

M.Sc. NUTRITION AND DIETETICS

SEM	COURSE CODE	COURSE	COURSE TITLE	HRS/ WEEK	CREDIT	CIA MARKS	SE MARKS	TOTAL MARKS
I	14PND1C1	CORE I	Applied Physiology	6	5	40	60	100
	14PND1C2	CORE II	Nutritional Biochemistry	6	5	40	60	100
	14PND1C3	CORE III	Therapeutic Nutrition-I	6	5	40	60	100
	14PND1C4P	CORE IV	Techniques in Clinical Nutrition - Practical	6	5	40	60	100
	14PND1CE1	CORE BASED ELECTIVE I#		6	5	40	60	100
TOTAL				30	25	200	300	500
II	14PND2C5	CORE V	Human Nutrition	6	5	40	60	100
	14PND2C6	CORE VI	Therapeutic Nutrition- II	6	5	40	60	100
	14PND2C7	CORE VII	Nutrition for Growth and Development	6	5	40	60	100
	14PND2C8P	CORE VIII	Therapeutic Nutrition - Practical	6	3	20	30	50
	14PND2C8I	CORE VIII I	Therapeutic Nutrition - Internship	4(wks)	2	20	30	50
	14PND2CE2	CORE BASED ELECTIVE II#		6	5	40	60	100
TOTAL				30	25	200	300	500
III	14PND3C9	CORE IX	Nutrition and Physical Fitness	6	5	40	60	100
	14PND3C10	CORE X	Advanced Food Science	6	5	40	60	100
	14PND3C11	CORE XI	Research Methodology and Statistics	6	5	40	60	100
	14PND3C12P	CORE XII	Techniques in Food Analysis - Practical	6	5	40	60	100
	14PND3CE3	CORE BASED ELECTIVE III #		6	5	40	60	100
	14PND3EC1	EXTRA CREDIT – I	Hospitality Administration	-	5*	-	100*	100*
TOTAL				30	25	200	300	500
IV	14PND4C13	CORE XIII	Advances in Food Microbiology	6	5	40	60	100
	14PND4C14	CORE XIV	Public Health Nutrition	6	5	40	60	100
	14PND4EC2	EXTRA CREDIT - II	Consumer in the Market	-	5*	-	100*	100*
	14PND4PW	PROJECT WORK		18	5	40	60	100
TOTAL				30	15	120	180	300
GRAND TOTAL				120	90	720	1080	1800

Core Based Electives

SEMESTER	CORE BASED ELECTIVE
I	Paediatric Nutrition
	Nutritional Needs for Special Children
II	Functional Foods and Nutraceuticals
	Nutritional Management and Safety for Food Service
III	Food Processing
	Nutritional Counselling and Education

* Not considered for Grand Total and CGPA

SEMESTER- I: CORE -I
APPLIED PHYSIOLOGY

Course Code : 14PND1C1
Hours/Week : 6
Credit : 5

Max. Marks : 100
Internal Marks : 40
External Marks : 60

Objectives:

To enable the students to

1. Understand the physiological functions related to nutrition.
2. Understand the alterations in physiology in diseases.

UNIT –I

18 hours

Blood and immunology

1.1 Blood- composition and# functions#.

1.2 Blood cells- plasma proteins- origin and its #functions# .RBC- structure and functions, normal and abnormal variation of counts. WBC-Types, structure and functions, normal and abnormal variation of counts. Platelets-structure and functions.

1.3 Blood group system, importance of ABO groups in blood transfusion, matching and cross matching, ABO incompatibility.Rh factors, erythroblastosisfetalis.

1.4 Immunity –Definition and types of immunity, development of cellular immunity and humoral immunity.

UNIT-II

18 hours

Circulatory and Digestive system

2.1 Circulatory system- Introduction to cardiovascular system, origin and spread of cardiac impulse, cardiac cycle, electro cardiogram (ECG) , heart rate, blood pressure-factor influencing blood pressure.

2.2 Digestive system - Structural and function of gastrointestinal tract, movements of intestine, physiology of digestion.

UNIT-III

18 hours

Respiratory and Excretory system

3.1 Respiratory system- #Structure and function of respiratory organ#, mechanics of respiration, exchange of respiratory gases, pulmonary volumes, regulation of respiration.

3.2 Excretory system -Structure of kidney and nephron, urine formation, # micturition#, acid base balance by kidney.

UNIT-IV

18 hours

Endocrine and Reproductive system

4.1 Endocrine system - Functions of hormones secreted by pituitary, thyroid, parathyroid, and pancreas, adrenal and its hyper and hypo secretion.

4.2 Reproductive system - # Structure of male and female reproductive system#, functions- spermatogenesis and oogenesis #, menstrual cycle, pregnancy, conception, implantation, lactation- hormones involved.

UNIT-V

18 hours

Nervous system and special senses

- 5.1 **Nervous system-** structure and functions- nerve cell, spinal cord, brain. Autonomic nervous system – sympathetic and parasympathetic nervous system- functions.
- 5.2 **Ear, Eye, Nose and # Tongue-**structure and functions#.

#.....# self –study portion.

TEXT BOOKS

1. K. Sembulingam, and Prema sembulingam, Essentials of Medical Physiology, Second Edition, Jay Pee Brothers Medical Publishes (p) Limited, New Delhi (2010).
2. Ross and Wilson, Anatomy and Physiology in Health and Illness, Eleventh Edition Library Cataloging in Publication (2010).

