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SHAMBHUNATH INSTITUTE OF PHARMACYSubject Code: **BP 603** Subject: **HERBAL DRUG TECHNOLOGY** B.Pharm. 6th**SEMESTER****FIRST SESSIONAL EXAMINATION, EVEN SEMESTER, (2019-2020)****Time –1hr 30 min****Maximum Marks – 30****SECTION – A****1. Attempt all questions in brief.****(1*5 = 5)**

Q N	QUESTION	Marks	CO	BL
a.	Define Nutraceuticals. Ans: Nutraceuticals are products, which other than nutrition are also used as medicine. A nutraceutical product may be defined as a substance, which has physiological benefit or provides protection against chronic disease.	1	3	1
b.	What do you understand by Biopesticides? Ans: Biopesticides are certain types of pesticides derived from such natural materials as animals, plants, bacteria, and certain minerals. For example, canola oil and baking soda have pesticidal applications and are considered biopesticides .	1	1	1
c.	Enlist the different sources of herbs with example. Ans: The different sources of herbs and its examples are- <ul style="list-style-type: none"> • Plant- Digitalis, Aloe • Animal- snake venom, woolfat from sheep • Mineral- Shilajit, Calamine • Marine- Agar-agar, Spirulina • Plant tissue culture- callus culture of catharanthus roseus 	1	1	2
d.	Write the basic principle behind Homeopathy. Ans: Homeopathy is based on the principle that substances that cause symptoms in healthy people can be used in extreme dilution to treat illnesses that cause the same symptoms (likes cure like).	1	1	3
e.	What are herbs, herbal preparation and herbal medicine? Ans: Herbs include crude plant materials such as leaves, flowers, fruits, seed, stem wood, bark, roots, rhizomes or other plant parts, which may be entire, fragmented or powdered. Herbal preparation includes comminuted or powdered herbal materials, or extracts. Herbal medicine consists of herbs as active ingredients.	1	1	2

SECTION - B

2. Attempt any **TWO** of the following.

(2*5 = 10)

Q N	QUESTION	Marks	CO	BL
a.	<p>Discuss the basic concept, procedure, diagnosis and treatment behind Ayurveda.</p> <p>Ans: The universe is composed of five basic elements or pancha bhutas: prithvi (earth), jal (water), teja (fire), vayu (air) and akash (space). Everything in the universe, including food and the bodies were derived from these bhutas. There are three doshas in the body. They are vata, pitta and kapha. There are direct equivalents for these three doshas, known as tridoshas. The following concepts in Ayurveda guide the preventive, health-promotive, and curative aspects of the practice.</p> <p>1. Three Principles of Nature Satwa, Rajas, and Tamas are said to be the essences of nature in which all physical and physiochemical energies are included. Energy existing in all matters is due to Rajas, resistance and stability of matters is due to Tamas, and all conscious manifestation of matters is due to Satwa. In nature, these three principles always exist in an interdependent manner.</p> <p>2. Five Gross Elements The five gross elements are earth, water, fire, air, and space. Creation of all forms of life is credited to these elements. Diseases are said to occur in the human body due to the imbalance of the five gross elements caused by a variety of reasons. Therefore, the main objective of the treatment is to restore the balanced state. To detect this imbalance due to the five gross elements, Ayurveda established the three humors, vital organs, and excretory products theories. Three Humors: The three constituent humors are Vata, Pitta, and Kapha. These three concepts are broadly comparable to the modern concepts of motion, energy, and inertia. The concept of the <i>Kapha Dosha</i> (inertia) helps in synthesizing the building blocks of cells and thus deals with cellular and intracellular structures of the human body. It is responsible for support to and stability of, the body. Pitta Dosha (energy) refers to the energy state of the body and is concerned with the metabolic and biochemical processes which generate heat and energy. The Vata Dosha (motion) is to regulate the proper use of energy by the different cellular structures. Ayurveda describes the Vata Dosha as the controller of the other two Doshas. The relationship between the five gross elements and the three humors is as follows: Space and Air are predominant in Vata; Fire in Pitta; Water and Earth are predominant in Kapha.</p> <p>Treatment In Ayurveda, before starting the treatment, a person's constitutional type should be determined. Drugs are prescribed based on the patient's body type as well as</p>	5	1	2

