

BOARD SOLVED QUESTION
WITH ANSWER

Year : 2022

Subject : Pharmacognosy

Subject Code : ER20-13T

Subject In-Charge : Adyasha Senapati



Withania
Somnifera

D. Pharm Part - I

ODISHA STATE BOARD OF PHARMACY
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31/01/2023
2022(I)

DO NOT WRITE ANYTHING ON YOUR QUESTION PAPER EXCEPT YOUR ROLL NO.
QUESTION PAPER CONTAINING ANYTHING WOULD BE TREATED AS MALPRACTICE

Full Mark -80

PHARMACOGNOSY (Theory)

Time -3 hrs

PART-A

Q1. Long answer type questions (Answer 6 out of 7)

[6 x 5 = 30]

- Write about quantitative microscopical evaluation. ✓
- Define surgical dressings. Write notes on Cotton. ✓
- Write a note on Ergot. ✓
- Write in detail about Soxhlet extraction method.
- Write details about the Phytochemical test used for glycosides and alkaloids.
- Explain adulteration of crude drugs with suitable examples. ✓
- What do you mean by herbal formulation? Classify it with example. Give notes on Classical Ayurvedic formulations.

PART-B

Q2. Short answer type questions (Answer 10 out of 11)

[10 x 3 = 30]

- Write a short note on Umbelliferous fruits.
- Define antioxidants with examples.
- Write the biological source, chemical constituents & uses of Neem. ✓
- Explain about the biological role of Omega-3 fatty acid.
- Write details on scope of Pharmacognosy. ✓
- Write the Biological source and chemical constituents of Gokhru and Punarnava.
- Write down methods of preparation of Lehya.
- Define stomatal number and stomatal index.
- Differentiate between pale catechu and black catechu.
- Differentiate between Organised and Unorganised drugs? ✓
- Write the biological source, chemical constituents & commercial preparations of Sandal Wood Oil.

PART-C

Q3: Objective type (Answer all from all the sections). Each carries ONE mark [20 x 1 = 20]

A) Define the followings:

a) Tannins 2. Oleogumresin 3. Palisade ratio 4. Cosmeceuticals 5. Crude Drugs

B) Write down the biological source of

a. Squill b. Guggul c. Ispaghula d. Senna e. Rauwolfia
f. Myrrh g. Ashwagandha h. castor oil i. Aloe j. Artemisia

C) Answer the following

- What are the chemical constituents of Fennel?
- What is gutica?
- What is chemical test for tropane alkaloids?
- Write basic principle of unani system of Medicine.
- What is Chemotaxonomy?

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ER-2020

(Year-2022)

(D. Pharma 1st year)

PART-A

Q1-(i) write about quantitative microscopical evaluation?

Ans - Determination of numerical value of microscopic characteristics of particles or objects.

- Importance - To ensures quality control, detects adulteration and identifies materials.

- Techniques - (I) Particle Size Analysis - measures size and distribution of particles.

(II) Counting - Determines number of particles, cells, or microorganisms.

(III) Morphological Analysis - Examines shape, size and structure.

- Parameters - (1) Particle size, (2) Shape (3) Number (4) Distribution, (5) morphology.

- Applications -

(1) Pharmaceuticals - Quality control of powders, granules, and suspensions.

(2) Biotechnology - Cell Counting, viability testing.

(3) Food industry - Microbial analysis, contamination detection.

(4) Environmental Monitoring - water, air, and soil analysis.

- Instruments -

① Optical microscope

② Electron microscope

③ Image analyzer

④ Particle size analyzer

- Procedure -

- (1) Sample preparation
- (2) Microscopic examination
- (3) Data recording
- (4) Analysis and interpretation

- Limitations -

- (1) Operator bias
- (2) Instrumental errors
- (3) Sampling errors.

(ii) Define Surgical dressings and write notes on cotton.

Ans - Materials applied to a wound to promote healing, protect from infection, and absorb fluids.

