

SYLLABUS

FOR

TWO-YEAR FOUR-SEMESTER COURSE

IN

NUTRITION AND PUBLIC HEALTH BIOLOGY

2021

RANI RASMONI GREEN

UNIVERSITY

OUTLINE OF THE SYLLABUS FOR TWO-YEAR M.Sc. COURSE IN NUTRITION AND PUBLIC HEALTH BIOLOGY (WITH EFFECT FROM THE SESSION 2021-2022 ONWARDS)

Semester wise distribution of Courses and Credits:

Semester-I				
Course Code		Title	Marks	Credits
GNPHT-11	Unit 1	Introduction to Food, Diet and Nutrition Concept of Community Health and Nutrition	50	4
	Unit 2			
GNPHT-12	Unit 1	Anatomy and Physiology Physiology of Digestive Glands and Endocrine Glands	50	4
	Unit 2			
GNPHT-13	Unit 1	Major Nutrients and Nutritional Biochemistry and Physiology Vitamins, Minerals and Trace Elements, Enzymes and Dietary Fibres	50	4
	Unit 2			
GNPHT-14A OR (Choice based) GNPHT-14 B	Unit 1	Biosystematics	50	4
	Unit 2	Biodiversity		
	Unit 1	Rural Technology and Economic Botany		
	Unit 2	Rural Technology and Economic Zoology		
GNPHT-15		Practical & Assignments	100	8
Total of Semester-I			300	24
Semester-II				
GNPHT-21	Unit 1	Food Commodities and Food Processing Nutrition in Phases of Human Life	50	4
	Unit 2			
GNPHT-22	Unit 1	Pathophysiology and Diet Therapy of Gastrointestinal Diseases	50	4
	Unit 2	Pathophysiology and Diet Therapy of Heart and Kidney Diseases Diabetes and Neoplastic Disorders		
GNPHT-23	Unit 1	Basic Microbiology and Bacteriology Virology	50	4
	Unit 2			
GNPHT-24A OR (Choice based) GNPHT-24B	Unit 1	Health Policies Health Education and Health Programmes	50	4
	Unit 2			
	Unit 1	Environmental Biology		
	Unit 2	Environmental Health		
GNPHT-25		Practical & Assignments	100	8
Total of Semester-II			300	24
Semester-III				
GNPHT-31	Unit 1	Epidemiology and Disease Ecology Parasitology	50	4
	Unit 2			
GNPHT-32	Unit 1	Anthropometry Biochemical Assessment	50	4
	Unit 2			
GNPHT-33	Unit 1	Food Microbiology and Food Borne Diseases Food Toxicants and Food Hygiene	50	4
	Unit 2			
GNPHT-34A OR (CHOICE BASED) GNPHT-34B	Unit 1	Basic Statistics Viral Statistics	50	4
	Unit 2			
	Unit 1	Bioinformatics	50	4
	Unit 2	Nutrigenomics		
GNPHT-35		Practical & Assignments	100	8
Total of Semester-III			300	24

Semester-IV				
GNPHT-41	Unit 1 Unit 2	Medical Entomology and Vector Biology Vector Control	50	4
GNPHT-42	Unit 1 Unit 2	Cell Biology and Immunology Genetics	50	4
GNPHT-43	Unit 1 Unit 2	Social Medicine Rural Health	50	4
GNPHT-44	Practical & Assignments	Project proposal writing / Review Paper Term Paper / Project work and Dissertation Seminar Presentation [Presentation + viva] (40 + 10)	25 + 25 = 50	8
Total of Semester-IV			250	20

SEMESTER-I

COURSE CODE: GNPHT-11

UNIT -1: INTRODUCTION TO FOOD, DIET AND NUTRITION

Concept of food and Diet

Food, food groups and Food pyramid

Functional Foods

Comparison among Core foods, Secondary foods and Peripheral foods

Concept on food, diet and nutrients, concept of balanced diet

Healthy diet and dietary practices

Understanding Major and minor food

Concept of Nutrition

Definition of Nutrition, Basic terms used in nutrition

Understanding Nutrition and its relation to health and wellbeing

Malnutrition and Under-nutrition and its different spectrum and manifestations

Concept, classification, sources and importance of Nutraceuticals

Concept on Bioactive compounds

Definition and multidisciplinary nature of public nutrition

Concept and scope

Role of Public Nutritionist

UNIT 2: CONCEPT OF COMMUNITY HEALTH AND NUTRITION

Definition and concept of Community Health, History of community health

Concept of Population and Community:

Population dynamics-Natality, Mortality, Survivorship and age distribution

Community structure, Major and Minor community

Relationship between species and number (Abundance, Density, Frequency, Relative abundance, Dominance, Dominance index, Species diversity)

Community boundary.

Understanding Community Nutrition

Core functions and essential services of Community Health

Important Public Health Acts

Health problems of developed and developing countries

Health problems in India

National Services and Programmes of Community Health Nutrition

References:

- ❖ Ghosh S (1997). Nutrition and child care – A practical guide. 1st ed. Jaypee Brothers; New Delhi.
- ❖ Gopalan C (1992). Growth charts in Primary Health Care – Time for Reassessment. NFI Bulletin.
- ❖ Hughes O, Bennion M (1970). Introductory Foods, Macmillan & Co. New York.

- ❖ Jelliffe DB and Jelliffe EFP (1989). Community Nutritional Assessment, Oxford University Press WHO. The growth chart: A tool for use in infant and child health care. Geneva: WHO; 1986.
- ❖ Pomeranz Y (Ed) (1991). Functional Properties of Food Components, (2ND edition), Publishers.
- ❖ Tindall HD (1983). Vegetables in the Tropics, MacMillan Press, London.
- ❖ Winton AL, Winton KB (1999). Techniques of Food Analysis. Allied Scientific

COURSE CODE: GNPHT-12

UNIT 1: ANATOMY AND PHYSIOLOGY

Digestive system

Anatomy of oral cavity, esophagus, stomach, duodenum, jejunum, ileum, colon, rectum and anal canal

Process of digestion and absorption of food

Circulatory system

Functions and properties of blood

Formation of blood cells, blood groups and blood types, Haemostasis

Structure of blood vessels and heart

Cardiac muscle tissue and cardiac conduction system

Cardiac cycle and cardiac output

Blood pressure and its regulation

Osteoskeletal system

General anatomy of musculoskeletal system

Physiology of muscle contraction

Neuromuscular system

Anatomical overview of central and peripheral nervous system

Brief anatomy and functions of cerebrum, cerebellum, hypothalamus and neuron

Concept of synapse and synaptic transmission

Genito-urinary system

Structure and function of kidney

Physiology of urine formation

Anatomical overview of human reproductive system

Fertilization, Spermatogenesis and oogenesis

Integumentary system

Structure and function of skin

Regulation of temperature of the body

Energy and metabolism

Physiological understanding of Energy and metabolism, BMR, Specific dynamic action, Anabolic and catabolic pathways

UNIT -2: PHYSIOLOGY OF DIGESTIVE GLANDS AND ENDOCRINE GLANDS

Digestive glands

Salivary glands and its digestive physiology
Movements of gut and gut motility
Physiological function of stomach
Physiology of hepatobiliary system
Physiology of pancreas and its metabolic functions
Physiological function of small and large intestine

Endocrine glands

Physiology of Pituitary gland
Physiology of Thyroid and Parathyroid gland
Physiology of Adrenal glands
Physiology of Gonads

References:

- ❖ Chaudhuri, S. K. (2000). Concise Medical Physiology. New Central Book Agency (P) Ltd.
- ❖ Ganong, W. F. (2003). Review of Medical physiology. 21st ed. McGraw Hill.
- ❖ Hildebrand, M. (1995). Analysis of Vertebrate Structure. John Wiley and Sons.
- ❖ Hill, R.W., Wyse, G.A. and Anderson, M. (2008). Animal Physiology. 2nd ed. Sinauer Associates Inc.
- ❖ Hoar, W. S. (1984). General and comparative Physiology. 3rd ed. Prentice-Hall of India
- ❖ Kardong, K. V. (2002). Vertebrates: Comparative anatomy, function evolution. Tata McGraw Hill.
- ❖ Kent, G. C. and Carr, R. K. (2001). Comparative anatomy of the Vertebrates. 9th ed. Mc Graw Hill.
- ❖ Koppen, B. M. and Stanton, B. A. (2009). Berne and Levys' Physiology. 6th ed. Mosby.
- ❖ Romer, A. S. and Parsons, T. S. (1986). The vertebrate body. 6th ed. Saunders College Publishing.
- ❖ Bolandar, M. (2001). *Molecular Endocrinology*. Elsevier Science.
- ❖ Greenspan, F. S. and Gardener, F. G. (2003). *Basic and Clinical Endocrinology*. 7th ed. McGraw Hill.
- ❖ Ganong, W. F. (2003). Review of Medical physiology. 21ST ed. McGraw Hill.
- ❖ Hadley, M. E. (2000). *Endocrinology*. 5th ed. Pearson Education.
- ❖ Norris, D. O. (2006). *Vertebrate Endocrinology*. 4th ed. Academic Press.
- ❖ Randall, D., Burggren, W. and French, K. (2002). Eckert's Animal Physiology – Mechanisms and Adaptation. 5th ed. W. H. Freeman.
- ❖ Sherwood, L. (2004). Human Physiology: From cells to systems. 5th ed. Thomson Brooks Cole.

COURSE CODE: GNPHT- 13

UNIT 1: MAJOR NUTRIENTS AND NUTRITIONAL BIOCHEMISTRY AND PHYSIOLOGY

Carbohydrate:

Types of dietary carbohydrates and their relative importance

Digestion and absorption of carbohydrates

Carbohydrate Metabolism (Glycolysis, Gluconeogenesis, Hexose monophosphate shunt, Citric acid cycle)

Health aspects of sugar and non-starch polysaccharides.

Protein:

Composition and nature of proteins, Protein-providing foods in the diet

Basic structure of proteins and their alteration by cooking

Digestion and absorption of proteins

Amino-acid metabolism, Control of Protein metabolism

The role of proteins and amino acids in health and disease.

