



Notes by PharmacoLearn

General Pharmacy

BP102T — B.Pharm Semester I

Exam Success Notes

Theory-exam mastery: complete answers, the way examiners want them

As per PCI B.Pharm (NEP 2020) syllabus

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Unit I — Introduction to the Profession of Pharmacy

History of the Profession of Pharmacy in India

Pharmacy in India has three parallel tracks that grew together — education, the pharmaceutical industry, and professional organisations. For centuries medicines came from the Ayurveda, Unani and Siddha systems, prepared by vaidyas and hakims. Modern pharmacy entered with the British, and the turning points below are the ones examiners keep returning to. Learn them as a timeline, in order.

Milestones (education, industry, organisation)

- 1899 — Acharya P. C. Ray founded the Bengal Chemical and Pharmaceutical Works in Calcutta. This is treated as the birth of the Indian pharmaceutical industry.
- 1901 — Alembic Chemical Works was set up at Baroda, another early industry milestone.
- 1937 — The first B.Pharm course in India started at Banaras Hindu University (BHU), Varanasi. This is the single most-asked date in the whole topic — if you remember one year, remember this one.
- 1940 — The Drugs and Cosmetics Act was passed, bringing the manufacture, import and sale of drugs under legal control.
- 1948 — The Pharmacy Act was passed and the Pharmacy Council of India (PCI) was constituted. The PCI regulates pharmacy education and the registration of pharmacists.
- 1955 — The first edition of the Indian Pharmacopoeia (IP) was published.

Exam tip: Questions here are usually framed as "Trace the history of pharmacy education in India" or "Write a note on the development of the pharmaceutical industry in India." Write a chronological timeline with the years bolded — it looks prepared and it scores.

Organisations you must know

- PCI (Pharmacy Council of India) — statutory body under the Pharmacy Act, 1948. Frames education regulations, approves courses, and maintains the register of pharmacists.
- AICTE (All India Council for Technical Education) — approves technical and pharmacy institutions at the national level.
- IPA (Indian Pharmaceutical Association) — the main professional association of pharmacists in India.
- IDMA (Indian Drug Manufacturers' Association) and OPPI (Organisation of Pharmaceutical Producers of India) — industry bodies representing Indian drug manufacturers and research-based producers respectively.

Exam tip: If a question asks "role of PCI," write statutory functions: education standards, course approval, registration of pharmacists. Keep PCI separate from IPA — one is a legal regulator, the other a professional association. Mixing them up is a common slip.

Scope of the Pharmacy Profession — Role and Responsibilities of Pharmacists

The syllabus splits this into three areas. Questions almost always ask "the role of the pharmacist in ..." with one area named. Write 6–8 crisp points under the asked heading and never mix the three.

1. Retail / community pharmacy

This is the pharmacy on every street — the most visible face of the profession.

- Dispense medicines against prescriptions and counsel patients on dose, timing, duration and storage.
- Sell OTC products and advise on minor ailments and first aid.
- Check prescriptions for errors — wrong dose, drug interactions, illegible writing — and contact the prescriber when something looks wrong.
- Maintain legally required records: prescription files, narcotic registers, purchase and sale records.
- Promote rational use of medicines — patient education on completing antibiotic courses and the correct use of generics.
- Refer patients to doctors when a condition is beyond self-medication.

2. Hospital and clinical pharmacy

The hospital pharmacist is part of the healthcare team, not just a storekeeper.

- Manage the hospital drug store: procurement, proper storage (cold chain for vaccines and insulin), and distribution to wards.
- Prepare sterile products such as IV admixtures and handle cytotoxic drugs where applicable.
- Do clinical pharmacy work: attend ward rounds, monitor drug therapy, and advise doctors on drug interactions and dose adjustments.
- Report adverse drug reactions (ADRs) under the PvPI (Pharmacovigilance Programme of India).
- Counsel patients at discharge — especially for chronic diseases like diabetes and hypertension — so therapy continues correctly at home.

3. Industrial pharmacy (including R&D)

- Production: manufacture of tablets, capsules, injectables and other dosage forms under GMP.

- Quality control / quality assurance: testing raw materials, in-process materials and finished products against pharmacopoeial standards.
- R&D: formulation development (converting a drug into a stable, effective dosage form), analytical method development, and support for clinical trials.
- Regulatory affairs: preparing dossiers for drug approval — CDSCO in India, USFDA/EMA for export markets.
- Marketing and medical sales: product promotion to doctors through medical representatives.

Exam tip: For "describe the role of a pharmacist in hospital pharmacy" (or community, or industry), pick the heading and write points only under it. Examiners deduct when students dump all three areas into one answer.

Pharmacopoeias

What a pharmacopoeia is

A pharmacopoeia is an official book that lays down standards for the identity, purity, strength and quality of drugs. A drug included in a pharmacopoeia must meet that book's standards — and because the standards are backed by law (the Drugs and Cosmetics Act in India), they are legally enforceable. That is why pharmacopoeias matter: they protect patients from substandard medicines.

The pharmacopoeias in the syllabus

Pharmacopoeia	Published by	Standing
IP — Indian Pharmacopoeia	Indian Pharmacopoeia Commission (IPC), Ghaziabad	The legal standard for drugs in India under the Drugs and Cosmetics Act; first edition 1955, latest widely used edition IP 2022
BP — British Pharmacopoeia	UK (MHRA)	Legal standard in the UK; used across Commonwealth countries
USP — United States Pharmacopoeia (USP-NF)	US Pharmacopeial Convention	The legal standard in the USA
BPC — British Pharmaceutical Codex	—	Historical — last edition 1973; its content was absorbed into the British National Formulary (BNF). The syllabus still names it, so know what it was, but don't cite it as a current book
International Pharmacopoeia (Ph. Int.)	WHO	For global use, especially where no national pharmacopoeia exists

Pharmacopoeia	Published by	Standing
National Formulary of India (NFI)	IPC, Ghaziabad	Not a standards book — gives practical prescribing information: formulations, doses, guidance for prescribers

Exam tip: "Distinguish between the Indian Pharmacopoeia and the National Formulary of India" is a favourite 5-mark question. The line to build your answer on: the IP sets quality standards (what the drug must be); the NFI gives prescribing guidance (how the drug is used).

Structure and content of the Indian Pharmacopoeia

The IP is published in multiple volumes. Its contents:

- Monographs — the core of the book; one per drug substance or formulation.
- General notices — the rules for interpreting the whole book.
- General chapters — standardised test methods (limit tests, dissolution, sterility testing and others).
- Appendices — reference standards, reagents and procedures.
- Recent editions also cover vaccines, sera, biotechnology products and herbal drugs.

Study of one model IP monograph (example: Paracetamol)

Every monograph follows a fixed skeleton. Learn it once and you can reproduce it for any drug in the exam:

- 1 Title — the official name (e.g., Paracetamol).
- 2 Chemical name and structural formula.
- 3 Description — what it looks like (e.g., white crystalline powder).
- 4 Identification — tests proving it is what it claims to be (IR spectrum, chemical tests).
- 5 Tests — purity checks: related substances, heavy metals, loss on drying, sulphated ash.
- 6 Assay — the quantitative test of strength (e.g., "contains not less than 98.0% and not more than 101.0%").
- 7 Storage — how it must be stored (well-closed container, protected from light).
- 8 Labelling — what the label must state.
- 9 Category / Dose — therapeutic category and the usual dose.

Exam tip: "Describe the salient features of an IP monograph with an example" — draw the skeleton as numbered points with Paracetamol filled in. Writing it as a numbered list reads as if you have actually opened the book, which is exactly the impression you want.