- Types of Surgical Dressings -

- (1) Absorbent dressings
- (2) Non-absorbent dressings
- (3) Occlusive dressings
- (4) Semi-occlusive dressings.

- Functions -

- (1) Protect wound from infection
- (2) Absorb wound exudate
- (3) Provide cushioning and support
- (4) Promote healing.

- (Cotton) -

A natural fiber obtained from the cotton plant, used in surgical dressings.

Properties of Cotton-

- ① Absorbency
- ② Softness
- ③ Breathability
- ④ Biocompatibility

Uses of Cotton in Surgical Dressings-

- (1) Absorbent pads
- (2) Gauze pads
- (3) Cotton wool
- (4) Surgical threads.

Advantages of Cotton-

- (1) Non-irritating
- (2) Non-toxic
- (3) Biodegradable
- (4) Cost-effective

Limitations of Cotton-

- (1) Lacks strength when wet
- (2) May leave lint or fibers
- (3) Not suitable for heavy bleeding

(iii) Write a note on ergot.

Ans - A fungal alkaloid produced by *Claviceps purpurea* growing on rye and other grains.

- Occurrence - found in temperate regions, contaminating cereals, especially rye.

- Chemical Composition - Contains lysergic acid, ergometrine, and ergotamine.

~~Pharma~~

- Pharmacological actions -

- ① vasoconstriction (ergotamine)
- ② urine stimulation (ergometrine)
- ③ Anti-migraine (ergotamine)

- Therapeutic uses:-

- ① Migraine and cluster headaches
- ② Postpartum hemorrhage
- ③ uterine inertia

- Adverse Effects -

- ① Nausea and vomiting
- ② Diarrhea
- ③ Peripheral vasospasm

- Preparation -

- ① Ergotamine tartrate (Cafertgot)
- ② Ergometrine maleate (Syntometrine)
- ③ Lysergic acid diethylamide (LSD) Controlled substance.

(iv) write in detail about Soxhlet extraction method.

Ans - A continuous, solid-liquid extraction, ~~where~~ technique used to separate soluble components from insoluble materials.

- principle - Based on the principle of continuous extraction, where the solvent repeatedly passes through the sample, extracting the

the desired compounds.

- Apparatus -

- (1) Soxhlet extractor
- (2) Condenser
- (3) Round-bottom Flask
- (4) Thimble

- procedure -

- (1) Prepare sample
- (2) Place thimble in extractor
- (3) Add solvent to round-bottom flask
- (4) Assemble apparatus
- (5) Heat solvent to boiling point
- (6) Condenser cools and condenses solvent vapour
- (7) Solvent drips back into flask, repeating cycle.
- (8) Extraction complete when solvent returns clear.

- Advantages -

- (1) Efficient extraction of soluble components.
- (2) Minimal solvent usage
- (3) Easy to set up and operate
- (4) Suitable for various sample sizes.

- Disadvantages -

- (1) Time-consuming
- (2) Requires heat, potentially damaging thermolabile compounds.
- (3) Not suitable for volatile or high boiling solvents.

Applications -

- (1) Food and beverage analysis (Caffeine, fats)
- (2) Pharmaceutical analysis (alkaloids, glycoside)
- (3) Environmental monitoring (pesticide residues)
- (4) Plant and animal tissue analysis
- (5) Write details about the phytochemical test - used for glycosides and alkaloids.

Ans: - Glycosides -

- (1) Test - Borntrager's test
- (2) Reagent - Ammonium hydroxide and benzene
- (3) Procedure -
 - ↳ Extract the plant sample with ethanol.
 - ↳ Add ammonium hydroxide to the extract.
 - ↳ Layer with benzene.
 - ↳ Observe the pink or red color in the benzene layer.
- (4) Result - Presence of Glycosides indicated by pink/red color.

