li>1. It helps to reduce blood pressure,</li> <li>2. It depresses activity of central nervous system.</li> <li>3. Tranquillizing agent</li> <li>4. For extraction of alkaloids such as reserpine, ajamaline. In the preparation of rauwolfia liquid extract.</li> </ol>	<p><b>3M</b></p>
<p><b>4</b></p>	<p><b>e)</b></p>	<p><b>Define with examples : ( 1 mark for each definition with any 1 example )</b></p> <ol style="list-style-type: none"> <li>i) <b>Diuretics:</b> Diuretics are the drugs which increase the flow of urine <b>Examples-</b> Gokhru, Punarnava</li> <li>ii) <b>Antitussives:</b> Antitussives are the agents which acts upon the pulmonary membranes that hasten or alter expectoration. <b><u>OR</u></b> These are the agents which relieves or suppresses the cough. <b>Example-</b> Vasaka, Tulsi, Tolu balsam.</li> </ol>	<p><b>3M</b></p>



		iii) <b>Antidysentrics:</b> The drugs used in the treatment of dysentery, is called antidysenterics. <b>Example-</b> Ipecacaunha	
<b>4</b>	<b>f)</b>	<b>Write uses of the following : ( 1 mark each)</b> i) <b>Dioscorea:</b> Pharmaceutically, the tubers are rich source of diosgenin. It being steroidal in structure is used as a precursor for synthesis of several corticosteroids, sex- hormones & oral contraceptives. It is also used in the treatment of rheumatic arthritis. ii) <b>Pyrethrum:</b> It is a natural contact insecticide. It is used in the form of aerosols containing 0.2 to 1 % extract. It is also used in preparation of mosquito coils and sticks and insect repellent formulations. The sprays of 'pyrethrum concentrates' are prepared in kerosene or other non-polar solvent. iii) <b>Shatavari:</b> Used as galactagogue, tonic & diuretic. Shatavarin -I is possess antioxytotic property. Oil of roots used in the treatment of rheumatism & in Nervine disorders.	<b>3M</b>
<b>5</b>		<b>Attempt any FOUR of the following : ( 3 marks each)</b>	<b>12M</b>
<b>5</b>	<b>a)</b>	<b>Write cultivation, collection and preparation of Senna for the market. ( 1 mark each for cultivation, collection and preparation)</b> <b>Cultivation of Senna:</b> The cultivation of senna is done by sowing the seeds either by broadcasting or dibbling method. For quick germination pounding of the seeds with coarse sand in mortar is done as the seeds are tough coated. The cultivation is done twice in a year i.e. in March/ April, and November/December. For cultivation, well drained irrigated land is preferred. It can also be cultivated under dry conditions but the drug collected from dry area is regarded as inferior one. Red soil as well as black soil serves the purpose of cultivation nicely. In March/April, the sowing is done as main crop, while in November/December, it is cultivated along with other crops like Coriander, Chillies, paddy etc. <b>Collection of senna:</b> Alexandrian senna is collected mainly in September from both wild and cultivated plants. The pods and large stalks are first seperated by means of sieves. By the tossing process leaves get separated from the heavier stalks. The leaves are then graded, partly by means of sieves and partly by hand picking into 1. Whole leaves 2. Whole leaves	<b>3M</b>