UNIT I Text Book- 1 Chapter- VI-XXVII

UNIT II Text Book- 1 Chapter-V, XII

UNIT III Text Book- 2 Chapter- X, XIII

UNIT IV Text Book- 2 Chapter-IX, XVIII

UNIT V Text Book- 1 Chapter-VII, VIII

REFERENCE BOOKS

1. S.M. Subramanian and Mathavan Kuttu, Text Book of Physiology, Chand and Company New Delhi(2001).
2. K. Sembulingam and Prema sembulingam, Essentials of Medical Physiology, Second Edition, Jay Pee Brothers Medical Publishes (p) Limited, New Delhi(2000).
3. Vidya Tatna, Hand Book of Human Physiology, Seventh Edition, Jay Pee Brothers Medical Publishers (p) Limited, New Delhi (1993) .
4. A.C. Guyton and J.B. Hall, Text book of medical physiology, Fifth Edition, W.B, Saunders Company Prism Books Private Limited Bangalore (1996).
5. C.C. Chatterjee, Human physiology, Volume I &II, Medical Allied Agency, 82/1 Mahatma Gandhi road Calcutta (1998).

SEMESTER-I: CORE-II
NUTRITIONAL BIOCHEMISTRY

Course Code :14PND1C2
Hours/Week : 6
Credit : 5

Max. Marks : 100
Internal Marks : 40
External Marks : 60

Objectives:

To enable students to understand the interrelationship between different metabolic pathways in the body.

UNIT- I

18 hours

Carbohydrates:

- 1.1 Structure, classification and #properties of monosaccharides, disaccharides and Polysaccharides#.
- 1.2 Intermediary metabolism – glycolysis, TCA cycle, HMP shunt, gluconeogenesis, glycogenesis, glycogenolysis. Role of liver on carbohydrate metabolism.
- 1.3 Disorders of carbohydrate metabolism – galactosemia. glycogen storage disease, pentosuria, fructosuria.

UNIT II

18 hours

Proteins:

- 2.1 Structure and classification of amino acids, peptide bond formation, structure of proteins.
- 2.2 Protein metabolism, Transamination, Deamination and Urea cycle, Amino acid pool. Protein biosynthesis.
- 2.3 Inborn errors of metabolism – phenyl ketonuria, cystinuria, albinism, alkaptonuria, maple syrup disease.

UNIT III

18 hours

Lipids:

- 3.1 Definition, classification, structure, Metabolism of lipids in Denovo synthesis of fatty acids, Beta (β) Oxidation. Cholesterol Biosynthesis and regulation.
- 3.2 Ketone bodies, Prostaglandins – significance. Plasma lipoproteins and Hyperlipidemias.
- 3.3 Disorders of lipid metabolism – dyslipidemia and lipid storage diseases. Role of liver on fat metabolism.

UNIT IV

18 hours

Nucleic Acids:

- 4.1 Composition and classification. Structure and #Properties of DNA and RNA#. DNA replication, DNA mutation.
- 4.2 Metabolism of Purines, Metabolism of pyrimidines.
- 4.3 Disorder of nucleic acid metabolism – Gout, aciduria, xanthinuria.

UNIT V

18 hours

Vitamins and Minerals:

- 5.1 Major Vitamins(thiamine, riboflavin, niacin, pyridoxine, biotin and folic acid) with coenzyme functions.
- 5.2 Mode of action of thiamine, riboflavin, niacin, pyridoxine, biotin and folic acid.
- 5.3 Macro minerals(sodium, potassium, calcium)with other nutrients, interaction of micro minerals (Iron, Iodine, zinc).

TEXT BOOKS

1. Ambika Shanmugam, Fundamentals of Biochemistry for Medical Students, Seventh Edition, New Age Publishing Pvt. Ltd., New Delhi(1986).
2. C.P. Champe and A.R. Harvey, Lippincott's Illustrated Reviews(1987).
3. U. Sathyanarayana and U. Chakrapani, Textbook of Biochemistry, Third Edition, Books and Allied (P) Ltd, Kolkata (2010).
4. R. Davidson, Stanley Pass more, Brock and J.H. Heeman, Nutrition and Dietetics, Livingston's Ltd., Edinduragt London(1973).

UNIT I Text book –1 Chapter –I, XVII

UNIT II Text book –1 Chapter – III, XXI

UNIT III Text book –1 Chapter – II, XIX, XX

UNIT IV Text book –1 Chapter – VI, X

UNIT V Text book –1 Chapter – V, XXV

REFERENCE BOOKS

1. T.M. Devlin, Text book of Biochemistry with Clinical Correlations,Fourth Edition, Wiley Liss Inc.(1997).
2. R.K.Murray, D.K. Granner, P.A. Mayes and V.W. Rodwell, Twenty Fifth Edition, Harper's Biochemistry Macmillan Worth Publishers(2000).
3. D.L. Nelson and M.M. Cox Lehninger's Principles of Biochemistry,Third Edition. Macmillan Worth Publishers.(2000)
4. Davidson, P. Passmore and L.P. Break, Human Nutrition and Dietetics, English language book society, Livingstone(1986).
5. J.S. Garrow. & W.P.T. James, Human Nutrition and Dietetics,Church Hill Living Stone, (1993).

**SEMESTER-I: CORE –III
THERAPEUTIC NUTRITION- I**

Course Code : 14PND1C3
Hours/Week : 6
Credit : 5

Max. Marks : 100
Internal Marks : 40
External Marks : 60

Objectives:

To enable the students to

1. Understand the physiology, metabolism and special requirements of critically ill.
2. Know the effect of various diseases on nutritional status.
3. Learn recent concepts in dietary management of recent concepts.

UNIT-I

18 hours

Role of Dietitian and Therapeutic Feeding

- 1.1 **Definition**-dietitian, professional ethics
- 1.2 Nutritional assessment of hospitalized patient
- 1.3 **Team approach to nutritional care** – effect of illness on food acceptance and utilization – inter – relationship with the patient. Psychology of feeding the patient.
- 1.4 **Therapeutic Diet**-types. Different types of feeding methods-enteral feeding-oral feeding, tube feeding-gastrostomy and jejunostomy. #Parenteral feeding-formula and complications#

UNIT-II

18 hours

Respiratory Disorders

- 2.1 Etiology, symptoms and dietary management for asthma, chronic lung disease of prematurity (CLD), bronchopulmonary dysplasia(BPD), chronic obstructive pulmonary disease.
- 2.2 Contributory factors, symptoms and dietary regimen for cystic fibrosis, #lung cancer, pneumonia#, respiratory failure and tuberculosis.