Metabolic changes and clinical features of Protein Energy Malnutrition (Marasmus and Kwashiorkor).

Fats:

Nature and characteristics of fats important in human nutrition

Digestion and absorption of fats

Importance of the essential fatty acids

Role of fats in the diets and trends in fat consumption

Advantages and disadvantages of fat in the diet

Importance of mono and poly unsaturated fatty acids, omega-3 fatty acids in the body.

UNIT 2: VITAMINS, MINERALS AND TRACE ELEMENTS, ENZYMES AND DIETARY FIBRES

Vitamins:

Physiological action, sources, functions and deficiency symptoms of: Vitamin A, D, E and K, Thiamin, Riboflavin, Vitamin B12, Pantothenic acid, Folic Acid, Pyridoxine, Niacin, Ascorbic acid

Minerals and Trace elements

Absorption, utilization, sources, functions and deficiency symptoms of calcium and phosphorous. Factors affecting calcium absorption. Role of calcium in ossification and bone growth. Functions, Sources, absorption, utilization and storage of iron. Role of iron in prevention of anemia.

Physiology, source and role of iodine, fluorine, zinc, copper, manganese, selenium and chromium in human nutrition.

Dietary fibres:

Components of dietary fiber, Physiological and metabolic effects of dietary fiber, Role of fibers in prevention of diseases (Coronary heart disease, Diabetes Mellitus, Constipation, colon dysfunction and weight control). Disadvantages of Dietary fibers

Enzymes and Co-enzymes:

General properties, nutritional classification and functions of digestive enzymes. Enzyme kinetics and Factors affecting enzyme action. Mechanism of enzyme action. Enzyme regulation. Definition of co-enzymes. Physiological functions of Co-Enzymes. Types of Co-enzymes. Diseases and disorders related to coenzymes.

References:

- ❖ Boyer R (2000). 3rd Ed. Modern Experimental Biochemistry. Person Education, Asia.
- ❖ Devlin TM (Ed) (2002). Textbook of Biochemistry with clinical correlations. 5th ed. Wiley-Liss.
- ❖ Murray RK, Granner P, Mayes A, Rodwell VW (2003). Harper's Illustrated Biochemistry. McGraw-Hill.
- ❖ Nelson DL & Cox MM (2004). Lehinger's Principles of Biochemistry. 2ND ed., Macmillan worth Publishers.
- ❖ Switzer RL, Garrity LF (1999). Experimental Biochemistry. WH. Freeman & Company.
- ❖ Voet D, Voet JG & Pratt CW (1999). Fundamentals of Biochemistry. Upgrade edition. John Wiley & Sons
- ❖ Gopalan C (198). Nutritive value of Indian Foods. Indian Council of Medical Research.
- ❖ Guthrie AH (1986). Introductory Nutrition, 6th Ed. The C.V. Mesby Company.
- ❖ Indian Council of Medical Research (2003). Nutrient Requirements and Recommended-Dietary Allowance for Indians. New Delhi.
- ❖ Swaminathan M (2009). Essentials of Foods and Nutrition, Vols -1 and II. Ganesh and Co. Madras.
- ❖ WHO (1979). A growth chart for International use in Maternal and Children Health Care, Geneva.
- ❖ Winword (1988). Sear's Anatomy and Physiology for Nurses. London, Edward Arno ll.

COURSE CODE: GNPHT-14A

UNIT-1: BIOSYSTEMATICS

Biosystematics and Taxonomy

Definition and basic concepts of biosystematics and taxonomy

Importance and applications of biosystematics in biology

Micro- and Macro-taxonomy, Levels of taxonomic study

Concepts of species

Types –Typological, Biological and Evolutionary, Kinds of species

Rules of nomenclature

Kinds of Type Specimens

Holotype, Paratype, Lectotype, Neotype, Allotype, Metatype, Monotype

Modern trends in Polyphasic taxonomy

Numerical taxonomy concept and prospects, Phenotypic (cultural, physiological and biochemical) taxonomy, Biochemical techniques used in taxonomy, Significance of molecular taxonomy, Molecular techniques used in taxonomy, Molecular determinants used in taxonomy

UNIT-2: BIODIVERSITY

Biodiversity as Bio-resource

Biodiversity as a source of food and improved varieties, Source of drugs and medicines
Aesthetics and cultural benefits

Levels of Biodiversity

Community diversity (alpha, beta and gamma biodiversity; Ecosystems diversity: biomes, mangroves, coral reefs, wetlands and terrestrial diversity)

Ecosystem diversity

Microbial diversity and useful prokaryotic genes

Methods of Taxonomy of Bacteria and Viruses

Usefulness of Bioresource microbes.

Biodiversity Hot spots

Concepts, distribution and importance

Conservation of biodiversity,

India's biodiversity and its conservation

Endangered threatened and rare species, IUCN red list categories

In-situ and Ex-situ conservation

References:

- ❖ Blackwelder, R. E., (1967). Taxonomy- A text and reference book. John Wiley and Sons.
- ❖ Forey, P. L., Humphries, C. J., Kitching, I.J., Scotland, R. W.; Siebert, D. (1993). Cladistics – A practical course in systematics. Oxford University Press.
- ❖ Kapoor, V. C. and Kapoor, M. (2012). Theory and Practice of Animal Taxonomy. Oxford and IBH. 7th ed.
- ❖ Kapoor, V. C. (1994). Theory and practice of animal taxonomy. 3rd. ed. Oxford and IBH.
- ❖ Kitching, I.J., Forey, P. L., Humphries, C. J., Williams, D. (1998). Cladistics: Theory and Practice of
- ❖ Parsimony Analysis (Systematics Association Special Volumes). 2ND ed. OUP Oxford.
- ❖ Lomolino, M.V., Riddle, B. R., Whittaker, R. J. and Brown, J. H. (2010). Biogeography. 4th Ed. Sinauer Associates.
- ❖ Mayr, E. and Ashlock, P. D. (1991). Principles of Systematic Zoology. 2 ed. McGraw-Hill.
- ❖ Mayr, E. (1969). Principles of Systematic Zoology. Tata McGraw-Hill.
- ❖ Mayr, E. (1997). This is biology: the science of the living world. Belknap, Harvard University Press, Cambridge, Mass.

- ❖ Quicke, D. A. J. (1993). Principles and Techniques of Contemporary Taxonomy. Blackie Academic and Professional.
- ❖ Scott-Ram, N. R. (1990). Transformed cladistics, taxonomy and evolution. Cambridge University Press.
- ❖ Simpson, G. G. (1961). Principles of Animal Taxonomy. Columbia University Press. New York.
- ❖ Groom, M. J., Meffe, G. K. and Carroll, C. L. (2005). *Principles of Conservation Biology*. 3rd ed. Sinauer Associates Inc. Publishers, USA.
- ❖ Hunter, M. L. Jr. and Gibbs, J. P. (2006). *Fundamentals of Conservation Biology*. 3rd ed. Wiley-Blackwell.
- ❖ Pullin, A. S. (2002). *Conservation Biology*. Cambridge University Press.
- ❖ Sodhi, N. S. and Ehrlich, P.R. (2010). *Conservation Biology for all*. Oxford Biology, USA.

COURSE CODE: GNPHT-14B:

UNIT-1: RURAL TECHNOLOGY AND ECONOMIC BOTANY

Nature and Characteristics of Rural Resources

Definition and meaning of Resources, Types and characteristics of Rural Resources, Natural and Man-made

Horticulture

Scope of horticultural crops. Soil and climatic requirements for fruits and vegetables, nursery raising and management. Crop production technology for major fruit crops viz., mango, banana, sapota, aonla, pomegranate, guava, etc.

Mushroom cultivation technique

Types of edible Mushroom species, Nutritional value of Mushrooms, Medicinal value of mushrooms. Mushroom Production Technique – Button Mushroom (*Agaricus*), Oyester Mushroom (*Pleurotota*), Paddy Straw Mushroom (*Volvariella*). Spawn Production Techniques: Preparation of culture, mother spawn production, multiplication of spawn.

Organic manures:

Green manuring. Recycling of organic residue and bio-fertilizers.

Medicinal and aromatic plants

Importance and needs of cultivation of medicinal and aromatic plants, nutritional value, scope, development and future prospect

Medicinal plants: Amla, Shankhpuspi, Brahmi, Chirayita, Arjuna, Kutki, Harad, Tulsi, Ashwagandha, Aloe-Vera, Sarpagandha, Isubgol, Kuth, Jatamanshi Garlic, Ginger Turmeric, Black pepper, Coriander, Fenugreek, Clove and other species related to local condition.

Aromatic Plants: Lemon grass, Lavender grass, Citronella grass, Geranium, Ocimum, Mentha, Eucalyptus and other species related to local conditions.

UNIT-2: RURAL TECHNOLOGY AND ECONOMIC ZOOLOGY

Vermi Technology

External and internal features of earthworms. Use of earthworms, vermicomposting materials, requirement of vermiculture and vermicomposting, Factors affecting earth worm's growth. Types of vermicomposting, methods of vermicomposting, Harvesting and storage of vermicompost, advantages of vermicompost, Use and benefits of Vermicompost, Effect of vermicompost on plants, chemical composition of vermicompost, vermiwash (worm-tea), Chemical composition of vermiwash, Use and advantages of vermiwash.

Apiculture

Importance and future prospects of apiculture, History of apiculture industries in India and world. Species of honeybee and their castes. Equipment and Appliances: Bee Hive, Comb, other appliances for bee keeping. Life cycle and developmental stages of Honey Bees (Egg, Larva, Pupa and Adult). Artificial feeding of honeybees. Properties of Honey: Physical and chemical properties of honey, Honey bee products and their values. Honey extraction and processing.

Sericulture

Types of silkworms. Distribution and Races Exotic and indigenous races Mulberry and non-mulberry Sericulture. Life cycle of *Bombyx-mori*. Structure of silk gland and secretion of silk. Selection of mulberry variety and establishment of mulberry garden Rearing house and rearing appliances. Silkworm rearing technology: Early age and Late age rearing, Spinning, harvesting and storage of cocoons. Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial. Prevention of pests and diseases.

