1.3 PHARMACOGNOSY

Theory (75 hours)

1. Definition, history and scope of Pharmacognosy including indigenous system of medicine.

2. Various systems of classification of drugs of natural origin.

3. Adulteration and drug evaluation; significance of Pharmacopoeial standards.

4. Brief outline of occurrence, distribution, outline of isolation, identification tests, therapeutic effects and pharmaceutical applications of alkaloids, terpenoids, glycosides, volatile oils, tannins and resins.

5. Occurrence, distribution, organoleptic evaluation, chemical constituents including tests wherever applicable and therapeutic efficacy of following categories of drugs.

(a) Laxatives: Aloes, Rhuburb. Castor oil, Ispaghula, Senna.

(b) Cardiotonics-Digitalis, Arjuna.

(c) Carminatives & G.L regulators – Umbelliferous: Coriander, Fennel, Ajowan, Cardamom Ginger, Black pepper, Asafoetida. Nutmeg. Cinnamon, Clove.

(d) Astringents-Catechu.

(e) Drugs acting on nervous system - Hyoscyamus, Belladonna. Aconite, Ashwagandha. Ephedra, Opium, Cannabis, Nux vomica.

(f) Antihypertensives - Rauwolfia.

(g) Antitussives - Vasaka, Tolu balsam, Tulsi.

(h) Antirheumatics - Guggul, Colchicum.

(i) Antitumour - Vinca.

(j) Antileprotics - Chaulmoogra Oil.

(k) Antidiabetics - Pterocarpus, Gymnema, Sylvestro.

(1) Diuretics - Gokhru, Punarnava.

(m) Antidysentrics - lpecacuanha.

(n) Antiseptics and disinfectants Benzoin, Myrrh. Nim, curcuma.

(o) Antimalarials - Cinchona.

(p) Oxytocics - Ergot.

(q) Vitamines - Shark liver Oil and Amla.

(r) Enzymes - Papaya, Diastase, Yeast.

(s) Perfumes and flavouring agents - Peppermint Oil, Lemon Oil, Orange Oil, Lemon grass Oil, Sandalwood.

(t) Pharmaceutical aids - Honey, Arachis Oil, Starch, Kaolin, Pectin, Olive oil, Lanolin, Beeswax, Acacia, Tragacanth, Sodium alginate, Agar, Guar gum, Gelatin.

(u) Miscellaneous - Liquorice, Garlic, Picrorhiza, Dioscorea, Linseed, Shatavari, Shankhapushpi, Pyrethrum, Tobacco.

6. Collection and preparation of crude drug for the market as exemplified by Ergot, Opium, Rauwolfia, Digitalis, Senna.

7. Study of source, preparation and identification of fibres used in sutures and surgical dressings-cotton, silk, wool and regenerated fibre.

8. Gross anatomical studies of Senna, Datura, Cinnamon, Cinchona, Fennel, Clove, Ginger, Nuxvomica & Ipecacuanha.

CHAPTER 1.

Definition, history and scope of Pharmacognosy including indigenous system of medicine.

DEFINITION:

The Term ***'Pharmacognosy'*** was coined by the German scientist Seydler by using a word ***'Pharmakon'*** which means **'a drug'** and ***'Gignosco'*** means 'to acquire the knowledge of'

HISTORY:

The history of herbal medicines is as old as human civilization. The documents, many of which are of great ancientness, revealed that plants were used medicinally in India, China, Egypt and Greece long before the beginning of the Christian era.

1. The well known treatises in Ayurveda are ***Charaka Samhita*** and ***Sushrutha Samhita***.
   Charaka worked meticulously to examine and classify herbs into groups called Gunas. fifty groups of ten herbs each of which, according to him, would suffice an ordinary physician's need. Marked by extreme care in treatment of details **Sushrutha** arranged 760 herbs in 7 distinct sets based on some of their common properties. A large portion of the Indian population even today depends on the Indian System of Medicine Ayurveda, **'An ancient science of life'.**

2. In 16th century before Christ ***Papyrus Ebers***, One of the most famous surviving remainder document is dominated by more than 800 formulae and 700 different drugs.

3. 460 - 360 B.C., *Father of medicine"*, **Hippocrates"**

4. 131 - 200 A. D. The first pharmacist, **Galen** Galen, was known to have had a number of pain-relieving materials, including opium in his apothecary.

5. 384 - 322 BC, **Aristotle**

6. 1852 **Stass** and **Otto** A new extraction process for alkaloid was developed

7. 1860 **Neumann**, cocaine

8. 1493-1541 **Paracelsus** develop mineral salts which might potential of being universal curative agents.