Introduction to Prescription

Definition

A prescription is a written order from a registered medical practitioner to a pharmacist to supply and compound medicines for a patient. It is both a clinical document and a legal one — which is why its parts and its handling both appear in exams.

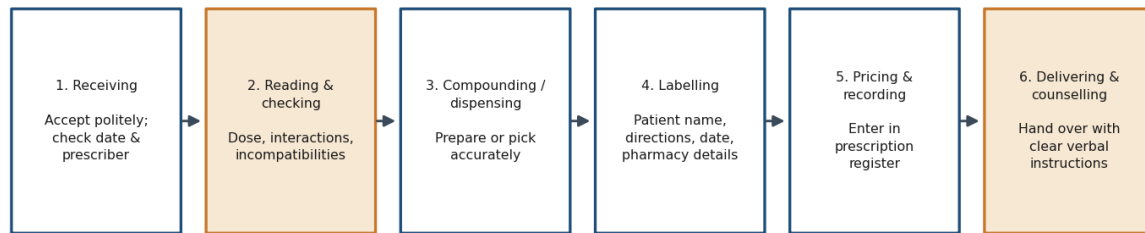
Parts / structure of a prescription (seven parts)

- 1 Date — every prescription must be dated.
- 2 Patient information — name, age, sex, address (weight for children).
- 3 Superscription — the symbol Rx, from Latin recipe, "take thou".
- 4 Inscription — the names and quantities of the medicaments ordered.
- 5 Subscription — directions to the pharmacist (e.g., "mix and make 10 powders").
- 6 Signatura (transcription) — directions to the patient: dose, frequency, route ("take one tablet twice daily after food").
- 7 Prescriber's signature, name and registration number — without these, the prescription is not valid.

Exam tip: The classic mix-up is subscription vs signatura. Remember it this way:
subscription = directions to the person below the prescriber in the chain (the pharmacist);
signatura = the directions the patient actually signs off on by following. Write all seven parts in order — examiners check the sequence.

Handling of prescriptions (correct order)

Handling a prescription — the correct order



If anything is doubtful — unusually high dose, illegible drug name, dangerous interaction — DO NOT GUESS. Contact the prescriber.

Seven parts of a prescription: date · patient info · superscription (Rx) · inscription · subscription · signatura · prescriber's signature + reg. no.

Flowchart showing the six steps of handling a prescription in order: receiving, reading and checking, compounding or dispensing, labelling, pricing and recording, delivering and counselling, with a warning never to guess at a doubtful order

- 1 Receiving — accept it politely; check the date and prescriber details.
- 2 Reading and checking — read carefully; verify doses, check for drug interactions, incompatibilities and obvious errors.
- 3 Compounding / dispensing — prepare or pick the medicines accurately.
- 4 Labelling — the label must carry the patient name, directions, date and pharmacy details.
- 5 Pricing and recording — enter it in the prescription register.
- 6 Delivering and counselling — hand it over with clear verbal instructions.

If anything is doubtful — an unusually high dose, an illegible drug name, a dangerous interaction — do not guess. Contact the prescriber. This single line earns marks in every prescription-handling answer.

Latin terminology used in prescriptions

These come as "expand the following" — learn the Latin and the exact meaning together.

Abbreviation	Latin	Meaning
Rx	Recipe	Take thou
a.c.	Ante cibum	Before meals
p.c.	Post cibum	After meals

Abbreviation	Latin	Meaning
b.i.d.	Bis in die	Twice daily
t.i.d.	Ter in die	Three times daily
q.i.d.	Quater in die	Four times daily
o.d.	Omne in die	Once daily
h.s.	Hora somni	At bedtime
s.o.s. / p.r.n.	Si opus sit / Pro re nata	When required
stat	Statim	Immediately
q.s.	Quantum sufficiat	Sufficient quantity
aq.	Aqua	Water
mist.	Mistura	Mixture
tab.	Tabella	Tablet
cap.	Capsula	Capsule
ung.	Unguentum	Ointment
lot.	Lotio	Lotion
gtt.	Guttae	Drops

Exam tip: Write the Latin expansion exactly — a wrong expansion on a label or in an exam is treated as a serious error. b.i.d. / t.i.d. / q.i.d. are the highest-yield three.

Very short questions (2 marks)

- 1 In which year and at which university did the first B.Pharm course in India start?
- 2 What is the full form of PCI, and under which Act was it constituted?
- 3 Define a pharmacopoeia.
- 4 Expand the Latin abbreviations b.i.d., h.s. and q.s. with their meanings.
- 5 What is the superscription in a prescription?

Short questions (5 marks)

- 1 Distinguish between the Indian Pharmacopoeia and the National Formulary of India.
- 2 Describe the seven parts of a prescription in order.
- 3 Write a note on the role and responsibilities of a pharmacist in community pharmacy.

Long questions (10 marks)

- 1 Trace the history of the profession of pharmacy in India with reference to pharmacy education, the pharmaceutical industry and professional organisations.

- 2 Describe the structure and content of the Indian Pharmacopoeia, and explain the salient features of an IP monograph with a suitable example.

How to approach these answers

- Very-short Q1: give the year (1937) and the university (BHU, Varanasi); one line, no paragraph.
- Very-short Q2: full form + Act + year, in one line.
- Very-short Q3: one-sentence definition naming identity, purity, strength and quality.
- Very-short Q4: Latin expansion + meaning for each, in a compact list.
- Very-short Q5: name the symbol Rx, its Latin origin and its position in the prescription.
- Short Q1: open with one line on each book, then a small comparison table (standards vs prescribing guidance, same publisher).
- Short Q2: list the seven parts in order with one line on each; close with the validity point (signature + registration number).
- Short Q3: 6–8 points under the community pharmacy heading only; add one closing line on patient counselling.
- Long Q1: structure — intro (Ayurveda to modern pharmacy), main body under 3 subheads (education, industry, organisations) with dated timeline, conclusion naming PCI and the first IP.
- Long Q2: structure — intro (why pharmacopoeias exist), main body under 2 subheads (IP structure/content; monograph skeleton with Paracetamol), conclusion on legal enforceability.

Unit II — Introduction to Pharmaceutical Calculations and Dosage Forms

Metric system of weights and measures

Pharmacy uses the metric system almost exclusively — grams for weight, litres for volume. Before any calculation, convert everything to the same unit; most numerical errors in exams are unit errors, not formula errors.

- 1 kg = 1000 g; 1 g = 1000 mg; 1 mg = 1000 micrograms (mcg or µg)
- 1 L = 1000 mL
- Household measures still seen on labels: 1 teaspoon ≈ 5 mL, 1 tablespoon ≈ 15 mL, 1 drop ≈ 0.05 mL (so 20 drops ≈ 1 mL)

Scientific notation handles very large or small quantities: 0.00025 g = 2.5×10^{-4} g. Keep the power-of-ten conversions fluent — they appear inside almost every calculation below.