	<p>on what disease or disturbance of the <i>doshas</i> they are suffering from. Ayurvedic treatment attempts to establish a balance among the bodily humours of <i>vata</i>, <i>pitta</i> and <i>kapha</i>, as well as to improve digestion and elimination of <i>ama</i> (Undigested food).</p>			
b.	<p>Discuss the Market growth and scope of Nutraceuticals.</p> <p>Ans: Scope of Nutraceuticals</p> <ul style="list-style-type: none"> □ Nutraceuticals may range from isolated nutrients, dietary supplements, and diets to genetically engineered “designer” foods, herbal products, and processed products, such as cereals, soups, and beverages. The importance of micronutrients in the prevention of diseases, new compounds, so-called phytochemicals, entered the stage in recent years. □ The medical and scientific knowledge of the role of phytochemicals in specific disease processes has advanced at an accelerating pace. Many different classes of phytochemicals have been implicated as having preventive effects against different diseases. <p>Nutraceuticals market scenario and growth</p> <p>The U.S. Dietary Supplement Health and Education Act of 1994, there has been an explosion of various kinds of nutraceuticals, in terms of both food supplements and functional” foods. China and India will be the fastest growing markets, while the US will remain the largest.</p> <ul style="list-style-type: none"> □ Nutraceuticals are a multi-billion-dollar industry, rivaling the pharmaceutical industry. Many new entrepreneurs and pharmaceutical companies have entered the nutraceuticals field. □ Global demand for nutraceuticals ingredients will grow 5.8% annually through 2010. Best prospects include probiotics, soy additives, lycopene, lutein, sterol based additives, green tea, glucosamine, chondroitin and coenzyme Q10. □ This enthusiasm is based on epidemiological studies of the prevalence of chronic diseases in different parts of the world and of the beneficial health effects of whole foods, fruits, and vegetables and probable active ingredients of these food stuffs and their predicted influence on biochemical pathways. □ Increasing numbers of consumers, concerned about healthcare costs and dissatisfied with pharmaceutical agents in promoting health, are turning to nutraceuticals to improve their health and prevent chronic disease. 	5	3	2
c.	<p>What are the types of Nutraceutical products available in the market Nutraceuticals?</p> <p>Ans: Nutraceuticals or functional foods can be classified on the basis of their natural sources, pharmacological conditions or as per chemical constitution of the products. On the basis of natural source, these are the products obtained from plants, animals, minerals or microbial sources. The classification of nutraceuticals based upon its therapeutical implications for the treatment or prevention of specific condition may produce a big list. Some of the important conditions in which the nutraceuticals are specially directed for its treatment,</p>	5	3	2