Alkaloid -

- (1) Test - Mayer's test
- (2) Reagent - Mayer's reagent (potassium mercuric iodide)

(3) Procedure -

- ↳ Extract the plant sample with ethanol.
- ↳ Add Mayer's reagent.
- ↳ observe the white or creamy precipitate

1) Result - Presence of alkaloids indicated by white creamy precipitate.

(2) Wagner's test - Wagner's reagent (iodine in potassium iodide) produces a brown or yellow precipitate.

(3) Dragendorff's test - Dragendorff's reagent - potassium bismuth iodide) produces an orange or red ppt.

(4) Hager's test - Hager's reagent (picric acid) produces a yellow or orange precipitate.

Glycoside -

(2) Keller-Killiani test - Glacial acetic acid and sulfuric acid produce a blue/green color.

(3) Molisch's test - α -Naphthol and sulfuric acid produce a purple or red color.

(4) Hydrolysis test - Glycosides break down into sugars and aglycones when heated with hydrochloric acid.

(VI) Explain adulteration of crude drugs with suitable examples.

Ans - Adulteration is the intentional or unintentional contamination of crude drugs with substances that may affect their quality, potency or safety.

Types of adulteration -

- ① Substitution - Replacing a crude drug with a similar looking substance.
- ② Addition - Adding a foreign substance to increase weight or potency.
- ③ Removal - Removing valuable constituents to reduce cost.

Example -

① Substitution -

- Adulterating Turmeric with yellow ochre.
- Replacing Senna leaves with Cassia acuticulata.

② Addition -

- Adding starch or sugar to Ashwagandha powder.
- Mixing ~~sand~~ sawdust with Dry Ginger powder.

③ Removal -

- Removing alkaloids from Opium to reduce potency.

Prevention -

- ① Proper sourcing and authentication.
- ② Regular quality control checks.
- ③ Storage and handling precautions.

(vii) what do you mean by herbal formulation? Classify it with example. Give notes on classical Ayurvedic formulation?

Ans - Herbal formulations refer to the processed forms of herbal medicines, which are derived from plants, plant extracts, or plant parts. These formulations are designed to deliver specific health benefits, treating various ailments or promoting overall well being.

- Classification -

- ① Ayurvedic - Based on traditional Indian medicine.
- ② Unani - Based on traditional Greek medicine.
- ③ Homeopathic - Highly diluted herbal preparations.
- ④ Phytopharmaceuticals - standardized herbal extract.

- Classify with some examples -

① Liquid preparations -

- Infusions - peppermint tea for digestive issues.
- Decoctions - Ginger decoction for nausea.
- Tinctures - Valerian root tincture for insomnia.
- Syrup - Cough syrup with thyme and honey.

② Semisolid -

- Ointment - Calendula ointment for skin wounds.
- Creams - Aloe vera cream for skin moisturizing.
- Gels - Aloe vera gel for sunburn relief.
- Pastes - Neem paste for skin conditions.

- Solid preparation -

- ① Capsule - Turmeric capsule for inflammation.
- ② Tablet - Ginkgo biloba tablet for memory.
- ③ Powder - Ashwagandha powder for stress-relief.

- Ayurvedic based on traditional Indian medicine.
- It is classified into following types -

- ① Kashaya - prepared by boiling herbs in water.
- ② Arishta - prepared by fermenting herbs with sugar and water.
- ③ Asava - prepared by fermenting herbs with sugar & water.
- ④ Avaleha - prepared by mixing herbs with honey and ghee.
- ⑤ Churna - prepared by grinding herbs into fine powder.
- ⑥ Vati - prepared by compressing herbal powders into tablet.
- ⑦ Bhasma - prepared by calcinating metals or minerals.
- ⑧ Rasayana - prepared by combining herbs with minerals & metals.

Part-B

(2) (a) Write a short note on umbeliferous fruit?

Ans - Umbeliferous fruit also known as Schizocarpic fruit.

Characteristics:-

- (1) Derived from inferior, bicarpellary ovary.
- (2) Fruit splits into two one-seeded mericarps.
- (3) Mericarps are attached to a central axis (Carpophore).