		and half leaves mix.  <b>Preparation for market:</b> The harvested leaves are spread on the floor under the shade without overlapping .The leaves are shuffled to attain uniform drying .Leaves loose about 50 -60 % of their weight on drying. After drying leaves are packed in bales under hydraulic press and store it away from light and send to market.	
5	b)	<b>Define and classify fibres. Write ideal requirements of surgical dressings.</b>  ( ½ mark for definition, 1 ½ marks for any three classes of fibre, ½ mark each for any two requirement)  <b>Definition- (½ mark) :</b> Fibres are elongated thick walled cells with pointed ends, cell walls of which may consist of cellulose and may or may not contains lignin.  <b>Fibres can be classified into following classes: (1 ½ marks)</b>  1. Plant fibres – Ex. Cotton, flax, banana, hemp.  2. Animal fibres- Ex. Silk, Wool.  3. Regenerated and synthetic fibres-  I. Fibres regenerated from carbohydrate material- Ex. Rayon, Alginate yarn.  II. Fibres regenerated from protein material- Ex. Fibrolin from milk casein  III. Synthetic fibres- Nylon, terylene.  <b>Ideal requirements of surgical dressings are as follows: (½ mark each for any two requirement)</b>  1. They should be sterilized before use. 2. They should be stored in dry well- ventilated place at a temp. not exceeding 25 <sup>0</sup> C. 3. They should be used with permitted antiseptics in prescribed concentration only. 4. They should not be dyed unless mentioned in the monograph. 5. Adhesive products should not be allowed to freeze. 6. There should not be any loose threads, fibre-ends in dressings.	3M



5	c)	<p><b>Write biological source, chemical constituents and uses of Madhunashini or Shankhapushpi.</b></p> <p><b>(1 mark each for Biological source, chemical constituents and uses of any one drug)</b></p> <p><b>Madhunashini:</b></p> <p><b>Biological source-</b> It consist of the leaves of the plant known as <i>Gymnema sylvestre</i> belonging to family <i>Asclepiadaceae</i>.</p> <p><b>Chemical constituents-</b> The leaves contain hentriacontane, pentriacontane, phytin, <math>\alpha</math> and <math>\beta</math> – chlorophyll, resin, tartaric acid, formic acid, butyric acid, gymnemic acid and anthraquinone derivatives.</p> <p><b>Uses-</b> It is used as antidiabetic, stomachic, stimulant, laxative and diuretic.</p> <p><b>Shankhapushpi.</b></p> <p><b>Biological source-</b> This consist of aerial parts of the plant known as <i>Canscora decussata</i> , family : <i>Gentianaceae</i>.                    <b>OR</b></p> <p>This consist of aerial parts of the plant known as <i>Convolvulus pluricaulis</i> belongs to family <i>Convolvulaceae</i></p> <p><b>Chemical constituents-</b> The drug contains alkaloids known as shankhpusthine and volatile oil. Drug is found to contain bitter substance and an oleo-resin. Shankhapushpi is found to contain triterpenes, alkaloids and xanthenes.</p> <p><b>Uses-</b></p> <p>It is used as bitter and nervine tonic.</p> <p>The fresh juice of the plant is prescribed in insanity, epilepsy and nervous debility.</p> <p>Alcoholic extract possesses anti-viral activity against Ranikhet disease virus.</p>	3M
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5	d)	<p><b>Define Antitumour. Write chemical constituents and uses of vinca.</b></p> <p><b>( 1 mark for definition, 1 mark for chemical constituents, ½ mark each for any two uses)</b></p> <p>Antitumour are the drugs which are used in the treatment of cancer.</p> <p><b>Chemical constituents :</b></p> <p>The indole-indoline alkaloids like vincristine and vinblastine has anticancer property. The other alkaloids present in the drug are ajmalicine, serpentine, lochnerine and tetrahydroalstonine. The other alkaloids of the drug are vindoline, vindolinine and catharanthine.</p> <p><b>Uses</b></p> <p>Vincristine is used in treatment of Leukaemia.</p> <p>Vinblastine is used for the treatment of generalized Hodgkin's disease and chorionepithelioma.</p> <p>Vinca also exhibits hypotensive and antidiuretic property.</p>	3M
5	e)	<p><b>Define Volatile oil. Write isolation methods of volatile oil.</b></p> <p><b>( 1 mark for definition, 1 mark each for any two isolation method with description)</b></p> <p>Volatile oils are odourous and colourless principles of plants and animal sources these are evaporated when exposed to air at ordinary temperature.</p> <p><b><u>Methods of isolation of volatile oil:</u></b></p> <p><b>A) Distillation :</b></p> <p>Most of the oils are obtained by distillation which are of following 3 types</p> <p><u>1. Water distillation</u> -is mostly applicable to such plant material, which is dried initially in air and the constituents are not degraded by boiling upto 100<sup>0</sup>C</p> <p>e.g Turpentine oil</p>	3M





