

**VIMALA COLLEGE (AUTONOMOUS)**  
**THRISSUR**  
**(Affiliated to University of Calicut)**



**M Sc DEGREE PROGRAMME IN**  
**HOME SCIENCE**  
**(NUTRITION AND DIETETICS)**  
**CREDIT AND SEMESTER SYSTEM (CSS-PG 2010)**

**SYLLABUS**  
**2016 ADMISSION ONWARDS**



## M SC HOME SCIENCE (NUTRITION AND DIETETICS)

### COURSE STRUCTURE AND SCHEME OF EXAMINATION UNDER CSS

SI No	CORE COURSE	TITLE OF THE COURSE	INSTRUC TION HRS/WK		CREDI T	EXAM HRS	SCEME OF EVALUATION	
			T	P			EE weight (75%)	IE weight (25%)
I	VPND1 C01	HUMAN PHYSIOLOGY	4		4	3	3	1
	VPND1 C02	NUTRITION THROUGH LIFE CYCLE	5		4	3	3	1
	VPND1 C03	ADVANCED FOOD SCIENCE	6		4	3	3	1
	VPND1 C04	MACRO NUTRIENTS	4		4	3	3	1
	VPND1 C05	RESEARCH METHODS & STATITICS	6		4	3	3	1
	<b>TOTAL</b>		<b>25</b>		<b>20</b>			
II	VPND2 C06	FUNCTIONAL FOODS AND NEUTRACEUTICALS	4		4	3	3	1
	VPND2 C07	FOOD SERVICE MANAGEMENT	5		4	3	3	1
	VPND2 C08	CLINICAL AND THERAPEUTIC NUTRITION	6		4	3	3	1
	VPND2 C09	NUTRITIONAL MANAGEMENT IN LIFE STYLE DISEASES	6		4	3	3	1
	VPND2 PL1	PRACTICAL- CLINICAL AND THERAPEUTIC NUTRITION		4	4	3	3	1
	<b>TOTAL</b>		<b>25</b>		<b>20</b>			
III	VPND3 C10	VITAMINS AND MINERALS	6		4	3	3	1
	VPND3 C11	COMMUNITY NUTRITION	6		4	3	3	1
	VPND3	PAEDIATRIC NUTRITION	6		4	3	3	1

	C12							
	VPND3 E11	<b>ELECTIVE COURSES</b> NUTRITIONAL COUNSELLING AND EDUCATION ENTREPRENEURIAL DEVELOPMENT FOOD PRESERVATION	3		4	3	3	1
	VPND3 E12							
	VPND3 E13							
	VPND3 PL2	HOSPITAL INTERNSHIP AND COMMUNITY NUTRITION EDUCATION PROGRAMME		4	4	3	3	1
	<b>TOTAL</b>		<b>25</b>		<b>20</b>			
IV	VPND4 C13	METABOLIC AND BIOCHEMICAL CHANGES IN DISEASES	6		4	3	3	1
	VPND4 PL3	PRACTICAL- METABOLIC AND BIOCHEMICAL CHANGES IN DISEASES		4	4	3	3	1
	VPND4 E21	<b>ELECTIVE COURSE</b> DIABETIC CARE AND MANAGEMENT FOOD SAFETY AND QUALITY CONTROL PUBLIC NUTRITION AND HEALTH	5		4	3	3	1
	VPND4 E22							
	VPND4 E23							
	VPND4 PR	PROJECT		10	4		3	1
	VPND4 V	VIVA VOCE			4		3	1
<b>TOTAL</b>			<b>25</b>		<b>20</b>			
<b>TOTAL CREDITS (CORE, ELECTIVES,PROJECT AND VIVA)</b>			<b>80</b>					

## GRADING AND EVALUATION

### (1) Minimum Credits for pass

Accumulated minimum credit required for successful completion of the course shall be 80.

(2) A **project work** of 4 credits is compulsory and it should be done in III & IV semesters. Also a comprehensive Viva Voce may be conducted by external examiners at the end of IV Semester and carries 4 credits.

### (3) Evaluation and Grading:

All grading starting from the evaluation of papers is done on 5 point scale (A, B, C, D, E) and SGPA and CGPA – between 0 to 4 and in two decimal points. An overall letter grade (Cumulative Grade) for the whole programme shall be awarded to the student based on the value of CGPA using a 7-point scale given below.

#### Overall Grade in a Programme

CGPA	Overall Letter Grade
3.80 to 4.00	A+
3.50 to 3.79	A
3.00 to 3.49	B+
2.50 to 2.99	B
2.00 to 2.49	C+
1.50 to 1.99	C
1.00 to 1.49	D

### (4) Weightage of Internal and External valuation:

The evaluation scheme for each course shall contain two parts (1) internal evaluation (2) external evaluation. Its weightage are as follows:

<b>Evaluation</b>	<b>Weightage</b>
Internal	1 (or 25%)
External	3(or 75%)

Both internal and external evaluation will be carried out using Direct Grading System

**A) Theory: Every Semester**

Pattern of question Paper -**External marks distribution**

Division	Type	No. of Questions	Weightage	Total Weightage
Part A	Short Answer	10 out of 12	1	10
Part B	Short Essay	6 out of 8	3	18
Part C	Essay	2 out of 4	4	8
<b>Total Weightage</b>				<b>36</b>

**Internal marks distribution**

Sl.No	Criteria	Weightage
1	Attendance	<b>1</b>
2	Assignments	1
3	Seminar	1
4	Test papers-2-	2
<b>Total</b>		<b>5</b>

**B) PRACTICAL**

**Internal marks distribution**

Sl.No	Criteria	Weightage
1	Attendance	1
2	Performance	1
3	Record	1
4	Class test (2)	2
<b>Total</b>		<b>5</b>

**External marks distribution****VPN2PL1 PRACTICAL –CLINICAL AND THERAPEUTIC NUTRITION**

<b>Sl . No</b>	<b>Criteria</b>	<b>Weightage</b>
1	Presentation	8
2	Taste and Serving	2
3	Time and Cleanliness	2
4	Principle	4
5	Menu Plan	6
6	Calculation	4
7	RDA	4
8	Record	6
<b>TOTAL</b>		<b>36</b>

**VPND3 PL2 HOSPITAL INTERNSHIP AND COMMUNITY NUTRITION EDUCATION PROGRAMME**

<b>Sl . No</b>	<b>Criteria</b>	<b>Weightage</b>
1	Performance in Hospital Internship	15
2	Weekend Hospital Training	6
3	Report and Presentation	5
4	Community Nutrition Camp	8
5	Community Nutrition Camp-report	2
<b>Total</b>		<b>36</b>

**VPND4 PL3 PRACTICAL – METABOLIC AND BIOCHEMICAL CHANGES IN DISEASES**

<b>Sl . No</b>	<b>Criteria</b>	<b>Weightage</b>
1	Principle	4
2	Procedure	6
3	Calculation	4
4	Graph	4
5	Result	6
6	Record	6
7	Viva	6
<b>Total</b>		<b>36</b>

## VPND4 PR -PROJECT

### Internal Marks distribution

Sl.No	Criteria	Weightage
1	Initiative	1
2	Interest in Research	1
3	Regularity	1
4	Efficiency	1
5	Writing Skills	1
Total		5

### External marks distribution

Sl.No	Criteria	Weightage (Total 36)
1	Choice of the topic	1
2	Introduction and Objectives	2
3	Review of literature	5
4	Methodology	8
5	Results and Discussion	8
6	Summary and conclusion	4
7	Bibliography	4
8	Abstract	2
9	Over all	2

## VPND4V- Viva Voce

### Internal Marks distribution

Sl.No	Criteria	Weightage
1	Preparation	1
2	Presentation	2
3	Knowledge	2
4	Total	5

### External marks distribution

Sl.No	Criteria	Weightage
1	Preparation	10
2	Presentation	10
3	Knowledge	16
4	<b>Total</b>	<b>36</b>



**SEMESTER I**  
**VPND1 C01 HUMAN PHYSIOLOGY**

**Hours per week: 4**

**Credit: 4**

**Objectives**

1. To enable students to understand the metabolic changes in health and different disease conditions.
2. Gain knowledge about the relationship between nutrition and human system.

**UNIT I BLOOD**

Blood and its composition, Functions and structure of each constituents of blood, Formation and Destruction, Blood group, Rhesus factor, Erythroblastosis foetalis, ESR, Hemostasis.

**UNIT II CARDIOVASCULAR SYSTEM**

Structure and Functions of Heart. Blood vessels and its type, Special conducting tissues of Heart, Properties of cardiac muscle, Heart rate. Cardiac cycle, Heart sound, Cardiac output, Pulse, Tachycardia and Bradycardia. ECG & its significance. Hemorrhage, compensatory changes after hemorrhage. Blood Pressure, Cardio vascular modification during exercise. Different types of circulation- foetal circulation, pulmonary, hepatic, capillary. Techniques to identify cardiovascular disorders –angioplasty, angiogram.

**UNIT III RESPIRATORY SYSTEM**

Organs & functioning, Mechanism of respiration, Gaseous exchange in lungs and tissues. Composition of inspired and expired gas, Regulation of respiration, Lungs volumes and capacities. Apnea, Hypoxia, dyspnea, asphyxia, hyperpnoea, Resuscitation and its methods.

**UNIT IV DIGESTIVE SYSTEM**

Structure and functions of Alimentary tract (Mouth, Stomach, Small Intestine, Large Intestine), Functions and composition of various secretions and juices- Saliva, Gastric, Bile, Intestinal, Pancreatic secretion. Mechanism of swallowing, Phases of secretion of

digestive juices and its regulation, movements of gastrointestinal tract, defecation, Regulation of appetite.

