

Unit 1: Fundamental Concepts of the Indian Systems of Medicine

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Indian System of Medicine, subject code MPG203T, is the third core theory subject of M.Pharm Pharmacognosy, Semester 2. It carries 4 credits and 60 hours of theory, taught at 4 hours per week, for 100 marks, and its five units are of equal length at 12 hours each. Its scope, as the syllabus states it, is to make the students understand thoroughly the principles and preparations of medicines of the various Indian systems of medicine like Ayurveda, Siddha, Homeopathy and Unani, also focusing on clinical research of traditional medicines, quality assurance and the challenges in monitoring the safety of herbal medicines. The subject turns the student from the plant to the traditions that used the plant for centuries before pharmacognosy named it. Unit 1 lays the foundations: the fundamental concepts of Ayurveda, Siddha, Unani and Homoeopathy, the dosage forms in which those systems deliver their medicines, the Ayurvedic Pharmacopoeia and the analysis of formulations and crude drugs, and the Siddha pharmacology of Gunapadam with its raw drugs, its Dhatu and Jeevam classes and its purification process, Suddhi. Unit 2 covers the practice systems that stand beside the drug based ones: naturopathy, yoga and aromatherapy. Unit 3 follows the formulations into their making, the preparation techniques of the four pharmacopoeial traditions, and the standardization, shelf life and stability work an ISM formulation must now undergo. Unit 4 is the manufacturing law of the subject: Schedule T good manufacturing practice, quality assurance through GAP, GMP and GLP, documentation for new drug applications and export, and the challenges of monitoring the safety of herbal medicines. Unit 5 closes with the knowledge politics of traditional medicine: the Traditional Knowledge Digital Library, geographical indications, government action in AYUSH, and the four research councils, CCRAS, CCRS, CCRH and CCRU. One idea holds the subject together: these systems are complete medical traditions with their own physiology, pharmacology, pharmacy and literature, and the pharmacognosist's task is to understand each on its own terms first, and only then to test, standardise and manufacture its medicines by the quality discipline taught in the rest of this degree.

1.1 The Indian systems as a group

Indian System of Medicine, in the usage of this syllabus and of the Government of India, names the systems of medicine of Indian origin, or that came to India from outside and were absorbed so deeply into Indian practice that they are now part of the Indian tradition. The principal systems are Ayurveda, Siddha, Unani and Homoeopathy, with Yoga and Naturopathy standing as the practice and lifestyle systems of the same family, taught in Unit 2 of this subject. Since 2014 these systems have had their own ministry, the Ministry of AYUSH, whose name is built from their initials: Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy, with Sowa-Rigpa, the Himalayan tradition, also recognised in the Indian fold. Each system is a complete medical tradition, not a list of remedies: each has its own account of the body and of health, its own principles for judging a drug, its own classical texts, its own pharmacy of formulations and dosage forms, and its own line of practitioners. What they share, and what makes them one subject, is their common ground: a heavy reliance on drugs of natural origin, plant above all, then mineral and animal; a holistic reading of the patient in which the constitution and the balance of the body's governing principles matter as much as the named disease; and a written classical literature, in Sanskrit, Tamil, Arabic and Persian, and later in European languages for Homoeopathy, which functions as the primary authority for what a medicine is and how it is made.

Three consequences of that shared ground organise the whole subject. First, the raw materials of these systems are the starting materials of pharmacognosy itself, so the identity, purity and quality discipline of MPG202T applies to them in full, and Unit 1 returns to it under the Ayurvedic Pharmacopoeia. Second, the systems' medicines are manufactured today in licensed factories under good manufacturing practice, Schedule T, Unit 4 of this subject, so the classical pharmacy is a regulated modern industry and not only a textual inheritance. Third, because the knowledge is old, textual and collectively held, it needs a defence against private appropriation that modern knowledge does not, and Unit 5 takes up that defence through the TKDL and geographical indications. The attitude this subject teaches throughout is to take each system's concepts seriously as its own framework, and to state plainly which of its claims rest on classical authority, which on long use, and which on modern testing, never confusing those three standings.