UNIT-III

18 hours

Gastro Intestinal Tract Disorders

- 3.1 **Upper gastro intestinal tract disorders** – etiology, symptoms and dietary management for esophagitis, oral cancer , peptic ulcer, gastritis, stomach and dumping syndrome.
- 3.2 **Lower gastro intestinal tract disorders** - etiology, symptoms and dietary management for #constipation, diarrhea, steathorrhoea#, celiac disease, tropical sprue, inflammatory bowel disease–(Crohn’s disease, ulcerative colitis), irritable bowel syndrome, diverticular disease and colon cancer.

UNIT-IV

18 hours

Liver, Gall Bladder, Pancreatic and Renal Disorders

Pathophysiology, etiology, symptoms and dietary regimen for the following disorders:

- 4.1 Hepatitis, Wilson’s disease, cirrhosis, hepatic encephalopathy and hepatic coma.
- 4.2 #Cholecystitis, cholelithiasis# and pancreatitis.

4.3 Renal disorders – glomeronephritis, nephrotic syndrome, acute and chronic renal failure and nephrolithiasis. Types and dietary management of dialysis.

UNIT-V

18 hours

Metabolic and Musculo Skeletal System Disorder

5.1 **Nutritional care** - gout, phenyl ketonuria, maple syrup urine disease and lactose intolerance.

5.2 **Nutritional care in diseases of musculo-skeletal system-** muscular dystrophy, osteoporosis, osteo arthritis and rheumatoid arthritis.

5.3 **Nutritional care in febrile conditions:**

Short term fever - typhoid and influenza.

#Long term fever -tuberculosis and AIDS#

Intermittent - malaria

#.....# self- study portion

TEXT BOOKS

1. B. Srilakshmi, Dietetics, Seventh Edition, New Age International (P) Ltd. Publishers, Chennai (2011).
2. S. Mahtab, N. Bamji Prasad Rao and Vinodini Reddy, Textbook of Human Nutrition, Second Edition, Oxford and IBH Publishing Co., Pvt., Ltd (2003).
3. M. Swaminathan, Essentials of Food and Nutrition, Vol. II, The Bangalore Printing and Publishing Co., Ltd., Bangalore (2008).
4. S. A. Joshi, Nutrition and Dietetics, Second Edition, Tata Mc. Graw Hill Publication, New Delhi (2008).

UNIT- I Text book –1 Chapter – XXIV
Ref book – 1Chapter – XXIV

UNIT –II Ref book - 2 Chapter – XXXVIII

UNIT-III Text book –1Chapter – XVI
Text book –3Chapter – VIII
Text book - 4Chapter – XII
Ref book - 2 Chapter - XXXIX

UNIT - IVText book – 1 Chapter – XVII, XIX
Text book – 2 Chapter – XXVIII, XXIX, XXX
Text book – 3Chapter – VIII
Text book – 4Chapter – XIII

UNIT –V Text book – 1 Chapter –XIII
Text book – 3 Chapter – VIII
Ref book – 2Chapter – XXXXIV

REFERENCE BOOKS

1. Robinson, Normal and Therapeutic Nutrition, Seventeenth Edition, Oxford & LBM Publishing, Bombay (1990).
2. L.K. Mahan and M.T. Arlin, Krause's Food Nutrition and Diet Therapy, Eleventh Edition, W.B. Saunders Company, London (2000).
3. M. E. Shils, J. A. Olson, M. Shike, & A.C. Ross, Modern Nutrition in Health & Disease, Tenth Edition, Lippincott Williams and Wilkins (2006).

SEMESTER-I: CORE –IV
TECHNIQUES IN CLINICAL NUTRITION- PRACTICAL

Course Code : 14PND1C4P
Hours/Week : 6
Credit : 5

Max. Marks : 100
Internal Marks : 40
External Marks : 60

1. Quantitative analysis of blood:

- a. Glucose- WV method (or) orthotoludine method
- b. Cholesterol- Zak's method
- c. Urea- DAM method
- d. Serum A/G ratio and total protein
- e. Serum Vitamin A

2. Quantitative analysis of urine

- a. Creatinine
- b. Urea- DAM method
- c. Calcium
- d. Phosphorus
- e. Vitamin C

**SEMESTER – I: CORE BASED ELECTIVE -I
PAEDIATRIC NUTRITION**

Course Code :14PND1CE1

Hours/Week : 6

Credit : 5

Max. Marks : 100

Internal Marks : 40

External Marks : 60

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

18 hours

Infancy & Immunization Schedule

- 1.1 Physiological development, assessment of nutritional status- anthropometric measurements, biochemical parameters, clinical & dietary data. Nutritional and food requirements for infants.
- 1.2 Immunization schedule during pregnancy, infancy and childhood.

UNIT II

18 hours

- 2.1 **Nutritional Management**- Premature, LBW Babies And children with developmental disabilities- characteristics, causes and complications, feeding methods, growth and nutritional assessment.
- 2.2 **Identification of Sick Newborn**- Detection of abnormal signs- cyanosis, jaundice, respiratory distress, bleeding, seizures, refusal and feed, abdominal distention, failure to pass meconium and urine.

UNIT III

18 hours

- 3.1 **Nutritional Management in Malnutrition**- Causes, Symptoms & Nutritional Managements for PEM, anaemia, scurvy, rickets, vitamin A deficiency, childhood obesity. Underweight and underweight nutrition- short term and long term consequences in brief.

UNIT IV

18 hours

- 4.1 **Nutritional Management of Infectious Diseases** -Causes, Symptoms & Nutritional Managements for Diarrhoea, typhoid, TB and hepatitis.
- 4.2 **Nutritional Management in Gastro Intestinal Disorders**- Causes, Symptoms & Nutritional Managements for Lactose intolerance, celiac disease, inflammatory bowel disease, constipation and fat absorption test diet (calculation of fluids & electrolytes-both deficit and maintenance and management calorie intake).