Liver, gall bladder, pancreas, spleen – anatomy & physiology Functions of bile salts.

## **UNIT V URINARY SYSTEM**

Structure and functions of kidney, structure of nephron, Urine formations, GFR, composition of normal and abnormal urine, regulation of reabsorption, Role of Kidney in maintaining pH of Blood, Acid base balance, Micturition and its regulation

## **UNIT VI NERVOUS SYSTEM**

Structure of neuron, conduction of nerve impulse, nervous transmission, synapse, reflex action, classification of nervous systems (only the parts and general functions- CNS and SNS), common test in neurological disorders- EEG , EMG, MRI, NCV

## **UNIT VII ENDOCRINE SYSTEM**

Endocrine glands, secretions, functions, regulation of secretions.

## **UNIT VIII REPRODUCTIVE SYSTEM**

Male Reproductive system (structure, functional anatomy, and spermatogenesis) and female reproductive system (structure, functional anatomy, Oogenesis). ovarian and uterine cycle's, puberty, menarche, menopause, fertilization, conception, implantation.

Male and female contraception's- Etiology of male and female infertility

## **RELATED EXPERIENCE**

1. Measurement of pulse and blood pressure.
2. Demonstration of blood group determination.
3. Microscopic examination of blood.

## **REFERENCES**

1. Chatterjee.C.C, Human Physiology (11th edition), vol 1 & 2, Medical Allied Physiology (2016).

2 Guyton and Hall Textbook of Medical Physiology, 12e (Guyton Physiology), by John E. Hall PhD (Author) , Hardcover – Import, Publishers- Saunders; 12 edition 19 Jul 2010

3. Ross and Wilson Anatomy and Physiology in Health and Illness: With access to Ross & Wilson website for electronic ancillaries and eBook, Publisher: Churchill Livingstone; 11 edition, 2010

## **SEMESTER I**

### **VPND1 C02 NUTRITION THROUGH LIFE CYCLE**

**Hours per week: 5**

**Credit: 4**

#### **Objectives**

1. Understand the role of nutrition in different conditions.
2. Develop competency in planning diets to meet the nutritional requirements of different socio economic levels.

#### **UNIT I NUTRITION AND DIET IN HEALTH**

Vital link between nutrition and health. Review –concept of adequate nutrition, and malnutrition. Different food groups – guide in menu planning. Balanced diets.

#### **UNIT II NUTRITION IN PREGNANCY**

Physiological changes during Prgnancy, Nutritional need during Pregnancy, Maternal Nutrition and foetal outcome, complications of pregnancy, Management of High risk Pregnancies, LBW babies – causes and complications, tests during pregnancy, prenatal and postnatal care.

#### **UNIT III NUTRITION IN LACTATION**

Physiology of lactation, Malnutrition- effects on milk and effects on mothers, Nutritional requirement and dietary management, .

#### **UNIT IV NUTRITION IN INFANCY**

Nutritional status of the infants, rate of growth as the indicator. Nutritional allowances for the infants, breast feeding Vs formula feeding, food square, weaning foods suitable for infants, feeding the premature infants and LBW infants, interventions to prevent malnutrition.

#### **UNIT V NUTRITION IN PRESCHOOL AGE**

Growth and development of preschool children, food habits and nutrient intake of preschool children. Dietary allowances – supplementary foods, reasons for under 5 MR. Nutritional problems and Interventions to prevent malnutrition.

## **UNIT VI GROWTH AND HEALTH MONITORING**

Growth Monitoring- Importance, Growth Chart- ICDS, WHO. Immunization Schedule

## **UNIT VII NUTRITION DURING SCHOOL AGE**

Physical development, nutritional status of school going children, food habits, nutritional requirements, nutrition and academic performance, Nutritional disorders, interventions to prevent malnutrition.

## **UNIT VIII NUTRITION DURING ADOLESCENCE**

Physical, physiological and psychological changes in adolescents, sexual maturity rating. Nutritional needs, Nutritional Problems, changes needed to prevent malnutrition.

## **UNIT IX NUTRITION FOR THE ADULTS**

Nutrition for the adult-Nutritional requirements according to the mode of activity. Nutrition and health of women-general nutritional problems of women, anemia, osteoporosis, pre and post menopausal syndrome, hormonal changes during menopause .Infertility –risk factors, prevention, methods of detection.

## **UNIT X NUTRITION IN OLD AGE**

Theories of ageing – physiological changes during ageing, changes in body composition, techniques for assessing body composition and Nutritional requirement and Dietary Modifications.

## **UNIT XI NUTRITION IN SPECIAL EVENTS**

**Sports nutrition** – Energy systems, nutritional requirements, carbohydrate loading, role of water and electrolytes, ergogenic aids.

**Nutrition in high altitude**

**Nutrition in Disaster Management-** requirements, major nutritional deficiency diseases in emergency monitoring assessment, surveillance of nutritional status and Relief measures in emergencies.

**Space nutrition** – space food formulation

## **RELATED EXPERIENCE**

Planning diets to meet the requirements at different economic level- low, middle and high income for the following conditions.

1. Pregnancy
2. Lactation
3. Preschool age
4. School age
5. Adolescents
6. Adult
7. Old people
8. Athletes

## **REFERENCES**

1.Mahan.L.K and Stump SE, Krause's Food, Nutrition and Diet Therapy, WB Saunders Company, 10th edition, 2001

**SEMESTER I**  
**VPND1 C03 ADVANCED FOOD SCIENCE**

**Hours per week: 6**

**Credit: 4**

**Objectives**

1. To understand the nutritive value of foods.
2. To understand the principles and chemistry of foods and apply the principles during preparation & cooking

**UNIT I INTRODUCTION TO FOOD SCIENCE**

History and Development of food Science. functions of food .different methods and objectives of cooking

**UNIT II FUNCTIONAL PROPERTIES OF FOODS**

Definition and properties of colloids, solution, sol, gel, emulsion, food dispersion. Enzymes- definition, classification, specificity of enzymes, enzyme inhibition, allosteric enzymes, application of enzymes in food industry. Sensory tests . Types of tests. Procedures for determination and monitoring of shelf life

**UNIT III CEREALS & MILLETS**

Cereal- Structure and composition. Parboiling, germination. Cereal cookery — effect of moist and dry heat, gluten- factors affecting gluten formation, Starch granules structure and characteristics. nonstarch poly saccharides- (fibres,cellulose, hemicellulose, pectic substances,gums, carboxy methyl cellulose(CMC))Application in food industry batters and dough, breakfast cereals , fermented products

**UNIT IV PULSES, NUTS AND OILSEEDS**

Composition, protein foods for infants and children, soy products, protein concentrates and isolates textured vegetable proteins.

## **UNIT V VEGETABLES AND FRUITS**

Classification and Composition Nutritional importance, pigments and acids in vegetables and fruits, effect of cooking on pigments and nutrients. , Ripening , browning reactions- enzymatic and non-enzymatic browning

## **UNIT VI FLESH FOODS**

Composition, post-mortem changes in meat, changes produced during cooking,

Fish – Composition , selection of spoilage, importance of fish.

Egg- Effect of heat on egg proteins, egg foams, and egg products.

## **UNIT VII MILK**

Composition, processing, effect of heat, milk products, cheese making

Microbiology of milk

## **UNIT VIII FATS AND OILS**

Classification of lipids and fatty acids, role of fat in cookery, physical & chemical properties of fat, rancidity, changes of fat on heating, salad dressing.

## **UNIT IX FOOD ADDITIVES AND ADULTERATION**

Food additives Types, Adulteration, Food laws and standards. FSSAI , HACCP, Principles of food packaging and labeling.

## **UNIT X SUGAR**

Properties, sugar related products, crystallization, factors affecting crystallization, crystalline & no- crystalline candies, stages of sugar cookery, artificial sweeteners.

## **UNIT XI EVALUATION OF FOOD QUALITY**

Quality attributes of food – appearance , texture, flavor, colour ,taste.

Subjective evaluation and objective evaluation. Types of sensory evaluation tests

## **UNIT XII EMERGING TRENDS IN FOOD SCIENCE**

GM foods, novel foods, SCP, leaf Protein, Nanotechnology in food industry



## **RELATED EXPERIENCE**

1. Microscopic examination of different starch granules and effect of heat on starch (cake and bread making) Determination of gluten content of different flours
2. Preparation of stable emulsion (mayonnaise)
3. Stages of sugar cookery, crystalline and non-crystalline candies- Fondant, fudge, marshmallow.
5. Preparation of foam and effect of additives on stability, Meringue.
6. Effect of heat on milk / scum formation. Preparation of any 3 products.
- 7 Changes in pigments due to different cooking methods.
8. Enzymatic browning of fruits and vegetables.
9. Sensory evaluation of foods.
10. Product development- preparation and standardization of novel nutritious recipes.
11. Market survey on new processed items available in the local markets.
- 12 microbiological test for foods

## **REFERENCES**

1. Potter, N. Hotchkiss, H.J, Food Science, 5th edition, CBS publishers and distributors, New delhi, 1996.
2. Srilakshmi, B, Food Science, New Age International Pvt. Ltd., Chennai, 2006
3. Beckhan. C.G & Graves.H.J, Foundations of food preparations, Macmillan Publishing Co, New Delhi, 1979.

**SEMESTER I**  
**VPND1 C04 MACRO NUTRIENTS**

**Hours per week: 4**

**Credit: 4**

**Objectives**

1. Obtain depth on the study of major nutrients and
2. Develop competence for undertaking nutritional investigations.

**UNIT I UNDERSTANDING NUTRITION**

Nutrition science: Basic concepts, Latest concepts, Methods for studying the nutrient requirements.