		<p><u>2. Water and steam distillation</u> – 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</p> <p><u>3. Direct steam distillation</u>- it is invariably applicable to fresh drugs that is loaded with sufficient natural moisture and hence no maceration is required e.g. peppermint oil.</p> <p><b>B) Solvent Extraction :</b></p> <p>Extraction is done by using some organic solvents like ether, benzene, petroleum etc.</p> <p><b>C) Ecuelle Method:</b> In this method the oil cells of the citrus fruits are ruptured mechanically using pointed projections and thus citrus oil is extracted.</p> <p><b>D) Enfleurage Method:</b> 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.</p>	
<b>5</b>	<b>f)</b>	<p><b>Enlist Indigenous system of medicine. Write about Ayurvedic system of medicine.</b></p> <p><b>( 1mark for any four system, 2 marks for description of Ayurveda)</b></p> <p><b>Various Indigenous system of medicine are as follows-</b></p> <ol style="list-style-type: none"><li>1) Ayurveda</li><li>2) Siddha</li><li>3) Unani</li><li>4) Homoeopathy</li><li>5) Naturopathy</li><li>6) Yoga</li></ol> <p><b>Ayurvedic system of medicine:</b></p> <p>It is the oldest system of medicine in India .In Ayurveda there is a supposition that everything in universe is made up of 5 basic elements (Panchamahabhuta) like solid , liquid</p>	<b>3M</b>



		<p>,air, space, and energy .These 5 elements exist in the body in combined form like Vata,Pitta,Kapha. These three forms are together called as “Tri-dosh”.</p> <ol style="list-style-type: none"><li>1.Vata(space+air)</li><li>2.Pitta(energy +liquid)</li><li>3.Kapha(solid+liquid)</li></ol> <p>The seven forms of Tri dosh are called as ‘SAPTADHATU’. These saptadhatu under goes wear and tear processes and form excretory material or mala.</p> <p>When these tri dosh, saptadhatu and mala are in balanced form, the condition is healthy. But if it is in imbalanced form there are pathological disorders.In Ayurveda Charak Samhita and Sushrut Samhita are two well-known treatises .In Charak Samhita descriptions of plants used as medicine are included and in Sushrut Samhita emphasis is given on surgery.</p>	
<b>6</b>		<b>Write chemical tests of the following crude drugs ( Any FOUR ) ( 4 marks each)</b>	<b>16M</b>
<b>6</b>	<b>a)</b>	<b>Acacia: ( 1 mark each for any 4 test)</b>  1). Solution of lead sub-acetate gelatinizes aqueous solution of Indian gum.  2). Mount a small quantity of acacia powder in ruthenium red solution and examine under microscope. The particles do not get red colour.  3). To 0.1 g of powder, add 1 ml of N/50 iodine. The mixture does not acquire crimson colour.  4). Hydrolyse the aqueous solution of gum acacia in presence of dilute hydrochloric acid by boiling. To it add Fehling’s solution A and B and heat again. Red precipitate is observed, which confirms the presence of reducing sugar as the product of hydrolysis.  5) To the aqueous solution of gum acacia, add 0.5 ml solution of hydrogen peroxide and 0.5 ml solution of benzidine in alcohol (1% solution), shake it well. A blue colour is produced (due to oxidase enzyme).	<b>4M</b>