	prevention or support.																					
	<table border="1"> <thead> <tr> <th>Functional Food</th> <th>Functional Beverages</th> <th>Dietary Supplements</th> </tr> </thead> <tbody> <tr> <td>Probiotics Fortified Food</td> <td>Fruit & Vegetable Juices and Drinks</td> <td>Proteins & Peptides</td> </tr> <tr> <td>Omega Fatty Acid Fortified Food</td> <td>Dairy & Dairy Alternative Drinks</td> <td>Vitamins & Minerals</td> </tr> <tr> <td>Branded Ionized Salt</td> <td>Noncarbonated Drinks (Bottled Water, Tea, and Coffee)</td> <td>Herbals (Ayurveda Extracts, Plant Extracts, Algal Extracts, Phytochemicals)</td> </tr> <tr> <td>Branded Wheat Flour Market</td> <td>Other (Herbal Tea, Sports Drinks, and Energy Drinks)</td> <td>Others (Fatty Acids and Fiber).</td> </tr> <tr> <td>Other Functional Food</td> <td></td> <td>Personal Care</td> </tr> </tbody> </table>	Functional Food	Functional Beverages	Dietary Supplements	Probiotics Fortified Food	Fruit & Vegetable Juices and Drinks	Proteins & Peptides	Omega Fatty Acid Fortified Food	Dairy & Dairy Alternative Drinks	Vitamins & Minerals	Branded Ionized Salt	Noncarbonated Drinks (Bottled Water, Tea, and Coffee)	Herbals (Ayurveda Extracts, Plant Extracts, Algal Extracts, Phytochemicals)	Branded Wheat Flour Market	Other (Herbal Tea, Sports Drinks, and Energy Drinks)	Others (Fatty Acids and Fiber).	Other Functional Food		Personal Care			
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d.	<p>Discuss about the selection, identification and authentication of herbal materials.</p> <p>Ans: Identification And Authentication Of Herbal Materials</p> <p>(a) Identification</p> <ul style="list-style-type: none"> <input type="checkbox"/> Nearly 90 per cent of the Crude Drugs are obtained from the plant sources while about 10 per cent of the drugs are derived from animal and mineral sources. <input type="checkbox"/> The drugs of plant origin are frequently used as whole plant; otherwise their parts such as Root, Stem, Leaf, Flower, Seed, Fruit modifications of Stem and Root, Bark of a Stem or Root, Wood, and their Exudates or Gums etc. <input type="checkbox"/> Drugs can be identified with the aid of size, shape, outer surface, inner surface etc. only if they are available in entire condition. Sensory or organoleptic characters describe colour, odour, taste, consistency etc. <input type="checkbox"/> Visual characters like size, colour, surface characteristics like texture and fracture characteristics and other characters like odour and taste. The size of the plant material may be used as an identification character. <input type="checkbox"/> The colour of the material may be compared with an authentic material for genuineness. <p>(b) Authentication</p> <ul style="list-style-type: none"> <input type="checkbox"/> Authentication of herbal raw material for preparation of a medicament should be authenticated on the basis of Botanical (Pharmacognostic) characters. The method of authentication of raw material (i.e., how done and by whom) describes how the original material or plant was identified and allows the reader to determine, to some degree, if the raw material for the herbal product was produced from the plant as reported. The lot number of the raw material provides the reader with key information as to where from the raw material came. 	5	1	2																		

SECTION - C

3. Attempt any ONE part of the following :

(1*5 = 5)

Q N	QUESTION	Marks	CO	BL
a.	<p>Write the preparation and standardization of Lehya.</p> <p>Ans: <i>Avaleha</i> or <i>lehya</i> is a semisolid preparation and prepared with addition of jaggery, sugar or sugar candy and boiled with drug juice or decoction as per procedure. They are also known as <i>modaka</i>, <i>guda</i>, <i>khanda</i>, <i>rasayana</i>, <i>leha</i>, etc.</p>	5	1	3

	<p>Method of Preparation</p> <ul style="list-style-type: none"> <input type="checkbox"/> <i>Lehya</i> preparations are made up of <i>kasaya</i> or other liquids, jaggery or sugar or sugar candy, powders or pulps of certain drugs, ghee or oil and honey. Jaggery, sugar or sugar candy is dissolved in the liquid, strained to remove the foreign particles and boiled over a moderate fire. <input type="checkbox"/> After the <i>paka</i> is ready, when it sinks in water without getting easily dissolved; it is removed from the fire. Then with continuous and vigorous stirring, fine powders of drugs are added in small quantities to form a homogeneous mixture. <input type="checkbox"/> For better appearance the required amount of ghee or oil is added while the preparation is hot and mixed well. Honey is added at last when the mass is cool and mixed uniformly. <p>Characteristics of best <i>Lehya</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> The <i>lehya</i> should neither be hard nor be a thick fluid. When pulp of the drugs is added and ghee or oil is present in the preparation, this can be rolled between the fingers. <input type="checkbox"/> If the metals are mentioned, the <i>bhasmas</i> of the metals are used. The colour and smell depend on the drugs used. <p>Standardization of <i>Lehya</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Solvent blend composition <input type="checkbox"/> Extraction process parameters, such as amount of solvent, temperature, length of time, method of collection of extractives, etc. <input type="checkbox"/> Method of concentration <input type="checkbox"/> Semisolid blending time <input type="checkbox"/> Blend homogeneity <input type="checkbox"/> Viscosity/Rheological characters <input type="checkbox"/> Light sensitivity, storage and other precautions during processing 		
b.	<p>Write the preparation and standardization of <i>Ghutika</i>.</p> <p>Ans: Drug is prepared in the form of pills, known as <i>Gutika</i>. These are made of one or more drugs of plant, animal or mineral origin.</p> <p>Method of Preparation</p> <ul style="list-style-type: none"> <input type="checkbox"/> The drugs of plant origin are dried and made into fine powders separately. The minerals are made into bhasma. If cases where <i>paradanand gandhaka</i> are mentioned, <i>kajjali</i> are made first and other drugs are added, one by one according to the formula. <input type="checkbox"/> These are put into a <i>khalva</i> and ground to a soft paste with the prescribed fluids. if more than one liquid is prescribed for grinding, they are used in succession. <input type="checkbox"/> When the mass is properly ground and is in a condition to be made into pills or <i>gutika</i>, <i>sugandha dravyas</i> (flavour), like <i>kasturi</i>, <i>karpura</i> (Kapur), if are included in the formula, then added and ground again. <input type="checkbox"/> <i>Gutika</i> may be dried in shade or in sun. In cases where sugar or jaggery (<i>guda</i>) is mentioned, <i>paka</i> of these should be made on mild fire and removed from the oven. <p>GUTIKA (PILLS)</p> <ul style="list-style-type: none"> <input type="checkbox"/> <i>Gutika</i> made of plant drugs when kept in airtight containers can be used for 	5	1
			3