Alligation

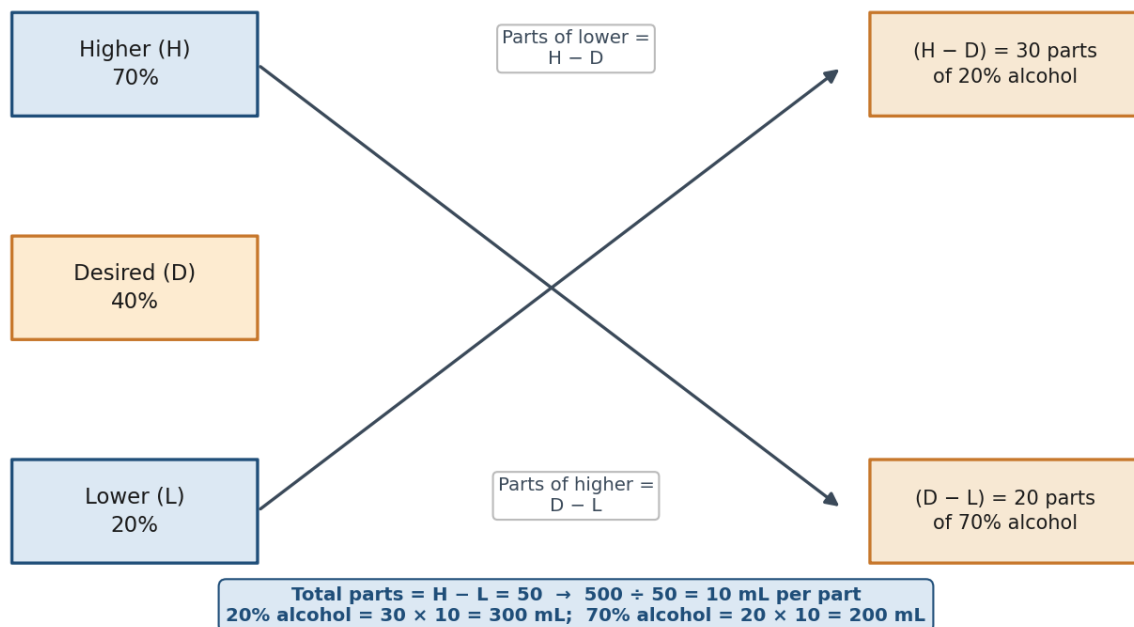
Definition

Alligation is the method for mixing two preparations of different strengths to obtain a preparation of an intermediate strength. It answers questions like: "How much of 70% alcohol and 30% alcohol do I mix to get 50% alcohol?"

Alligation alternate — the cross method

Alligation alternate — the cross method

Example: prepare 500 mL of 40% alcohol from 70% and 20% alcohol



Alligation cross method diagram with a worked example: mixing 70% and 20% alcohol to prepare 500 mL of 40% alcohol

- Parts of the higher-strength ingredient = $D - L$
- Parts of the lower-strength ingredient = $H - D$
- Total parts = $H - L$, where H = higher strength, D = desired strength, L = lower strength.

Worked example (exam-answer form)

Question: Prepare 500 mL of 40% alcohol from 70% and 20% alcohol.

Solution:

- Parts of 70% alcohol (higher) = $D - L = 40 - 20 = 20$ parts
- Parts of 20% alcohol (lower) = $H - D = 70 - 40 = 30$ parts
- Total parts = $70 - 20 = 50$ parts

- Volume per part = $500 \div 50 = 10$ mL
- 70% alcohol required = $20 \times 10 = 200$ mL
- 20% alcohol required = $30 \times 10 = 300$ mL

Answer: mix 200 mL of 70% alcohol with 300 mL of 20% alcohol to get 500 mL of 40% alcohol.

Exam tip: Alligation numericals are almost guaranteed. Always draw the cross diagram — it carries method marks even if the arithmetic slips. State the subtraction rule (D – L for higher, H – D for lower) before you start.

Proof spirit

Proof spirit is the reference standard for alcohol strength: it contains 57.1% v/v ethanol (measured at 15.56 °C / 60 °F). Other alcohol strengths are expressed relative to it:

- 100° proof = proof spirit itself (57.1% v/v ethanol)
- Over proof (O.P.): stronger than proof spirit — e.g., 25° O.P. = 125° proof
- Under proof (U.P.): weaker than proof spirit — e.g., 25° U.P. = 75° proof

Conversion formula: % v/v ethanol = (proof strength $\div$ 100) $\times$ 57.1

Worked example (exam-answer form)

Question: A spirit is labelled 70° proof. What is its ethanol content in % v/v?

Solution: % v/v = $(70 \div 100) \times 57.1 = 0.70 \times 57.1 = 39.97 \approx 40\%$ v/v.

Answer: approximately 40% v/v ethanol.

Exam tip: Examiners love "define proof spirit" (2 marks: the definition plus 57.1% v/v) and one conversion numerical. Memorise 57.1 and the direction of over/under proof.

Isotonic solutions

Definition

A solution is isotonic with body fluids (tears, blood plasma) when it exerts the same osmotic pressure as those fluids — roughly equivalent to 0.9% w/v sodium chloride. Eye drops and injections must be isotonic; otherwise they cause pain, irritation, or haemolysis of red blood cells.

Methods of adjusting tonicity

Two standard methods — one definition plus these two, each with its principle, is a complete answer.

- 1 Sodium chloride equivalent (E value) method: E is the amount of NaCl that produces the same osmotic effect as 1 g of the drug. The NaCl to add = $0.9 - (E \times \text{quantity of drug per 100 mL})$. Add that much NaCl and the solution becomes isotonic.
- 2 Freezing-point depression method: blood plasma freezes at $-0.52\text{ }^{\circ}\text{C}$. Adjust the formulation so that the freezing point of the solution is also $-0.52\text{ }^{\circ}\text{C}$, and it is isotonic with plasma.

Exam tip: "Define isotonic solution. Describe the methods of adjusting tonicity" — open with the definition and 0.9% NaCl, give the two methods with one line of principle each, close with why it matters (eye drops, injections). That is the full 5-mark structure.

Dilute solutions — percentage and ratio strengths

- % w/w = grams of solute per 100 g of solution (ointments — e.g., 5% w/w).
- % w/v = grams of solute per 100 mL of solution (most liquids — e.g., 0.9% w/v NaCl).
- % v/v = mL of solute per 100 mL of solution (e.g., alcohol strengths).
- Ratio strength: 1:1000 means 1 g in 1000 mL. Conversion: $\% = (1 \div \text{ratio}) \times 100$, so 1:1000 = 0.1% w/v and 1:10,000 = 0.01% w/v.

Exam tip: "Convert 1:5000 to percentage strength" is a classic 2-mark numerical: $(1 \div 5000) \times 100 = 0.02\% \text{ w/v}$. Write the conversion formula first.

Geometric dilution

When a very small quantity of a potent drug must be mixed uniformly into a large quantity of powder, you don't add it all at once. In geometric dilution, the drug is mixed with an approximately equal volume of diluent, then the diluent is doubled at each step until everything is incorporated. Mortar-and-pestle trituration does the work.

This is how a few milligrams of drug get blended uniformly into grams of lactose — and the same principle applies when incorporating a potent drug into an ointment base.

Exam tip: One line — "mix drug with equal volume of diluent, then double the diluent stepwise" — plus the mortar-and-pestle mention covers this as a 2-mark definition. Link it to potent drugs; that word is the trigger in the question.

Posology

Definition

Posology (Greek posos = how much, logos = study) is the study of doses — the science of deciding the correct dose of a drug for a patient. Adult doses are the reference point; the formulas below scale them down for children.