<b>6</b>	<b>b)</b>	<b>Pale Catechu: ( 1 mark each for any 4 test)</b>  1. Gambier fluorescin test.: Boil a little powdered drug with alcohol, filter and add sodium hydroxide solution to the filtrate, stir and add few ml of light petroleum. Petroleum layer shows green fluorescence.  2. Matchstick test: dip the wooden matchstick in the solution of drug and dry it over a flame. Moisten the stick with hydrochloric acid and warm. Purple colour appears on the matchstick due to conversion of catechu into Phloroglucinol.  3. Vanillin hydrochloric acid test: Make solution containing vanillin 1ml, alcohol 10ml and dilute hydrochloric acid 10ml, it gives pink or red colour due to the formation of Phloroglucinol.  4. Heat about 0.5gm of powdered drug with 5 ml of chloroform in a dish and evaporate the filtrate on a water bath. A greenish yellow residue is left due to the presence of chlorophyll in the drug.  5. With ferric chloride solution, it gives bluish black colour.  6. With Lime water, pale catechu gives brown colour .	<b>4M</b>
<b>6</b>	<b>c)</b>	<b>Turmeric: ( 1 mark each for any 4 test)</b>  1. Powdered drug with sulphuric acid gives crimson colour.  2. The aqueous solution of turmeric with boric acid gives reddish colour which on addition of alkali changes to greenish blue.  3. With acetic anhydride and concentrated sulphuric acid, it gives violet colour, When this test is observed under U.V. light, red fluorescence is seen.  4. Prepare a tincture of turmeric and impregnate a filter paper with it. Treat the impregnate paper with borax solution, a green colour is produced.  5. Take powdered turmeric in a test tube or on slide and add a solution of sodium hydroxide or potassium hydroxide, the powder gives red to violet colour.	<b>4M</b>



<b>6</b>	<b>d)</b>	<b>Agar: ( 1 mark each for any 4 test)</b>  1. Boil 1 % solution of Agar. On cooling It forms a stiff jelly.  2. When mounted in solution of ruthenium red and examine under microscope, the mounted particles acquires pink colour.  3. To 0.2% solution of agar in water, add solution of tannic acid no precipitate is produced.  4. When N/50 iodine solution is added to the powder, it produces crimson to brown colour.  5. Agar is incinerated to ash, dilute hydrochloric acid added and observed under microscope. Skeletons and sponge spicules of diatoms are seen.  6. On warming a little agar in solution of KOH, canary yellow colour is produced.  7. Hydrolyse 1% aq. solution of agar with 0.5 ml of Conc HCL. Divide this hydrolyse solution in to two parts  i) Part A : to this part add 1 ml of Fehling's solution A and B and warm on water bath, colour of the Fehling's solution reduced  ii) Part B: To this part add solution of barium chloride, white precipitate of barium sulphate is produced.	<b>4M</b>
<b>6</b>	<b>e)</b>	<b>Asafoetida: ( 1 mark each for any 4 test)</b>  1. Fractured surface of the drug, if treated with sulphuric acid forms red or reddish brown colour.  2. When treated with 50% of nitric acid, the drug gives green colour.  3. When triturated with water, it forms yellowish orange emulsion.  4. Umbelliferon test- Triturate about 0.5g of drug with sand and 5ml of hydrochloric acid, to it add little quantity of water, filter and to the filtrate add equal volume of ammonia. A blue fluorescence is produced due to presence of umbelliferon.	<b>4M</b>



<b>6</b>	<b>f)</b>	<b>Senna: ( 4 mark for Borntrager's test)</b>  <b>Borntrager's test:</b> Boil the powdered leaves with dilute sulphuric acid. Filter immediately, separate the filtrate and cool. Mix the filtrate with double volume of any one of the water insoluble organic solvents like benzene, chloroform or carbon tetrachloride. Shake it well and separate the organic solvent layer. To the layer of organic solvent add equal quantity of dilute ammonia. The ammonical layer becomes pink and finally red indicating the presence of anthranquinone derivatives.	<b>4M</b>