UNIT V

18 hours

5.1 Nutritional Management for Children with Special Conditions-Causes, Symptoms & Dietary Managements for Autism, ADH (Attention DeficitHyperactivity disorder),Spectrum disorders, Cerebral Palsy, Epilepsy, Muscular Dystrophy.

TEXT BOOKS

1. Sushila Srivastava and K. Sudha Rani, Text Book of Human development A life span developmental approach, First Edition, S. Chand &Company Pvt(2014).
2. B. Srilakshmi, Dietetics, Seventh Edition, New Age International (P) Ltd. Publishers, Chennai (2011).

UNIT – I	Text Book - 1	Chapter –I,III
UNIT-II	Text Book –2	Chapter – III,
	Ref Book - 2	Chapter – XXXXXI, XXXXXXXXXVI, XXXXXXXXXXI
UNIT -III	Text Book - 1	Chapter-VI
UNIT -IV	Text Book -2	Chapter-XIII
	Ref Book -1	Chapter-XXVI, XXVII
UNIT-V	Ref Book - 1	Chapter – XXXXV, XXXXI
	Ref Book -2	Chapter - XXXXXVII

REFERENCE BOOKS

1. Mahan, L.K. and Escott-Stump, S. (2000): Krause’s Food Nutrition and Diet Therapy, 10th Edition, W.B. Saunders Ltd.
2. Depak K Guha, Neonatology Principles and Practices, Third Edition, Jaypee Brothers Medical Publications (P) Ltd, New Delhi (2005)
3. Textbook of pediatric nutrition- Book review, Stephen J Rose, Ach Dis Child, 1995
4. Shils, M.E., Olson, J.A., Shike, M. and Ross, A.C. (1999): Modern Nutrition in Health and Disease, 9th Edition, Williams and Wilkins.
5. Escott-Stump, S. (1998): Nutrition and Diagnosis Related Care, 4th Edition, Williams and Wilkins.
6. Davis, J. and Sherer, K. (1994): Applied Nutrition and Diet Therapy for Nurses, 2nd Edition, W.B. Saunders Co.
7. Walker, W.A. and Watkins, J.B. (Ed) (1985): Nutrition in Pediatrics, Boston, Little, Brown & Co.
8. Guyton, A.C. and Hall, J.E. (1999): Textbook of Medical Physiology, 9th Edition, W.B. Saunders Co.
9. Ritchie, A.C. (1990): Boyd’s Textbook of Pathology, 9th Edition, Lea and Febiger, Philadelphia.
10. Fauci, S.A. et al (1998): Harrison’s Principles of Internal Medicine, 14th Edition, McGraw Hill.

**SEMESTER – I : CORE BASED ELECTIVE -I
NUTRITIONAL NEEDS FOR SPECIAL CHILDREN**

Course Code :14PND1CE1

Hours/Week : 6

Credit : 5

Max. Marks : 100

Internal Marks : 40

External Marks : 60

Objectives:

To enable the students to

1. Understand the role of food for special children
2. Understand the role and special nutritional care for special children

UNIT I

18 hours

1.1 Regulations and School Food Service - Disabilities Definition, Individuals with Disabilities Education Act (IDEA).

1.2 Diet Prescription- #Role of Physician for Children with Disabilities#, Medical Statement for Children with Special Dietary Needs

1.3 The Role of School Food Service - school issues, school food service responsibilities, Providing Special Meals to Children with Disabilities, Menu Modifications for Children with Disabilities, Texture Modifications for Children with Disabilities.

UNIT II

18 hours

2.1. Description of Selected Disabilities – Attention deficit hyperactivity disorders- Autism , Spectrum disorders, Cerebral Palsy, Epilepsy or Seizure Disorder - #Muscular Dystrophy#.

2.2. Mental Retardation - Down Syndrome - Prader Willi (PW) Syndrome - Spina Bifida - Cystic Fibrosis -Rett Syndrome.

2.3 Metabolic Diseases - Inborn Errors of Metabolism (IEM) – Galactosemia, Phyneylketonuria.

UNIT III

18 hours

3.1. Food Allergies and Food Sensitivities - Common Food Allergens , Foods that commonly contain the “Big Eight” allergens and should be avoided,# Symptoms of Food Allergy #.

3.2. Gastrointestinal symptoms associated with food allergy - Cutaneous, or skin, symptoms associated with food allergy - Respiratory symptoms associated with food allergy – Anaphylaxis and its signs.

3.3. Managing Food Allergies in Children – In the kitchen -Know which foods to avoid, Keep the kitchen organized to avoid cross-contamination, clean- Outside the kitchen. Monitoring for an allergic reaction. Food Intolerance.

UNIT IV

18 hours

4.1 Issues Impacting Nutrition and Special Dietary Orders - Energy Needs –

Overweight- Intervention strategies for reducing calories in school lunch and Breakfast.

Underweight - Ways to Increase Calories #.

4.2. Feeding Problems. Oral-Motor Problems. Modification of Food Texture – Chopped,

Ground, Pureed. Positioning Problems. Behavioral Issues- Self-feeding, Tube Feedings.

UNIT V

18 hours

5.1. Special Formulas and Special Medical Foods - The Purchase of Special Formulas and Special Medical Foods. Fluids and Fiber.

5.2. Environmental Considerations. Dining Environment . Scheduling. Space. Location.

Lighting. Dealing with Distractibility.# Food safety issues #.

TEXT BOOKS

1. Hand book for Children with Special Food and Nutrition Needs, Item No ET69-06, National Food Service Management Institute, The University Mississippi (2006).