**UNIT II CARBOHYDRATES**

Classification, Properties, Functions, Digestion, & absorption, Food sources & RDA. Metabolism: Glycolysis, gluconeogenesis, TCA cycle, HMP shunt, glycogenesis, glycogenolysis, bioenergetics. Regulation of blood glucose concentration, threshold for glucose, abnormal levels in blood glucose. Glycemic index (Factors affecting GI). Dietary Fiber (Classification, functions) & Resistant starch (Classification, functions) , Modification of carbohydrate intake for specific disorder. Deficiencies and Toxicity

**UNIT III PROTEINS**

Classification (Protein and Amino acid), Properties, Functions, Digestion, absorption, Food sources & RDA. Metabolism: General catabolism of amino acids, deamination, transamination, decarboxylation, urea cycle. Protein quality evaluation, Protein turnover, amino acid balance, Deficiency and toxicity.

**UNIT IV FATS AND LIPIDS**

Classification (Fatty acids and Lipids), eicosanoids- importance. Properties, Functions, Digestion. Absorption, transportation & utilization. Food sources & RDA. Metabolism of lipids: biosynthesis and oxidation of saturated and unsaturated fatty acids, biosynthesis cholesterol and regulation, Toxicity and Deficiency. Plasma lipoproteins and their significance and ketone body formation.

## **UNIT V ENERGY**

Definition. measurement of energy, Direct and indirect calorimetry. Determination of Energy value of food- Bomb Calorimeter. Physiological value of food, Gross calorific value, Total energy Expenditure, Components of energy expenditure- Resting Energy Expenditure, Thermic Effect of Food, Energy expended in Physical Activity. Methods of estimation of energy expenditure, BMR- definition its determinants & factors affecting BMR, factors affecting energy requirement, Recommended dietary allowances, factors affecting RDA, Indian reference man and woman, Energy Requirements. Estimating energy requirement of individuals and group, energy balance. Nutrition and work capacity- factors affecting physical work capacity and efficiency.

## **UNIT VI INTERMEDIARY METABOLISM AND REGULATION OF NUTRIENT METABOLISM**

Interrelationship between carbohydrates, proteins, and fats.

Regulation of body weight, Control of food intake, role of hunger and satiety centre, metabolic consequences of starvation.

## **UNIT VII WATER**

Functions. Water distribution in our body. Water balance. Regulation of water balance, Requirements of water. Disturbances in fluid balance-dehydration and oedema.

## **REFERENCES**

1. Mahan.L.K and Stump.S.E , Krause's Food, Nutrition and Diet Therapy, W.B Saunders Company, USA.
2. Nix.S, William's Basic Nutrition and Diet Therapy, Mosby, India.
3. Sreelakshmi.B, Nutrition Science, New Age International, New Delhi.
4. Bamji, MS, Rao,MP; Reddy.V, "Textbook of human Nutrition", Oxford and IBH Publishing Co, New Delhi.

## **SEMESTER I**

### **VPND1 C05 RESEARCH METHODS AND STATISTICS**

**Hours per week: 6**

**Credit: 4**

#### **Objectives**

1. Understand the methodology of research and techniques
2. Develop skills in conducting research from planning a study to report Writing
3. Apply statistical procedure to analyse numerical data draw inferences

### **PART A: RESEARCH METHODS**

#### **UNIT I FUNDAMENTAL CONCEPT OF RESEARCH**

Meaning, definition, objectives and characteristics of Research –basic research (fundamental research): applied research, action research, ex post facto research, evaluation research, historical research, exploratory research, industrial research, developmental research.

#### **UNIT II DEFINING RESEARCH PROBLEM**

Definition and selection, necessity of defining the problem, technique involved in defining a problem

#### **UNIT III RESEARCH DESIGN / PROPOSAL**

Meaning and purpose of a research design or proposal, research problem definition, identification, statement of research problem, criteria for selection, definition of concepts (operational definition). Variables - types of variables, independent and dependent variables, control and intervening variables. Hypothesis - Meaning and importance, types. Finding related literature: Significance, source, role taking

## **UNIT IV METHODS OF DATA COLLECTION**

Collection of primary data – observation method, Interview method, collection of Data through questionnaires and schedules, other methods of data collection, collection of secondary data

## **UNIT V MEASUREMENTS AND SCALING TECHNIQUES**

Measurement in research, Measurement scales, Sources of error in measurement, Technique of developing measurement tools, scaling-meaning, classification and techniques

## **UNIT VI SAMPLING**

Census and sample method ,theoretical basis for sampling, methods of sampling ,size of sample merits and limitations of sampling ,sampling and non sampling errors ,reliability of sampling.

## **UNIT VII REPRESENTATION OF DATA**

Significance of diagrams, graphs, types of diagrams and graphs, limitation of diagrams and graphs, meaning and advantage of statistical presentation of data

## **UNIT VIII RESEARCH REPORT WRITING**

Principles of report writing ,basic components, preliminaries, text of reports, bibliography, foot notes, spacing ,margins, indentations , quotations , writing a scientific paper. Project proposal

## **RELATED EXPERIENCE**

1. Prepare a project proposal for M.Sc dissertation.
2. Make a power point presentation of the project proposal.

## **PART B: STATISTICS**

### **UNIT I DESCRIPTIVE STATISTICS**

1. Measures of central tendency-mean ,median, mode
2. Measures of variability –range, quartile deviation, mean deviation Standard deviation
3. Correlation coefficients, rank order correlation, product moment correlation – regression and prediction
4. Normal probability curve –properties, practical applications

### **UNIT II SAMPLING STATISTICS**

1. Statistical inference and central limit theorem
2. Null hypothesis and tests of significance
3. The chi-square
4. Testing difference between mean, proportions, standard deviations and correlations.

### **UNIT III INTRODUCTION TO STATISTICAL PACKAGE FOR SOCIAL SCIRNCES (SPSS)**

#### **RELATED EXPERIENCE**

1. Construct a research tool.
2. Prepare a research tool.
3. Present abstract of a research report.
4. Preparation of diagrams/ graph

#### **REFERENCES**

1. Kothari.C.R, Research Methodology, Wiley Eastern Ltd, New Delhi, 2000.

2. Best W L & Khan V, Research in Education, 7th edition, prentice hall Private, New Delhi.
3. Roul L, Methodology of Educational Research, 2nd edition, Vikas Publishing House Ltd, New Delhi.
4. Gupta.SC & Kapur VK, Fundamentals of mathematical statistics, Sulthan Chand & Sons, New Delhi

## **SEMESTER II**

### **ND2 C06 FUNCTIONAL FOODS AND NEUTRACEUTICALS**

**Hours per week: 4**

**Credit: 4**

#### **Objectives**

1. Gain knowledge about functional foods and nutraceuticals
2. Have thorough understanding about the health effects
3. Be familiar with applications in industry.

#### **UNIT I INTRODUCTION**

Definition– phytochemicals, functional foods and nutraceuticals, Types of classification, Role of nutraceuticals in disease prevention and treatment. Significance in the present scenario.

#### **UNIT II PROBIOTICS**

Definition, Important features of probiotic micro- organisms. Health effects of probiotics including mechanism of action. Probiotics in various foods: fermented milk products, non-milk products etc. Quality Assurance of probiotics and safety.

#### **UNIT III PREBIOTICS**

Definition, chemistry, sources, metabolism and bioavailability, effect of processing, physiological effects, effects on human health and potential applications in risk reduction of diseases (therapeutic benefits), perspective for food applications for the following- Non-digestible carbohydrates/oligosaccharides(FOS), Dietary fibre, Resistant starch, Gums, fructans.

#### **UNIT IV OTHER FOOD COMPONENTS WITH POTENTIAL HEALTH BENEFITS**

Definition, chemistry, sources, bioavailability, effect of processing, physiological effects, effects on human health and potential applications in risk reduction of diseases, perspective for food applications for the following:

Polyphenols: Flavonoids, catechins, isoflavones, tannins, Phytoestrogens, Phytosterols, Glucosinolates ,Pigments : Lycopene, Curcumin etc, Organo sulphur compounds, Other



components – Phytates, Protease inhibitors, saponins, Amylase inhibitors, haemagglutinins. Active biodynamic principles in spices,condiments

## **UNIT V FOOD AND NUTRIENTS WITH NEUTRACEUTICAL EFFECT**

Proteins, Conjugated linoleic acid and n-3 fatty acids, – green tea, grapeseed, wheat grass, Garcinia cambogia and Aloe vera.

## **UNIT VI MARKETING AND REGULATORY ISSUES FOR FUNCTIONAL FOODS AND NUTRACEUTICALS**

Regulatory aspects -, labelling. -Opportunities for functional food market growth.

## **REFERENCES**

1. Cho S. S. and Dreher, M.L. (2001): Handbook Dietary Fibre, Marcel Dekker Inc., NewYork.
2. Yurawecz, M.P., M.M. Mossoba, J.K.G. Kramer, M.W. Pariza and G.J. Nelson eds (1999) Advances in Conjugated Linoleic Acid Research, Vol. 1. AOCS Press,Champaign.
3. Wildman, R.E.C. ed. (2000) Handbook of Nutraceuticals and Functional Foods, CRCPress, Boca Raton.
4. Fuller, R. ed. (1992) Probiotics the scientificbasis, London: Chapman and Hall, NewYork.
5. Fuller, R. ed. (1997) Probiotics Applications and Practical Aspects, London: Chapmanand Hall, New York.
6. Salminen, S. A. Von Wright (eds) (1998): Lacticacidbacteria:microbiology and functional aspects, 2nd edition, Marcell Dekker Inc. New York.
7. Goldberg, I. Ed (1994): Functional Foods: Designer Foods, PharmaFoods, Nutraceuticals, Chapman & Hall, New York.
8. Wood, B.J.B. ed. (1992): The lactic acid bacteria in health and disease, Elsevier Applied Science, London.
9. Gibson, G., Williams, C. eds (2000): FunctionalFoods. Woodhead Publishing Ltd. U.K.

