

UNIVERSITY SOLVED QUESTION WITH ANSWER

Year : 2024

Subject : Pharmacognosy

Subject Code : ER20-13T

Subject In-Charge : Adyasha Senapati



ODISHA STATE BOARD OF PHARMACY
D. Pharm Annual Examination, 2024 (Part – I) [ER-2020]

Date 20/01/2025

Roll No.....
DO NOT WRITE ANYTHING ON YOUR QUESTION PAPER EXCEPT YOUR ROLL NUMBER.
QUESTION PAPER CONTAINING ANYTHING OTHER THAN THE ROLL NUMBER WOULD BE
TREATED AS MALPRACTICE

Answer the questions serially and continuously

Subject: PHARMACOGNOSY (Theory)

Full Mark -80

Time -3 Hours

I. LONG QUESTION (Answer any 6 out of 7 questions)

6x5=30 marks

- a) Discuss the parameters used for evaluation of the crude drug.
- b) Discuss the source, synonym, chemical constituents and therapeutic efficacy of cinchona.
- c) Write the properties and preparation of surgical catgut.
- d) Write the mechanism of action and uses of probiotics and prebiotics.
- e) Enlist and explain the steps of performing percolation.
- f) Discuss the role of spectroscopy in isolation, purification and identification of drugs.
- g) Discuss about biological testing of herbal drugs.

II. WRITE SHORT NOTES (Answer any 10 out of 11 questions)

10x3=30 marks

- a) Artemisinin
- b) Borntrager test
- c) Umbelliferous fruits
- d) Herbal cosmetic
- e) Dietary fiber
- f) Aloe vera
- g) Omega 3 fatty acids
- h) Chemotaxonomic drug classification
- i) Lycopodium Spore Method
- j) Stomatal number and stomatal index
- k) Nutraceuticals

III. OBJECTIVE QUESTIONS (Answer ALL questions of A, B, C & D)

20x1=20 marks

A. Give one example of each: [5x1=5]

- a) Glycoside
- b) Volatile Oil
- c) Alkaloid
- d) Terpenoid
- e) Rasayana

B. Write the name of biological source of the following drugs: [1x5=5]

- a) Spirulina
- b) Reserpine
- c) Atropine
- d) Vasaka
- e) Digitalis

C. Fill in the blanks: [5x1=5]

- a) Iodine value of olive oil is _____
- b) LUVET stands for _____
- c) Ispaghula belongs to _____ family.
- d) Deadly Nightshade is synonym for _____
- e) Goldbeater's skin test is done to identify _____

D. Multiple Choice Questions (Choose the most appropriate answer): [5x1=5]

1. Which is an un-organized drug
a. Vinca b. Arjuna c. Nutmeg d. Asafoetida
2. Keller-Killiani test is done to identify
a. Alkaloid b. Glycoside c. Tannins d. Resins
3. Which of the following denotes the drugs physical property
a. Rasa b. Vipaka c. Guna d. Virya
4. The main chemical constituent garlic is
a. Colchicine b. Vasicine c. Myristicin d. Allicin
5. Wool fibers are made of
a. Collagen b. Elastin c. Keratin d. Fibronectin

I] Long question

Q] Discuss the parameters used for evaluation of the crude drug.

Ans:- The evaluation of crude drugs involves a series of parameters to assess their quality, safety and efficacy. These parameters help in determining the authenticity, potency, and purity of herbal medicines.

① Macroscopic Evaluation:-

This involves assessing the physical characteristics of the drug, such as:

→ size, shape, and color:- observing the general appearance to identify the plant or plant part.

→ odor and taste:- some drugs can be identified by their distinctive smell or taste, which may also relate to their medicinal properties.

② Microscopic Evaluation:-

This involves examining the internal structure of the crude drug using a microscope, which helps identify the species, quality, and presence of contaminants like adulterants.

→ cellular structures:- such as epidermal cells, trichomes, vascular bundles, etc.