<p>two years. Pills containing minerals can be used for an indefinite period. Examples: Khadiradi gutika, Bilvati Gutika, Mrist sanjivani Gutika, Marma Gutika, Lasunadi Gutika etc. Standardization of Gutika (Pills) 1. It can be standardizing by the raw materials 2. Standardization of Manufacturing Process <input type="checkbox"/> Particle size distribution of drugs <input type="checkbox"/> Blending order and time of blending <input type="checkbox"/> Granulating fluid, binder concentration, granulating time <input type="checkbox"/> Drying temperature and time <input type="checkbox"/> Spray rate of film coating solution 3. Finished products standardization <input type="checkbox"/> Dissolution: Bioavailability <input type="checkbox"/> Moisture content <input type="checkbox"/> Hardness <input type="checkbox"/> Pills characters, such as disintegration, friability etc. <input type="checkbox"/> weight and thickness control <input type="checkbox"/> Biological characteristics: Efficacy and toxicity tests <input type="checkbox"/> Stability testing: To define shelf life of the product <input type="checkbox"/> Storage condition <input type="checkbox"/> Packaging systems/unit</p>			
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4. Attempt any ONE part of the following :

(1*5 = 5)

Q N	QUESTION	Marks	CO	BL
a.	<p>Discuss Good agricultural practices in cultivation of medicinal plants with reference to Biodynamic farming. Ans: Biodynamics is emphasizing the use of manures and composts and excludes the use of synthetic (artificial) fertilizers on soil and plants. The biodynamic approach includes its treatment of animals, crops, and soil as a single system, an emphasis from its beginnings on local production and distribution systems, its use of traditional and development of new local breeds and varieties. Good agricultural practices (GAP) in cultivation of medicinal plants <input type="checkbox"/> The WHO guidelines on good agricultural and collection practices (GACP) for medicinal plants are primarily intended to provide general technical guidance on obtaining medicinal plant materials of good quality. <input type="checkbox"/> The main objectives of these guidelines are to: (a) contribute to the quality assurance of medicinal plant materials used as the source for herbal medicines, which aims to improve the quality, safety and efficacy of finished herbal products; (b) guide the formulation of national and/or regional GACP guidelines and GACP monographs for medicinal plants and related standard operating procedures; and (c) Encourage and support the sustainable cultivation and collection of medicinal plants of good quality in ways that respect and support the conservation of medicinal plants and the environment in general.</p>	5		3