Ornamental fish culture

The potential scope of aquarium fish industry as a cottage industry, exotic and endemic species of aquarium fishes. Common characters of Fresh water and Marine Aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish

Integrated pest management

Major and minor pests of paddy, wheat, jute and vegetable crops Importance of Integrated Pest Management (IPM), uses of bio-control agents and bio-pesticides

References:

- ❖ Hartmann HT & Kester DE. 1989. Plant Propagation – Principles and Practices. Prentice Hall of India.
- ❖ Bose TK, Mitra SK & Sadhu MK. 1991. Propagation of Tropical and Subtropical Horticultural Crops. Naya Prokash.
- ❖ Peter KV. (Ed.). 2008. Basics of Horticulture. New India Publ. Agency. Singh SP. 1989 Mist Propagation. Metropolitan Book Co.
- ❖ Rajan S & Baby LM. 2007. Propagation of Horticultural Crops. New India Publ. Agency.
- ❖ Radha T & Mathew L. 2007. Fruit Crops. New India Publ. Agency.
- ❖ M. K. Sadhu, Plant propagation, New Age International Publishers.

- ❖ S. C. Day, Mushroom Growing, Agrobios India.
- ❖ Pathak Yadav Gour, Mushroom: Production and Processing Technology, Agrobios India.
- ❖ R. C. Ram, Mushroom and their Cultivation, Technique Aavishkar Publishers, Distributors, Jaipur India.
- ❖ Prajapat, Purohi, Sharms. Kumar, A Handbook of Medicinal Plants: A Complete Source Book, Agrobios India.
- ❖ Dr. D. K. Bhatt/ Dr. Aparna Raj/ Kiran Bhatt, Herbal and Medicinal Plants of India Shree Publishers and Distributors, New Delhi.
- ❖ N. Kumar/ JBM Md. Abdul Khader/ P. Rangaswami/ I. Irulappan, Introduction to Spices, Plantation Crops, Medicinal and Aromatic Plants Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
- ❖ T. V. Sathe, Vermiculture and Organic Farming, Daya Publishing House, New Delhi.
- ❖ Arun K Sharma, A Hand book of Organic Farming, Agro bios Inida, New Delhi.
- ❖ Dharm Singh/ Devendra Pratap Singh, A handbook of Beekeeping: Agrobios, India.
- ❖ E. F. Phillips, Beekeeping, Agro bios, India.

COURSE: GNPHP-15: PRACTICAL

Time: 10 hrs.

1. Detection of haemoglobin percent, C.T. and B.T.
2. Estimation of blood pressure by sphygmomanometer (Ausculatory method)
3. Measurement of blood pressure, sweat rate during exercise
4. Study of pulse rate and breathing rate with the change of postures
5. Protein estimation of lowry method
6. Biochemical estimation of cholesterol and sugar
7. Total count of RBC and WBC
8. Differential count of W.B.C
9. Agglutination reactions: Direct and indirect agglutination tests.
10. Identification of patients with reasons (photographs): Ricketts, Marasmus, Kwashiorkor,
11. Identification with reasons of histological slides (Liver, Kidney, Lung, Small intestine, Stomach, Thyroid, Adrenal, Pancreas, Testis, ovary and muscle of mammals
12. Submission of Laboratory Records
13. Viva-voce

SEMESTER-II

COURSE CODE: GNPHT-21

UNIT-1: FOOD COMMODITIES AND FOOD PROCESSING

Plant based foods and food processing

Cereals: Nutritional aspects of wheat, rice and oat, properties, composition and commercial value

Pulses and legumes: Types of pulses and legumes, uses, nutritional aspects and storage

Vegetables and fruits: Use and nutritional aspect of commonly available vegetables and fruits – raw and processed product

Fats and oils: Types, sources, use and nutritional aspects

Beverages: Commonly available types (tea, coffee and wines) and their uses

Food adjuncts: Spices (Chilies, Turmeric, Garlic and Ginger), Food colours, essence and their uses

Preserved products: Jams, Jellies, Pickles, Syrup, Squashes –uses and nutritional aspects.

Baking technology: Bread, biscuits/ Cookies and cake. Principles of baking, ingredients and their functions, methods of preparation

Animal based foods and food processing

Milk and milk Products: Nutritive value of milk, Composition, Pasteurization, Types of processed milk, Milk products (butter, curd, paneer and cheese)

Eggs: Nutritional aspects and uses. Composition, quality factors, storage, bacterial infection and pasteurization, freezing, drying and egg substitutes.

Fish: Major edible freshwater and marine fish and their nutritional significance. Composition, onboard handling & preservation, drying and dehydration, salt curing, smoking, marinades, fermented products, canning, Modified Atmosphere Packaging, and quality factors.

Meat: Major edible fish and meat: storage, spoilage and nutritional aspects
Composition, variety, grading, ageing, curing, smoking and tenderizing of meat, meat pigments and colour changes, cooking, storage, methods of preservation for value addition and spoilage.

Methods of cooking: Dry, moist, frying and microwave cooking. Effect of various methods of cooking on foods, nutrient losses in cooking

UNIT-2: NUTRITION IN PHASES OF HUMAN LIFE

Nutrition of newborn, infants and school going children

General understanding of Nutritional requirement of a Human

Nutritional requirement of a newborn and Infant

Breast feeding and its importance, Benefits of breast milk in nutrition of Newborn, Breast feeding alternatives, Growth and nutritional monitoring of newborn and infants

Nutritional requirement of a Growing Child, Nutritional assessment of growing child,

Nutritional challenges of a growing child, Nutritional requirements of Adolescents

Nutrition of adult man and women, lactating and pregnant mother, nutrition at old age

Nutritional requirement of an adult man and women, Concept of Reference man and women

Nutritional requirement of a Pregnant women, Nutritional challenges and means to overcome Pregnancy nutrition

Physiology of lactation and Nutritional requirements of lactation, Lactogougues

Geriatric Nutrition: Nutritional requirements of geriaty, Assessment of Nutritional status of geriatric population, Nutritional challenges of geriatric age group

References:

- ❖ Anderson L, Dibble MV, Tukki PR, Mitchall HS, and Rynbergin HJ.: Nutrition in Health and Disease. 17th edition, J.B. Lipincott & Co. Philadelphia.
- ❖ Anita FP. Clinical Dietetics and Nutrition. 2nd Edition, Oxford University Press, Delhi.
- ❖ Davis J and Sherer K (1994). Applied Nutrition and Diet Therapy for Nurses, 2ND Edition, W.B. Saunders Co.
- ❖ Escott-Stump S (1998): Nutrition and Diagnosis Related Care, 4th Edition, Williams and Wilkinson.
- ❖ Garrow JS, James WPT and Ralph A (2000). Human Nutrition and Diabetics, 10th Edition, Churchill Livingstone.
- ❖ Srilakshmi B (2016). Dietetics. New Age International.
- ❖ Fabriani, G and Lintas C. (1988) Durum Wheat Chemistry and Technology. American Association of Cereal Chemistry Inc.
- ❖ Kent N L.(1993) Technology of Cereals. 4th Edi. Pergamon Press.
- ❖ Olson, V M; Shemwell G A and Pasch, S (1998) Egg and Poultry Meat Processing, VCH P, New York
- ❖ Winton & Winton, (1991) Techniques of Food Analysis. Allied Scientific Publishers. Matz A Samuel, Bakery Technology and Engineering.
- ❖ Pomeranz Yeshuraj, Food Analysis: Theory and Practice.

COURSE CODE: GNPHT- 22

UNIT1: PATHOPHYSIOLOGY AND DIET THERAPY OF GASTROINTESTINAL DISEASES

Diet and Diet therapy

What is diet, difference between food and diet, Concepts of dietetics
Nutritive value of Different foods, Prominate principles of different foods
Dietary analysis and diet record, Habitual diets in India and their adequacy
Dietary guideline, Role of Diet in health and disease
Nutritional deficiencies and their prevention and control
Nutritional diseases and their prevention and control

Concept of Medical nutrition Therapy and Diet therapy

Concept of medical nutrition therapy and diet therapy

Nutrition in critical care:

Types of short term feeding methods of Enteral Nutrition: Nasogastric, Nasoduodenal, Nasojejunal, Methods of delivery – Bolus, gravity, pump, Formula feeds; Long term feeding methods: Gastrostomy, Percutaneous Endoscopic Gastrostomy, Percutaneous Endoscopic Jejunostomy; Advantages and disadvantages and complications of enteral nutrition; Types of Total Parenteral Nutrition and Peripheral Parenteral Nutrition
Composition of parenteral nutrition solutions, Advantages, Disadvantages and Complications of parenteral nutrition; Nutritional support in burns

Gastrointestinal diseases and disorders:

Diarrhoea, Constipation, Acid peptic disorder, Pepticulcer, Nonulcer dyspepsia, Gastroparesis and motility disorders, Flatulence, Haemorrhoids, Steatorrhoea, Diverticular disease, Irritable bowel syndrome and inflammatory bowel disease, Malabsorption Syndrome, Intestinal brush border enzyme deficiencies, Lactose intolerance, Protein-losing enteropathy. Diagnostic Tests for the G.I. diseases and Medical Nutrition Therapy (MNT) for gastro intestinal tract diseases/disorders.

Liver-diseases and diet-therapy:

Liver diseases: Viral Hepatitis, Cirrhosis of liver, Hepatic encephalopathy, Wilson's disease; Liver-function Test, Dietary care and management in liver-diseases.
Pancreas and its disorders: Acute and chronic pancreatitis, MNT for pancreatitis

UNIT 2: PATHOPHYSIOLOGY AND DIET THERAPY OF HEART AND KIDNEY DISEASES, DIABETES AND NEOPLASTIC DISORDERS

Diseases of cardiovascular system:

Hypertension and its pathophysiology, Dyslipidemia and its types, Pathophysiology Atherosclerosis, Arteriosclerosis, Ischemic heart disease, Thrombus, Embolus, Myocardial infarction, Dysrhythmias
Heart failure, Cardiomyopathy, Stroke, Risk-factors (blood lipids, hypertension, obesity, diabetes, hyperlipidemias, smoking, and stress), Nutrient guidelines and diet therapy of heart diseases.