③ Physical Evaluation :-

Physical tests are used to evaluate the drug's characteristics that might influence its use.

→ Moisture Content :- determines the water content in the drug, which can affect its shelf life and microbial stability.

④ Chemical Evaluation :- This

This involves determining the chemical composition of the crude drug to assess its active constituents and quality.

⑤ Discuss the source, synonym, chemical constituents and therapeutic efficacy of cinchona.

Ans :- • synonym :- The plant cinchona is also known as Jesuit's bark, peruvian bark, and cinchona bark.

• Biological source :- It is the dried bark of the Cinchona calisaya.

• Family :- Rubiaceae

• Chemical constituents :- The chemical constituents of cinchona include alkaloids, acids, tannins, and other compounds.

• Therapeutic efficacy :-

- treatment of malaria
- it is an antipyretic agent
- it reduces fever
- it is used for cardiovascular use
- Analgesic agent (pain-relieving)
- Cough suppression and cold treatments.
- Digestive Benefits.

① write the properties and preparation of surgical Catgut.

Ans:- properties of surgical Catgut

- ① Material
- ② Absorbability
- ③ Strength
- ④ Flexibility and elasticity
- ⑤ sterility
- ⑥ Tissue Reaction
- ⑦ Appearance
- ⑧ tensile strength

→ preparation of surgical Catgut

- ① raw material selection :- The Intestine of sheep or goats are selected as the raw material.
- ② cleaning :- The intestine are cleaned to remove any impurities or debris.
- ③ soaking :- The cleaned intestine are soaked in water to remove any residual impurities.
- ④ Treatment with lime :- The soaked intestine are treated with a lime solution to remove the mucous membrane and other impurities.
- ⑤ washing :- The intestine are washed with soap and water to remove any impurities.
- ⑥ drying :- The washed intestine are dried to remove any moisture.
- ⑦ stretching :- The dried intestines are stretched to align the fibers.
- ⑧ spinning :- The stretched intestine are spun into yarn.
- ⑨ twisting :- The yarn is twisted to create a thread-like structure.

⑩ cutting:- The twisted thread is cut into desired lengths.

⑪ sterilization:- The cut threads are sterilized using heat, radiation, or ethylene oxide.

⑫ packaging:- The sterilized Catgut threads are packaged in airtight containers.

⑬ storage:- The packaged Catgut threads are stored in a cool, dry place.

⑭ write the mechanism of action and uses of probiotics and prebiotics.

Ans:- Probiotics:-

• Mechanism of Action:- Probiotics are live microorganisms, primarily bacteria or yeast, that, when administered in adequate amounts, confer health benefits to the host. They work through several mechanisms.

- ① Gut Microbial Balance
- ② Immune system Modulation
- ③ Competitive Exclusion
- ④ production of metabolites
- ⑤ Gut Barrier protection

• uses of probiotics:-

- Gut health
- Immunity Boost
- Allergy management
- Mental Health

② probiotics :-

• Mechanism of action :- probiotics are non-digestible food components that selectively stimulate the growth or activity of beneficial microorganism in the gut, particularly beneficial bacteria like Bifidobacteria and Lactobacilli. They act by:

- Fermentation
- selective growth of beneficial
- Gut Barrier enhancement
- Anti-inflammatory effects.

• uses of probiotics :-

- Gut health
- Immune system support
- weight management
- Bone health
- mental health

③ Enlist and explain the steps of performing percolation.

Ans :-

① selection of percolation apparatus :-

→ select a suitable percolation apparatus such as a percolation cone or a Soxhlet apparatus, based on the type and quantity of the material to be percolate.

② preparation of the material.

→ prepare the material to be percolated by grinding or crushing it into a suitable size to ensure uniform extraction.

③ packing the percolation apparatus :-

→ pack the percolation apparatus with the prepared material, ensuring that the material is evenly distributed and the apparatus is not over-filled.