10. Young, J. (1996): Functional Foods: Strategies for successful product development. Management Report Pearson Professional Publishers, London.
11. Frei, B. (1994): Natural antioxidants in human health and disease. Academic Press, San Diego.
12. Tannock, G.W. (1999): Probiotics: A critical review, Horizon Scientific Press.

### **Related experiences**

Survey of major nutraceutical (probiotic and prebiotics) foods and supplements available in the market

## **SEMESTER II**

### **VPND2 C07 FOOD SERVICE MANAGEMENT**

**Hours per week: 5**

**Credit: 4**

#### **Objectives**

1. Understand the objectives of different types of food service institutions.
2. Apply knowledge in space allocation of food plants
3. Gain knowledge in menu planning preparation of recipes in large scale and serving and in food costing.

#### **UNIT I FOOD SERVICE INDUSTRY**

Scope of food industry: food industry segmentation, Types of Hotel

#### **UNIT II ORGANISATION & ADMINISTRATION OF FOOD SERVICE INDUSTRY**

Organization –types, organization structure and management

#### **UNIT III PHYSICAL FACILITIES AND LAYOUT**

Size and Type of Kitchen, Work simplification, Designing Kitchen, Layout of Kitchen, Work centres in Kitchen layout

#### **UNIT IV FOOD SERVICE EQUIPMENT**

Classification, selection, care and maintenance

#### **UNIT V QUANTITY FOOD PREPARATION**

Types of menu, purchasing, storage, method of food production, conventional and non conventional sources of energy, Standardization and portion control.

#### **UNIT VI TYPES AND STYLES OF SERVICE**

Self service, waiter-waitress service, vending and mobile food service system, counter service, English service, French service, American service, Russian service and service techniques.

#### **UNIT VII SANITATION AND HYGEINE**

Hygiene & sanitation, Hygiene in foods handling, personal hygiene, Product standards. HACCP.

## **UNIT VIII HUMAN RESOURCE MANAGEMENT**

Recruitment & selection, induction, training, performance appraisal, leadership, communication, employee benefits, laws governing food service establishment.

## **UNIT IX FINANCIAL MANAGEMENT**

Budgets, records for control, factors affecting food cost control, concepts and behavior of cost. Menu Pricing- Factor method, Prime cost method and Actual cost method. Break even analysis.

## **UNIT X MARKETING**

Definition, marketing mix in food service.

## **RELATED EXPERIENCE**

1. Standardization of 10 selected recipes.
2. Quantity preparation of any 2 food item.
3. Visit to any food service institution / flight kitchen.
4. Table setting.

## **REFERENCES**

1. Marian C Spears; Food Service Organization; III Edition, Prentice Hall Inc., USA. 1995
2. Lendal. H. Kotschever, Richard Donnelly, "Quantity Food Purchasing, Mac Millan Publishing Company, New York, IV Edition, 1993.
3. West and Woods, Introduction to Food Service, Macmillan Publishing

## **SEMESTER II**

### **VP ND2 C08 CLINICAL AND THERAPEUTIC NUTRITION**

**Hours per week: 6**

**Credit: 4**

#### **Objectives**

1. Understand the physiology, metabolism and special requirements of critically ill.
2. Know the effect of various diseases on nutritional status and nutritional and dietary requirement.

#### **UNIT I ROLE OF DIETITIAN IN THE HOSPITAL AND COMMUNITY**

Dietitian- definition, scope, role, qualifications, professional ethics and obligations.  
Nutritional care process- assessment, diagnosis, intervention, monitoring and evaluation.

#### **UNIT II ROUTINE HOSPITAL DIETS**

Regular diet, light diet, soft diet, full liquid diet, clear liquid diet and tube feeding.  
Enteral and parenteral feeding –composition, monitoring and complications. Transitional feeding.

#### **UNIT III MODIFICATIONS OF DIET IN FEBRILE CONDITIONS**

Acute, chronic and recurrent fevers, typhoid, rheumatic fever, tuberculosis, malaria, H1N1, dengue fever and chikungunya

#### **UNIT IV GASTROINTESTINAL DISORDERS**

Esophagitis, cancer of oral cavity, ulcer, indigestion, gastritis, carcinoma of the stomach, gastric surgery and dumping syndrome. Diarrhoea, constipation, flatulence, celiac disease, tropical sprue, steatorrhea. Irritable bowel disease (IBD) – Crohn's disease, ulcerative colitis, Irritable bowel syndrome (IBS), diverticulitis, colitis and colon cancer.

#### **UNIT V LIVER, GALL BLADDER AND PANCREAS DISORDERS**

Cirrhosis of liver, hepatitis, hepatic coma, cholecystitis, cholelithiasis and pancreatitis

## **UNIT VI METABOLIC DISORDERS**

Hypothyroidism, hyperthyroidism, gout, phenylketonuria and lactose intolerance

## **UNIT VII RENAL DISORDERS**

Acute and chronic glomerulonephritis, nephrosis, acute and Chronic Renal Failure, and nephrolithiasis and Dialysis.

## **UNIT VIII - FOOD ALLERGY**

Definition, types, tests, dietary management and prevention

## **UNIT IX - DISEASES OF MUSCULO-SKELETAL SYSTEM**

Arthritis, Osteoporosis- dietary management

## **UNIT X - NEUROLOGICAL DISORDERS**

Alzheimer's disease, Parkinson's disease and epilepsy - dietary management and prevention.

## **UNIT XI - DIET DURING METABOLIC STRESS**

Burns, sepsis and trauma. Surgical conditions- CV complications, stroke and surgery, respiratory failure, hepatic failure, multi organ failure, GI tract (surgery and complications) and neurosurgery.

## **REFERENCES**

1. Antia FP, Clinical Dietetics and Nutrition, Oxford University Press, New Delhi, 4th edition, 1997.
2. Davidson, Pasmore P and Break LP, Human Nutrition and Dietetics, English language book society, Livingstone, 1986.
3. Robinson, normal and Therapeutic Nutrition, Oxford & LBM Publishing, Calcutta, Bombay, 17th edition, 1990.
4. Garrow.JS & James W.P.T, Human Nutrition and Dietetics, Church Hill Living Stone, 1993.
5. Mahan.L.K and Stump SE, Krause's Food, Nutrition and Diet Therapy, WB Saunders Company, 10th edition, 2001.

## **SEMESTER II**

### **VPND2 C09 NUTRITIONAL MANAGEMENT IN LIFE STYLE DISEASES**

**Hours per week: 6**

**Credit: 4**

#### **Objectives**

1. Gain knowledge about the principles of diet therapy and different therapeutic diets
2. Develop aptitude for taking up dietetics as a profession.

#### **UNIT I STRESS**

Stress – definition, types, physiological and psychological impact. Stress enhancing food, antistress foods and nutrients. Dietary guidelines.

#### **UNIT II NUTRITION FOR WEIGHT MANAGEMENT.**

Body composition and maintenance. Obesity- types, causes, assessment and complications. Theories of obesity. Weight reduction techniques- dietary, surgical, lifestyle modification, under weight- causes, complications and dietary management.

#### **UNIT III DIABETES MELLITUS**

Classification, causes, symptoms, diagnosis and complications and management – dietary and lifestyle.

#### **UNIT IV CARDIOVASCULAR DISEASES.**

Risk factors, Blood lipids- Classification, assessment, dyslipidemia and hypercholesterolemia, Atherosclerosis-disease progression, causes, symptoms and clinical findings. Management- dietary and lifestyle. Hypertension - classification, causes, complications and dietary management. Dietary management in angina pectoris, myocardial infarction and cardiac failure and CABG.

#### **UNIT V NUTRITION IN ONCOLOGY**

Classification, development of cancer, risk factors-environmental, hereditary & nutritional factors.. Medical Nutritional Management in Oral cancer, Breast cancer,

Easophagal cancer, Lung cancer, Uterus cancer, Colon cancer, Stomach cancers, Pancreas cancer, Renal cancer . Nutritional problems related to chemotherapy, radiationtherapy, surgery, Immuno therapy, and marrow transplantation. Role of food in the prevention of cancer. Nutrient supplementation in cancer therapy and its need.

## **UNIT VI MEDICAL NUTRITION THERAPY FOR HUMAN IMMUNO DEFICIENCY VIRUS (HIV) DISEASE**

Etiology, Pathophysiology and classification. Stages, opportunistic infections, complications and Malnutrition. Medical Nutrition therapy.

### **RELATED EXPERIENCE**

- 1) Study the weight reduction techniques followed by various health centres.
- 2) Case study report of the patient with related disease.

### **REFERENCE**

1.Mohan,L.K. and Shump,S.E.Krause's Food Nutrition&Diet therapy,W.B.Sauders Company,XII edition,2001.. Shills,E.m.,Olson,S.J. and Shiks,M.C. Modern Nutrition in health and disease,Lea andFebringer,Philadelphia,8th edition,1994



## **SEMESTER II**

### **VPND2 PL1 PRACTICAL - CLINICAL AND THERAPEUTIC NUTRITION**

**Hours per week: 4**

**Credit: 4**

#### **Objectives**

To enable students to obtain knowledge on different therapeutic diets and their preparation

#### **UNIT I PREPARATION OF HOSPITAL DIETS.**

Visit to dietary kitchen, preparation of routine hospital diets-regular diet, soft diet, full fluid diet and preparation of tube feeding blends.