Importance:-

- (1) Used as spice, spice blends and herbal remedies.
- (2) Contains essential oils, flavonoids, and phenolic acid.
- (3) Exhibits antioxidant, anti-inflammatory, and antimicrobial properties.

Pharmaceutical applications:-

- (1) Carminative and digestive aid
- (2) Antimicrobial and antifungal properties
- (3) Used in traditional medicine for respiratory issues.

Examples:- Coriander (*Coriandrum sativum*)

Caraway (*Carum carvi*)

Fennel (*Foeniculum vulgare*)

(b) Define antioxidant with example.

Ans - A substance that prevents or slows down the oxidation of other substances, thereby preventing cell damage and reducing the risk of chronic diseases.

Characteristics:-

- (1) Neutralizes free radicals
- (2) Prevents oxidative stress
- (3) Protects cells from damage

Pharmaceutical application:-

- (1) Anti-inflammatory drugs
- (2) Anti-Cancer therapies
- (3) Cardiovascular health supplements

Food Sources:-

- (1) Fruits (berries, pomegranates, apples)
- (2) Vegetables (leafy greens, broccoli, carrots)
- (3) Nuts & seeds (almonds, sunflower seeds, - pumpkin seeds).

Examples:-

- (1) Vitamin C (found in citrus fruits, berries)
- (2) Vitamin E (found in nuts, seeds, vegetable-oils).
- (3) Polyphenols (found in green tea, turmeric, ginger).

(Q) Write the biological source, chemical constituents and uses of neem.

Ans - Biological Source -

- Kingdom - plantae
Family - Meliaceae
Genus - Azadirachta
Species - A. indica

Common Name - Neem, Indian Lilac

Chemical constituents:-

- (1) Alkaloids - Azadirachtin, Nimbin, Nimbidin
- (2) Glycosides - Nimboside, Neemine
- (3) Terpenoids - Nimbinene, Neemol
- (4) Flavonoids - Quercetin, Kaempferol
- (5) Saponins - Neem Saponins

uses -

- (1) Medicinal uses - Antimalarial, Antibacterial, Antifungal, Anti-inflammatory, Antiviral, Anticancer, Skin disorders, Dental care.
 - (2) Agricultural uses - Insecticide, pesticide, Fungicide,
 - (3) cosmetic uses - skin creams, soaps, shampoos
 - (4) Other uses - Biofuel, Timber, Dye, Fertilizer.
 - (5) Traditional uses - Ayurvedic medicine, Unani-medicine, Siddha medicine, Folk medicine.
- (d) Explain about the biological role of Omega-3 Fatty acid.

Ans - (1) Structural and Functional Roles -

- (1) Cell membrane structure: - Omega-3 Fatty acids, particularly EPA and DHA, are integral components of cell membranes.
- (2) Fluidity and flexibility: They maintain membrane fluidity, facilitating cellular process.
- (3) Receptor function: - Omega-3s interact with receptors, influencing cellular signaling.

(2) Physiological effects -

- (1) Heart health: - Omega-3s reduce inflammation, triglycerides, and blood pressure.
- (2) Brain Function: - DHA supports brain development, cognitive function, and mental health.
- (3) Anti-inflammatory: Omega-3s modulate inflammation, alleviating conditions like arthritis.

(3) Health Benefits -

- (1) Cardiovascular health - Reduces cardiovascular disease risk.
 - (2) Neuroprotection - May help prevent neurodegenerative diseases.
 - (3) Fetal development - DHA essential for fetal brain and eye development during pregnancy.
- Food sources - Fatty fish (Salmon, Sandlines)
- Nuts and seeds (Walnuts, flax seeds)
- Fortified food (eggs, yogurt)

(e) write details on scope of pharmacognosy.

Ans - Pharmacognosy, the study of medicinal plants and natural products, has a vast scope in various fields.