Dose calculation formulas

Formula	Based on	Equation
Young's formula	Age (children)	Child dose = $[\text{Age} \div (\text{Age} + 12)] \times \text{adult dose}$
Dilling's formula	Age	Child dose = $(\text{Age} \div 20) \times \text{adult dose}$
Clark's formula	Body weight	Child dose = $(\text{Weight in lb} \div 150) \times \text{adult dose}$, or $(\text{Weight in kg} \div 70) \times \text{adult dose}$
Fried's rule	Age in months (infants)	Infant dose = $(\text{Age in months} \div 150) \times \text{adult dose}$
Body surface area (BSA)	BSA	Child dose = $(\text{BSA in m}^2 \div 1.73) \times \text{adult dose}$

BSA is the most accurate basis for children because it correlates best with metabolic rate. It is calculated by the Mosteller formula: $\text{BSA (m}^2\text{)} = \sqrt{[\text{height (cm)} \times \text{weight (kg)} \div 3600]}$.

Worked examples (exam-answer form)

Example 1 — Young's formula. Adult dose = 500 mg; child aged 6 years.

Child dose = $[6 \div (6 + 12)] \times 500 = (6 \div 18) \times 500 = 166.7 \text{ mg} \approx 167 \text{ mg}$.

Example 2 — Clark's formula. Adult dose = 250 mg; child weighs 35 kg.

Child dose = $(35 \div 70) \times 250 = 125 \text{ mg}$.

Example 3 — Fried's rule. Adult dose = 300 mg; infant aged 15 months.

Infant dose = $(15 \div 150) \times 300 = 30 \text{ mg}$.

Exam tip: Always name the formula before solving — "By Young's formula..." — because naming it is part of the method marks. Match the formula to the data given: age in years → Young; weight → Clark; age in months → Fried.

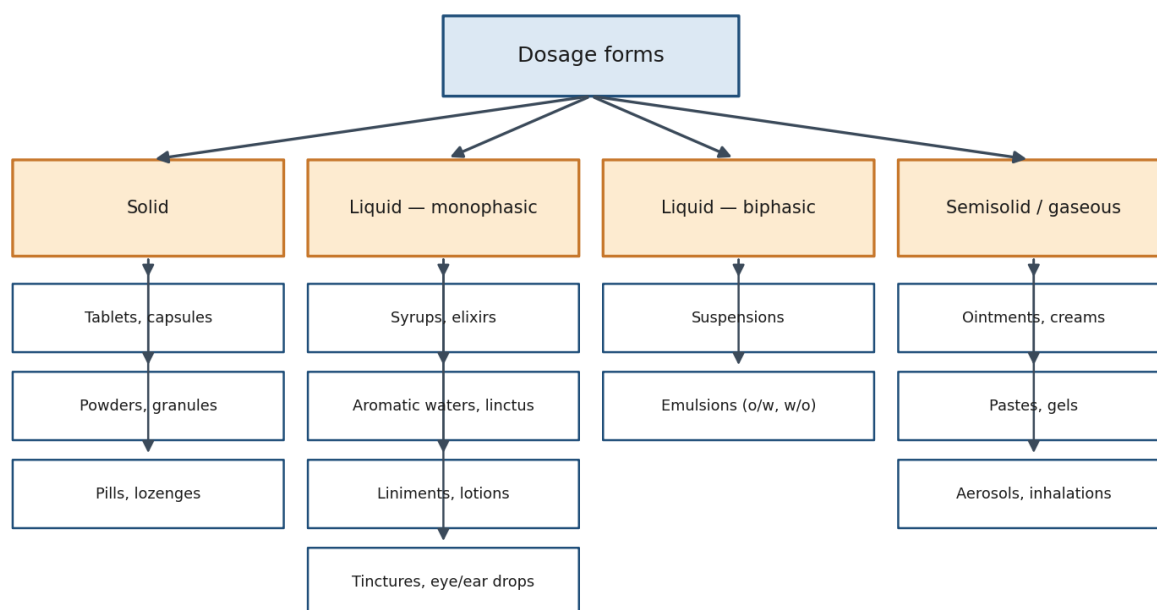
Routes of administration

The route of administration decides how fast a drug acts and where it goes in the body.

- Oral — tablets, capsules, syrups. Convenient, but slow onset and subject to first-pass metabolism.
- Sublingual / buccal — under the tongue or in the cheek (e.g., nitroglycerin/sorbitrate). Fast, avoids first-pass.
- Parenteral — IV (fastest of all), IM, SC, intradermal, intrathecal. Sterile products; used when the oral route isn't possible.
- Rectal — suppositories, enemas. Useful when the patient is vomiting or unconscious, and in children.
- Topical — ointments, creams, lotions applied to skin.
- Inhalation — aerosols, nebulisers for asthma; drug delivered directly to the lungs.
- Nasal, ophthalmic, otic — nose drops, eye drops, ear drops.
- Transdermal — patches delivering drug through the skin over hours.

Classification of dosage forms

Classification of dosage forms (by physical state)



Dosage forms can also be classified by route (oral, parenteral, topical...) or by release (immediate, sustained, controlled).

Tree diagram classifying dosage forms by physical state into solids, monophasic liquids, biphasic liquids, and semisolids and gaseous forms, with examples under each

A dosage form is the physical form in which a drug is presented for administration (tablet, syrup, injection, and so on). The commonest classification is by physical state:

- Solid: tablets, capsules, powders, granules, pills, lozenges.
- Liquid — monophasic: syrups, elixirs, aromatic waters, linctus, tinctures.

- Liquid — biphasic: suspensions, emulsions.
- Semisolid: ointments, creams, pastes, gels.
- Gaseous: aerosols, inhalations.

Dosage forms are also classified by route (oral, parenteral, topical, and so on) or by release pattern (immediate, sustained, controlled).

Exam tip: If the question just says "classify dosage forms," give the physical-state classification with two examples under each head. If it says "with examples," the examples are where the marks are.

Active Pharmaceutical Ingredients and Excipients

- API (Active Pharmaceutical Ingredient): the substance in the formulation that produces the therapeutic effect (e.g., paracetamol in a Crocin tablet).
- Excipient: any substance other than the API that is included to help manufacture the product, keep it stable, or make it acceptable to the patient (e.g., starch as binder/disintegrant, lactose as diluent, colourants, flavourants).

Ideal characteristics of excipients

- Inert — no chemical reaction with the drug.
- Non-toxic and safe at the quantities used.
- Stable under normal storage conditions.
- Compatible with the API and the packaging.
- Economical — affordable at manufacturing scale.

Importance of excipients

Without excipients, a good drug never becomes a usable medicine: a tablet wouldn't hold together, a syrup wouldn't pour or taste acceptable, a suspension wouldn't stay uniform. Excipients decide manufacturability, stability, and patient acceptability — the API alone decides only the therapeutic effect.

Exam tip: "Define API and excipient. What are the ideal characteristics of excipients?" is a favourite 5-mark short note: two definitions, five characteristics as points, one closing line on importance.

Very short questions (2 marks)

- 1 Define alligation and state when it is used.
- 2 What is proof spirit? Give its ethanol content.
- 3 Define posology.

- 4 Convert a 1:5000 solution to percentage strength.
- 5 Distinguish between an API and an excipient.

Short questions (5 marks)

- 1 Define an isotonic solution and describe the methods of adjusting tonicity.
- 2 A child is 4 years old and the adult dose of a drug is 250 mg. Calculate the child's dose using Young's formula. Show all steps.
- 3 Classify dosage forms by physical state, giving two examples of each class.

Long questions (10 marks)

- 1 Explain alligation with the cross method. Prepare 500 mL of 40% alcohol from 70% and 20% alcohol, showing the complete calculation.
- 2 Define posology. Describe the formulas for calculating children's doses based on age, body weight and body surface area, with one worked example for any two of them.