#### **UNIT II DIET IN FEBRILE CONDITIONS.**

Acute & chronic fevers – typhoid, tuberculosis.

#### **UNIT IV DIET IN GASTRO INTESTINAL DISORDERS.**

Peptic ulcer, gastritis, diarrhoea, constipation, malabsorption syndrome.

#### **UNIT V DIET IN LIVER, GALL BLADDER AND PANCREAS DISORDERS**

Cirrhosis, hepatitis, cholelithiasis and pancreatitis.

#### **UNIT VI DIET IN METABOLIC DISORDERS.**

Diabetes mellitus, hypothyroidism, hyperthyroidism, gout, phenyl ketonuria, Lactose intolerance.

#### **UNIT VII DIET IN RENAL DISORDERS.**

Glomerulonephritis, nephrosis, nephrolithiasis & diet in dialysis.

#### **UNIT VIII DIET IN OBESITY AND UNDERWEIGHT.**

#### **UNIT IX DIET IN CARDIOVASCULAR DISORDERS.**

Atherosclerosis, hypercholesterolemia, hypertension, myocardial infarction.

#### **UNIT X DIET IN NUTRITIONAL DEFICIENCY DISEASES.**

Anaemia, protein calorie malnutrition, vitamin A deficiency.

#### **UNIT XI DIET IN CANCER.**

#### **UNIT X DIET FOR CRITICALLY ILL**

Diet in Surgical conditions – stroke, multi organ disorders and burns.

### **SEMESTER III**

#### **VPND3 C10 VITAMINS AND MINERALS**

**Hours per week: 6**

**Credit: 4**

#### **Objectives**

- 1) To gain knowledge about different micro nutrient deficiencies.
- 2) Obtain depth on the study of major nutrients.

#### **UNIT I FAT SOLUBLE VITAMINS**

Vitamin A, D, E, K- Functions, absorption, transport, utilization, storage and excretion.  
Dietary sources, RDA, deficiency and toxicity

#### **UNIT II WATER SOLUBLE VITAMINS**

Vitamin C and B complex- Functions, absorption, transport, utilization, storage and excretion. Dietary sources, RDA, deficiency .

#### **UNIT III CALCIUM AND PHOSPHORUS**

Functions,distribution,absorption,transportation,utilisation,storage&excretion,sources,RD  
A.Calcium – Phosphorus ratio, calcium balance, deficiency & toxicity, interrelationship  
between calcium and vitamin D

#### **UNIT IV MAGNESIUM, SULPHUR, SODIUM, POTASSIUM**

Functions,distribution,absorption,transportation,utilisation,storage&excretion,sources,  
requirements, deficiency and toxicity. Electrolyte balance.

#### **UNIT V IRON**

Functions, distribution, absorption – role of other nutrients, transport, utilization, storage  
& excretion, sources and RDA. Bioavailability of iron, deficiency and toxicity.

#### **UNIT VI IODINE & FLOURINE.**

Functions ,distribution ,absorption ,transport ,utilization ,storage & excretion, sources and requirements, deficiency and toxicity.

## **UNIT VII ZINC AND OTHER TRACE ELEMENTS**

Functions, distribution, absorption, utilisation, storage & excretion, sources, requirements, deficiency & toxic effects of Zinc, Copper, Selenium and other trace elements.

## **RELATED EXPERIENCE**

Estimation of Protein

Estimation of Vitamin C

Estimation of  $\beta$  Carotene

Estimation of Calcium

## **REFERENCES**

1. Mohan,L.K. and Shump,S.E.Krause's Food Nutrition&Diet therapy,W.B.Sauders Company,XII edition,2001.
2. Shills,E.M.,Olson,S.J. and Shiks,M.C. Modern Nutrition in health and disease,Lea and Febringer,Philadelphia,8th edition,1994
3. Srilakshmi,B. Nutrition science, New Age International(P)Ltd,Chennai,2006.
4. Bamji,M.S,Rao,P.R. and vinodini,R. Text book of Human Nutrition,oxford and IBH,Publishing Co.Pvt.Ltd,NewDelhi,1996.
5. Berdanier,C.D. Advanced Nutrition-Micronutrients ,CRC Press,Washington,D.C.1998.
6. Wardlaw, G.M.Contemporary nutrition – issues and insights, 2003, New York, McGraw Hill Companies.

## **SEMESTER III**

### **VPND3 C11 COMMUNITY NUTRITION**

**Hours per week: 6**

**Credit: 4**

#### **Objectives**

To enable the students:

1. Gain insight in to the national nutritional problems and their implications and
2. Understand the international contribution towards nutritional improvements in India.
3. Develop skills in organizing and evaluating nutrition projects in the community.

#### **UNIT I ASSESSMENT OF NUTRITIONAL STATUS**

Nutritional assessment in community- methods used in individual, households and institutional level, direct- anthropometry, biochemical methods, clinical examination, dietary survey and indirect methods - Vital statistics.

#### **UNIT II PREVALENCE OF MALNUTRITION IN INDIA**

Ecological, socio- cultural, economic and demographical factors of malnutrition. Nutritional disorders-anaemia, Vitamin A deficiency, Iodine Deficiency Disorder, PEM- Etiology, prevalence, symptoms and preventive measures. Measures to overcome malnutrition in India. Need for an integrated approach to solve the problems of malnutrition.

#### **UNIT III NUTRITION INTERVENTION PROGRAMMES**

Nutrition intervention programmes and policies. Importance and impact evaluation.SLP, SNP, ANP, NIPCCD, and other programmes organized by governmental and non

governmental agencies for the vulnerable sections of the population. public health nutrition .Nutritional surveillance.

#### **UNIT IV ROLE OF NATIONAL AND INTERNATIONAL ORGANIZATIONS TO COMBAT MALNUTRITION**

International organizations concerned with food and nutrition, FAO, WHO, UNICEF, UNESCO, CARE, AFPRO, World Bank and others, National organizations concerned with food and nutrition- ICMR, ICAR, CHEB, CSWB, SSWB, ICAR, NIN, NNMB, CFTRI

#### **UNIT V NUTRITION EDUCATION**

Meaning, importance and methods of nutrition education to the community. Nutrition education programmes- planning, execution and evaluation. Problems of nutrition education programmes.

#### **UNIT VI FOOD PRODUCTION**

Food production in India – history, current status, Green Revolution, Blue Revolution, White Revolution and Yellow Revolution. Food and nutritional securities of India, indicators of food security, importance of PDS, FCI.

#### **RELATED EXPERIENCES**

1. One week community nutrition camp & report.
2. Assessment of nutritional status through anthropometry and dietary survey.
3. Planning, conducting and evaluating nutrition education programmes.
4. Evaluation of School Lunch programmes and nutrition awareness for the beneficiaries.

#### **REFERENCES**

1. Reddy.V; Rao.P.N; Sastry.G and Nath.K.K, Nutrition trends in India, NIN, Hyderabad.
2. Bamji, MS, Rao,MP; Reddy.V, “Textbook of human Nutrition”, Oxford and IBH Publishing Co, New Delhi.
3. Jeliffee.D.B, “Assessment of Nutritional Status of the community”, World Health Organisation, Geneva.

4. Swaminathan.M, “Principles of Nutrition and Dietetics”, Bangalore publishing company Ltd, Bangalore.
5. Park.K, “Park’s textbook of preventive and social medicine”, 16th edition, M/S , Banarsidas Bhanot publishers, Jabalpur.

### **SEMESTER III**

#### **VPND3 C12 PAEDIATRIC NUTRITION**

**Hours per week: 6**

**Credit: 4**

#### **Objectives**

1. Realize the importance of nutritional care and Nourishment of children.
2. Understand the specific needs of children and the effects of various diseases on nutritional status and nutritional requirements.

#### **UNIT I INFANCY**

Physical and Physiological development, Growth measurement. Nutritional and food requirements for infants.

#### **UNIT II IMMUNIZATION SCHEDULE.**

Immunization schedule during pregnancy, infancy and childhood

#### **UNIT III NUTRITIONAL MANAGEMENT OF PREMATURE, LBW BABIES AND CHILDREN WITH DEVELOPMENTAL DISABILITIES**

Definition, causes and complications, management- feeding practices

#### **UNIT IV IDENTIFICATION OF SICK NEWBORN**

Detection of abnormal signs- cyanosis, jaundice, respiratory distress, bleeding, seizures, refusal to feed, abdominal distention, failure to pass meconium and urine.

#### **UNIT V NUTRITIONAL MANAGEMENT IN MALNUTRITION**

PEM, anaemia, scurvy, rickets, vitamin A deficiency, childhood obesity and underweight - short term and long term consequences, management.

#### **UNIT VI NUTRITIONAL MANAGEMENT OF INFECTIOUS DISEASES**

Diarrhoea, typhoid, TB and hepatitis.

## **UNIT VII NUTRITIONAL MANAGEMENT IN GASTRO INTESTINAL DISORDERS**

Lactose intolerance, celiac disease, inflammatory bowel disease, constipation and other condition- causes, symptoms and management.

## **UNIT VIII NUTRITIONAL MANAGEMENT FOR CHILDREN WITH SPECIAL CONDITIONS**

Autism and ADH (Attention Deficit Hyperactivity disorder), epilepsy and AIDS.