④ Adding the solvent:-

→ Add the solvent to the percolation apparatus, ensuring that the material is completely covered by the solvent.

⑤ Allowing percolation:-

→ Allow the solvent to percolate through the material, ensuring that the solvent flows evenly and slowly through the apparatus.

⑥ Collecting the percolate:-

→ Collect the percolate, which is the liquid extract that has passed through the material.

⑦ Discuss the role of spectroscopy in isolation, purification and identification of drugs?

Ans:- Spectroscopy plays a vital role in the isolation, purification, and identification of drugs. Here's how:

① Isolation:-

② Detection of bioactive compounds:-

Spectroscopic techniques like nuclear magnetic resonance and mass spectrometry (MS) help detect bioactive compounds in crude extracts.

③ Monitoring extraction processes:-

→ Spectroscopy helps monitor the extraction process, ensuring that the desired compounds are extracted efficiently.

④ Purification:-

② Purity assessment:- Spectroscopic technique like high-performance liquid chromatography (HPLC) and gas chromatography (GC) helps assess the purity of isolated compounds.

① Identification of impurities :-

→ spectroscopy helps identify impurities and contaminants, ensuring that the purified compound meets the required standard.

③ Identification :-

① structural elucidation :- spectroscopic technique like NMR, MS, and Infrared (IR) spectroscopy help elucidate the structure of isolated compounds.

② confirmation of identity :- spectroscopy confirms the identity of isolated compounds by comparing their spectral data with reference standards or literature values.

⑨ Discuss about biological testing of herbal drugs :-

Ans :- Biological testing of herbal drugs is an essential step in evaluating their safety, efficacy, and quality.

• Types of biological testing :-

① Acute toxicity testing :- Evaluates the toxic effects of a herbal drug after a single administration.

② sub-chronic toxicity testing :- Assesses the toxic effects of a herbal drug after repeated administration for a period of 14-90 days.

③ chronic toxicity testing :- Evaluates the toxic effects of a herbal drug after repeated administration for a period of 90 days or more.

④ Carcinogenicity testing :- Evaluates the potential of a herbal drug to cause cancer.

• Biological testing methods :-

- ① In vivo testing :- testing on living organisms, such as animals or humans.
- ② In vitro testing :- testing on cells or tissues in a laboratory setting.
- ③ Ex vivo testing :- testing on cells or tissues outside of a living organism.

II] Write short notes

① Artemisinin

Ans:- Artemisinin is a naturally occurring compound derived from the *Artemisia annua* plant, commonly known as sweet wormwood.

- It has potent antimalarial properties and is the active ingredient in several treatments for malaria.
- Artemisinin works by disrupting the metabolism of the malaria parasite, particularly *Plasmodium falciparum*, by producing reactive oxygen species that damage the parasite's cellular compounds.
- Due to its high efficacy, it is often used in combination therapies (ACTs) to prevent resistance.
- Artemisinin has revolutionized the treatment of malaria, especially in regions with high transmission rates.

② Boontrager test :-

Ans:- The Boontrager test is a chemical test used to detect the presence of anthraquinone glycosides in plant extracts.

→ Anthraquinone glycosides in are compounds found in various plants, including senna, rhubarb, and aloes.

procedure:-

- ① A small amount of the plant extract is mixed with a solution of sodium hydroxide (NaOH).
- ② The mixture is then heated gently.
- ③ A few drops of chloroform are added to the mixture.

Result:- A pink or red coloration indicates the presence of anthraquinone glycosides.

© umbelliferous fruits :-

Ans:- characteristics of umbelliferous fruits

- ① origin :- develop from a bicarpellary, syncarpous ovary.
- ② shape :- typically schizocarpic, splitting into two mericarps.
- ③ structure :- Each mericarp has a single seed and a persistent calyx.

Example carrot seed, Fennel fruit, Coriander fruit, Dill fruit.