How to approach these answers

- Very-short Q1: one-sentence definition + the situation (mixing two strengths to get an intermediate one).
- Very-short Q2: definition + 57.1% v/v ethanol + 100° proof, in two lines.
- Very-short Q3: definition with the Greek roots (posos + logos) and what it determines.
- Very-short Q4: write the conversion formula first, then $(1 \div 5000) \times 100 = 0.02\% \text{ w/v}$.
- Very-short Q5: one line each — API gives the therapeutic effect, excipient helps manufacture/stability/acceptability.
- Short Q1: definition + 0.9% NaCl, then the two methods with one principle line each, close with eye drops/injections.
- Short Q2: name Young's formula, write the equation, substitute, solve: $[4 \div 16] \times 250 = 62.5 \text{ mg}$; box the answer.
- Short Q3: list the classes with two examples each; add one line on the alternative classifications (route, release).
- Long Q1: structure — intro (what alligation solves), main body under 2 subheads (the cross method with diagram; the worked calculation step by step), conclusion restating the final volumes.
- Long Q2: structure — intro (definition of posology), main body under 3 subheads (age-based, weight-based, BSA-based with equations and examples), conclusion naming BSA as the most accurate.

Unit III — Solid Dosage Forms

Solid dosage forms are the backbone of pharmacy — tablets and capsules make up the majority of medicines dispensed anywhere. This unit covers powders, tablets and capsules: what each type is for, their advantages and disadvantages, and how they are made. The "advantages and disadvantages" questions here are near-certain, so learn them as paired lists.

Powders

Definition

Powders are solid dosage forms containing one or more drugs in a dry, finely divided state. They are among the oldest dosage forms and are still used where tablets can't be — for very large doses, for external dusting, or for drugs unstable in liquid form.

Classification (one example with each)

- Bulk powders — dispensed in bulk; the patient measures each dose (e.g., antacid powder).
- Divided powders — individually wrapped single doses (e.g., ORS powder sachets).
- Dusting powders — applied externally to skin, very finely sifted so they don't irritate. Two types: medical (contain a medicament, e.g., antiseptic zinc oxide + starch powder) and surgical (sterile, used on wounds).
- Effervescent powders — contain sodium bicarbonate with citric/tartaric acid; on contact with water they release CO₂ and give a fizzy drink (e.g., ENO). The fizz masks taste and speeds absorption.
- Efflorescent powders — contain drugs that lose their water of crystallisation on exposure to air and become damp. They are gently dried before mixing and packed in well-closed containers.
- Hygroscopic powders — absorb moisture from the air and cake. They need airtight packing; a desiccant sachet is sometimes included.
- Eutectic mixtures — two solids that liquefy when mixed because the mixture's melting point drops below room temperature. Classic pair: menthol + camphor (also menthol + thymol). Handled by triturating each separately with an inert absorbent such as light magnesium oxide or lactose before combining — or by dispensing the components separately.

Exam tip: Examiners pair effervescent vs efflorescent because the names look alike. The line that separates them: effervescent powders release CO₂ in water (designed to fizz); efflorescent powders lose water of crystallisation in air (a storage problem, not a feature).

Advantages and disadvantages of powders

Advantages:

- Suitable for large doses that won't fit into a tablet or capsule.
- Fast dissolution and therefore fast absorption.

- Easy to compound in the pharmacy.
- Useful for external application (dusting powders).

Disadvantages:

- Bitter or unpleasant drugs taste bad.
- Hygroscopic drugs cake on storage; volatile drugs escape.
- Not convenient to carry; dose measurement by the patient can be inaccurate.

Excipients and methods of preparation (introductory)

Diluents such as lactose and starch bulk up small drug quantities. Preparation is by trituration (grinding in a mortar and pestle) or simple mixing, followed by sifting and packing.

Tablets

Definition

A tablet is a solid dosage form containing a drug (with or without excipients), prepared by compression (or moulding) into a flat or biconvex disc.

Types of tablets (with examples)

- Compressed tablets — the ordinary tablet (e.g., paracetamol/Crocin).
- Sugar-coated tablets — coating masks bitter taste and protects the core (older vitamin tablets).
- Film-coated tablets — thin polymer coat for taste-masking and stability.
- Enteric-coated tablets — coating resists stomach acid and dissolves in the intestine; used for drugs that irritate the stomach or are destroyed by acid (e.g., omeprazole, enteric diclofenac).
- Chewable tablets — chewed before swallowing; for children or antacids (e.g., Digene).
- Sublingual / buccal tablets — dissolve under the tongue or in the cheek for rapid action (e.g., sorbitrate/nitroglycerin).
- Effervescent tablets — dissolve in water with effervescence (e.g., vitamin C tablets).
- Dispersible tablets — disperse quickly in water before administration.
- Sustained-release / controlled-release tablets — release the drug slowly over hours (e.g., metformin SR).
- Moulded tablets (tablet triturates) — made by moulding a moist powder mass, not by compression; small, rapidly dissolving; historically used for potent drugs like nitroglycerin. Largely obsolete today, but examiners still ask "what are moulded tablets."
- Pills — small spherical masses made by rolling; the traditional dosage form that tablets replaced. Know the definition — you will rarely see real pills in modern practice.

Exam tip: Enteric coating serves two purposes, and both earn marks: it protects the stomach from the drug (irritant drugs) and protects the drug from stomach acid (acid-labile drugs). Write both.

Advantages and disadvantages of tablets

Advantages:

- Accurate, uniform dosing in every unit.
- Convenient, portable, stable — the easiest dosage form for patients to carry and store.
- Taste-masking possible through coating.
- Economical for large-scale production.

Disadvantages:

- Slower onset than liquids.
- Difficult for children and elderly patients to swallow.
- Drugs unstable to compression, or doses too large for a tablet, don't suit this form.

Excipients and methods of preparation (introductory)

Excipients: diluents (lactose, starch), binders (starch paste, PVP), disintegrants (starch, croscarmellose), lubricants (magnesium stearate, talc), glidants. Manufacture is by wet granulation, dry granulation, or direct compression — granules are made first (except in direct compression), then compressed on a tablet machine.

Exam tip: If asked "methods of tablet manufacture," name the three methods and add one line on each: wet granulation (liquid binder), dry granulation (slugging/roller compaction, for moisture-sensitive drugs), direct compression (no granulation step). The one-line distinction between them is what scores.

Capsules

Definition

A capsule is a solid dosage form in which the drug is enclosed in a gelatin shell.

Types of capsules

- Hard gelatin capsules — two-piece (body + cap), filled with powders or granules (e.g., amoxicillin capsules, omeprazole). This is the common capsule you see.
- Soft gelatin capsules — one-piece sealed shell, filled with liquids or semi-solids (e.g., vitamin E/Evion, cod liver oil).

Capsule sizes

Hard gelatin capsules come in sizes 000, 00, 0, 1, 2, 3, 4, 5 — 000 is the largest and 5 the smallest; size 0 is the most commonly used. (Memory hook: more zeros = bigger capsule.)

Advantages and disadvantages of capsules

Advantages:

- The tasteless shell masks bitter drugs.
- Elegant appearance; fast disintegration of the shell.
- Suitable for liquids and oils (soft gelatin capsules).
- Accurate dosing.

Disadvantages:

- Not for very hygroscopic drugs — gelatin absorbs moisture.
- Not for very large doses.
- Gelatin is animal-derived, a concern for some patients.
- More expensive to manufacture than tablets.

Excipients and methods of preparation (introductory)

Diluents (lactose), lubricants and glidants to help filling. Hard capsules are filled on capsule-filling machines (hand-operated to fully automatic); soft gelatin capsules are made by the rotary-die process.