9. 1707 - 1778 **Swede Linnaeus** classified the plants and introduced system of naming the plants known as the binomial system which is still followed.

10. In 19th Century era Materia Medica was used in Pharmacognosy

8. Define the following a) Pharmacognosy b) Drug Adulteration.

a) <u>Pharmacognosy:</u> (Pharmakon-a drug Gignosco-to acquire the knowledge of).

Scientific and systematic study of Structural, Physical, Chemical and Biological characters of crude drugs along with their history, cultivation, collection & preparation for the market.

Scope of pharmacognosy

Pharmacognosy as an applied science has played a crucial role in the development of different disciplines of science. A pharmacognosist should possess a sound knowledge of the terms used to describe the vegetable and animal drugs as covered under botany and zoology, respectively. The knowledge of plant taxonomy, plant breeding, plant pathology and plant genetics is helpful in the development of cultivation technology for medicinal and aromatic plants. Plant - chemistry (phytochemistry) has undergone significant development in recent years as a distinct discipline. It is concerned with the enormous variety of substances that are synthesised and accumulated by plants and the structural elucidation of these substances. The technology involving extraction, purification and characterisation of pharmaceuticals from natural sources is a significant contribution to the advancement of natural and physical sciences. The knowledge of chemotaxonomy, biogenetic pathways for formation of medicinally active primary and secondary metabolites, plant tissue culture and other related fields is essential for complete understanding of Pharmacognosy. The basic knowledge of biochemistry and chemical engineering is essential for development of collection, processing and storage technology of crude drugs.

Pharmacognosy is an important link between Pharmacology and Medicinal Chemistry. As a result of rapid development of phytochemistry and pharmacological testing methods in recent years new plant drugs are finding their way into medicine as purified phytochemicals, rather than in the form of traditional galenical preparations. The knowledge of pharmacology is essential for understanding action of drugs on animals and the human system. Pharmacognosy is the infrastructure on which depends evolution of novel medicines, as it is seen that several crude drugs are utilized for preparation of galenicals or as sources of therapeutically significant substances that cannot be synthesised economically. Further, the crude drugs also provide essential intermediates for final synthesis of active compounds. Phytopharmaceuticals or synthetic drugs derived from phytochemicals have to be ultimately incorporated in suitable dosage form which involves the knowledge of dispensing and preparative pharmacy, pharmaceutical technology and analysis.

In a nutshell, Pharmacognosy is an important bridge between the pharmaceutical and basic sciences. Pharmacognosy is a vital link between Ayurvedic and Allopathic systems of medicines. It provides a system wherein the active principles of crude drugs derived from natural origin can could be dispensed, formulated and manufactured in dosage forms acceptable to allopathic system of medicine.

Indigenous system of medicine: AYUSH

1. Ayurveda- Indian System of Medicine

Ayurveda-Ancient Science of Life is believed to be prevalent for last 5000 years in India. It is one of the most famous systems of medicine in the world. Ayurveda is based on hypothesis that everything in the universe is composed of five basic elements viz.

1.Fire (thumb), 2.Air (index) 3. Space (middle) 4. Earth (ring) and 5. Liquid (small finger)

They exist in the human body in combined forms like *vata* (space and air), *pitta* (energy and liquid) and *kapha* (liquid and solid). *Vata, pitta* and *kapha* together are called *Tridosha* (three pillars of life). It is believed that they are in harmony with each other, but in every human being one of them is dominating which, in turn is called as the *prakruti* of that person. *Tridosha* exist in human body in seven forms called *Saptadhatu* viz. *Rasa* (lymph), *Rakta* (blood), *meda* (adipose tissue), *mamsa* (flesh), *majja* (nervine tissue), *Shukra* (reproductive tissue) and *asthi* (bones). These tissues are subject to wear and tear so that *mala* (excretory material) is formed from them. When *tridosha, saptadhatu* and *mala* are in balance with each other, it is called as healthy condition while imbalance causes a pathological condition. It is hypothesised that the five characters of the medicinal herbs viz. *rasa, guna, virya, vipak* and *prabhava* can be applied to treat various pathological conditions. Authentic information on Ayurveda has been compiled by ancient Indian Medicine practitioners in forms called *Samhita* and other similar books. Ayurvedic pharmacy (*Bhaishajya-Vigyan*) proposes five basic dosage forms like *swaras, kalka, kwath, hima* and *phant.* A number of other dosage forms like *churna, avaleha, ghrita, sandhana kalpa, bhasma* are prepared from them. Mostly, all of them are polyherbal formulations. Some important herbs in Ayurveda are *Rauwolfia sepentina, Asparagus racemosus, Cassia angustifolia, Sesamum indicum, Holarrhena antidysenterica, Withania, somnifera, Aconitum napellus, Piper longum, etc.*

2. Yoga and Naturopathy

Naturopathy is not merely a system of treatment, but also a way of life, which is based on laws of nature. The attention is particularly paid to eating and living habits, adoption of purificatory measures, use of hydrotherapy, mud packs, baths, massage, etc.