### **RELATED EXPERIENCE**

Measuring, recording and plotting growth of infants

### **REFERENCES**

- 1.Mahan, L.K. and Escott-Stump, S. (2000): Krause's Food Nutrition and Diet Therapy, 10th Edition, W.B. Saunders Ltd.
- 2.Shils, M.E., Olson, J.A., Shike, M. and Ross, A.C. (1999): Modern Nutrition in Health and Disease, 9th Edition, Williams and Wilkins.
- 3.Escott-Stump, S. (1998): Nutrition and Diagnosis Related Care, 4th Edition, Williams and Wilkins.
- 4.Davis, J. and Sherer, K. (1994): Applied Nutrition and Diet Therapy for Nurses, 2nd Edition, W.B. Saunders Co.
- 5.Walker, W.A. and Watkins, J.B. (Ed) (1985): Nutrition in Pediatrics, Boston, Little, Brown & Co.
- 6.Guyton, A.C. and Hall, J.E. (1999): Textbook of Medical Physiology, 9th Edition, W.B. Saunders Co.
- 7.Ritchie, A.C. (1990): Boyd's Textbook of Pathology, 9th Edition, Lea and Febiger, Philadelphia.
- 8.Fauci, S.A. et al (1998): Harrison's Principles of Internal Medicine, 14th Edition, McGraw Hill.
- 9.Textbook of pediatric nutrition- Book review, Stephen J Rose, Arch Dis Child, 1995.

10.Nutrition in pediatrics: Basic Sciences & clinical Applicatios, W. Allan Walker, John B Watkins & Christopher Duggan, 2003. BC Decker Inc, Hamilton, Ontario. Journals

1.American Journal of Clinical Nutrition,

2.Archives of Diseases in Childhood,

3.Indian Journal of Pediatrics

4.Journal of Pediatric Gastroenterology and Nutrition

### **SEMESTER III**

#### **VPND3 E11 NUTRITIONAL COUNSELLING AND EDUCATION**

**Hours per week: 3**

**Credit: 4**

#### **Objectives**

1. To understand the principles and methods of counseling.

2. To apply counseling methods to patients with different diseases

#### **UNIT I COUNSELLING -6**

Introduction, Definition, Objectives, Skills, and Techniques, Professional Ethics in Counselling

#### **UNIT II COUNSELLING PROCESS -10**

Stages, Types- Crisis, facilitative, preventive and Developmental

Theories- Phychoanalysis, Behavoiur, Client Centered, gestalt, Reality

#### **UNIT III NUTRITION COUNSELLING-10**

Definition , Objectives Nutritional Counsellors Skills, Techniques of Nutrition Counselling

#### **UNIT IV NUTRITION COUNSELLING FOR DIFFERENT AGE GROUP-10**

Children. Adolescents, pregnancy Lactation , Old Age



## **UNIT V NUTRITION COUNSELLING FOR DIFFERENT LIFE STYLE DISEASES-10**

Cancer Diabetes HIV / AIDS Osteoporosis, Coronary Heart diseases

## **UNIT VI NUTRITION EDUCATION-8**

Methods, Different Education Material. Type of Nutrition Education- Individual And Group Counselling

## **RELATED EXPERIENCE**

Give counseling for 5 patients of different age groups - Report.

## **REFERENCES**

1. Currie, Joe, Barefoot counselling: A premier in building helping relationships. Asian Trading Cooperation, Bangalore. 1976.
2. Bhatia, K.K., Principles of guidance and counselling, Kalyani Publishers, Ludhiana. 2002.
3. Nelson – Jones, Richard, Practical counselling and helping skills, Better Yourself Books, Bombay. 1994.
4. Narayan Rao. S., Counselling, Tata Mc GrawHill Bartlet, Hariot.M, Social work practice in Health Field: National Association of Social Work, New Delhi.
5. Banarjee G.R.: Social Service Department in a Hospital, TISS, Bombay.
6. Bowel A.H. and Gardner L. : The Young Handicapped Child: Edinburgh, E and S Livingston Ltd Cooperation, Bangalore. 1976.
7. May, Rollo, Art of counselling: A practical guide with case studies and demonstrations. Abingdon Press, New York. 1967
8. Prashantham B.J., Indian case studies in therapeutic counselling, Christian Counselling Centre, Vellore. 1978

9. Bhatia, K.K., Principles of guidance and counselling, Kalyani Publishers, Ludhiana. 2002.
10. Narayan Rao. S., Counselling and Guidance, Mc GrawHill Education Publishing Company Ltd, New York 1981

### **SEMESTER III**

#### **VPND3 E12 ENTREPRENEURIAL DEVELOPMENT**

**Hours per week: 3**

**Credit: 4**

#### **Objectives**

1. To promote entrepreneurship skills among students.
2. To enable students to understand the need and relevances of entrepreneurship.
3. To understand the process and procedure of setting up small enterprises / self employment schemes.

#### **UNIT I ENTREPRENEURSHIP**

Definition, characteristics, meaning of entrepreneur, functions, types, importance of entrepreneurs in economic development factors affecting entrepreneurial growth.

#### **UNIT II ENTREPRENEURIAL DEVELOPMENT PROGRAMME**

Meaning and need, objectives, steps, qualities of successful entrepreneur, contents of training programmes, institutions conducting EDP.

#### **Unit III WOMEN ENTREPRENEURS**

Concept, need for women entrepreneurship, problems, measures taken for the development of women entrepreneurship in India.

#### **UNIT IV AGENCIES FOR ENTREPRENEURSHIP**

Agencies for training, infrastructure, financial help, marketing- DIC, SIDO, NSIC, TCO, SISI, STEP, STED, KITCO, CIDCO, KVIC.

## **UNIT V SMALL INDUSTRIES**

Concept, definition, characteristics, objectives, problems, measures taken for the promotion of SSI, industrial estates.

## **UNIT VI PROJECT FORMULATION**

Project, meaning, types, project identification, generation of project idea, sources of project, screening, project formulation – steps involved.

## **UNIT VII PROJECT REPORT PREPARATION**

Definition, objectives, importance, contents

## **RELATED EXPERIENCE**

1. Visits to agencies involved in development of entrepreneurship.
2. Visit to one or two units related to trade.
3. Interaction with one or two entrepreneurs

## **REFERENCES**

1. Gupta.C.B & Sreenivasan N.P, Entrepreneurship Development in India, New Delhi, Sultan Chand, 1987.
2. Desai.V, Dynamics of entrepreneurial development & management, Mumbai, Himalaya publishing house, 1997.
3. Khanka .S.S., entrepreneurial development, S Chand & Co Ltd., Ram Nagar, New Delhi, 1999.
4. Jain, N.K & Varshney.R.L, Entrepreneurship Development-RBSA publications, Jaipur, 1999.

**SEMESTER III**  
**VPND3 E13 FOOD PRESERVATION**

**Hours per week: 3**

**Credit: 4**

**Objectives**

1. Obtain Knowledge on Principles and methods of Preservation
2. To enable students to do Recipes based on preservation

**UNIT I IMPORTANCE AND SCOPE OF FOOD PRESERVATION**

Principles and methods of food preservation

**UNIT II SELECTION AND PURCHASE OF FRUITS AND VEGETABLES FOR PRESERVATION**

**UNIT III FOOD SPOILAGE**

Causes of spoilage, biological changes, action of enzymes, physical changes.  
Microorganisms responsible for spoilage.

**UNIT IV PRESERVATION BY LOW TEMPERATURE**

Principles, methods, commonly preserved foods by low temperature

**UNIT V PRESERVATION BY HIGH TEMPERATURE**

Principles, methods, pasteurisation, canning

**UNIT VI PRESERVATION BY DEHYDRATION**

Principle, methods, dehydrated foods

**UNIT VII PRESERVATION BY PRESERVATIVES**

Principles, types of preservatives, action on food

### **UNIT VIII PRESERVATION BY OSMOTIC PRESSURE**

Preservation by high concentration of sugar, preservation by high concentration of salt

### **UNIT IX PRESERVATION BY IRRADIATION**

Electromagnetic irradiation, ultra violet rays

### **UNIT X STORAGE AND SPOILAGE OF PRESERVED FOODS**

### **UNIT XI FOOD ADDITIVES**

Definition, their need, importance and safety evaluation, quality control and its importance, regulation of food additives.

### **RELATED EXPERIENCE**

1. Cereal preparations with three different methods of cooking- dry heat methods, moist heat method and baking.
2. Preparations with pulses and nuts – germinated recipes, soy milk, peanut butter and infants food
3. Changes in pigments on cooking in vegetables, salad preparations.

### **REFERENCES**

7. Potter, N. Hotchkiss, H.J, Food Science, 5th edition, CBS publishers and distributors, New Delhi, 1996.
8. Srilakshmi, B, Food Science, New Age International Pvt. Ltd., Chennai, 2006
9. Beckhan. C.G & Graves.H.J, Foundations of food preparations, Macmillan Publishing Co, New Delhi, 1979.
10. Sumathi.M.R, Food Science, New Age international Pvt Ltd, 1997.
11. Sakuntala Manay Food Facts and Principles 2000
12. Manay.N.S & Shadaksharaswamy.M, Foods-Facts & Principles, 2002, New Age International Pvt.Ltd, New Delhi.

**SEMESTER III**  
**VPND3 PL2 HOSPITAL INTERNSHIP AND COMMUNITY NUTRITION**  
**EDUCATION PROGRAMME**

**Hours per week: 4**

**Credit: 4**

**Objectives**

To enable students to:

1. Get an exposure to the working situation of the dietary department of a reputed hospital.
  2. Develop skills in diet counseling and feeding of patients.
  3. Develop capacity for taking dietetics as a profession.
  4. Get an exposure for Planning, conducting and evaluating nutrition education programmes.
- 
1. One month internship in a reputed hospital - Report
  2. Hospital training once in a week for a period of 8 months (30 days) - Report
  3. Diet counseling for the college students (10 students) – Report
  4. Community Nutrition education camp in the areas vulnerable to malnutrition/chemical disaster or disaster prone/tribal /coastal /slum areas etc.