Comparison: tablets vs capsules vs powders

Feature	Tablets	Capsules	Powders
Dose accuracy	High	High	Lower (bulk powders measured by patient)
Taste masking	By coating	By gelatin shell	Poor
Large doses	Limited by size	Limited by size	Well suited
Liquids/oils	Not suitable	Soft capsules suit oils	Not suitable
Cost	Cheapest	Costlier than tablets	Cheap to compound
Onset	Slower than liquids	Faster than tablets (shell dissolves quickly)	Fast

Exam tip: A "compare tablets and capsules" question is answered best as a table like this — rows for dose accuracy, taste masking, cost, onset. Tables read as organised thinking and they save you words.

Very short questions (2 marks)

- 1 Define a powder dosage form. Give one example of a bulk powder and one of a divided powder.
- 2 What is a eutectic mixture? Give one example.
- 3 What are moulded tablets, and how do they differ from compressed tablets?
- 4 Which hard gelatin capsule size is the largest, and which is most commonly used?
- 5 Name the three methods of tablet manufacture.

Short questions (5 marks)

- 1 Classify powders with one example of each class.
- 2 Describe the types of tablets with suitable examples.
- 3 Write the advantages and disadvantages of capsules.

Long questions (10 marks)

- 1 Define tablets. Classify them with examples, and discuss their advantages, disadvantages, excipients and methods of preparation.
- 2 Define capsules. Describe their types and sizes, and discuss their advantages, disadvantages, excipients and methods of preparation.

How to approach these answers

- Very-short Q1: one-sentence definition + the two examples, no extra detail.
- Very-short Q2: definition (two solids liquefy on mixing) + menthol + camphor + one handling line.
- Very-short Q3: made by moulding moist powder (not compression) + nitroglycerin example; one line on the difference.
- Very-short Q4: 000 largest, 5 smallest, 0 commonest — one line.
- Very-short Q5: just name the three methods.
- Short Q1: list the classes with one example each; add the dusting-powder subtypes (medical/surgical).
- Short Q2: 6–8 types with one example each; add the enteric-coating dual purpose as a closing line.
- Short Q3: paired advantages/disadvantages lists; close with the gelatin moisture point.
- Long Q1: structure — intro (definition), main body under 4 subheads (types with examples; advantages; disadvantages; excipients and the three manufacturing methods), conclusion on why tablets dominate.
- Long Q2: structure — intro (definition), main body under 4 subheads (hard vs soft with examples; sizes; advantages/disadvantages; excipients and filling methods), conclusion on when capsules beat tablets.

Unit IV — Monophasic and Biphasic Liquids

Liquid dosage forms are either monophasic (one clear phase — true solutions) or biphasic (two phases — suspensions and emulsions). This is the longest unit in BP102T. Learn each preparation as definition → example → one key point about preparation. The examples are what make an answer look like it comes from a pharmacy student rather than a textbook index.

Monophasic liquids for internal use

Aromatic waters

Definition: clear, aqueous solutions of volatile oils or other aromatic substances, used mainly as flavouring vehicles.

Examples: chloroform water, peppermint water, rose water, camphor water.

Preparation: the aromatic substance is shaken with purified water and filtered. Stored in well-closed containers, protected from light — volatile constituents escape and degrade otherwise.

Syrups

Definition: concentrated aqueous solutions of sucrose (or other sugars), used as sweet vehicles for bitter drugs.

Example: simple syrup IP, cough syrups.

Key point: Simple syrup IP contains 66.7% w/w sucrose, and that sugar concentration itself acts as the preservative — the high osmotic pressure stops microbial growth. Prepared by dissolving sucrose in purified water with heat (or by agitation without heat when heat-sensitive ingredients are added later).

Exam tip: 66.7% w/w sucrose in simple syrup IP is a number examiners love to ask. Pair it with why: the sugar is the preservative, not just the sweetener.

Elixirs

Definition: clear, sweetened hydroalcoholic liquids (containing alcohol, typically 5–40%), used as vehicles for drugs.

Example: phenobarbitone elixir.

Key point: the alcohol keeps both water-soluble and alcohol-soluble ingredients in solution and acts as a preservative. Because of the alcohol content, elixirs are not ideal for children or alcohol-restricted patients in large volumes — worth one line in any answer.

Linctus

Definition: viscous, sweet liquid preparations taken in small doses for their soothing action on the throat in cough.

Examples: codeine linctus, pholcodine linctus.

Key point: they are sipped slowly and never diluted with water, so the drug stays in contact with the throat mucosa as long as possible.

Quick comparison — internal monophasics

Preparation	Vehicle	Special point
Aromatic water	Water + volatile oil	Flavouring vehicle; protect from light
Syrup	Water + 66.7% w/w sucrose	Sugar is the preservative
Elixir	Water + alcohol (5–40%) + sugar	Dissolves both water- and alcohol-soluble drugs
Linctus	Viscous sweet vehicle	Sipped undiluted; soothing action on throat

Monophasic liquids for external use and body cavities

- Liniments — liquid or semi-liquid preparations rubbed onto the skin with friction; may be alcoholic or oily (e.g., turpentine liniment). Labelled "for external use only" and usually "shake well".
- Lotions — aqueous preparations dabbed (not rubbed) onto the skin without friction, for a soothing or cooling effect (e.g., calamine lotion).
- Throat paints — viscous liquids applied to the throat with a brush (traditional iodine-based throat paints).
- Applications — an older term for liquids or semi-liquids applied to the skin; the syllabus lists it, so know it as a historical category.
- Gargles — aqueous solutions used to treat the throat by gargling and spitting out (modern familiar example: Betadine gargle).
- Mouthwashes — used to cleanse and deodorise the mouth (e.g., chlorhexidine mouthwash).
- Enemas — liquids administered rectally, for evacuation or for retention of a medicament.
- Eye drops — sterile aqueous or oily solutions instilled into the eye; must be sterile, isotonic and buffered (ties back to Unit II).
- Ear drops — instilled into the ear (e.g., wax-softening drops).
- Nasal drops — instilled into the nose (e.g., decongestant drops).
- Tinctures — alcoholic or hydroalcoholic extracts of crude drugs (e.g., tincture of iodine, compound tincture of benzoin). Prepared by maceration or percolation.

Exam tip: The memory hook for this whole list — the internal four are aromatic waters, syrups, elixirs, linctus; everything else is external or body-cavity. If a question says "classify monophasic liquids," that split is your answer's skeleton. Liniment = rubbed, lotion = dabbed, gargle = throat, mouthwash = mouth.

Official preparations — excipients and methods (introductory)

Official means listed in the pharmacopoeia — prepared exactly to the official formula and standard. The excipients across these preparations:

- Vehicles: purified water, alcohol, glycerin.
- Sweeteners: sucrose, sorbitol.
- Preservatives: benzoates, parabens.
- Flavours and colours for acceptability.

General methods of preparation: solution (dissolving with stirring, with or without heat), maceration and percolation (extraction processes for tinctures), followed by filtration and clarification.

Suspensions — biphasic liquids

Definition

A suspension is a biphasic liquid dosage form in which finely divided solid particles are dispersed in a liquid vehicle (usually water). The "shake well before use" instruction on the label exists because the drug settles on standing.

Types

- Flocculated suspensions — particles form loose aggregates (flocs). They settle rapidly, but the sediment is fluffy and easily redispersed by shaking. No caking. This is the preferred type.
- Deflocculated suspensions — particles remain as individual fine particles. They settle slowly, but the sediment packs into a hard cake that is difficult to redisperse. This is the problem formulators avoid.