Academic and Research -

- (1) Plant anatomy, chemistry and taxonomy.
- (2) Phytochemistry and pharmacology.
- (3) Clinical trials and efficacy studies.

Industrial Application-

- (1) Herbal medicine and dietary Supplement industry.
- (II) pharmaceutical industries
- (III) Cosmetics and personal care products
- (IV) Food & beverage industry

HealthCare and Clinical-

- (1) Public health and epidemiology.
- (II) Clinical pharmacology and toxicology.
- (III) Traditional medicine.

Government and Regulatory-

- (1) Drug regulatory agencies
- (II) Herbal medicine regulations and policies
- (III) International trade and Commerce of medicinal plants.

Career Opportunities -

- (1) Research Scientist.
- (2) Herbal medicine specialist
- (3) Pharmacologist
- (4) Environmental Consultant

(F) write the biological source and chemical constituents of gokhru and punarnava.

Ans - Biological source of gokhru -

Gokhru is dried ripe fruits of tribulus -

↳ terrestris Linn.

→ Synonyms - Gokshur, puncture vine, land caltrop.

→ family - Zygophyllaceae

- Chemical Constituents -

- (1) Alkaloids - Harmane, Harmine
- (2) Glycosides - Tribuloside, Tenrestrosin D
- (3) Saponins - Tribestin, Protodioscin
- (4) Flavonoids - Kaempferol, Quercetin
- (5) Sterol - β -sitosterol, Stigmasterol.

- Biological Source of Punarnava -

It consists of a fresh or dried herb of Boenhavia diffusa.

Family - Nyctaginaceae

Common name - Punarnava, Hogweed.

- Chemical Constituents -

- (1) Alkaloids - Punarnavine, Boenhavine
- (2) Glycoside - Punarnavoside, Boenhavoside.
- (3) Flavonoids - Quercetin, Kaempferol.
- (4) Saponins - Boenhavasaponin
- (5) Terpenoids - Boenhavadiol.

(9) Write down the methods of preparation of Lehya?

Ans - Methods of preparation of Lehya -

→ General preparation Method -

- (1) Selection of ingredients (herbs, spices, minerals)
- (2) Cleaning and processing of ingredients
- (3) Weighing and mixing of ingredients
- (4) Heating or cooking with a medium (honey, ghee)

(5) Cooling and Solidification

- ~~Write~~ Specific preparation Techniques -

(1) Paka method: Heating ingredients with a liquid medium.

(2) Kriti method: mixing ingredients with a binding agent.

(3) Bhavana method: Soaking ingredients in a liquid medium.

(4) Samskara Method: - Processing ingredients through multiple steps.

- Modern Modifications -

(1) use of mechanical grinder & mixture.

(2) Standardization of ingredients & formulation.

(3) Quality Control measures.

(4) Packing and storage techniques.

(h) Define stomatal number and stomatal index.

Ans- Stomatal number -

(1) The total no. of stomata present on a given surface area of a leaf usually expressed per square millimeter per square centimeter.

(2) Count the no. of stomata in a fixed area using

a microscope & express it as:-

$$\rightarrow \text{Stomatal Number} = \frac{\text{Number of stomata}}{\text{Area}}$$

\rightarrow unit: Number/mm² or Number/cm²

Stomatal index -

(1) The ratio of the number of stomata to the total number of epidermal cells on a leaf surface.

(2)
$$\text{Stomatal index} = \frac{\text{No. of stomata}}{\text{total number of epidermal cells}} \times 100$$

unit - percentage (%)

(3) Differentiate between pale catechu and black catechu.

Ans:- Pale catechu (Acacia catechu)

- Source - Heartwood of Acacia catechu.
- Appearance - pale yellowish-brown, fragile and crumbly.
- Chemical Constituents: - catechin, epicatechin, and quercetin.
- use - Astringent & Anti-inflammatory.
 - Treatment of diarrhea, dysentery & skin disease.
 - use in traditional medicine & toothpaste.