The four Indian systems at a glance

AYURVEDA	SIDDHA	UNANI	HOMOEOPATHY
India; Sanskrit texts Tridosha: vata, pitta, kapha in balance Drug judged by rasa, virya, vipaka, prabhava Churna, kwatha, asava, taila and bhasma forms	Tamil country; Tamil texts Three humours: vatham, pitham and kabam Gunapadam classification Chooranam, kudineer, parpam and chenduram	Greece and Arabia; Arabic, Persian texts Four humours (akhlat) and temperament (mizaj) Drug judged by its temperament and degree Safoof, majoon, sharbat, arq	Germany; European texts Law of similars Single remedy, minimum dose Drug judged by provings Mother tincture, dilutions, and medicated globules

Different first principles, one shared ground: natural drugs, constitution and balance

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Figure: The four systems at a glance. Different languages, literatures and first principles, one shared ground of natural drugs and constitutional balance.

1.2 Fundamental concepts of Ayurveda

Ayurveda, the science of life, is the oldest and largest of the Indian systems, carried in the great compendia of Charaka (the Charaka Samhita, devoted to internal medicine), Sushruta (the Sushruta Samhita, devoted to surgery) and Vagbhata (the Ashtanga Sangraha and Ashtanga Hridayam), the Brihat Trayi or great trio, with a later trio of shorter texts, the Laghu Trayi, completing the classical shelf. Its physiology begins from the panchamahabhuta, the five great elements, akasha (space), vayu (air), agni or tejas (fire), jala (water) and prithvi (earth), of which everything in the body and in the drug is composed. In the body the elements work through the tridosha, the three doshas: vata, formed of space and air, governing movement; pitta, formed of fire and water, governing transformation, digestion and heat; and kapha, formed of water and earth, governing structure and cohesion. Health, in this framework, is the doshas in their proper balance for that person, and disease is their disturbance, so diagnosis reads the pattern of disturbance and treatment aims to restore the balance rather than only to silence a symptom.

Below the doshas the framework continues: the sapta dhatu, the seven tissues from rasa (nutrient fluid) through rakta, mamsa, meda, asthi and majja to shukra, nourished in sequence; the mala, the waste products whose proper elimination is part of health; agni, the digestive and metabolic fire on whose strength the whole nourishment depends; and the srotas, the channels that carry materials through the body. Each person also carries a prakriti, an individual constitution fixed by the proportion of the doshas, against which their balance and imbalance are judged. Ayurvedic pharmacology, the part of the framework a pharmacognosist must command, judges a drug by five properties: rasa, its taste, of which six are

recognised; guna, its qualities; virya, its potency, classically read as heating or cooling; vipaka, its taste after digestion; and prabhava, its specific action that the other four cannot explain. A formulation, in this system, is a deliberate composition in which drugs are combined so that their rasa, virya and vipaka correct the disturbed dosha while the vehicle and processing direct them, which is why Ayurvedic pharmacy, taken up in Unit 3, works with compound formulations far more than with single drugs.

1.3 Fundamental concepts of Siddha

The Siddha system is the medical tradition of Tamil country, attributed to the Siddhars, the perfected masters of whom Agathiyar is named first, and written in Tamil texts that combine medicine with alchemy and spiritual discipline. Its account of the body begins, as Ayurveda's does, from five elements, the panchabhutam, and works through three humours, vatham, pitham and kabam, corresponding in function to movement, transformation and structure, whose balance is health and whose derangement is disease. The body is built of seven physical constituents, the udal thathukkal, and the whole doctrine is organised in the classical teaching as 96 thathuvams, the basic principles that make up the human being and its functions. Pulse reading, naadi, holds a particularly developed place in Siddha diagnosis, read together with examination of the body's other signs.