Feature	Flocculated	Deflocculated
State of particles	Loose aggregates (flocs)	Individual fine particles
Rate of settling	Fast	Slow
Nature of sediment	Fluffy, loose	Hard, packed cake
Redispersibility	Easy	Difficult
Desirability	Preferred	Avoided

Exam tip: The trap here is assuming slow settling is better. It isn't — deflocculated suspensions settle slowly but cake irreversibly, while flocculated ones settle fast but shake back up in seconds. "Flocculated is preferred because redispersion matters more than settling rate" is the sentence that shows understanding.

Advantages and disadvantages of suspensions

Advantages:

- Suitable for drugs that are insoluble or unstable in solution.
- Mask bitter taste better than solutions.
- Higher drug loading possible per dose.
- Prolonged action possible with controlled particle size.

Disadvantages:

- Physical instability — settling and caking.
- Dose uniformity depends on the patient shaking the bottle.
- Bulky to store and transport.

Formulation excipients

- Suspending / viscosity agents (tragacanth, bentonite, sodium CMC, methylcellulose) — thicken the vehicle and slow settling.
- Wetting agents (surfactants) — help hydrophobic particles disperse in water.
- Flocculating agents (electrolytes) — create the flocs in a flocculated suspension.
- Sweeteners, flavours, preservatives — for taste and microbial stability.

General method of preparation

Triturate the drug with the wetting agent, add the suspending agent (often as a mucilage), incorporate gradually with the vehicle, make up to volume — and pack with a "shake well before use" label.

Emulsions — biphasic liquids

Definition

An emulsion is a biphasic liquid in which one liquid is dispersed as fine droplets in another immiscible liquid, stabilised by an emulsifying agent.

Types

- Oil-in-water (o/w) — oil droplets dispersed in water (e.g., oral emulsions like cod-liver-oil emulsion; vanishing-cream type bases). Washable, preferred for internal use.
- Water-in-oil (w/o) — water droplets dispersed in oil (e.g., cold-cream type). Greasy, used externally.

Emulsifying agents

- Natural: acacia, tragacanth, gelatin, egg yolk.
- Synthetic non-ionic surfactants: Tweens (hydrophilic — favour o/w) and Spans (lipophilic — favour w/o).
- Finely divided solids: bentonite.

Exam tip: Tweens → o/w, Spans → w/o. One line, but it appears in exams as both a 2-mark question and a trap option.

Tests for identification of emulsion type

Tests for identifying emulsion type — o/w or w/o?

1. Dilution test	o/w dilutes freely with water; w/o does not (dilutes with oil)
2. Dye test	Water-soluble dye: uniform colour = o/w; spotted colour = w/o
3. Conductivity test	o/w conducts electricity (water is continuous phase); w/o does not
4. Fluorescence test (UV)	o/w shows spotty fluorescence; w/o shows uniform fluorescence

Tweens (hydrophilic) favour o/w • Spans (lipophilic) favour w/o

Chart of the four tests used to identify whether an emulsion is oil-in-water or water-in-oil: dilution, dye, conductivity and fluorescence tests

Learn all four — this is a classic exam question, and it is usually asked as "name and explain":

- 1 Dilution test — an o/w emulsion dilutes freely with water; a w/o emulsion does not (it dilutes with oil instead).
- 2 Dye test — a water-soluble dye colours the continuous phase: uniform colour = o/w, spotted colour = w/o (and the reverse with an oil-soluble dye).

- 3 Conductivity test — o/w conducts electricity because water is the continuous phase; w/o does not.
- 4 Fluorescence test — under UV light, o/w shows spotty fluorescence while w/o shows uniform fluorescence (oils fluoresce).

Formulation excipients and general methods of preparation

Excipients: emulsifying agents (above), preservatives, antioxidants, and flavours/sweeteners for oral emulsions.

Methods:

- Dry gum (continental) method — acacia and oil are triturated first, then water is added at once to form the primary emulsion.
- Wet gum (English) method — acacia is first made into a mucilage with water, then oil is added gradually.
- Bottle method — for volatile oils; the ingredients are shaken together in a bottle.

Exam tip: Dry gum vs wet gum is the standard 2-mark distinction: in the dry method the gum meets the oil first; in the wet method the gum meets the water first. Bottle method is reserved for volatile oils.

Very short questions (2 marks)

- 1 What is the sucrose content of simple syrup IP, and why does it matter?
- 2 Distinguish between a liniment and a lotion.
- 3 Distinguish between a flocculated and a deflocculated suspension.
- 4 Name the four tests used to identify the type of an emulsion.
- 5 What is the difference between the dry gum and wet gum methods of emulsion preparation?

Short questions (5 marks)

- 1 Define and compare syrups, elixirs and linctus with one example of each.
- 2 Write a note on monophasic liquids used for external use and body cavities, with examples.
- 3 Define an emulsion. Describe its types and the emulsifying agents used, with examples.

Long questions (10 marks)

- 1 Define a suspension. Describe its types with a comparison, and discuss its advantages, disadvantages, formulation excipients and general method of preparation.
- 2 Define an emulsion. Explain the tests for identification of emulsion types and describe the general methods of preparation of emulsions.

How to approach these answers

- Very-short Q1: state 66.7% w/w + the preservative reason in two lines.
- Very-short Q2: rubbed with friction vs dabbed without friction + one example each (turpentine liniment, calamine lotion).
- Very-short Q3: flocculated = fast settling, easy redispersion (good); deflocculated = slow settling, caking (bad).
- Very-short Q4: just name the four tests; add one phrase of principle for each if space allows.
- Very-short Q5: dry gum = gum + oil first; wet gum = gum + water (mucilage) first.
- Short Q1: one paragraph each with definition + example + the key point (66.7%, alcohol content, sipped undiluted).
- Short Q2: group the list (skin: liniments, lotions; throat/mouth: paints, gargles, mouthwashes; cavities: enemas, eye/ear/nasal drops; tinctures) with one example per group.
- Short Q3: definition, o/w vs w/o with examples, then the three emulsifier classes with one example each.
- Long Q1: structure — intro (definition + shake-well label), main body under 4 subheads (types with comparison table; advantages; disadvantages; excipients and preparation method), conclusion favouring flocculated suspensions.
- Long Q2: structure — intro (definition), main body under 3 subheads (types; the four identification tests explained; the three preparation methods), conclusion with the Tweens/Spans line.

Unit V — Semisolid Dosage Forms

Semisolids sit between solids and liquids — they stay where you put them on skin or mucosa, but they spread under pressure. This unit covers ointments, pastes, creams and gels, then suppositories and pessaries. The highest-yield topics here are the four ointment bases and the displacement value — both are repeated exam favourites.

Semisolid dosage forms — definitions and classification

Semisolid dosage forms are preparations of such consistency that they adhere to the skin or mucous membrane when applied, without being fluid enough to flow.

Classification

- Ointments — greasy semisolids for external application, carrying medicament in a base (e.g., sulphur ointment).
- Pastes — stiffer than ointments; contain a high proportion of insoluble powder (20–50%), so they are less greasy, more protective, and stay in place (e.g., zinc oxide paste).

- Creams — semisolid emulsions: o/w (vanishing creams — washable, non-greasy) or w/o (cold creams — greasy, emollient).
- Gels (jellies) — transparent or translucent semisolids in which the liquid is thickened by a gelling agent (e.g., carbopol-based diclofenac gel).