Kidney diseases:

Acute kidney injury, Chronic renal failure and its different stages, Glomerular Diseases (Nephritic syndrome and nephrotic syndrome), Renal stone and Nephrolithiasis, Medical Nutrition Therapy for different kidney disease

Diabetes:

Types of Diabetes (Type1, Type2, Impaired Glucose regulation, Gestational diabetes) Risk Factors, Prevalence, Symptoms, Diagnosis (OGTT, Urinary sugar Blood glucose, Glycosylated Hemoglobin); Complications (Hypoglycemia, Ketoacidosis, Infections, Heart disease and Kidney disease).

Management of Diabetes:

Diet in Diabetes, Recommended Calorie intake and intake of other macro and micronutrients carbohydrates, proteins, fats, vitamins/ minerals, Role of fruits and vegetables, dietary fibre, fenugreekseeds for Diabetics. Dietary Guidelines, Glycemic Index, Role of other factors (Exercise, Drugs, Education)

Neoplastic disorders:

Definition of neoplasia and different types of neoplastic diseases, Cancer cachexia and its pathophysiology, MNT for Neoplastic disorders

References:

- ❖ Mahan, L. K. and Escott Stump. S. (2008) Krause's Food & Nutrition Therapy 12Th ed. Saunders-Elsevier
- ❖ Shils, M.E., Shike, M, Ross, A.C., Caballero B and Cousins RJ (2005) Modern Nutrition in Health and Disease. 10th ed. Lippincott, William and Wilkins.
- ❖ Gibney MJ, Elia M, Ljungqvist & Dowsett J. (2005) Clinical Nutrition. The Nutrition Society Textbook Series. Blackwell Publishing Company
- ❖ Garrow, J.S., James, W.P.T. and Ralph, A. (2000) Human Nutrition and Dietetics. 10th ed. Churchill Livingstone.
- ❖ Marian M, Russel M, Shikora SA. (2008) Clinical Nutrition for Surgical Patients. Jones and Bartlett Publishers.
- ❖ Vinay Kumar, Abul K. Abbas, Nelson Fausto and Jon Aster; Robbins & Cotran Pathologic Basis of Disease. 8th Edition. Publisher: Elsevier.
- ❖ Jo Ann Zerwekh, AZ Jo Carol Claborn, Tom Gaglione; Mosby's Pathophysiology Memory Note Cards: Visual, Mnemonic, and Memory Aids for Nurses, 2ND Edition. Publisher: Elsevier.
- ❖ Richard Mitchell, Vinay Kumar, Abul K. Abbas, Nelson Fausto and Jon Aste; Pocket Companion to Robins & Cortan Pathological Basis of Disease. 8th Edition. Publisher: Elsevier.
- ❖ Kathryn L. McCance & Sue E. Huether; Pathophysiology: The Biologic Basis for Disease in Adults and Children. Publisher: Elsevier.
- ❖ By Porth, Carol; Essentials of Pathophysiology; Concepts of Altered Health States. Publisher Lippincott Williams & Wilkins.
- ❖ Sue E Huether, Kathryn RN; Understanding Pathophysiology. 5th Edition. Publisher: Elsevier.
- ❖ Humphrey P. Rang, Maureen M. Dale, James M. Ritter, Rod J. Flower, Graeme Henderson; Rang & Dale's Pharmacology, 7th Edition. Publisher: Elsevier.
- ❖ K D Tripathi; Essentials of Medical Pharmacology. 6th edition Publisher Jaypee.

COURSE CODE: GNPHT- 23

UNIT-1: BASIC MICROBIOLOGY AND BACTERIOLOGY

History and milestones of Microbiology:

Milestones in Microbiology, Contributions of Leeuwenhoek, Koch, Pasteur, Jenner and Flemming, General idea about microbial agents

Sterilization:

Principles and mode of action of dry heat, moist heat, filtration, pasteurization and radiation; Source, classification; Antimicrobial resistance; Tests for sensitivity to antimicrobial agents and its quality control

Bacterial Nutrition

Nutrition and nutritional types of bacteria; Types of culture media: natural, synthetic, semi-synthetic and selective media; Composition and principles of: Nutrient Agar, MacConkey Agar, Triple-Sugar-Iron Agar, Pseudomonas Isolation Agar, Blood Agar, XLD agar, Mannitol Salt Agar

Bacteriology:

Structure and function of capsule, pili, flagella, cell wall, cell membrane, outer membrane, reserve materials and cytoplasmic inclusions; Bacterial endospore: Structure and properties; Spore-formation and germination; Plasmid and bacterial chromosome
Types of culture media; Pure culture techniques, Batch culture, continuous culture and synchronous culture; Phases of growth, Kinetics of growth, generation time; Environmental factors influencing growth (Temperature, pH, salt concentration, oxygen, osmotic concentration)

Systemic Microbiology

Classification, phenotypic, biochemical and toxin features, pathogenesis and laboratory diagnosis of: *Staphylococcus*, *Streptococcus*, *Escherichia coli*, *Klebsiella* and *Proteus*, *Pseudomonas*

Bacterial diseases

Microbial virulence, Mode of transmission, pathogenicity, prevention and control of bacterial diseases (Tuberculosis, Cholera, Typhoid, Tetanus, Diphtheria and Anthrax).

UNIT-2: VIROLOGY

Structural organization of viruses

Priions and Viroids

Lytic cycle

Lytic cycle of bacteriophages with reference to *E. coli* and T4
Structure and life-cycle of λ Phage virus and control

Lysogeny

Mechanism of lysogeny; Lysogenic conversion, induction and significance

Viral diseases

Mode of transmission, pathogenicity and prevention of viral diseases:
Dengue, Influenza, JE and Yellow fever
Mumps, Measles, Rabies, AIDS
Coronavirus disease (COVID-19) and herd immunity

References:

- ❖ Dimmock, N. J. and Primrose, S. B. (1994). *Introduction to Modern Virology*. 4th ed. Blackwell Scientific Publications. London.
- ❖ Williams and Wilkins. *Bergey's Manual of Determinative Bacteriology*. 9th ed. Baltimore (MD):
- ❖ Maloy, S. R., Cronan, E. J. and Freifelder, D. (1994). *Microbial Genetics*. 2ND ed. Jones and Bartlett.
- ❖ Prescott, L. M., Harley, J. P. and Klein, D. A. (2011). *Microbiology*. 8th ed. McGraw-Hill, New York.
- ❖ Schlegel, H. G. (1993). *General Microbiology*. 7th ed. Cambridge University Press.
- ❖ Slonczewski, J.L. and Foster, J.W. (2009). *Microbiology- An Evolving Science*. Norton.
- ❖ Stanier, R. Y., Adelberg, E. A. and Ingraham, J. L. (1986). *General Microbiology*. 5th ed. Macmillan.
- ❖ Talaro, K. and Talaro, A. (1999). *Foundations in Microbiology*. 3rd ed. Dubuque, McGraw Hill.
- ❖ Tortora, G. J., Funke, B. R., and Case. C. L. (2008). *Microbiology. An Introduction*. 9th ed.
- ❖ Menlo Park Calif. Voyleys, B. A. (2002). Benjamin/Cummings Publishing. *The biology of viruses*. 2ND ed. McGraw-Hill.
- ❖ Michael T. Madigan, John M. Brock Biology of Microorganisms, 13Th edition (2010), Pearson Publishers.
- ❖ Pelczar, Chan and Krieg; Microbiology, 6th edition (1993), McGraw Hill International, ISBN-13: 978-0070492585.

COURSE CODE: GNPHT- 24A

UNIT 1: HEALTH POLICIES

Health Committees and Development of Health Services in Independent India
Constitutional Provisions, Federal Structure and Social Security
National Health Policies (1983, 2002, 2017), Population Policy, Nutrition Policy
Policy on Indian Systems of Medicine and Homeopathy, 2002
Important Health Legislations in India
Health Infrastructure in India—Public, Private, and Charitable, Public Private Partnership (PPP)
Health financing and Health insurance, Out of Pocket expenditure
Civil society and Social Movements in Health
Health for All approaches- Primary Health Care (1978) to Universal Health Coverage
Millennium Development Goals (MDG) and Sustainable Development Goals (SDG)

UNIT-2: HEALTH EDUCATION AND HEALTH PROGRAMMES

Health Education

Methods, modes and barriers of communication
Planning, Management and Organization of health education programs

E-medicine, Distance education and associated legal issues

Role of media in Health Education

E Health and m Health

Health programmes

Integrated Child Development Services (ICDS)

Mind-day Meal (MDM) programme

Clinical Management – Severe Acute Malnutrition (CM-SAM)

State Level Nutrition programs

Vitamin A prophylaxis, Iron and Folic Acid Supplementation

Double Fortification of Salt (DFS) with iron and iodine

National Centre for Disease Control (NCDC)

National rural Health Mission (NRHM)

National Urban Health Mission (NUHM)

National Vector Borne Disease Control Programme (NVBDCP)

National Malaria Control Programme:

Magnitude of the problem - Early case Detection and Prompt Treatment (EDPT) - Drug Distribution Centers (DDCs) and Fever Treatment Depots (FTDs) - Chemoprophylaxis-Malaria control strategies - Modified Plan of Operation (MPO) - Urban Malaria Scheme (UMS) - *P. falciparum* containment Programme (PfCP) – Roll back malaria (RBM) - Management of drug resistance - Monitoring and control of epidemics and focal out breaks – Future interventions – Malaria Vaccines under trials.

National Filaria Control Programme:

History – Organization - current burden - case detection and treatment - Vector control strategies – Elimination of lymphatic filariasis (ELF) – Global Programme for ELF (GPELF) - Monitoring and Evaluation.