What distinguishes Siddha most sharply, and what the syllabus singles out through Gunapadam, is the weight of its mineral and metal pharmacy. Siddha uses plant drugs extensively, but its characteristic higher medicines are prepared from metals, minerals and salts, processed through elaborate purification and incineration into fine preparations such as parpam and chenduram, and it is this feature that makes the purification process of Suddhi, Section 1.11, a safety critical doctrine rather than a ritual. Siddha pharmacology classifies its raw drugs by origin into plant, mineral and animal classes, and judges them by properties such as taste (suvai), potency and post digestive effect, in a structure parallel to the Ayurvedic five properties but with its own texts, names and classifications. The student should register the pattern: the Indian systems repeatedly build the same architecture, elements, humours, drug properties, purification, compound pharmacy, from different regional and linguistic roots, which is why one subject can teach them together without merging them.

1.4 Fundamental concepts of Unani

The Unani system is the Greco-Arab tradition: founded in the Greek medicine of Hippocrates and Galen, developed by the Arab and Persian physicians, of whom Ibn Sina, Avicenna, and his Canon of Medicine are the standard names, and carried in India for centuries until it became one of the Indian systems in law and in practice. Its physiology rests on the four akhlat, the humours: dam (blood), balgham (phlegm), safra (yellow bile) and sauda (black bile), formed from the food in the liver and circulating as the body's nutritive fluids. Every person, organ and drug carries a mizaj, a temperament, described on the scales of hot and cold, wet and dry, and health is the humours in their proper quantity and quality for that temperament, maintained by tabiyat, the body's own governing power of self preservation and healing, which the physician assists rather than replaces.

The classical teaching organises the conditions of health as the Asbab-e-Sitta Zarooriya, the six essential prerequisites: ambient air, food and drink, physical movement and rest, mental movement and rest, sleep and wakefulness, and evacuation and retention. Disease arises when these, or the humours they govern, fall out of order. Unani therapy then proceeds by a graded logic that the examination expects in order: Ilaj bil Ghiza, treatment by diet; Ilaj bit Tadbeer, treatment by regimental measures such as exercise, massage, bathing and venesection in the classical practice; Ilaj bid Dawa, treatment by drugs, the largest part, drawn from plant, mineral and animal sources and judged by their temperament and degree; and Ilaj bil Yad, treatment by hand, that is surgery, as the last resort. The temperament of the drug must answer the

temperament of the disease in the opposite direction, hot remedies for cold diseases and the reverse, which is the system's version of the balancing principle seen in Ayurveda and Siddha, arrived at through a different literature.

1.5 Fundamental concepts of Homoeopathy

Homoeopathy is the youngest system in this unit and the only one of European birth admitted to the Indian family. It was founded by Samuel Hahnemann, a German physician whose *Organon of Medicine* of 1810 states the system, and who arrived at its central law through experiment: a substance that produces a set of symptoms in a healthy person can, in a suitably prepared small dose, treat those same symptoms in a patient. This is the law of similars, *similia similibus curentur*, let likes be treated by likes, and it inverts the logic of the other systems in this unit, which treat by opposites or by balance. Because the law points to the individual substance and the individual symptom picture, Homoeopathy builds its materia medica by provings: the systematic recording of the symptoms a substance produces in healthy volunteers, from which the remedy pictures that guide prescribing are drawn.

Three further principles complete the framework. The single remedy: classical Homoeopathy prescribes one substance at a time, matched to the total symptom picture of the patient, so that its effect can be read clearly. The minimum dose: the dose is reduced to the least that will act, which connects with the system's characteristic pharmacy. Potentisation: remedies are prepared by serial dilution with vigorous shaking, succussion, for liquids, or by grinding with lactose, trituration, for solids, on the decimal or centesimal scales, and the system's doctrine holds that this process releases the dynamic medicinal power of the substance while removing its material toxicity. The student is not asked to adjudicate these doctrines here; the student is asked to state them accurately as the system's own framework, to prepare its medicines correctly in Unit 3, and to recognise that its pharmacopoeia and manufacturing rules follow from these principles exactly as the other systems' rules follow from theirs.