b.	<p>Discuss the Health benefits and role of Nutraceuticals in CVS diseases and Cancer.</p> <p>Ans: Nutraceuticals in CVS Diseases</p> <ul style="list-style-type: none"> <input type="checkbox"/> Features of Cardiac Disease Cardiac disease originates from cellular stress. Remodeling compensates for hemodynamic changes that the system implements to sustain cardiac output. <input type="checkbox"/> Several epidemiological studies have shown that increased nutraceuticals dietary intake of natural phenolic antioxidants correlates with reduced coronary heart disease. <p>Food antioxidants exert a twofold action: they prolong the shelf life of the product, protect its constituents during processing, and prevent the formation of toxic compounds. These foods also supply antioxidants to the human body, thus contributing to the antioxidant defense system.</p> <p>Nutraceuticals in Cancer Diseases</p> <ul style="list-style-type: none"> <input type="checkbox"/> Phytochemicals as some nutraceuticals with anticancer effects were detected, and the fact that these compounds occur mainly in vegetables seem to confirm the epidemiological evidence that a high intake of vegetable protects against different kinds of cancer. <input type="checkbox"/> The casein-micelle complexation to deliver curcumin as a drug nanocarrier to reduce the cancer cells. <input type="checkbox"/> Conjugated Linoleic Acid (CLA) is a family of isomers of linoleic acid, each having different functions. One has anticancer effects. <input type="checkbox"/> Palm oil is a source of antioxidants with some protection against certain cancers. <input type="checkbox"/> Phytoestrogens have been found to regulate the IL-6 gene expression and control the DNA damaging factors in cancer cells and regulate DNA transcription in tumors. <input type="checkbox"/> Nutraceuticals derived from medicinal plants such as tea, garlic, ginger, soya bean, and others may act as chemopreventives via the apoptotic pathway. <input type="checkbox"/> Flavonoids extracted from black tea induce apoptosis in human stomach cancer cells, whereas flavonoids from green tea induce apoptosis in human colon cancer cells. <input type="checkbox"/> Stilbene from grapes, peanuts, and pines induces apoptosis in various cancer cells, including esophageal carcinoma. <input type="checkbox"/> Various fruits containing antioxidants were found to be effective in suppressing the growth of various colon cancer cells and other intestinal tumors. 	5	3	3
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5. Attempt any ONE part of the following :

(1*5 = 5)

Q N	QUESTION	Marks	CO	BL
a.	<p>Discuss role of Ashwagandha and Spirulina as health food.</p> <p>Ans: Ashwagandha Synonyms: Withania root. Ashwagandha, Clustered Wintercherry. Biological Source It consists of the dried roots and stem bases of <i>Withania somnifera</i> Dunal,</p>	5	3	2

belonging to family Solanaceae.

Chemical Constituents

The plants contain the alkaloid withanine as the main constituent and somniferine, pseudowithanine, tropine and pseudotropine, hygrine, isopelleterine, anaferine, anahygrine and steroid lactones.

Major medicinal uses

Ashwagandha used as a rasayana herbs most commonly in Ayurvedic medicinal combinations like Analgesic, improves blood glucose control, sedative, rejuvenator, asthma, uterine sedative, relaxant and antispasmodic effects on intestinal, uterine, bronchial, tracheal and blood-vessel muscles.

It is a reputed health food and herbal tonic that is used for cardiovascular diseases in ethnomedicine. It is available for human use either as a single herb or an ingredient of polyherbal or herbomineral formulations. The human doses of *Ashwagandha* are generally in the range of 4–6 g/day and are expected to be safe and nontoxic.

The leaves and roots of this plant are used as an abortifacient, aphrodisiac, diuretic, nerve tonic, narcotic, sedative, astringent, growth promoter, and anthelmintic.

It has antiarthritic, antibacterial, antistress, antitumor, and anticancer activities.

It is an antidote for scorpion stings.

It is used for toning the uterus, consumption, dropsy, leucoderma, impotence, rheumatism, debility from old age, ulcer, sexual and genital weakness, assumption, rheumatic swelling, loss of memory, loss of muscular energy, spermatorrhea, syphilis, sterility of women, blood discharge, leucorrhoea, anemia with emaciation, multiple sclerosis, neoplasia, cancer, and fatigue.

Fruits and seeds are diuretics and are used in the coagulation of milk.