References:

- ❖ Rajinikanth AM, Jaypee Brothers, 2010. Counseling Skills for Health Care Professionals, 1ST Edition.
- ❖ Kevin B. Wright, Lisa Sparks, H. Dan O'Hair, Health Communication in the 21ST Century, Blackwell publishing limited, 2013, first edition.
- ❖ R.D. Karma, Health Communication Published by Mohit Publications 2008.
- ❖ Renata Schiavo, Health Communication: From Theory to Practice, Published by Jossey Bash.
- ❖ Goel S L. 2001. Health Care System and Management: Primary Health Care management. Deep & Deep Publications: New Delhi. Vol 4 Oxford Textbook of Public Health, 4th edn
- ❖ Park K: 2005. Text Book of Preventive and Social Medicine. Banarsidas Bhanot Publishers: Jabalpur. 18th Ed

COURSE CODE: GNPHT- 24B

UNIT-1 : ENVIRONMENTAL BIOLOGY

Ecosystem structure and functions:

Structures – Biotic and Abiotic components. Functions – Energy flow in ecosystems, energy flow models, food chains and food webs. Biogeochemical cycles, Ecological succession. Species diversity, Concept of ecotone, edge effects, ecological habitats and niche. Ecosystem stability and factors affecting stability.

Population ecology:

Characteristics of population, concept of carrying capacity, population growth and regulations. Population fluctuations, dispersion and metapopulation. Concept of 'r' and 'k' species. Keystone species.

Community ecology:

Definition, community concept, types and interaction – predation, herbivory, parasitism and allelopathy. Biological invasions.

Stress on ecosystem and function

Ecosystem health and stress, Biological invasion, biological indicators and their use in monitoring pollution, bioaccumulation and biomagnifications

UNIT -2: ENVIRONMENTAL HEALTH

Air pollution

Sources and types of Pollutants – Natural and anthropogenic sources, primary and secondary pollutants. Impact of air pollutants on human health, plants and materials; Acid rain. Control devices for particulate matter and gaseous pollutants

Water pollution

Types and sources of water pollution. Impact on humans, plants and animals. Measurement of water quality parameters: sampling and analysis for pH, EC, turbidity, TDS, hardness, chlorides, salinity, DO, BOD, COD, nitrates, phosphates, sulphates, heavy metals and organic contaminants. Microbiological analysis – MPN.

Drinking water treatment: Coagulation and flocculation, Sedimentation and Filtration, Disinfection and Softening. Wastewater Treatment: Primary, Secondary and Advanced treatment methods. Common effluent treatment plant.

NoisePollution

Sources, weighting networks, Measurement and analysis of sound; A weighted sound level, Equivalent sound pressure level (Leq), Noise pollution level (NPL), Sound exposure level (SEL), Traffic noise index (TNI), Noise dose and Noise Pollution standards. Impact of noise and vibrations on human health. Noise control and abatement measures: Active and Passive methods.

Hazardous waste

Types, characteristics and health impacts. Hazardous waste management: Treatment Methods – neutralization, oxidation reduction, precipitation, solidification, stabilization, incineration and final disposal.

Pesticides in public health

History of Insecticides. Definition of various terms. Advantages and disadvantages of chemical control and its utility in vector and pest control. Classification and mode of action of insecticides, chemical Pesticides, Biolarvicides, Insect growth regulators.

References:

- ❖ Begon, M., Harper, J. L. and Townsend, C. R. (2006). *Ecology: Individuals, Populations and communities*. 4th ed. Blackwell science.
- ❖ Leveque, C. (2003). *Ecology: from Ecosystem to Biosphere*. Science Publishers. Inc.
- ❖ Mukherjee, B. (1996). *Environmental Biology*. Tata McGraw-Hill Publishing Comp. Ltd.
- ❖ Odum, E. P. and Barret, G. W. (2005). *Fundamentals of Ecology*. 5th ed. Thompson Brooks/Cole.
- ❖ Ricklefs, R. E. and Miller, G. L. (2000). *Ecology*. 4th ed. W. H. Freeman and Company.
- ❖ Saharia, V. B. (1998). *Wildlife in India*. Natraj Publishers.
- ❖ Santra, S. (2005). *Environmental Science*. New Central Book Agency (P) Ltd.
- ❖ Sinclair, A. R. E., Fryxell, J. M. and Caughley, G. (2009). *Wildlife Ecology, Conservation and Management*. Wiley.
- ❖ Smith, R. L. and Smith, T. M. (2001). *Ecology and Field Biology*. Benjamin Cummings Pearson Education.
- ❖ Stiling, P. (2002). *Ecology- Science and Applications*. 2ND ed. Prentice Hall of India.

- ❖ Andel, J. V. and Aronson, J. (2012). *Restoration Ecology: The New Frontier*. 2ND ed. Wiley-Blackwell.
- ❖ Chapman R. L. and Reiss, M. J. (2000). *Ecology – Principles and Application*. Cambridge Low Price Edition.
- ❖ Colinvaux, P. (1993). *Ecology 2*. John Wiley and Sons, Inc. New York. Eastern economy Edition.
- ❖ Freedman, B. (1989). *Environmental Ecology*. Academic press, Inc.
- ❖ Kormondy, E. J. (2002). *Concepts of Ecology*. 4th Indian Reprint. Pearson Education.
- ❖ Odum, E. P. and Barret, G. W. (2005). *Fundamentals of Ecology*. 5th ed. Thompson Brooks/Cole.
- ❖ Patwardhan, A. D. (2008). *Industrial Waste Water Treatment*. Eastern Economy Edition.
- ❖ Sinclair, A. R. E., Fryxell, J. M. and Caughley, G. (2006). *Wildlife Ecology, Conservation and Management*. 2ND ed. Wiley-Blackwell.
- ❖ Agarwal, S. K. (2009). *Noise pollution*. APH Publishing Corporation.
- ❖ J.S. Singh, S.P. Singh, S.R. Gupta, *Ecology Environment and Resource Conservation*, Anamaya Publishers, F-154/2, Lado Sarai, New Delhi-110030, India.

- ❖ Avinash Tyagi, Climate Change and Global Warming, Rajat Publications 4675/21, Ansari Road, Daryaganj New Delhi- 110002 (India)
- ❖ Upadhyay D.S. , Cold Climate Hydrometeorology, Wiley Eastern Ltd., 4835/24, Ansari Road, Daryaganj, New Delhi- 110002 (India).
- ❖ Jorgen Stenersen (2004). Chemical pesticides, mode of action and toxicology by CRC, Press, London. 6. Cremlyn R. (1979). Pesticides preparation and mode of action. John Wiley and Sons, Ltd., New York.

COURSE CODE: GNPHP- 25

Time: 6 hrs.

1. Preparation of normal diets for infant (Dahl soup).
2. Preparation of normal diets for preschool children (Dalia).
3. Preparation of normal diets for college student (Suji Upma).
4. Preparation of normal diets for pregnant lady and lactating mother (Khicheri with mixed vegetables).
5. Simple staining of bacteria and study of cell types; differential staining: Gram staining
6. Preparation of liquid media (broth) and solid media for routine cultivation of bacteria.
7. Preparation of slant and stab
8. Pure culture techniques: Spread plate, pour plate and streak plate
9. Isolation and enumeration of bacteria from natural source: soil/ water
10. Biochemical tests for characterization: Catalase, Nitrate reduction, Indole production, Methyl red and Voges–Proskauer test
11. Preparation of sanitizer
12. Laboratory records
13. Viva-voce

SEMESTER -III

COURSE CODE: GNPHT- 31

UNIT-1: EPIDEMIOLOGY AND DISEASE ECOLOGY

Principles of Epidemiology:

Concept of disease: Endemic, Epidemic and Pandemic, Acute and Chronic, Communicable and Non-Communicable; Infectious, Contagious, Sporadic and Zoonotic diseases; Epizootic, Enzootic, Vector-Borne, Nosocomial, Opportunistic and Iatrogenic diseases. Infectious disease epidemiology: Infection, Contamination, Infestation; Factors that influence the epidemiology of a disease

Epidemiological methods:

Descriptive studies, analytical studies and experimental studies.

Community water and its management

Source of water, safe drinking water, Etiology and effects of toxic agents, Water-borne diseases (Cholera and Amoebiasis),

Dynamics of Disease transmission

Human reservoir, Animal reservoir, Reservoir of non-living things

Modes of Transmission

Direct, Indirect, Vehicle-borne, Vector-borne, Fomite-borne, Unclean hands and fingers

Climate change and disease transmission

Impact of climate change in disease transmission, Factors affecting the emergence and reemergence of diseases

Disease prevention and control

Controlling reservoir: Early diagnosis Epidemiological investigation

Notification, Isolation, Treatment, Quarantine

Immunization: Active, Passive, Combined passive and active, Chemoprophylaxis, Immunization Schedule

WHO epi schedule, Non-specific measures, Health advice to travellers: Individual, local, National and International

Disinfection

Definitions: Disinfectant, Disinfection, Sterilization, Antiseptic, Asepsis, Sanitizer, Sterile, Hospital Disinfectant, Germicide, Detergent, Cleaning, Deodorant, Properties of ideal disinfectant, Types of disinfection

UNIT-2: PARASITOLOGY**Definitions and concept on:**

Parasites, vectors, hosts, carriers, mechanical transmitters

Protozoology

Classification of parasitic Protozoa

Intestinal Sarcodina and Flagellates

General account, morphology, life cycle, pathogenicity and control of *Entamoeba histolytica* and *Giardia lamblia*

Haemoflagellates

Morphological stages, life cycle, clinical features and control of *Trypanosoma cruzi* and *Leishmania donovani*, *Haemosporina*

Malarial parasites

Morphology, life cycle, clinical features, treatment, Prevention and control of *Plasmodium vivax*, Epidemiology, natural and acquired immunity

Helminthology

Classification of parasitic helminthes

General characteristics of the Cestoda, Trematoda and Nematoda

Morphology, life history, pathogenicity and control

Paragonimus westermani, *Schistosoma haematobium*, *Diphyllobothrium latum*, *Taenia saginata*, *Trichinella spiralis*, *Wuchereria bancrofti*

References:

- ❖ Norell SE (1998): Workbook of Epidemiology. Oxford: University Press, New York.
- ❖ Owen AY and Frankle RT (1986). Nutrition in the Community, The Art of Delivering Services, 2nd Edition, Times Mirror/Mosby.
- ❖ Park K (2009). Park's Textbook of Preventive and Social Medicine, 20th Edition, M/s Banarasidas Bhanot, Jabalpur.
- ❖ Roday, S. (1999) Food Hygiene and Sanitation. 1st Edition, Tata McGraw Hill, New Delhi.
- ❖ Saha A, Shattock F, Mustafa T. Epidemiology in Primary Health Care. The McGrawHill Companies.
- ❖ Berg, A. (1973) The Nutrition Factor, The Brookings Institution, Washington.
- ❖ Bonita R, Beaglehole R, Kjellstrom (2006) Basic Epidemiology. Second Edition.
- ❖ Frank G.C. (2008) Community Nutrition-Applying epidemiology to contemporary practice. Second Edition. Jones and Bartlett Publishers.
- ❖ Gibney M.J., Margetts, B.M., Kearney, J. M. Arab, I., (Eds) (2004) Public Health Nutrition, NS Blackwell Publishing.
- ❖ Bird, A. F. (1971). *The structure of Nematodes*. Academic Press, New York.
- ❖ Bogitsh, B. J. and Cheng, T. C. (2000). *Human Parasitology*. 2nd Ed. Academic Press, New York.
- ❖ Bogitsh, B. J., Carter, C. E. and Oltmann, T. N. (2006). *Human Parasitology*. 2nd Ed. Academic Press, New York.
- ❖ Cheng, T. C. (1986). *General Parasitology*. 2nd ed. Academic Press, Inc. Orlando. U.S.A.
- ❖ Hati, A. K. (2001). *Medical Parasitology*. Allied Book Agency, Kolkata.
- ❖ Hyman, L. H. (1951). *The Invertebrates*. (Vols- II, III) Mc.GrawHill Book Company.
- ❖ Noble, E. R. and Noble G. A. (1989). *Parasitology. The Biology of animal Parasites*. 6th ed. Lea and Febiger, Philadelphia.
- ❖ Roberts, L. S. and Janovy, Jr. J. (2006). *Foundations of Parasitology*. McGraw-Hill International Ed.
- ❖ Schmid, G. D. (1989). *Essentials of Parasitology*. Wm. C. Brown Publishers (Indian Reprint; 1990. Universal Book Stall).
- ❖ Smyth, J. D. (1994). *Animal Parasitology*. 3rd ed. Cambridge University Press.
- ❖ Soulsby, E. J. L. (1982). *Helminths, Arthropods and Protozoa of domesticated animals*. ELBS and Bailliere Tindall.
- ❖ Smyth, J. D. and McManus, D. P. (1989). *The Physiology and Biochemistry of cestodes*. Cambridge Univ. Press.

COURSE CODE: GNPHT- 32

UNIT 1: ANTHROPOMETRY

Basic tools for anthropometry

Weight for age, height for age, weight for height of different age groups
Body Mass Index (BMI), Mid upper circumference, head circumference
chest circumference of different age groups
Body fat assessment in different zone
Muscle mass assessment, waist hip ratio and its importance
Skinfold thickness in different age group
Resting energy expenditure from height, weight and others parameters

Nutritional assessment of children

Management of severe acute malnutrition in children
Feeding problems of children with special health care needs – cleft palate, craniofacial anomalies, neurodevelopmental disorders

UNIT-2: BIOCHEMICAL ASSESSMENT

Body composition and Biochemical Assessment

Fat mass index, muscle mass index
Bone density T score Z score, Water Index
Methods of calculation of body composition
Bioimpedance and its application in BCM analysis
Biochemical parameters of nutritional status
Indicators of protein-energy status, Indicators of PEW, Anemia
Bio chemical indicators for Immune dysfunction
Biochemical indicators for CVD risk and oxidative stress
Urine and stool analyses.

Assessment of Nutritional Status

Subjective Global Assessment (SGA)

References:

- ❖ Heyward, VH; Wagner DR. ,Applied body Compositon Assessment (2009), Human Kinetic.
- ❖ Cameron N. (1984). The measurement of Human Growth. Croom Helm Ltd. London and Sydney.
- ❖ Curry KA & Jaffe A (1998) Nutrition Counseling Skills & Communication Skills.WB Saunders & Co.
- ❖ Gibney MJ, Elia M, Ljungqvist & Dowsett J. (2005) Clinical Nutrition. The Nutrition Society Textbook Series. Blackwell Publishing Company
- ❖ Gibson R S. (2005). Principles of Nutritional Assessment. 2nd ed. Oxford University Press.

- ❖ Hickson JH (2000) Nutrition for Exercise & Sport. CRC Press. 2nd Edition
- ❖ Harrison, GA; Tanner, JM; Pilbeam, DR; Baker PT (1988). Human biology: An introduction to human evolution, variation, growth & adaptability, Oxford, England, Oxford University Press.
- ❖ Cameron Noel (2002). Human growth and development, St. Louis, Academic Press.
- ❖ Mahan, L. K. and Escott Stump. S. (2008) Krause's Food & Nutrition Therapy 12th ed. Saunders-Elsevier
- ❖ Bogin, Barry (1999). Patterns of human growth, Cambridge University Press.
- ❖ Johnson, FE, Roche, AF, Susanne, C, (1980). Proceeding on Human Physical Growth and Maturation, Plenum Publishing Corporation.
- ❖ Shils, M.E., Shike, M, Ross, A.C., Caballero B and Cousins RJ (2005) Modern Nutrition in Health and Disease. 10th ed. Lipincott, William and Wilkins.
- ❖ Snetselaar LG (2009) Nutrition Counseling Skills for the Nutrition Care Process. James & Bartlett Pub.
- ❖ WHO (2006). WHO Child growth standards: Length/height for age, weight for age, weight for length, weight for height and body mass index (2006). Available at [http:// www.who.int](http://www.who.int).
- ❖ WHO (2007). WHO Reference Data for Children and Adolescents (5-19 years). WHO reference. Available at <http://www.who.int/growthref/en/>
- ❖ WHO (2009). WHO Child growth standards: Growth velocity based on weight, length and head circumference Available at <http://www.who.int>

COURSE CODE: GNPHT-34A

UNIT-1: BASIC STATISTICS

Basic statistical methods

Data and its importance, Collection of data, Data keeping and its type

Mean, median and mode

Standard deviation

Coefficient of variation

Standard error of the mean

Statistical tests

Parametric tests of difference: T test

ANOVA and post hoc analysis of significance

Parametric tests of association: Pearson's product moment r

Non-parametric tests of difference: Mann-Whitney, Sign, Median, and Kruskal –Wallis

Non-parametric tests of association: Spearman's r

Chi square test

Computer Applications Software

EXCEL

SPSS

UNIT-2: VITAL STATISTICS:

Measuring the occurrence of disease

Measures of morbidity - prevalence and incidence rate

Association between prevalence and incidence, uses of prevalence and incidence, problems with incidence and prevalence measurements

Measurement of rate of a disease in a population:

Attack rate, morbidity rate, mortality rates and ratios

Standardized mortality ratio, proportion, two by two tables

Dose response

Diagnostic or screening test

Evaluation

Research methodology

Writing research proposal and report, Purpose of a proposal/report. Content of proposal/report, Critical review of research report and journal article. Introductory section, methodology adopted, Development of research tools. Protocol preparation

Analysis and inferences. Summary, conclusions and recommendations.

References/Bibliography, Appendices, Footnotes

References:

- ❖ Argyrous, G. (2000). Statistics for Social and Health Research. London: Sage.
- ❖ Bernard, H.R. (2000). Social Research Methods: Qualitative and Quantitative Approaches. Thousand Oaks, Ca: Sage.
- ❖ Minium, E.W., King, B.M., & Bear, G. (1995/2004). Statistical Reasoning for Psychology and Education. New York: Wiley and Sons.
- ❖ Mujis, D. (2004). Doing Quantitative Research in Education with SPSS. London: Sage.
- ❖ Salkind, N. (2000). Statistics for People Who (they think) Hate Statistics. London: Sage.
- ❖ D.N. Elhance, Veena Elhance, B.M. Fundamentals of Statistic, Aggarwal, Kitab Mahal, 22-A, Sarojini Naidu Marg, Allahabad.
- ❖ J.N. Kapur, H.C. Saxena, Mathematical Statistics, S. Chand & Company Ltd., Ram Nagar, New Delhi-110055.
- ❖ S. Singh, Theory and Analysis of Sample Survey Design, New Age Enterprises Ltd.
- ❖ Medhi, J., Statistical Methods- An Introductory Text, New Age Enterprises Ltd.
- ❖ Mukhopadhyay, P. (1999): Applied Statistics, Books and Allied (P) Ltd.
- ❖ Goon, A.M., Gupta, M.K. and Dasgupta, B. (2008): Fundamentals of Statistics, Vol. II, 9th Edition, World Press.
- ❖ Biswas, S. (1988): Stochastic Processes in Demography & Application, Wiley Eastern Ltd.
- ❖ Keyfitz, N and Caswell. H (2005): Applied Mathematical Demography (3rd edition), Springer.
- ❖ Chattopadhyay, A.K. and Saha, A.K. (2012): Demography: Techniques and Analysis, Viva Books.
- ❖ Ramakuar, R. and Gopal, Y.S. (1986): Technical Demography. Wiley Eastern Ltd.
- ❖ Spiegelman M. (1980): Introduction to Demography, Harvard University Press.

- ❖ Mishra B.D. (1980): An Introduction to the Study of Population, South Asian Pub
- ❖ Altman D G: Practical Statistics for Medical Research, London: Chapman and Hall, 2006.
- ❖ Rosner B: Fundamentals of Biostatistics, ed. 6, 2006.
- ❖ Dunn G, Everitt B: Clinical Biostatistics: An Introduction to Evidence-based Medicine. Edward Arnold, 1995

COURSE CODE: GNPHT-34B

UNIT-1: BIOINFORMATICS

Basic concept of Bioinformatics

Objectives, applications and challenges in Bioinformatics

Major databases & tools

Sequence alignment and annotation

Phylogenetic tree and Phylogenetic analysis.