UNIT I Text book – 1Chapter – I

UNIT II Text book – 2Chapter – II

UNIT III Text book –2Chapter – III

UNIT IV Text book –2Chapter – IV

UNIT V Text book –2 Chapter – V

REFERENCE BOOKS

1. Horsley, J.Q., & Shockey, W.L. (1999). Nutrition management for children with special food and nutrition needs. In Martin, J., & Conklin, M.T. (Eds.), *Managing Child Nutrition Programs* (pp. 363-387). Leadership for Excellence Gaithersburg, MD: Aspen Publishers.
- Cloud, H.H., Ekvall S.W., & Hicks, L. (2005). Feeding problems of the child with special health-care needs. In Ekvall, S.W. & Ekvall, V.K. (Eds). *Pediatric nutrition in chronic diseases and developmental disorders* (2nd ed.) New York: Oxford University Press

SEMESTER- II: CORE -V
HUMAN NUTRITION

Course Code : 14PND2C5
Hours/Week : 6
Credit : 5

Max. Marks : 100
Internal Marks : 40
External Marks : 60

Objectives:

To enable the students to

1. Understand the role of macronutrients
2. The metabolism of macronutrients
3. Gain knowledge about different micro nutrient deficiencies
4. Obtain depth on the study of major nutrients

UNIT I

18 hours

1.1 Energy, Protein and Amino Acids

- a) Energy value of foods, #SDA#, Energy Production
- b) Factors affecting thermogenesis, Energy utilization by cells
- c) Energy output –BMR, physical activity level, physical activity rate
- d) Energy balance, measurement of energy content of food

1.2 Proteins and Amino Acids

- a) Classification, Functions, Digestion, Sources, RDA
- b) Protein Quality Evaluation – PER,NPU, BV
- c) Nutritional Classification of Amino Acids, Amino acid balance, Imbalance and Toxicity, Amino Acid Pool
- d) Therapeutic applications of amino acid.

UNIT II

18 hours

Lipids and Carbohydrates

2.1 Lipids

- a) Classification, Functions, Digestion, Absorption, Sources, RDA
- b) Effects of Deficiency and Excess fat
- c) Role of Saturated fat, Cholesterol, Lipoprotein, Triglycerides and Essential Fatty Acids in the diet
- d) Role of n-3, n-6 fatty acid in Health and Diseases.

2.2 Carbohydrates

- a) Classification, Functions, Digestion, Absorption, Sources, RDA
- b) Dietary Fiber – Role of fibre in lipid metabolism, Colon Function, Blood Glucose Level and GI tract functions
- c) Sweeteners – Nutritive and Non-Nutritive

UNIT III

18 hours

3.1 Macro Minerals

Calcium – Distribution in the body, absorption, Storage, utilization, transport, excretion, balance, deficiency, toxicity, Factors influences and hinders absorption of calcium, sources, RDA, calcium interaction with other nutrients.

Phosphorus – Distribution, digestion, absorption, utilization, transport, storage, excretion, sources, Factors influences and hinders absorption of phosphorus, calcium phosphorus ratio, deficiency and toxicity

Iron - Distribution, absorption, utilization, transport, storage, excretion, Factors influences and hinders absorption of iron, sources, RDA, deficiency and toxicity

3.2 Micro Minerals

Iodine, fluoride, magnesium, copper, Zinc, selenium, manganese, chromium, distribution in the human body, function, sources, RDA, deficiency, toxicity

UNIT IV

18 hours

4.1 Fat Soluble Vitamins

Vitamins A, D, E, K : Functions, absorption, storage, excretion, Sources, RDA, Deficiency, toxicity, Interaction of fat soluble vitamins with other nutrients.

4.2 Water Soluble Vitamins

Thiamine, Riboflavin, Niacin, Biotin, pantothenic acid, pyridoxine and B12, folic acid

Ascorbic acid : Function, absorption, excretion, sources, RDA, deficiency, toxicity, Interaction of water soluble vitamins with other nutrients

UNIT V

16 hours

Water and Electrolyte

5.1 Water

Distribution and functions of water, water balance – Maintenance and Distribution – physiological variations in the intake and output of water – water retention and depletion – Requirements of water.

5.2 Electrolyte

Electrolyte content of fluid compartments and functions of electrolyte – Sodium, Potassium and chloride, absorption, balance, factor affecting electrolyte balance and hydrogen ion balance.

#.....# self -study portion.

TEXT BOOKS

1. A. Shubhagini Joshi, Nutrition and Dietetics (with Indian Care Studies), Tata Mc Graw Hill Education Private Limited(2010).
3. B. Srilakshmi, Nutrition Science, Third Edition, New Age International PVT Ltd (2008).

UNIT I Text book – 1 Chapter – I, II
Text book – 2 Chapter – VII

UNIT II Text book – 2 Chapter – IV, III

UNITIII Text book –2 Chapter – IX, X, XI, XII

UNITIV Text book – 2Chapter – XIII, XIV, XV, XVI, XVII, XVIII

UNITV Text book – 2 Chapter – XX

REFERENCEBOOKS

1. C. Gopalan, Dietary guidelines for Indians,ICMR,National Institute of Nutrition, Hyderabad (2003).
2. M.V.Krause and M.A. Hunsher, Food Nutrition and Diet Therapy, Eleventh Edition,W.B.Saunders company, Philadelphia, London (2004).
3. L.K. Mahan. and S.E. Stump, Krause’s Food Nutrition and Diet Therapy, W.B Saunders Company, USA.
4. S. Nix. William’s Basic Nutrition and Diet Therapy, Mosby, India.

**SEMESTER-II: CORE –VI
THERAPEUTIC NUTRITION- II**

Course Code : 14PND2C6
Hours/Week : 6
Credit : 5

Max. Marks : 100
Internal Marks : 40
External Marks : 60

Objectives:

To enable the students to

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

UNIT-I

18 hours

Nutritional Care in Biological Stress

- 1.1 Definition, types, psychosomatic disorders due to stress. The biological effects of stress on various systems–vital organs-brain, cardiovascular system, respiratory system and non-vital organs and immune system.
- 1.2 #Stress inducing food, anti - stress nutrients and foods#. Dietary guidelines for the management of stress and other stress management factors.