* Identification features :-

- ① Ribbing :- Fruits often have prominent ribs or ridges.
- ② oil ducts :- Fruits may contain oil ducts or vittae.
- ③ calyx :- persistent calyx is often present.

→ Umbelliferous fruits are characteristic of plants in the Apiaceae family, commonly known as the carrot or parsley family.

(d) Herbal cosmetic:

Ans:-

Definition:- Herbal cosmetics are products that utilize herbs, botanicals, and other plant-derived ingredients to promote beauty, hygiene, and skin health.

* Benefits :-> Herbal cosmetics are generally considered natural and safe for use.

-> many herbal cosmetics have been shown to be effective in promoting skin health and beauty.

-> Environmentally friendly!- Herbal cosmetics often have a lower environmental impact compared to synthetic cosmetics.

* Examples of herbal cosmetics:-

- > skin creams and lotions
- > Hair care product
- > face packs and masks

(e) Dietary fiber :-

Ans Definition:- Dietary fiber refers to the indigestible carbohydrates and lignin that are present in plant-based foods.

Types:-

These are two types ① soluble fiber

② Insoluble fiber

① soluble fiber :- Dissolves in water, forms a gel-like substance, and helps lower cholesterol levels.
eg:- oats, barley, fruits, and legumes.

② Insoluble fiber :- Does not dissolve in water, helps promote regular bowel movements, and prevents constipation.
eg:- whole grains, vegetables, and wheat bran.

* Food sources :-

① Fruits :- apples, bananas, berries, and citrus fruits.
② vegetables :- Broccoli, carrots, Brussels sprouts, and sweet potatoes.

③ Legumes :- Beans, rice, quinoa, whole wheat bread.

→ Adults :- 25-30 grams of dietary fiber per day.
→ children :- 14-18 grams of dietary fiber per day.

④ Aloe vera :-

Ans :- Synonym :- Aloe, India aloe, royal

Biological source :- Aloe barbadensis

Family :- Liliaceae

* Chemical constituents :-

- Anthraquinones
- Glycoproteins
- polysaccharides
- vitamins (A, C, E)
- Minerals

* preparation :-

- Gel :- applied topically for skin conditions and wound healing
- Juice :- Consumed orally for digestive issues and as a general tonic

→ Extracts:- used in cosmetics and pharmaceuticals

#) uses:-

- skin conditions
- wound healing
- digestive issues
- oral health
- cosmetics

#) pharmacological actions:-

- Anti-inflammatory
- Antioxidant
- soothing and protective
- wound healing
- anti-microbial

Q) omega 3 fatty acids:-

Ans:- Definition:- omega-3 fatty acids are a group of polyunsaturated fatty acids that are essential for human health.

#) Food sources:-

→ Fatty fish:- salmon, sardines, and mackerel.

→ seafood:- shellfish, crab, and lobster.

→ plant-based sources:- Flaxseeds, walnuts, chia seeds, and canola oil.

#) Health benefits:-

- ① Heart health
- ② Brain function
- ③ Inflammation
- ④ Fetal development

*1) Recommended Intake:-

- ① Adults:- 250 - 500 mg of Combined EPA and DHA per day.
- ② pregnant women:- 700 mg of DHA per day.

*2) Deficiency:-

omega-3 deficiency can lead to health issues such as:-

- ① Increased inflammation
- ② poor heart health
- ③ Cognitive impairment
- ④ mental health issues

③) Chemotaxonomic drug classification:-

Ans:-

Definition:- Chemotaxonomic drug classification is a method of classifying plants and drugs based on their chemical composition and taxonomic relationships.

Application:-

- plant can be classified according to chemical characteristics applying chemistry to taxonomy is known as chemo taxonomy.
- Chemo taxonomical studies involves analysis a different chemical substance present in various plant group. collection of evidence from result of analysis and use of evidence for classification.
- chemo taxonomy focuses in secondary metabolite glycoside of pharmaceutical relevance.
- chemo taxonomical knowledge support better classification of crude drug.