Exam tip: "Distinguish between an ointment, a cream and a paste" is a 2–5 mark staple. The separating lines: ointment = greasy medicated semisolid in a base; cream = semisolid emulsion (o/w or w/o); paste = stiff because of 20–50% insoluble powder. Mention the percentage — it shows precision.

Advantages and disadvantages of semisolids

Advantages:

- Direct local action at the site of application.
- Avoid first-pass metabolism for drugs absorbed through skin/mucosa.
- Easy to apply; good for skin diseases where the lesion is visible.

Disadvantages:

- Greasy and messy (ointments especially).
- Inaccurate dosing — the patient decides how much to apply.
- Poor acceptability on weeping or hairy areas.
- Stability issues — fatty bases can go rancid.

Ointment bases and other excipients

Why the base matters

The base decides how the ointment behaves — drug release, greasiness, washability, and stability. There are four types; learn them as a table.

Base type	Character	Example	Key point
Oleaginous (hydrocarbon)	Greasy, anhydrous, occlusive	White soft paraffin, hard paraffin	Protective; don't absorb water; difficult to wash off
Absorption	Absorb water to form w/o emulsions	Wool fat (lanolin), beeswax	Can take up aqueous drug solutions
Emulsion (water-removable)	o/w or w/o emulsions	Hydrous wool fat	Washable; the o/w type is preferred cosmetically
Water-soluble	Greaseless, washable	Macrogols (PEG ointment)	Release water-soluble drugs well; no rancidity

Exam tip: "Classify ointment bases with examples" is one of the most repeated questions in this subject. Reproduce the four-row table — type, character, example, key point — and you have the complete answer.

Other excipients in semisolids

- Preservatives (parabens) — for aqueous-containing preparations.
- Antioxidants — protect fatty bases from rancidity.
- Humectants (glycerin) — keep the preparation moist.
- Stiffening agents (waxes) — adjust consistency.
- And, of course, the medicament itself.

General methods of preparation

- 1 Trituration method — for insoluble powders: finely powder the drug, triturate with a small portion of the base on an ointment slab, then incorporate the rest of the base by geometric dilution.
- 2 Fusion method — for waxy bases: melt the base ingredients in decreasing order of melting point, add the drug (dissolved or suspended), and stir while cooling to avoid grittiness.

Exam tip: The fusion detail examiners check: melting in decreasing order of melting point (highest first), then stirring during cooling. Write both — they are the two halves of the method mark.

Suppositories and pessaries

Definitions

- A suppository is a solid dosage form for rectal administration that melts, softens or dissolves at body temperature to release the drug.
- Pessaries are the vaginal equivalent — larger, usually ovoid.
- Urethral suppositories are called bougies (thin, pencil-shaped).

Types

- Rectal suppositories — torpedo or cone-shaped, about 1–2 g.
- Vaginal suppositories / pessaries — larger, ovoid.
- Urethral suppositories (bougies) — thin and pencil-shaped.

Advantages and disadvantages

Advantages:

- Useful when the patient can't take oral medicines — vomiting, unconsciousness, or children who can't swallow.
- Local action for rectal conditions — piles, constipation (e.g., glycerin suppositories).
- Partly bypasses first-pass metabolism — the lower rectum drains into the systemic circulation.

Disadvantages:

- Low patient acceptability.
- Absorption can be incomplete and irregular.
- Storage problems in hot climates — they melt.

Properties of an ideal suppository base

- Melts at body temperature (or dissolves in body fluids) and releases the drug promptly.
- Non-toxic and non-irritant to mucous membranes.
- Stable and compatible with the drug.
- Contracts slightly on cooling, so the suppository releases easily from the mould.
- Good emulsifying or water-absorbing capacity where needed.

Types of suppository bases

- Oleaginous bases — cocoa butter (theobroma oil): the classic base; melts at body temperature (~34–35 °C), but goes rancid and has polymorphism problems in hot climates.
- Water-soluble / water-miscible bases — glycono-gelatin (dissolves slowly; used for vaginal pessaries) and macrogols/PEG bases (stable in heat, no rancidity — but hygroscopic).

Exam tip: The cocoa butter vs macrogol comparison is exam gold: cocoa butter melts at body temperature but goes rancid; macrogols are heat-stable and rancidity-free but hygroscopic. Write it as a paired contrast.

Displacement value

Definition: the displacement value of a drug is the quantity of drug that displaces one part (1 g) of the suppository base in the mould. Because the drug occupies space, you can't just fill the mould with the full weight of base — you must subtract what the drug displaces, or each suppository will be overweight and the dose per unit wrong.

Formula:

Base required = (mould capacity × number of suppositories) – (drug quantity ÷ displacement value)

Worked example (exam-answer form)

Question: A suppository mould makes 2 g suppositories. 10 suppositories are to contain 200 mg of drug each. The displacement value of the drug is 1.5. Calculate the base required.

Solution:

- Total drug = $200 \text{ mg} \times 10 = 2000 \text{ mg} = 2 \text{ g}$
- Base displaced by drug = $2 \text{ g} \div 1.5 = 1.33 \text{ g}$
- Total mould capacity = $2 \text{ g} \times 10 = 20 \text{ g}$
- Base required = $20 - 1.33 = 18.67 \text{ g}$

Answer: 18.67 g of base.

Exam tip: "Define displacement value" is a 2-mark favourite — memorise the definition word-for-word ("the quantity of drug that displaces 1 g of base"). A numerical on it is a 5-mark favourite. In the numerical, convert mg to g first; that conversion is where students lose marks.

General method of preparation of suppositories

Fusion (moulding) method — melt the base, incorporate the drug (dissolved or suspended, with stirring to keep it uniform), pour into cooled, lubricated moulds, allow to set, then trim and pack. (The older alternative is cold compression / hand-rolling.)

Very short questions (2 marks)

- 1 Define a semisolid dosage form.
- 2 Name the four types of ointment bases with one example of each.
- 3 Distinguish between an ointment, a cream and a paste.
- 4 Define displacement value.
- 5 What is a pessary, and how does it differ from a suppository?

Short questions (5 marks)

- 1 Classify ointment bases with examples, giving the key character of each type.
- 2 Write the advantages and disadvantages of suppositories.
- 3 Describe the properties of an ideal suppository base and the types of suppository bases.

Long questions (10 marks)

- 1 Define semisolid dosage forms. Classify them with examples, and describe the general methods of preparation of ointments, pastes, creams and gels.
- 2 Define suppositories. Discuss their types, advantages, disadvantages, formulation excipients and general method of preparation. Explain displacement value with a worked example.

How to approach these answers

- Very-short Q1: one-sentence definition (adheres to skin/mucosa, not fluid enough to flow).
- Very-short Q2: name the four types + one example each; one line is enough.
- Very-short Q3: three one-line definitions; add the 20–50% powder figure for pastes.
- Very-short Q4: quote the definition word-for-word (quantity of drug displacing 1 g of base).
- Very-short Q5: pessary = vaginal, larger and ovoid; suppository = rectal — one line.
- Short Q1: reproduce the four-row table (type, character, example, key point).
- Short Q2: paired advantages/disadvantages; close with the storage-in-heat point.
- Short Q3: list the ideal-base properties, then the two base classes with examples and one contrast line.
- Long Q1: structure — intro (definition), main body under 3 subheads (classification with examples; ointment bases table; trituration and fusion methods), conclusion on why base selection matters.
- Long Q2: structure — intro (definition), main body under 4 subheads (types; advantages/disadvantages; excipients and ideal-base properties with base types; displacement value definition + worked example), conclusion on when suppositories are the right choice.