## **SEMESTER IV**

### **VPND4 C13 METABOLIC AND BIOCHEMICAL CHANGES IN DISEASES**

**Hours per week:6**

**Credit: 4**

#### **Objectives**

To enable the students to understand the biochemical and physiological changes in diseases.

#### **UNIT I NORMAL CELLULAR PROCESS**

Normal cellular process. Injury and response of cells to injurious agents, cellular adaptations Stress and physiologic effects.

#### **UNIT II BODY ELECTROLYTES**

Law of electron neutrality, maintenance of pH, buffer system in the body, regulation of acid base balance, role of sodium, potassium & chlorine, estimation of body electrolytes (principles).

#### **UNIT III SAMPLE COLLECTION AND PRESERVATION**

Collection and preservation procedures of blood, plasma, serum, cerebrospinal fluid, urine, faeces, pleural fluid, peritoneal fluid and semen. Familiarization of biochemical charts from clinical labs.

#### **UNIT IV BLOOD ANALYSIS AND HEMATOLOGY**

Principles of estimation, normal values and clinical significance of the following parameters of blood -glucose, hemoglobin, uric acid, lipid profiles, acid phosphatase, creatine phosphokinase, Na<sup>+</sup>, K<sup>+</sup>, Cl<sup>-</sup> and phosphate. Principles of determination, clinical significance of the following parameters- Total count, Differential count, Erythrocyte

sedimentation rate, packed cell volume and prothrombin time. Brief study of blood groups, anticoagulants, storage and transfusion of blood.

## **UNIT V ANALYSIS OF URINE,CEREBROSPINAL FLUID AND SEMEN**

Urine and CSF- Normal and abnormal constituents, procedures of qualitative analysis and interpretation and their clinical significance. Principle of estimation of semen fructose and acid phosphatase.

## **UNIT VI METABOLIC DISORDERS, DISEASES OF ENDOCRINE GLANDS AND INBORN ERRORS OF METABOLISM**

Disorders associated with hyperglycemia, hypoglycemia, glycosylated haemoglobin and reducing sugars in the urine. Biochemical changes in atherosclerosis, dyslipidemia, obesity & fatty liver. Clinical significance of protein concentration in blood, cerebrospinal fluid, and other body fluids urine, ascetic fluid, lymph, synovial fluid, pleural fluid, transudates and exudates. .

Biochemical changes in diabetes mellitus, Hyper and hypothyroidism.

Inborn errors of carbohydrate, protein and lipid metabolism, galactosemia, lactose intolerance pentosuria, sphingolipidosis.

Disorders of purine and pyrimidine metabolism, porphyrias.

## **UNIT VII ORGAN FUNCTION TESTS**

Liver, kidney, thyroid, pancreatic and gastric function test

## **UNIT VIII BIOPHYSICS**

Principals involved in stimating calorimetry, chromatography, flame photometry, electrophoresis, ion selective electrodes, radioimmunoassay, ELISA test



## **UNIT IX DRUG, FOOD AND NUTRIENT INTERACTION**

Meaning, Detoxification Mechanism and types. Food additives, preservatives, drugs. pharmacodynamics. pharmacokinetics-absorption, distribution, metabolism, excretion. Food /nutrient effects on drug action –caffeinated beverages, fruit juices, alcohol, green leafy vegetables and commonly used herbs and spices. Drug side effects that affect nutritional status – appetite, oral cavity, taste, smell, GI tract, glucose levels, allergy, enteral feeds and excretion. Therapeutic importance of minimizing food drug interactions.

### **REFERENCES**

1. Mukerjee, K.L, Medical Laboratory technology, Tata MaGraw Hill Publishing Company, Co-Ltd, New Delhi.
2. Chatterjee, M.N and Shinde R, Textbook of Medical Biochemistry, Jay Pee Brothers Medical Publishing Pvt Ltd, New Delhi.
3. Lehinger A L, Nelson DC and Cox MM, Principles of biochemistry, CBS Publishers and distributors, Jain Bhavan, Bhalu Naga Nagar.

## **SEMESTER IV**

### **VPND4 PL3 METABOLIC AND BIOCHEMICAL CHANGES IN CLINICAL DISEASES- PRACTICAL**

**Hours per week: 4**

**Credit: 4**

#### **Objectives**

To enable students to acquire skills to estimate selected body metabolites.

1. Qualitative analysis of urine for
  - a. Albumin
  - b. Sugar
  - c. Acetone and acetoacetic acid.
  - d. Bile pigment.
2. Quantitative analysis of urine for protein.
3. Quantitative estimation of blood
  - a. Sugar
  - b. Blood urea
  - c. Serum Creatinine
  - d. Cholesterol
  - e. Calcium
  - f. Phosphorus
4. Hematology; determination of hemoglobin , packedcell volume, erythrocyte sedimentation rate, total count, differential count, blood grouping, clotting and bleeding time.

## **SEMESTER- IV**

### **VPND 4 E21 DIABETIC CARE AND MANAGEMENT**

**Hours per week: 5**

**Credit: 4**

## **Objectives**

1. Obtain in-depth knowledge about Diabetes Mellitus (DM)
2. To make the students aware of various complications during Diabetes Mellitus
3. To gain knowledge about the management of Diabetes Mellitus through diet, exercise and medication

## **UNIT I BASICS OF DIABETES MANAGEMENT**

Introduction, definition, classification of Diabetes Mellitus, Prevalence- International, national and state, risk factors and symptoms.

## **UNIT II ANATOMY AND PHYSIOLOGY OF PANCREAS**

Pancreas – functional anatomy, Secretion, synthesis of insulin, Mechanism of action of Insulin, Effect of Insulin. regulation and utilization of insulin, glucagon and somatostatin. Glucose Homeostasis.

## **UNIT III PATHOPHYSIOLOGICAL CHANGES IN PANCREAS, BETA CELLS AND ALPHA CELLS**

Pathological changes in metabolism. Pathophysiology of Diabetes Mellitus.

## **UNIT IV DIAGNOSIS AND ROUTINE INVESTIGATIONS**

Monitoring the blood glucose level, Urine testing for the presence of sugar, random blood glucose, GTT and Glycosylated Hb (Hb A1C).

## **UNIT V MANAGEMENT OF DIABETES MELLITUS**

- 1) Dietary Management- Role of carbohydrate, protein, fat and fiber in Diabetes Mellitus. Glycemic index. Alcohol and diabetic diet, fruits and diabetes, refined sugar and alternative sweeteners and dietary supplements.
- 2) Physical activity and exercise- Physiological changes occurring during exercise, Benefits of exercise in patients with Diabetes, Potential adverse effect of exercise in patients with Diabetes, Type of Physical Activity (SAFE)
- 3) Medication and Diabetes- Oral agent for diabetes. Main group of OHA'S, general aspects in OHA therapy, Insulin therapy in Diabetes Mellitus- types of Insulin and time activity characteristics. Practical aspects of insulin therapy- storage,

sterilization, injection sites, timing. Factors that affecting rate of insulin absorption, Complications of insulin Therapy, Commonly seen side effects.

## **UNIT VI COMPLICATION OF DIABETES MELLITUS AND THEIR MANAGEMENT**

1) Hyperglycaemia- definition and clinical manifestation- treatment, prevention and clinical levels of hyperglycaemia, prevention and hyperglycaemia awareness.

Ketoacidosis-definition and causes- clinical manifestation.

Non- Ketotic Hyper osmolar coma and Lactic acidosis.

2) Macrovascular complications: Cardio vascular complications and dyslipidemia- Definition, clinical manifestation, prevention and Treatment.

## **UNIT VII PREVENTION AND MANAGEMENT OF LONG TERM DIABETIC COMPLICATIONS/ MICROVASCULAR COMPLICATIONS**

Diabetic retinopathy- Epidemiology, Risk factors, Classification and Features of Diabetic Retinopathy, Complication and Management.

Neuropathy- definition, Classification, pathogenesis, prevention and treatment. Importance of early diagnosis, diagnosis, the feet and diabetes.

Diabetic nephropathy- definition, etiology, stages, risk factors for the development of diabetic nephropathy, diagnosis, Pathogenesis, Treatment and prevention.

## **UNIT VIII MANAGEMENT OF CO- MORBID CONDITION**

Hypertension, dyslipidaemia, obesity, metabolic disorders.

## **RELATED EXPERIENCE**

- 1) Analysis of urine blood sugar
- 2) Detection of blood glucose by using glucometer.
- 3) Case study of two diabetic patients (complicated cases)

## **REFERENCES**

1. TC Raghuram et al., Diet and Diabetes, NIN, ICMR

2. PG Raman and LC Gupta, Step by Step Management of Diabetes, JayPee Brothers Medical Publishers (P) LTD
3. Frenny Billimoria and Surinder W, The Diabetics Look Book,
4. MMS Ahuja, Diabetes Care In Clinical Practise, Jaypee Brothers, Medical Publishers (P) LTD, New Delhi
5. M D Mnams et al., Diabetes, Jaypee Brothers Medical Publishers (P) LTD
6. Rudy B and Richard D, Hand book of Diabetes, A John wiley and sons, LTD

#### **SEMESTER IV**

#### **VPND4 E22 FOOD SAFETY AND QUALITY CONTROL**

**Hours per week: 5**

**Credit: 4**

**Objectives**

1. Understand the common organisms associated with food borne illness
2. Apply the principles & methods of storage and preservation of various foods.
3. To study about the food safety methods.

**UNIT I FOOD SAFETY-BASIC CONCEPTS**

Food safety and importance of safe food. Factors affecting food safety- physical hazards, biological hazards, chemical hazards. Role of microorganisms in food- bacteria, fungi, yeasts, moulds, viruses, parasites. Denaturation of bacteria.