→

① Lycopodium spore method

Ans:-

Definition:- The Lycopodium spore method is a technique used to determine the surface area and particle size of powders,

Procedure:-

- ① A known quantity of Lycopodium spores is mixed with the powder sample.
- ② The mixture is then dispersed in a liquid medium, such as water or ethanol.
- ③ The surface area and particle size of the powder are estimated by measuring the settling rate or sedimentation volume of the spores.

Advantages:-

- simple and inexpensive method.
- can be used for a wide range of powders.
- provides a quick estimates of surface area and particle size.

② stomal number and stomatal index

Ans:- Stomatal Number

Definition:- The number of stomata present on a given surface area of a leaf, usually expressed per square

millimeter (mm^2) or per square

centimeter (cm^2)

② Importance: - stomatal number affects gas exchange, transpiration, and photosynthesis.

③ factors influencing: - climate, temperature, humidity, light intensity, and CO_2 concentration.

④ Stomatal Index: -

① Definition: - The ratio of the number of stomata to the total number of epidermal cells on a given surface area of a leaf, usually expressed as a percentage.

② Importance: - stomatal index helps in identifying plant species, understanding adaptations to environmental conditions, and analyzing plant responses to stress.

③ Calculation: -
$$\text{stomatal index} = \frac{\text{Number of stomata}}{\text{Total number of epidermal cells}} \times 100.$$

④ Nutraceuticals: -

Ans: -

Definition: - Nutraceuticals are food-derived products that provide health benefits beyond basic nutrition, often used to prevent or treat disease.

* Benefits: -

- prevention of chronic disease
- Improved digestive health
- Enhanced immune function
- Anti-inflammatory effects
- Antioxidant properties

Eg: - probiotics, omega-3 fatty acids, turmeric, ginger, green tea extract

III Objective questions

(A) Give one example of each

(a) Glycoside

Ans:- Digitallis

(b) volatile oil

Ans:- peppermint

(c) Alkaloid

Ans:- Ergot

(d) Terpenoid

Ans:- Artemisinin

(e) Rasayana

Ans:- Ashwagandha

(B) write the name of biological source of the following drugs:

(a) Spirulina:-

Ans:- spirulina is a cyanobacteria, or blue-green algae, that is the biological source Arthrospira platensis, and Arthrospira maxima.

(b) Reserpine:-

Ans:- the biological source of reserpine is the roots of the Rauwolfia plant, also known as Sarpagandha.

(c) Atropine:-

Ans:- Atropine is a biological product derived from the plant Atropa belladonna, also known as deadly nightshade.

(d) Vasaka:-

Ans:- the biological source of vasaka is the Adhatoda vasica.

① Digitalis :-

Ans:- The biological source of digitalis is the Digitalis purpurea.

② Fill in the blanks

① Iodine value of olive oil is 75 and 94 gm of iodine per 100 grams of oil.

② LUVET stands for Lowest unit volume Effective temperature.

③ Ispaghula belongs to Plantago ovata family.

④ Deadly Nightshade is synonym for Atropa belladonna.

⑤ Goldbeater's skin test is done to identify tanning properties of a substance.

⑥ Multiple choice question :-

① which is an un-organized drug

① Vinca ② Ajuna ③ Nutmeg ④ Asafoetida ✓

Ans:- Asafoetida

② Keller-Killani test is done to identify

① Alkaloid ② Glycoside ③ Terpenes ④ Resins

Ans:- Glycoside

③ which of the following denotes the drug's physical property

① Rasa ② Vipaka ③ Guna ④ Virya

Ans:- Guna

④ The main chemical constituent garlic is

① Colchicine ② Vasicine ③ Myristicin ④ Allicin

Ans:- Allicin

⑤ wool fibers are made of

① collagen ② elastin ③ keratin ④ Fibronectin

Ans:- keratin