UNIT-II

18 hours

Diseases of the Endocrine: Thyroid-Hypo and Hyper Thyroidism and Pancreas - Diabetes Mellitus

- 2.1 Clinical features, metabolic features, nutritional requirements and treatment for hypo and hyper thyroidism.
- 2.2 Classification, pathophysiology, symptoms, diagnosis, risk factors and complications. Management of diabetes mellitus – Insulin therapy and oral hypoglycemic agents.
- 2.3 Dietary care and nutritional therapy, meal plan with and without insulin. Glycemic index of food, #special diabetic foods and lifestyle management#.
- 2.4 Gestational diabetes – causes, complications and dietary management.

UNIT- III

18 hours

Diseases of the Cardiovascular Diseases

- 3.1 **Hyperlipidemias** - classification of hyperlipidemias. Clinical and nutritional aspects of hyperlipidemias. Dietary regimen
- 3.2 **Hypertention**-types, pathophysiology, etiology and nutritional care.
- 3.3 **Atherosclerosis**- pathophysiology, role of fat in the development of atherosclerosis, clinical effects, risk factors and dietary modification.
- 3.4 **Ischemic heart disease** – #angina pectoris, myocardial infarction-clinical effects# and dietary management. Congestive heart disease- pathophysiology, etiology, symptoms and dietary management.

UNIT- IV

18 hours

Nutritional Care in Cancer and Diseases of Nervous System

4.1 **Cancer**-classification, pathophysiology, risk factors-environmental, hereditary and nutritional effects of cancer and abnormalities in metabolism.

4.2 **Nutritional effects of cancer therapy**-chemo therapy , radiation therapy and bone marrow transplantation. Side effects of cancer therapy and dietary management. #Role of food in the prevention of cancer#.

4.3 **Diseases of Nervous system**-nutrition care in Alzhemers diseases, epilepsy, migraine, multiple sclerosis and Parkinson's disease.

UNIT- V

18 hours

Assessment: Food – Drug – Interactions

5.1 **Effects of food on Drug therapy** – drug absorption, medication and enteral nutrition, inter actions, drug distribution, drug metabolism and #drug excretion#.

5.2 **Effects of drug on food and nutrition** – nutrient absorption, nutrient metabolism and #nutrient excretion#.

5.3 **Effects of drugs on nutritional status** – oral, taste, smell, gastro – intestinal effects, appetite changes, organ system toxicity and glucose levels.

#.....# self - study portion

TEXT BOOKS

- 1.B. Srilakshmi, Dietetics, Seventh Edition, New Age International (P) Ltd. Publishers, Chennai(2011).
2. S. Mahtab, N. Bamji Prasad Rao and Vinodini Reddy, Textbook of Human Nutrition, Second Edition, Oxford and IBH Publishing Co., Pvt., Ltd (2003).
3. M. Swaminathan, Essentials of Food and Nutrition, Vol. II, The BangalorePrinting and Publishing Co., Ltd., Bangalore (2008).
4. S. A. Joshi, Nutrition and Dietetics, Second Edition, Tata Mc. Graw Hill Publication, New Delhi (2008).

UNIT- I Ref book –2Chapter – XXXXII

Ref book -3 Chapter – XVII

UNIT –II Text book –1 Chapter – XVIII

Text book –1 Chapter – XVIII

Text book –2Chapter – XXVI

Text book –3Chapter – VIII

Text book –4Chapter – IX

Ref book - 1 Chapter – XXXVII

Ref book - 2 Chapter – XXXIII

Ref book - 3 Chapter – XXII

UNIT-III Text book –1 Chapter – XV, X
Text book –2Chapter – XXV
Ref book – 2Chapter – XXXV
Ref book - 3 Chapter - II

UNIT - IV Text book – 1 Chapter – XXII
Text book – 2 Chapter – XXVII
Text book – 3Chapter – VIII
Text book – 4Chapter – XVI
Ref book - 2 Chapter – XXXX, XXXXIII
Ref book - 3 Chapter – XXIV

UNIT –V Ref book – 2 Chapter – XIX
Ref book – 3 Chapter – XVIII

REFERENCE BOOKS

1. Robinson, Normal and Therapeutic Nutrition, Seventeenth Edition, Oxford & LBM Publishing, Bombay (1990).
2. L.K. Mahan and M.T. Arlin, Krause's Food Nutrition and Diet Therapy, Eleventh Edition, W.B. Saunderson Company, London (2000).
3. D. Eleanor, Schlenker and Sara Long Roth, Williams Essentials of Nutrition and Diet Therapy, Tenth Edition, St-Louis (2011).

SEMESTER- II: CORE -VII
NUTRITION FOR GROWTH AND DEVELOPMENT

Course Code :14PND2C7

Hours/Week : 6

Credit : 5

Max. Marks : 100

Internal Marks : 40

External Marks: 60

Objectives:

To enable the students to

1. Get acquainted with growth and development changes from conception till death.
2. Understand the inter-relationship between nutrition, growth and development during life cycle.
3. Understand the role of nutrition facts in vulnerable groups and special group of society.

UNIT-I

18 hours

Nutrition in Pregnancy:

- 1.1 Importance of nutrition prior to pre gestational and gestational periods. Effect of malnutrition on maternal and fetal health- short term and long term, intra- uterine growth retardation (IUGR).
- 1.2 Nutritional requirements and storage during pregnancy, nutritional adaptations in pregnancy, complications of pregnancy and management.

UNIT-II

18 hours

Nutrition in lactation:

- 2.1 Growth and development of mammary gland, physiology of lactation-synthesis of milk components, let down reflex, role of hormones, effect of breast feeding on maternal health.
- 2.2 Feeding problems due to – sore nipples, engorged breast, inverted nipples, nutrient need and dietary modification.