**UNIT II MICROBIOLOGY OF NATURAL PRODUCTS**

Water: sources, bacteriology of water supplies, bacteriological examination and purification of water.

**UNIT III FOOD SPOILAGE**

Causes, Factors affecting spoilage, Spoilage of perishable and non perishable foods.

**UNIT IV FOOD BORNE DISEASES AND THEIR OUT BREAK.**

**UNIT V FOOD PRESERVATION**

Objectives, principles and methods of food preservation. .

**UNIT VI FOOD ADDITIVES AND FOOD ADULTERATION**

Food additives – classification & Food adulteration – definition, types, common adulterants and prevention.

**UNIT VII FOOD PACKAGING**

Packaging :concepts ,significance and functions. Classification of packaging materials- flexible packages, rigid packages, retail or shipping containers. Packaging methods. Moisture sorption properties of foods and selection of packaging materials. Interactions between packaging and food toxicity hazards. Biodegradable material and environmental issues. Labelling requirements and bar coding- Nutrition labeling and nutrition claims, coding of food products. Packaging laws and regulations

**UNIT VIII FOOD LAWS AND STANDARDS**

Mandatory measures-PFA, Essential commodities act, 1955. Voluntary standards and certification system- Bureau of Indian standards, AGMARK. Consumer protection act, 1986. Food standardization and regulation agencies in India-CCFS, CFL. International standards- Codex alimentarius, ISO, WHO, FAO, WTO, HACCP.

### **RELATED EXPERIENCE**

1. Visit and study the various food preservation techniques applied in the industries/units.
2. Demonstration of food adulteration
3. Preparation of preserved foods by using different preservation methods.

### **REFERENCES**

- 1.Roday,S 1999. Hygiene and Sanitation in Food Industry. Tata Mc Graw Hill Publishing Company Ltd., New Delhi
- 2.Frazier,W.C & Westhoff, D.C. Food Microbiology. Tata MC Graw –Hill Publishing Company Ltd., New Delhi, 5th Edition, 1997
3. Adams,M.R and Moss ,M.O .Food Microbiology .New Age Intenational (P) Ltd., Publishers.1996
4. Anna K.Joshua, Microbiology. Popular Book Dept. Publishers. 1994  
New Delhi , 1996
- 5.Potter,N.Hotchkiss, H.J. Food Science (5th edition) CBS Publishers and Distributors, New Delhi , 1996
6. Srilakshmi B. Food Science. 4th Edition . New Age International Private Limited, New Delhi, 2008
- 7.Shakuntala M.N., Shadaksharaswamy M. Foods –Facts and Principles. New Age International Publishers, New Delhi, 2002

### **SEMESTER IV**

## **VPND4 E23 PUBLIC NUTRITION AND HEALTH**

**Hours per week: 5**

**Credit: 4**

### **Objectives**

It will enable the students to:

- Develop a holistic knowledge base and understanding of the nature of important nutritional problems and their prevention and control for the disadvantaged and upper socio-economic strata in society
- Understand the causes /determinants and consequences of nutritional problems in society
- Be familiar with various approaches to nutrition and health interventions, programmes and policies.

### **UNIT I CONCEPT OF PUBLIC NUTRITION**

Relationship between health and nutrition, role of public nutritionists in the health care delivery

### **UNIT II SECTORS AND PUBLIC POLICIES RELEVANT TO NUTRITION AND HEALTH.**

### **UNIT III PRIMARY HEALTH CARE OF THE COMMUNITY**

National Health Care Delivery System, determinants of Health Status, indicators of Health

### **UNIT IV POPULATION DYNAMICS**

Demographic transition, population structure, fertility behavior, population policy, fertility, interrelationship between Nutrition and quality of Life.

### **UNIT V FOOD AND NUTRITION SECURITY**

Food production – access, distribution, availability, losses, consumption. Food Security. Sociocultural aspects and Dietary Patterns - their implications for Nutrition and Health

### **UNIT VI NUTRITIONAL STATUS**

Determinants of nutritional status of individual and populations. Nutrition and Non-nutritional indicators - socio-cultural, biologic, environmental, economic. Assessment of



nutritional status of individuals of different ages- MUAC, Wt for age, Ht for age, Wt for ht, Ponderal index, BMI. Applications and limitations in different field situations - choice of an indicator.

## **UNIT VII MAJOR NUTRITIONAL PROBLEMS**

Etiology, prevalence, clinical manifestations, preventive and therapeutic measures for: Macro and micro nutrient deficiencies. Other nutritional problems like lathyrism, dropsy, aflatoxicosis, alcoholism and fluorosis. Overweight, obesity and chronic degenerative diseases

## **UNIT VIII NATIONAL FOOD, NUTRITION AND HEALTH POLICIES**

Plan of action and programmes

## **UNIT IX APPROACHES AND STRATEGIES FOR IMPROVING NUTRITIONAL STATUS AND HEALTH**

Programmatic options- their advantages and demerits – feasibility, political support, available resources (human, financial, infrastructural). Case studies of selected strategies and programmes: their rationale and context, how to select interventions from a range of possible options. Healthbased interventions, food-based interventions including fortification and genetic improvement of foods, supplementary feeding, and Nutrition education for behaviour change.

## **UNIT X HEALTH ECONOMICS AND ECONOMICS OF MALNUTRITION**

Its impact on productivity and national development. Cost-Benefit, cost effectiveness, cost efficiency

## **REFERENCES**

1. Owen, A.Y. and Frankle, R.T. (1986): Nutrition in the Community, The Art of Delivering Services, 2nd Edition Times Mirror/Mosby.
2. Park, K. (2000): Park's textbook of preventive and social medicine, 18th Edition, M/s. Banarasidas Bhanot, Jabalpur.
3. SCN News, UN ACC/SCN Subcommittee on Nutrition.

4. State of the World's Children, UNICEF.
5. Census Reports.
6. Berg, A. (1973): The Nutrition Factor, the Brookings Institution, Washington.
7. Beaton, G.H. and Bengoa, J.M. (Eds) (1996): Nutrition in Preventive Medicine, WHO.
8. Bamji, M.S., Rao, P.N., Reddy, V. (Eds) (1996): Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
9. Gopalan, C. and Kaur, S. (Eds) (1989): Women and Nutrition in India, Nutrition Foundation of India.
10. Gopalan, C. and Kaur, S. (Eds) (1993): Towards Better Nutrition, Problems and Policies, Nutrition Foundation of India.
11. Gopalan, C. (Ed) (1987): Combating Undernutrition – Basic Issues and Practical Approaches, Nutrition Foundation of India.
12. Achaya, K.T. (Ed) (1984): Interfaces between agriculture nutrition and food science, The United Nations University.
13. National Family Health Survey I & II (1993, 2000): International Institute for Population Studies, Mumbai.
14. National Plan of Action on Nutrition (1995): Food & Nutrition Board, Dept. Of WCD, Govt. of India.
15. National Nutrition Policy (1993): Dept. of WCD, Govt. of India.
16. Nutrition Education for the Public (1997): FAO Food and Nutrition Paper, 62, FAO.
17. Allen, L. and Ahluwalia, N. (1997) Improving Iron Status Through Diet: The Application of Knowledge Correcting Dietary Iron Bioavailability in Human Populations. OMNI/USAID, Arlington, VA, USA
18. Nestel, P. (ed) (1995). Proceedings: Interventions for Child Survival. OMNI/USAID Arlington, VA, USA
19. Documents and Reports published by the International Vitamin A Consultative Group
20. Documents and Reports of the International Nutritional Anemia Consultative Group
21. Howson, C.; Kennedy, E. and Horwicz, A. (eds) (1998). Prevention of Micronutrient

Deficiencies: Tools for Policymakers and Public Health Workers. Committee on Micronutrient Deficiencies, Board on International Health, Food and Nutrition Board, National Academy Press, Washington D.C. USA.

22. Micronutrient Initiative (1998) Food Fortification: to end Micronutrient Malnutrition. The Micronutrient Initiative, Ottawa, Canada.

23. Murray, C.; Lopez, A. (eds) (1994) Global Comparative Assessments in the Health Sector Disease Burden, Expenditures and Intervention Packages. Collected articles from the Bulletin of the World Health Organization, Geneva, Switzerland.

24. Murray, C. and Lopez, A. (eds)(1996) Global Burden of Disease and Injury Harvard University Press, Cambridge, MA, USA.

25. Ross, J.; Horton, S. (1998) Economic Consequences of Iron Deficiency. The Micronutrient Initiative, Ottawa, Canada.

26. World Health Organization (1998) World Health Report: Life in the 21st century. Report of the Director General. WHO, Geneva, Switzerland

27. Ramakrishnan, U. (eds) (2001). Nutritional Anemias. CRC Press in Modern Nutrition, CRC Press, Boca Raton, FL.

**SEMESTER IV**  
**VPND4 PR PROJECT**

**Hours per week: 10**

**Credit: 4**

1. Development of research Programme
2. Collection of Review
3. Conduct Pilot Study in the field
4. Conduct of work in the lab/ hospital/ community
5. Analysis of Data
6. Writing for the thesis and submission

<b>Sl.No</b>	<b>Criteria</b>	<b>Weightage (Total 36)</b>
1	Choice of the topic	1
2	Introduction and Objectives	2
3	Review of literature	5
4	Methodology	8
5	Results and Discussion	8
6	Summary and conclusion	4
7	Bibliography	4
8	Abstract	2
9	Over all	2

**SEMESTER IV**  
**VPND4V VIVA VOCE**

**Credit: 4**

**Based on**

1. Project work
2. Internship
3. Course Programme