1.6 Dosage forms of the ISM

The dosage forms of the Indian systems are best learned as families, since every system delivers its drugs in a recurring set of physical forms, and the examination asks for the families and their characters rather than for recipes. The solid forms come first. Powders are universal: the Ayurvedic *churna*, the Siddha *chooranam* and the Unani *safoof* are all finely powdered drugs or drug mixtures, dosed by measure and taken with a vehicle such as water, milk or honey. Pills and tablets follow: the Ayurvedic *vati* and *gutika*, the Unani *habb* and *qurs*, moulded or compressed masses of powdered drug with a binding liquid. The Siddha solids reach further into the mineral pharmacy with *parpam*, the fine white calxes produced by incineration of metals and minerals, and *chenduram*, the red coloured preparations of the same family, forms that have no counterpart in ordinary herbal pharmacy and that depend entirely on the purification doctrine of Section 1.11 for their classical claim to safety.

The liquid and semi solid forms form the second family. Decoctions, the Ayurvedic *kwatha* and Siddha *kudineer*, extract drugs with boiling water and are used fresh. Fermented liquids, the Ayurvedic *asava* and *arishta*, are generated by fermenting decoctions or juices with jaggery or sugar until a self generated alcohol both preserves the preparation and extracts its constituents, the single most distinctive liquid technology of the Indian pharmacy. Distillates, the Ayurvedic and Unani *arka* or *arq*, carry the volatile fraction of aromatic drugs. Syrups and electuaries, the Unani *sharbat*, *majoon*, *jawarish* and *khamira* and the Ayurvedic *avaleha* or *leha*, deliver drugs in sugar or honey based semi solids that keep well and taste acceptable. The fatty forms, Ayurvedic *taila* (medicated oils) and *ghrita* (medicated ghees) and the Siddha *ennai* and *nei*, process drugs into oil or ghee for internal and external use, the lipid vehicle being itself part of the therapy in the classical account. Homoeopathy stands apart with its own forms: mother tinctures, the

alcoholic extracts from which its remedies begin, their serial dilutions, and the medicated globules and pellets that carry a dilution to the patient. A comparison of the four systems is given here, and the preparation techniques behind the forms are Unit 3.

Point of comparison	Ayurveda	Siddha	Unani	Homoeopathy
Origin and language	India, Sanskrit texts	Tamil country, Tamil texts	Greece and Arabia, Arabic and Persian texts	Germany, European texts
Governing principles	Tridosha: vata, pitta, kapha	Three humours: vatham, pitham, kabam	Four humours (akhlat) and temperament (mizaj)	Law of similars, single remedy, minimum dose
Drug judgement	Rasa, guna, virya, vipaka, prabhava	Taste, potency and allied properties	Temperament and degree of the drug	Proving picture on healthy persons
Characteristic forms	Churna, kwatha, asava and arishta, taila, bhasma	Chooranam, kudineer, parpam, chenduram	Safoof, majoon, sharbat, arq	Mother tincture, dilutions, globules
Signature pharmacy	Compound formulations, fermented liquids	Metal and mineral preparations	Diet and regimental therapy beside drugs	Potentisation by dilution and succussion

1.7 The Ayurvedic Pharmacopoeia of India

A living classical system needs an official book of standards, and for Ayurveda that book is the Ayurvedic Pharmacopoeia of India (API), published under the Ministry of AYUSH by the Pharmacopoeia Commission for Indian Medicine and Homoeopathy. The API is organised in two parts. Part I carries the monographs of single drugs, the individual crude drugs of plant origin in the main, each monograph fixing the drug's identity and standards: its names and description, the part used, its macroscopic and microscopic characters, its foreign matter and physico-chemical constants such as ash values and extractive values, its assay or marker requirements where these are established, and its identity tests including chromatographic fingerprints. Part II carries monographs of compound formulations, the classical multi ingredient preparations, stating their composition from the authoritative texts and the standards each finished formulation must meet. Beside the pharmacopoeia stands the Ayurvedic Formulary of India (AFI), which collects the formulations themselves, their ingredients and methods of preparation, drawn from the classical texts recognised as authoritative, the books listed in the First Schedule of the Drugs and Cosmetics Act, 1940.