Proteomics – protein structure prediction

Current status of Bioinformatics in India

Tools in Bioinformatics,

Online Analysis Tools & Servers

PDB, SWISS-PROT

Homology Tools –BLAST, FASTA

Multiple Alignment-CLUSTAL

UNIT-2: NEUTRIGENOMICS

Basic concept on Genomics and Proteomics

Principle and applications of Nutrigenomics

Principle and applications of Pharmacogenomics

Nutritional regulation of gene expression

Role of specific nutrient in controlling gene expression.

Relation between food and medicine in controlling of diseases.

References:

- ❖ Attwood TK et al. (2007). *Introduction to Bioinformatics*. 1ST ed. Pearson Education.
- ❖ Bailey, N. T. J. (1995). *Statistical Methods in Biology*. 1st ELBS ed.
- ❖ Boyer, R. (2000). *Modern Experimental Biology*. Pearson Education. English Universities Cambridge Lowprice Ed.
- ❖ Das S.(2006). *Unix – Concepts and Applications*. Tata McGraw-Hill.
- ❖ Forthofer, N. and Lee, E. S. (2006). *Introduction to Biostatistics: A Guide to Design, Analysis and Discovery*. Academic Press.
- ❖ Kanetkar Y. P. (2008). *Let Us C*. 8th ed. Infinity Science Press.
- ❖ Lipschutz, S (2011). *Data structure with C*. 1st ed. McGraw Hill Education (India) Private Limited.
- ❖ Selvin, S. (2004). *Biostatistics: How it works?* Pearson Education.

- ❖ Sinha P. K. and Sinha P. (2011). *Computer Fundamentals*. 6th ed. Bpb Publications.
- ❖ Sokal, R. R. and Rohlf, F. J. (1995). *Biometry: the principles and practice of statistics in biological research*. 3rd ed. W. H. Freeman and Company, New York.
- ❖ Zar J. H. (1999). *Biostatistical Analysis*. 3rd ed. Pearson Education (India) Ltd.
- ❖ Journal Nutrients 2012, 4, 1898-1944; Molecular Nutrition Research—The Modern Way Of Performing Nutritional Science.
- ❖ Journal Nutrients 2013, 5, 32-57; Nutrigenetics and Metabolic Disease: Current Status and Implications for Personalized Nutrition
- ❖ Lesk, A.M. (2009). *An Introduction to Bioinformatics*. Ed 2. Oxford Principles of Gene Manipulation
- ❖ R.W. Old and S. B Primrose, *An Introduction to Genetic Engineering* 6th edition, Blackwell Science Inc.
- ❖ Andreas D. Baxevanis and B.F. Fancis Ouellette (2002). *Bioinformatics: A practical guide to the analysis of genes and proteins* 2ND edition Wiley Interscience.
- ❖ David Freifelder, George Malacinski. (2005). *Essentials of Molecular Biology*. - 4th edition.
- ❖ David Webster. (2000). *Protein Structure prediction: Methods and Protocols*, Human Press.
- ❖ T. A. Brown. (2006). *Genomes*, 2ND edition, Garland Science publisher

GNPHP- 35: PRACTICAL

1. Anthropometry: Height, weight, circumference of chest, Mid-upper arm circumference.
2. COMPARISON with norms and interpretation of the nutritional assessment data and its significance-Weight forage, height forage, weight for height,
3. Body Mass Index (BMI,) Waist-Hip Ratio (WHR).
4. Diet Chart preparation of a person suffering from Protein Energy Malnutrition.
5. Diet Chart preparation for fevers and infections.
6. Diet Chart preparation of a person suffering from Gastrointestinal disease, Liver-disease, Diabetes, Heart-disease, Kidney disease
7. Drawing and staining of blood films for parasitic Protozoa and microfilaria
8. Whole mount preparation of trematode and arthropod parasites
9. Staining of scolex and proglottids of cestodes
10. Whole mount preparation of mosquito vectors (*Anopheles*, *Culex* and *Aedes*)
11. Identification of parasites and vectors (Slides/ Photographs)
12. Retrieval of parasite nucleic acid /protein sequence from Nucleic acid/Protein Data Base/Parasite Data-Base, Alignment of parasite DNA /Protein sequence
13. Submission of Laboratory Records
14. Viva-voce

SEMESTER-IV

COURSE CODE: GNPHT-41:

UNIT-1: MEDICAL ENTOMOLOGY AND VECTOR BIOLOGY

Mosquitoes of public health importance:

Life cycle, mating, host seeking, feeding, resting, oviposition behaviour – longevity, gonotrophic cycle, fecundity. Salient features and distribution of important vector species of *Anopheles* (*An. stephensi*, *An. culicifacies*, *An. fluviatilis*), *Aedes* (*Ae. aegypti*, *Ae. albopictus*), *Culex* (*Cx. quinquefasciatus*, *Cx. tritaeniorhynchus*), *Mansonia* (*Ma. annulifera*, *Ma. uniformis*).

Sand flies

Salient features and distribution and medical importance of *Phlebotomus*

Medical importance:

Fleas, Black fly, Bed bugs, Head louse, Body louse, Ticks and Mites

Life-cycle, pathogenesis and control of vector borne diseases:

Malaria, Lymphatic filariasis, Dengue and Japanese Encephalitis

UNIT-2: VECTOR -CONTROL

Vector Ecology and Population Dynamics

Introduction to vector ecology and Ecosystem, habits and habitat – Population interaction with abiotic and biotic factors – dispersal and migration; natality, mortality, survivorship

Vector control by Biological agents

Animal predators, Larvivorous fish and plant extracts and plant derived oils.

Vector-Parasite and Vector-Microbe interaction

Mosquito –Plasmodium interaction, Mosquito-Wuchereria interaction

Symbiotic association of microbes with vectors. Insect-pathogen relationship

Factors affecting the pathogenicity of insect vectors

Vector control by Microbial pesticides

General properties, types and properties of toxins and mode of action of *Bacillus thuringiensis*, *Bacillus sphaericus*

Role of nuclear polyhedrosis virus and plant extracts as controlling agents of vectors

Endosymbionts and their significance

Wolbachia and its significance

References:

- ❖ Laird, M. (1988). The natural history of larval mosquito habitats. Academic Press Ltd., New York.
- ❖ Marquardt, W.C. (2005). Biology of disease vectors (2ND Edition). Doody Enterprises, Inc., USA.

- ❖ Mullen, G. and Durden L. (2009). Medical and veterinary entomology, Academic press, London ISBN 0 12 510451 0.
- ❖ Nicholas R. H. Burgess. (1981). Arthropods of Medical importance, Published by Noble Books Ltd. Hampshire.
- ❖ Rao, T. R. (1984). The Anophelines of India. Malaria Research Centre, ICMR, New Delhi
- ❖ Harwood R.F. and James M.T. (1979). Entomology in Human and animal health. Macmillan Publishing Co., Inc, London; 7 Ed pp 548.
- ❖ Imms, A. D. (1977). A general text book of Entomology. ELBS, London
- ❖ Service M. W. (1996). Medical Entomology for students. Chapman & Hall, London.
- ❖ Service, M. W. (1984). Mosquito Ecology- Field sampling methods. Applied Science Publishing Ltd., London.
- ❖ Service, M.W. (1993). Mosquito Ecology- Field sampling methods. Chapman & Hall, New York.
- ❖ Smith, T.M. and Smith, R.L. (2006) Element of Ecology. Ed 6. Peassion.
- ❖ Rozendaal, J.A. (1997). Vector Control - Methods for Use by Individuals and Communities, World Health Organization, Geneva.
- ❖ World Health Organization, (1989). Geographical distribution of arthropod-borne disease and their principal vectors, WHO/VBC/89.967, Geneva.
- ❖ World Malaria Report (2010). WHO, Geneva.
- ❖ Sustainable Development and Health for all: Building the capacity of National Health authorities, WHO – SEARO, 1999, No.30.

COURSE CODE: GNPHT-42

UNIT-1: CELL BIOLOGY AND IMMUNOLOGY

Cell Theory and Introduction to Cell Biology

History and breakthroughs in cell biology

Properties and behaviour of cells, diversity of cell types

Differences and similarities in the basic structure and functioning of prokaryotic and eukaryotic cells

Biological membrane

Composition of biological membranes: Lipids and lipid modification, membrane proteins

Functions of cell membrane

Cell organelles

Structure, function and diseases associated with cell organelles such as nucleus, mitochondria, ER, Golgi

Cells and organs of the immune system:

Leucocytes, APC, Macrophage-cell and B-cell, Mastcell, Dendritic cell and APC, NK cells

Structure and Function of MHC.