Spirulina

Spirulina is a blue green algae obtained from *Spindina platensis* or *S. maxima*, family Oscillatoriaceae. It is simplest photosynthetic algae which grow in fresh water in planktonic form. Spirulina, also named *Arthrospira*, are multicellular and filamentous cyanobacteria (bluegreen algae). It has gained considerable popularity in the healthy food industry and is considered a food supplement for humans. It has very high macronutrient and micronutrient contents, such as proteins, amino acids, unsaturated fatty acids, minerals, and vitamins.

Medicinal Use

The most interesting biochemical compound is c-phycoerythrin because it has anticancer effects by selectively inhibiting COX-2 due to the conformation and large structure. The structure of the c-phycoerythrin facilitates the proper binding to the active site of COX-2.

Spirulina has been reported to have immunostimulant activities and shows promises for the treatment and management of HIV and other viral infection, such as Herpes, Cytomegalovirus, Influenza, Mumps and Measles virus.

The glycolipid part of the spirulina is reported to be responsible for its anti-HIV potential. It stimulates the activity of spleen, thymus and bone marrow stem cells.

Spirulina also acts as an antioxidant due to the presence of enzyme superoxide

	dismulase and thereby found helpful in the treatment of atherosclerosis, arthritis, cataract, diabetes and aging process.			
b.	<p>Discuss role of Alfaalfa and Amla as health food.</p> <p>Ans: Alfalfa (<i>Medicago satiova L.</i>) has been grown extensively as a livestock feed, while alfalfa sprouts are consumed as a garnish.</p> <p>Pharmacological Actions</p> <p>Alfalfa extracts with acerola cherry extracts, a rich source of vitamin C, enhanced the antioxidant activity of alfalfa extracts to inhibit LDL-oxidation (LDL).</p> <p>Alfalfa top (stem and leaves) saponins have been reported to decrease plasma cholesterol concentrations without changing high-density lipoprotein (HDL) cholesterol concentrations, decrease intestinal absorption of cholesterol, increase excretion of neutral steroids and bile acids, prevent atherosclerosis and induce the regression of atherosclerosis.</p> <p>The protective effect, only evident between alfalfa or soybean extracts and acerola cherry extracts, was attributed to synergistic interaction between its flavonoids and phytoestrogens with ascorbic acid in the cherry extract.</p> <p>Policosanol is found in sugar cane waste and the leaves of alfalfa. Comparison of policosanol (10 mg) with lovastatin (20 mg) showed similar effects on lipid levels, but none of the statin side effects were observed with policosanol.</p> <p>Policosanol is also thought to act by inhibition of cholesterol biosynthesis, but direct inhibition of HMG-CoA reductase as seen with the statins is not the mode of action.</p> <p>The seeds are reported to contain trypsin inhibitors.</p> <p>Saponins isolated from the aerial parts have been reported to stimulate the lipolytic activity of neopancreatinum (a mixture of porcine pancreatic enzymes including lipase, amylase and proteases).</p> <p>Amla</p> <p>Synonyms: Emblica, Indian goose berry.</p> <p>This consists of dried, as well as fresh fruits of the plant <i>Emblica officinalis</i> (<i>Phyllanthus emblica</i> Linn.), belonging to family Euphorbiaceae.</p> <p>Pharmacological properties</p> <p>Amla fruit extract works effectively in mitigative, therapeutic, and cosmetic applications through control of collagen metabolism, and it also protect the skin from the damaging effects of free radicals, nonradicals, and transition metal-induced oxidative stress.</p> <p>The fruit was found to contain pyrogallol, an active compound responsible for the anti-inflammatory effect in bronchial epithelial cells.</p> <p>Multiple animal studies showed that the dried fruit powder of <i>P. emblica</i> is hypolipidemic and induced partial regression of atherosclerotic lesions in arteries and decreased lipogenesis.</p> <p>The tannoid principles of the fruits of the plant <i>P. emblica</i>, including emblicanin A, emblicanin B, punigluconin, and pedunculagin, have been reported to exhibit antioxidant activity in vitro and in vivo and supports its use in Ayurveda as hepatoprotectant.</p>	5	3	2