The legal force of these books is the point a pharmacist must not miss. Ayurvedic medicines manufactured for sale in India are licensed under the Drugs and Cosmetics Act and Rules, and the pharmacopoeial standards are the standards against which their quality is judged: a drug that fails its API monograph is, in law, not of standard quality. Parallel pharmacopoeias serve the other systems in the same way: the Siddha Pharmacopoeia of India and the Siddha Formulary, the National Formulary of Unani Medicine and the Unani Pharmacopoeia, and the Homoeopathic Pharmacopoeia of India for Homoeopathy. MPG104T has already taught the comparative study of these monographs; this subject uses them, and Unit 3 returns to them as the working references of formulation development.

The pharmacopoeia family of the Indian systems

AYURVEDA	SIDDHA	UNANI AND HOMOEOPATHY
Ayurvedic Pharmacopoeia of India (API) Part I: single drugs Part II: formulations Ayurvedic Formulary of India (AFI)	Siddha Pharmacopoeia of India Siddha Formulary of India Gunapadam as the classical basis	Unani Pharmacopoeia National Formulary of Unani Medicine Homoeopathic Pharmacopoeia of India (HPI)

Each system holds its standards in its own books, and those standards carry legal force

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Figure: The pharmacopoeia family. Each system holds its standards in its own pharmacopoeia and formulary, and those standards carry legal force in manufacture and sale.

1.8 Analysis of formulations and crude drugs: identity, purity and quality

The syllabus fixes the analysis of ISM material under three heads, and they are the same three heads under which all pharmacognosy analysis is organised. Identity asks whether the material is what it claims to be: the correct species, the correct part, the genuine classical drug of that name. Identity is established by organoleptic characters, by macroscopy and microscopy against the pharmacopoeial description, by chemical identity tests, and, in modern practice, by chromatographic fingerprinting, HPTLC above all, in which the pattern of a genuine sample is matched band for band, the technique MPG103T built for exactly this service. Purity asks what else is present: foreign matter, substituted or exhausted material, microbial load, and the contaminant panel of heavy metals, pesticide residues and aflatoxins that MPG202T taught, applied here with special force to the mineral containing Siddha and Ayurvedic preparations, where arsenic, lead and mercury compounds are classical ingredients in some formulations and uncontrolled contaminants in others, and the laboratory must distinguish an ingredient declared and processed by the classical method from the same metal present as a failure of control. Quality asks whether the genuine, clean material is strong enough: its physico-chemical constants within pharmacopoeial limits, its marker or assay values at standard, its formulation performance, disintegration, uniformity and stability, as it should be.

For compound formulations the analysis hardens, because no single assay can certify a mixture of ten or twenty ingredients. The working method, as standardised in API Part II practice, is layered: the raw materials are each certified before manufacture, the process is controlled and recorded, and the finished formulation is judged by its own pharmacopoeial monograph, its fingerprint, selected marker assays for characteristic ingredients, and its physical standards. The conclusion transfers the lesson of MPG202T into the ISM setting unchanged: identity, purity and quality are three different questions, each answered by its own family of tests, and a formulation that has not faced all three has not been analysed, however classical its name.

1.9 Siddha pharmacology: Gunapadam

Gunapadam is the pharmacology of the Siddha system, the part of its literature that studies the drugs themselves: their sources, characters, properties and actions, and the methods by which they are purified and prepared into medicines. Its organisation by origin is the feature the syllabus examines. Gunapadam divides its materia medica into classes by kingdom and kind. The herbal class, Mooligai, covers the drugs of plant origin, the largest class and the one shared with the other systems. The mineral and metal class, Thadhu, covers the metals, minerals, salts and allied substances, gold, silver, copper, iron, zinc, mercury,

sulphur, arsenic compounds and the rest of the classical mineral shelf, which in Siddha are not marginal ingredients but the basis of its most characteristic medicines. The animal class, Jeevam in the syllabus's spelling, covers drugs of animal origin. For each drug the classical Gunapadam account gives its names, its source and varieties, its organoleptic characters, its properties in the system's own terms of taste and potency, its actions and uses as the tradition records them, and, critically for the Thadhu class, its purification.