Types of antigen and antibodies:

Definition and properties of antigenic determinants of immunoglobulin (Isotype, allotype & idiotype) Structure, classes and biological activities of antibodies

Antigenic determinants

Types of immune response:

Innate and acquired Immunity, Humoral and Cellular Immunity

Vaccination and Immunization schedule:

Types of vaccines

National immunization schedule

UNIT-2: GENETICS

Basics of Nucleic acid structure & Function

Structure of DNA & RNA

DNA Replication, Transcription, Translation

Gene expression and regulation

Genome of plasmid and mitochondria

Gene transfer in microorganisms: conjugation, transformation and transduction

Genetic disorders and Twin Study and Gene therapy

Monogenic diseases – Thalassemia, Albinism, Hemophilia, Colour blindness, Polygenic diseases- Hyperlipidemia, Diabetes mellitus

Genetic basis of Myocardial Infarction, Genetic basis of neurodegenerative disorders

Techniques in Genomic study

Gel Electrophoresis, PCR, ARMS PCR, MLPA, RT-PCR, Sanger sequencing, NGS

Genetic screening and counselling

Prenatal and Post-natal screening of genetic diseases, Amniocentesis, Chronic Villus sampling, Family screening for genetic diseases; Scope and methods of genetic counselling

References:

- ❖ Abbas, A. K., Lichtman, A. H. and Pillai, S. (2006). *Cellular and molecular Immunology*. 6th ed. Saunders.
- ❖ Alberts, B., Johnson, A. Lewis J., Raff, M., Roberts, K. and Walter, P. (2008). *Molecular Biology of the Cell*. 5th Ed. Garland Publishing House.
- ❖ Coico R, Sunshine, G., Benjamini, E. (2003). *Immunology: A short Course*. 5th ed. Wiley-Liss: New Jersey. English, L. S. (1994). *Technological Applications of Immunochemicals (BIOTOL)*. Butterworth- Heinemann, Oxford Freeman and Co.
- ❖ Cooper, G. M. (2004). *The Cell*. 3rd ed. ASM Press.
- ❖ Goldsby, R. A., Kindt, T. J., Kuby, J. and Osborne, B. A. (2003). *Immunology*. 5th ed. W. H. Freeman and Co.
- ❖ Karp, G. (2008). *Cell and Molecular Biology: Concepts and experiments*. 5th ed. John Wiley.
- ❖ Kindt, T., Goldsby, R. Osborne, B. (2007). *Kuby's Immunology*. 6th ed. W.H. Freeman and Co.
- ❖ Phillips, R., Kondev, J. and Theriot, J. (2008). *Physical Biology of the Cell*. Garland Science.
- ❖ Roitt, I. M. and Delves, P. J. (2001). *Roitt's Essential Immunology*. 10th ed. Blackwell Science Ltd.
- ❖ Brown, T. A. (2006). *Genomes 3*. 3rd ed. Garland Science.

- ❖ *Griffiths, A. J. F., Wessler, S. R., Lewontin, R. C. and Carroll, S. B. (2008). Introduction to genetic analysis. 9th ed. W. H. Freeman and Company, New York.*
- ❖ *Hartl, D. L. and Jones, E. W. (2006). Essential Genetics: a genomics perspective. 4th ed. Jones and Bartlett Publishers, Boston.*
- ❖ *Lewin, B. (2008). Genes IX. Jones and Bartlett Publishers.*
- ❖ *Watson, J. D., Baker, T. A. and Bell, S. P. (2007). Molecular Biology of the Gene. 6th ed. Benjamin Cummings.*
- ❖ *Malacinski, G. M. (2003). Essentials of Molecular Biology. 4th ed. Jones and Bartlett.*
- ❖ *McConkey, H. (1993). Human Genetics: The molecular Revolution. Jones and Bartlett Publishers.*
- ❖ *Snustad, D. P. and Simmons. M. J. (2004). Principles of Genetics. 4th ed. John Wiley and Sons.*
- ❖ *Stansfield, W. D. (1991). Schaum's Outline Series: Theory and Problems of Genetics. 3rd ed. McGraw-Hill.*
- ❖ *Strickberger M.W. (1985). Genetics. 3rd ed. Prentice Hall of India Pvt. Ltd., New Delhi.*
- ❖ *Tamarin, R. H. (2004). Principles of Genetics. Tata McGraw-Hill Publishing Comp. Ltd.*
- ❖ *Twyman R.M. (2003). Advanced Molecular Biology. Viva Books.*

COURSE CODE: GNPHT-43

UNIT 1: FOOD MICROBIOLOGY AND FOOD BORNE DISESAES

Milk & Dairy technology:

Pasteurization, homogenization of milk

Manufacture of milk products like condensed and dried milk, cream, butter, ghee, ice cream, cheese, Fortification of milk products.

Fruits & Vegetables processing:

Beverages, soft drinks, fruit juice, wine, bear, vinegar, jam, jelly, marmalade, pickles, sauce

Bread Making

Probiotics

Role of Probiotic bacteria in human and animal health

Food-borne diseases and food poisoning

Mode of transmission, pathogenesis and control of:

Staphylococcal enteritis, Botulism

Bacillus cereus enteritis, Salmonellosis

Shigellosis, *Vibrio* enteritis

Listeriosis, *Escherichia* enteritis

Campylobacteriosis and *Perfringens* enterotoxemia

Prevention measures for food-poisoning and spoilage

Preventing the incorporation of microbes into food

Preventing the survival or multiplication of microbes in food (Temperature and Food Preservation, Irradiation and chemical preservation)

UNIT-2: FOOD TOXICANTS AND FOOD HYGIENE

Food toxicants:

Neuro lathyrisms, Aflatoxins, Ergot, Epidemic dropsy, Endemic ascites, Fusarium toxins

Food allergies:

Clinical manifestations of food allergy:

Food adulteration:

Adulterants in commonly consumed food items, Common adulterants in food and their effects on health, household methods to detect adulterants in food

Sanitation and hygiene

Importance of sanitation and hygiene in food, kitchen hygiene, food plant hygiene, food laws.

Indices of food, milk and water: Sanitary quality, Microbiological criteria of foods, water and milk testing (Bacteriological analysis).

Milk hygiene

sources of infection, Milk-borne diseases, Clean and safe milk, Pasteurization of milk, Tests for pasteurized milk);

Meat hygiene

Meat inspection, slaughter houses), Fish hygiene (Sign of a fresh fish, Fish poisoning)

Hygienic handling of Food

Precaution to be taken while handling pesticides

Food laws:

Prevention of Food Adulteration (PFA) Act. Regulating authority-Fruit Products Order(FPO), Meat Products Order(MPO), Bureau of Indian Standards(BIS) MMPO, FSSAI, ISI, Agmark. Prevention of Food Adulteration Act (PFA), Milk and Milk Products Order (MMPO), Meat Food Products Order (MFPO), Fruits Products Order (FPO).

References:

- ❖ Kent N L.(1993) Technology of Cereals. 4th Edi. Pergamon Press.
- ❖ Olson, V M; Shemwell G A and Pasch, S (1998) Egg and Poultry Meat Processing, VCH P, New York
- ❖ Winton & Winton, (1991) Techniques of Food Analysis. Allied Scientific Publishers.
- ❖ Fellows P J (2002), Food Processing Technology- Principles and Practices, 2ND Edition. Woodhead Publishing Ltd. port.
- ❖ Fennema O R, (1985), Principles of Food Science: Part- II Physical Principles of Food Preservation. Marcel Decker New York
- ❖ Peter S. Murano (2003), Understanding Food Science and Technology. Peter Marshall Publisher.
- ❖ Rahman M S, (2007) Handbook of Food Preservation 2ND Edition by Taylor & Francis Group, CRC Press
- ❖ Banwart GJ (1987) Basic Food Microbiology. CBS Publishers and Distributors.

- ❖ Frazier WC, Westoff DC. (1998) Food Microbiology. 4th ed. Tata McGrawHill Publishing Co. Ltd.
- ❖ Jay JM, Loessner DA, Martin J. (2005) Modern Food Microbiology. 7th ed. Springer.
- ❖ Prescott LM, Harley JP, Klein DA. (2008) Microbiology. 6th ed. WMC Brown Publishers.
- ❖ Schmidt, RH. Roderick, Food Safety Handbook, G.E. Wiley interscience, 2003, New Jersey.
- ❖ Siddapa, G S(1986) Preservation of Fruits and Vegetables, ICAR Publication
- ❖ Van Loesecke HW (1998), Food Technology Series Drying and Dehydration of foods. Allie Scientific Publishers
- ❖ Salikhe D K and Kadam S S(1995), Handbook of fruit science and technology. Production Composition, Storage and processing. Marcel Decker inc, New York
- ❖ Marriott N G (1985), Principles of Food Sanitation 1ST Edition. A VI publication USA.
- ❖ Fuller, G.W. (1999) New Food Product Development. From concept to market place. CRC press, New York.
- ❖ Graf E and Saguy I S, (1991) Principles and practices for the safe processing of foods. Butterw Heinemann Ltd., Oxford.
- ❖ Mahindru, S N (2000) Food Additives- Characteristics Detection and Estimation. Tata Mc Graw Hill Publishing Co. Ltd

COURSE CODE: GNPHT-44

UNIT-1: SOCIAL MEDICINE

History of Social Medicine and Community Health

History of public health and its milestones

Comprehensive health care. Social development and health

Dimensions and determinants of health.

Concepts and indicators of health and wellbeing natural history of disease

Levels of prevention, globalization and its impact on health

Roles and responsibility of state, community and private sector in health

Social sciences and health

Definition, scope, concepts and significance of social, economic, cultural and behavioral factors on health and disease

Social theories of causation of disease

Implications of social structure and socio-economic status for health

Political and economic aspects of health

Health perceptions and behavior

Health economics.

Qualitative research methodology

Social work approach in health care

UNIT-2: RURAL HEALTH

Sanitation & Water Supply

Problem in environmental sanitation

Introduction to rural ecology and environment, housing ventilation

Drinking Water Disposal of human, animal waste

Drinking Water

Physicochemical and microbiological analysis of the quality of water

Methods of infection of water and mode of transmission of water-borne diseases

Rural water supply schemes & their implementation

Various appropriate technology for providing potable drinking water

Rural Waste Management

Necessity of Systematic collection and disposal of waste

Brief description of sewage disposal system sewerage system

References:

- ❖ S.B Verma, S.K. Jiloka, A.C. Pathak, Rural Health Care and Housing, Deep & Deep Pub. New Delhi
- ❖ G.K. Ghosh, Water of Inida (Quality and Quantity), APH Publishing, New Delhi
- ❖ M. Dinesh Kumar, Water Management in India, Gyan Publishing House, New Delhi
- ❖ Rajiv K. Sinha, Er. Ambuj K. Sinha, Waste Management, INA Shri Publisher, Jaypur
- ❖ U.S. Sree Ramulu, Management of Water Resources in Agriculture, New Age International Publisher, N. Delhi
- ❖ Suresh Sharma, Health Problems of Rural Population in India, APH Publishing corporation N. Delhi

COURSE CODE: GNPHP- 45:

Project proposal writing / Review Paper

Term Paper / Project work and Dissertation

Seminar Presentation [Presentation + viva]