Black catechu (Acacia mollissima)

- Source - ~~pale~~ Heartwood of mimosa catechu or acacia mollissima.
- Appearance - Dark brown to black, hard, dense.
- Chemical Constituents - catechin, tannine, and phlobatannins.
- use - Anti-inflammatory and antimicrobial.
 - Dyeing and tanning agent.
 - Treatment of wounds, ulcers and gastrointestinal issues.

(J) Differentiate between organised and unorganised drug?

Ans: - Organised drug -

↳ Standardized, purified, and well defined drug with known chemical structure and composition.

↳ Characteristics -

- ① Chemically pure
- ② Standardized extracts
- ③ Known chemical structure
- ④ Quality control measures
- ⑤ Regulatory approval

↳ Example - Alkaloids, Glycosides, Synthetic drugs

① ~~Crude plant extract~~ ② ~~variable chemical composition~~

unorganised drug -

↳ Crude, unpurified and complex substances with variable composition.

↳ characteristics:-

- ① Crude plant extract
- ② variable chemical composition.
- ③ Lack standardization
- ④ Limited quality control
- ⑤ Regulatory oversight varies

↳ Example:- Herbal remedies, Ayurvedic and traditional medicine, crude plant extracts.

(K) Write the biological source, chemical constituent and commercial preparation of sandal wood oil?

Ans :- Biological source -

Kingdom - plantae

Family - Santalaceae

Genus - Santalum

Species - S. album (white sandalwood)

Part used - Heart wood

Chemical constituents -

① Sesquiterpenes :- Santalol (70-90%), β -Santalene.

② Terpenoids :- α -Santalol, β -Santalol.

③ Volatile oil :- Limonene, Terpinolene.

Commercial preparation :-

① Sandalwood oil (essential oil)

② Sandalwood powder

③ Sandalwood Extract

(Part - C)

Q3: (A)

(a) Tannins - Tannins are a type of poly-phenolic compound found in plants, exhibit astringent, bitter and antimicrobial properties.

(b) Oleogumresins - Oleogumresins are a type of natural resin that combines gum and oil, typically obtained from plants. They are viscous, sticky liquid or semi-solids.

with a mixture of volatile oil, gum, resin.

(c) Palisade Ratio - The palisade Ratio is a botanical term that measures ratio of palisade cells and spongy cells.

(d) Cosmeceuticals - Cosmeceuticals are Cosmetic products with bioactive ingredients that provide therapeutic or medicinal benefits, bridging the gap between cosmetic and pharmaceuticals.

(e) Crude drug - Crude drugs are raw, unrefined plant materials used for medicinal purposes.

Ex - Roots, leaves, stems, barks, seeds, flowers.

(B)(a) Squill - *Drumia maritima*

(b) Guggul - *Commiphora mukul*

(c) Ispaghula - *Plantago ovata*

(d) Senna - *Cassia angustifolia*

(e) Rauwolfia - *Rauwolfia serpentina*

(f) Myrrh - *Commiphora molmol*

(g) Ashwagandha - *Withania somnifera*

(h) Castor oil - *Ricinus communis*

(i) Aloe - *Aloe barbadensis*

(j) Artemisia - *Artemisia absinthium*

(c)

(a) what are the chemical constituents of fennel?

Ans:- Essential oil, flavonoids, Terpenoids, Coumarins, phenolic acid, Glycosides, etc.

(b) what is Gubica?

Ans:- Gubica is a small, rounded dosage form used as a traditional Ayurvedic medicinal formulation. These are designed for easy administration and convenient dosing.

(c) what is the chemical test for tropane alkaloid?

Ans:- ~~Drag~~ Dragendorff's test.

(d) write basic principle of unani system of medicine

Ans:- The unani system of medicine, also known as Yunani or Hellenistic medicine, is based on the holistic approach and natural healing.

(e) what is chemotaxonomy?

Ans:- Chemotaxonomy is the study of the chemical composition of organisms, particularly plants to understand their taxonomic relationships, evolution and classification.