The system of Yoga is as old as Ayurveda. The eight components of Yoga are restraint, observance of austerity, physical postures, restraining of sense organs, breathing exercises, contemplation, meditation and Samadhi. Yoga exercises have potential in improvement of better circulation of oxygenated blood in the body, restraining the sense organs, improvement of social and personal behaviour and induction of tranquility and serenity in the mind.

3. Unani System of Medicine: The roots of this system goes by Greek philosopher **Hippocrates** who is credited with it. **Aristotle Golen** (384 - 322 BC) Greek - Philosopher *"Father of natural history"* made valuable contributions to it. This system of Greek origin was further carried to Persia (Iran), where it has been improved by Arabian physicians.

This system is based on two theories viz. the Hippocratic theory of four humours and the Pythagorian theory of four proximate qualities. The four humours are blood, phelgm, yellow bile and black bile while the four qualities are the states of living human body like hot, cold, moist and dry. They are represented as earth, water, fire and air. The Greek ideas were put by Arabian physicians as seven working principles (*Umur-e-Tabia*) and included elements, temperaments, humours, organs, life, spirit, energy and actions. They believed that these principles are responsible for the body constitution and its health, as well as, the diseased conditions.

The Unani system of medicine aims at treating the cause of disease and not its symptoms. For this purpose, thorough history of the patient is recorded in addition to his pulse, urine and stool examinations. The diseased condition is considered to be due to the imbalance between humours and accordingly, treatment is given. The drugs are polyherbal formulations and their collective effect is considered.

Unani system of medicine is called by various names in different parts of world such as Arab medicine, Greco-Arab medicine, Loniah medicine, Islamic medicine and also Oriental medicine.

Unani-medicines: Madar, fufal, Gilo, Kabab chini, Karanj, Kulthi, Lodh, Qust, Sana, Tagar, Zeera, Siyah.

4. Siddha System of Medicine

The term 'Siddha' means achievement and 'Siddhars' were saintly personalities, who attained proficiency in medicine through practice of Bhakti and Yoga. According to traditional belief Lord Shiva unfolded the knowledge of medicine to his wife Parvati which was then passed to Siddhars. This is the system of pre-vedic period identified with Dravidian culture and it is largely therapeutic in nature. Like Ayurveda, this system believes the role of three humors i.e. vatta, pitta and kapha and that all objects in universe are made up of five basic elements namely, earth, water, sky, fire and air. The identification of causative factors of diseases is done through pulse reading, the colour of body, the study of voice, urine examination, the status of digestive system and the examination of tongue. The literature of Siddha system is mostly in Tamil. A few natural drugs used in Siddha system of medicine are:

Abini (*Papaver somniferum*), Alari (*Nerium indicum*),
Ethi (*Strychnos Nux-vomica*), Gomathai (*Datura stramonium*),
Haikalli (*Euphoribia nerifolia*), Ratha polam (*Aloe-barbadensis*).

5. Homeopathic system of medicine.

The history of homeopathy begins with the discoveries of its founder **Samuel Hahnemann** (1755-1843), a German physician. Hahnemann first coined the word "homeopathy" ("homoios" in Greek means *similar*, "pathos" means *suffering*) to refer to the pharmacological principle, the law of similars, that is its basis. **Homeopathy** is a **medical system** based on the belief that the body can cure itself. Those who practice it use tiny amounts of natural substances, like plants and minerals. They believe these stimulate the healing process. While many **homeopathic** products are highly diluted, some products sold or labeled as **homeopathic** may not be; they can contain substantial amounts of active ingredients, which may **cause side effects** or **drug interactions**. **Negative** health **effects** from **homeopathic** products of this type **have** been reported. None of them give any evidence that **homeopathy can cure** or prevent any type of disease. There is also no reliable evidence to say that **homeopathy can** treat **cancer**. Many studies are too small, and the method of study is not always of good quality.