The pharmacist's reading of Gunapadam should be exact about what kind of text it is. It is a classical pharmacology: its drug judgements are the system's own framework, refined over centuries of practice, and its accounts of action are traditional knowledge, to be stated as such. Its permanent value is twofold: it is the authoritative record of what the Siddha tradition contains, without which no Siddha formulation can even be identified, and its classification and purification doctrines still govern how Siddha medicines are legally made, because the Siddha Formulary and Pharmacopoeia rest on it. Sections 1.10 and 1.11 take its two remaining syllabus heads in turn.

1.10 Raw drugs, Dhatu and Jeevam in the Siddha system

The raw drug teaching of Gunapadam begins from the three classes of Section 1.9 and follows the drug from its source to the factory door. A raw drug, in this literature, is specified not only by species or substance but by the part and condition: for plant drugs the part used and its proper collection and drying, for the mineral class the genuine form of the metal, mineral or salt and the marks by which inferior or substituted material is known. The Dhatu drugs, using the syllabus's term for the mineral and metal class of substances, are the distinctive burden of Siddha raw drug science, because a metal in its crude state is not the medicine: it is a toxic starting material that becomes a medicine, in the classical account, only after the purification and processing of the next section, and the raw drug monographs of the tradition therefore carry as much weight on recognition and rejection of bad material as any plant monograph. The Jeevam class, drugs of animal origin, is the smallest of the three and is taught on the same pattern: source, characters, purification where the texts prescribe it, and the classical account of its properties.

Two modern consequences follow, examined again in Unit 4. Raw drug quality is the single largest variable in ISM manufacture, because the classical formulations assume genuine material of the classical description, and Schedule T therefore opens its requirements with raw material authentication and storage. And the mineral class places Siddha and the allied Ayurvedic rasa preparations at the centre of the herbal safety debate, since their safety, in the classical claim, rests on a process, and a process can be verified, audited and tested, or skipped, and the difference is exactly what good manufacturing practice exists to police.

1.11 Suddhi: the purification process

Suddhi is the purification process of the Siddha system, with its counterpart Shodhana in Ayurveda: the series of operations by which a raw drug, above all a metal, mineral or poisonous plant drug, is treated before it is fit to enter a medicine. The classical operations are physical and pharmaceutical in character and are taught here as techniques, not recipes: washing and cleaning; boiling or steaming in specified liquid media such as decoctions, juices or milk; trituration and grinding with liquid media, the levigation called bhavana in the Ayurvedic parallel; quenching of heated material in liquids; and calcination, the controlled heating that converts the treated material toward its final form. Each operation is repeated as the text directs and is followed by the classical tests of the purified state, fineness, colour and behaviour, before the material passes to formulation. No quantities or schedules are given in this subject, because none are in the syllabus: what is examined is the doctrine and its purpose.

The purpose should be stated in both of the languages this subject speaks. In the system's own terms, Suddhi removes the dosha, the defect or toxicity, of the raw drug and makes it assimilable, converting a substance the body could not handle into one the tradition holds it can. In analytical terms, the operations do real pharmaceutical work that a laboratory can describe without endorsing any further claim: they wash away soluble impurities, oxidise and convert metals toward oxide and sulphide forms of lower solubility, reduce particle size to the very fine, and standardise the material from batch to batch when they are faithfully performed. Both statements are true on their own level, and the discipline of this subject is to keep them separate: the process is classical, its physical effects are demonstrable, and the safety of the finished medicine is a further question, answered by the analysis of Section 1.8 and the surveillance of Unit 4, not by the performance of the process alone. That separation, respect for the doctrine with honesty about what proves what, is the intellectual centre of this whole subject, and it returns in every unit that follows.

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Suddhi, the purification sequence (doctrine level)
  Raw drug received and identified
    |
    v
  Cleaning and washing
    |
    v
  Treatment in liquid media (boiling, steaming)
    |
    v
  Trituration and levigation with liquids
    |
    v
  Calcination or conversion heating (for mineral drugs)
    |
    v
  Classical tests of the purified state
    |
    v
  Material passed to formulation

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