UNIT-III

18 hours

Nutrition in Infancy:

- 3.1 Nutritional status at birth, growth and development, nutritional requirement during infancy.
- 3.2 Significance of Breast feeding- methods. Artificial feeding- feeding with cow's milk. Problems encountered in artificial feeding.
- 3.3 Weaning- need and food selection. Feeding schedule. Feeding of low birth weight and pre-term babies.

UNIT-IV

18 hours

Nutrition for Preschool children, School children and Adolescence:

4.1 Nutrition for Preschool Children - growth and development, nutritional requirements. Food habits, meal pattern and dietary modification, supplementary foods, malnutrition.

4.2 Nutrition for School children- growth and development, nutritional requirements, factors influencing nutritional status, packed lunch, establishing healthy eating habits, nutritional problems – over weight, obesity, under weight, iron deficiency anemia and dental caries.

4.3 Nutrition for Adolescents - growth and development during adolescence. Nutritional dietary requirements. Food habits and dietary practices. Nutritional problems. Accelerated demands- Adolescent pregnancy, increased activity pattern.

UNIT-V

18 hours

Adulthood and Geriatric Nutrition:

5.1 Nutrition in Adulthood- #Reference man and woman#, basis for nutritional requirements, nutrition and work efficiency. Per menopausal, menopausal and post menopausal women, nutritional needs.

5.2 Geriatric Nutrition- The ageing process- physiological, socio-psychological aspects of ageing. Nutritional problems of elderly. #Nutritional requirements of elderly and dietary management to meet nutritional needs#.

#.....# self study Portion

TEXT BOOKS

1. B.Srilakshmi, Dietetics, Sixth edition, New Age International Pvt Ltd (2010).
2. S.Ghosh, The Feeding and Care of Infants and Young Children, VHAI, Sixth edition, New Delhi (1992).
- 3.M.Swaminathan, Essentials of Food and Nutrition, Vol I, Ganesh & Co. Madras (1985).
- 4.M.Swaminathan, Essentials of Food and Nutrition, Vol II, Ganesh & Co. Madras (1985).
5. C.Gopalan, Recent Trends in Nutrition, Oxford University Press (1993).
6. H.P.S.Sachdeva, P. Chaudhary, Nutrition in Children. Developing Country Concerns Department of Pediatrics, Maulana Azad Medical College, New Delhi (1994).

- UNIT I** Text book – 1Chapter – VII
- UNIT II** Text book – 1 Chapter – VIII
- UNIT III** Text book – 1Chapter – III
- UNITIV** Text book – 1 Chapter – IV
 Text book – 1 Chapter – V
- UNIT V** Text book – 1 Chapter – II
 Text book – 1Chapter – IX

REFERENCE BOOKS

1. WHO, A Growth Chart for International Use in Maternal and Child Health, Geneva (1978).
2. C.Gopalan, Indian Council of Medical Research Recommended Dietary Intakes for Indians (1989).

SEMESTER-II: CORE –VIII
THERAPEUTIC NUTRITION-PRACTICAL

Course Code : 14PND2C8P
Hours/Week : 6
Credit : 3

Max. Marks : 50
Internal Marks : 20
External Marks : 30

Plan, calculate, modify the nutrient requirements and prepare the diets for the below mentioned pathological conditions:

1. Routine hospital diet
Fluid-clear, full.
Soft and regular diets.
2. Diet for fever conditions
Short term fever - Influenza, typhoid.
Intermittent fever - Malaria.
Long term fever - Tuberculosis.
3. Diet for pre and post- operative conditions.
4. Diet in special feeding- enteral feeding (blend preparation for tube feeding).
5. Diet for gastro-intestinal disorders
Diarrhea, constipation, ulcer, Irritable bowel syndrome, chronic pancreatitis, liver diseases- hepatitis, cirrhosis.
6. Diet for diabetes mellitus
Insulin dependent, Non –insulin dependent, Gestational diabetes mellitus.
7. Diet for weight management
Obesity grade-I & III, underweight.
8. Diet for renal diseases
Glomerulonephritis, Nephrosis, Renal failure-Acute, chronic, Dialysis and Renal calculi.
9. Diet for heart diseases
Hypertension, Atherosclerosis, Congestive heart failure.
10. Diet for cancer
11. Diet for Acquired immune deficiency syndrome

**SEMESTER-II: CORE BASED ELECTIVE – II
FUNCTIONAL FOODS AND NUTRACEUTICALS**

Course Code : 14PND2CE2

Hours/Week : 6

Credit : 5

Max. Marks : 100

Internal Marks : 40

External Marks : 60

Objectives:

To enable the students to

1. Gain knowledge about functional foods and Nutraceuticals
2. Have thorough understanding about the health effects

UNIT- I

18 hours

Functional Foods and Nutraceuticals

- 1.1 Definition – History of functional foods- Classification of Nutraceuticals, composition based on chemical Nature
- 1.2 Nutraceuticals: Primary and Secondary metabolites in plants; a) Carotenoids b) Conjugated Linoleic acid c) Flavonoids d) Nitrogen and Sulphur containing amino acid derivatives e) Proteinase and alpha amylase inhibitor f) omega 3 PUFA g) Terpenoids

UNIT- II

18 hours

Organizational models for Nutraceuticals

2.1 Food Source: Plant, Animal, Microbial

2.2 Mechanism of action: Anticancer, positive influence on blood lipid Profile, antioxidation, anti-inflammatory, osteogenic

2.3 Chemical Nature: Isoprenoid derivatives, phenolic substances, structural lipids, fatty acids, carbohydrates and derivatives, amino acid base substances, microbes, minerals

UNIT – III

18 hours

3.1 Prebiotics:

Definition, Sources, effect of processing, physiological effects, effects on human health and potential applications in risk reduction of diseases

#Perspective for food applications for the following:

- Non-digestible carbohydrates/Oligosaccharides
- Dietary fibre
Resistant Starch
- Gums

3.2 Probiotics : 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

Safety of probiotics

3.3 Synbiotics : Important features of synbiotics.

UNIT - IV

18 hours

4.1. Useful food components with potential health benefits: Definition, sources, bioavailability, effect of processing, physiological effects, effects on human health and potential applications in risk reduction of diseases

4.2 Perspective for food applications of the following:

- Polyphenols: flavonoids, catechins
- Isoflavones, tannins
- Phytoestrogens
- Phytosterols
- Glucosinolates
- Pigments- Lycopene, curcumin
- Sulphur compounds
- Other components- phytates, protease inhibitors, saponins, amylase inhibitors
- Active compounds of spices and condiments (Allicin, trigonellin, gingerol, capsaicin)

UNIT -V

18 hours

5.1. Application of herbs as functional ingredients

Herb as ingredients in functional foods

5.2. Action of Herbs and its Efficacy and safety regulatory status

- a) Nervous System-Ashwagandha (*withania Somnifera*)
- b) Heart and Circulatory System-hawthorn plant
- c) Immune System –Neem, Echinacea, *acacia catechu*, *citrus aurantium*
- d) Digestive System-Ginger, valerian, root, fennel
- e) Respiratory System-Tulsi (*ocimum Sanctum*)
- f) Urinary System-Cranberry, Saw palmetto, *ziziphus jujuba*
- g) Musculoskeletal System-Fever few, eclipsta prostate, *curcuma longa*

#.....# self- study portion.

UNIT - I Net Reference www.ajpcr.com/vol3Issue1/265.pdf
www.ncbi.nlm.nih.gov/pubmed/-
www.nutrition.org/content/136/6/1636s.long
www.bodybuilding.com/store/cla.html
www.hspb.harvard.edu
www.whfoods.com/gen_page.php? tname = nutrient & bid =84
www.eufic.org/article/en/expid/basics-functional -foods -

UNIT-II Net Reference [www.sphinxesai.com/vol.3No.1/pharm-Jan-Mar 11/pdf/JM 11](http://www.sphinxesai.com/vol.3No.1/pharm-Jan-Mar%2011/pdf/JM%2011)

UNIT - III Net Reference www.medicinet.com

UNIT- III, Ref Book - 1 Chapter – XV

Ref Book – 2 Chapter – X

Net Reference www.medicinet.com

UNIT - IV Net Reference www.Pitt.edu/~super7/45011-46001/45161

Net Reference www.ipv.pt/millennium/mellineum/

Ref Book – 2 Chapter – V

UNIT - V Net Reference www.ashwagandha.com

www.herbwisdom.com/herb-ashwagandha.html

www.webned.com.../ingrdientmono-527-hawthorn.aspx?
www.livestrong.com>Health
www.grherbals.in/herbal-extract.html
www.agriculture.indiabizclub.com/manufacturer/echinacea-purpurea-p.e.

REFERENCES BOOKS

1. Bibek Ray and Arun Bhunia, Fundamental Food Microbiology, CRC Press (2008)
2. Mary K Schmidl and Theodore P.Labuza, Essential of functional Foods. Springer (India) private Limited (2000)
3. G.Mazza. Functional Foods Biochemical Processing Aspects Culinary and Hospitality Industry Publications Services(1998)
4. Israel Goldberg Functional Foods Designer Foods Pharma Food,Nutraceuticals Culinary and Hospitality Industry Publications (2001)
5. Robert E C Wildman Handbook of Nutraceuticals and Functional Foods (2001).

SEMESTER-II: CORE BASED ELECTIVE – II
NUTRITIONAL MANAGEMENT AND SAFETY FOR FOOD SERVICE

Course Code : 14PND2CE2
Hours/Week : 6
Credit : 5

Max. Marks : 100
Internal Marks : 40
External Marks : 60

Objectives:

To develop managing skill in food service industry.

UNIT- I **18 hours**

1.1 Food Service Industries in India – acts and responsibilities. Fables, foibles, fraud and fact – note on eating preference and misinformation, reliable information, #source of reliable information, government information and regulations on healthful food program#.

UNIT- II **18 hours**

2.1 Menu Planning and Service - Projecting and preserving nutrients during production, purchase, storage, cooking and serving. Types and function of menu, planning a menu according to food service type, recipes and #special menu for food service#.

UNIT – III **18 hours**

5.1 Kitchen management - principles of layout, determination of equipment – factors affecting the selection, criteria for selection, types of equipment, #basic materials used in manufacture of equipments#, installation and care of equipments, fuel saving techniques, physical planning- architectural features, floor, walls, lighting, plumbing and ventilation.

UNIT - IV **18 hours**

4.1 Food service - service areas, methods and styles, table winding up, setting, presentation techniques, clearing and customer relations.
4.2 Laws governing food service institutions – food laws, labour laws, #laws concerning hygiene and safety#.

UNIT -V **18 hours**

5.1 Environmental Hygiene and Sanitation - Hygiene in food plant hygiene, safety handling, personal hygiene, to prevent procedure followed in food service establishment to prevent accidents, facilities and benefits to workers in each establishment. #Indices of food and water field of catering establishment#, biological criteria of food, testing and control measures. Management of food waste and waste water.

#.....# self- study portion.

TEXT BOOKS:

1. M. Sethi, S. Malhan, "Catering management: An integrated approach", wiley Eastern, New Delhi, (1993).
2. M. Sethi, "Institutional Food Management", 1st edition, New Age International Publishers, (2004).
3. S. Andrews, "Textbook of Food & Beverage Management", Tata McGraw Hill Education (P) Ltd., (2008).
4. D.Kumar, "Food Service & Catering Management", Omega Publications, New Delhi-2, (2009).
5. George.B & Chatterjee.S, "Food Beverage Service & Management", Jaico Publishing house, (2008).
6. S. Andrews, "Food & Beverage Service (Training Manual)", Tata McGraw Hill Publishing Company Ltd., (1980).

UNIT I Text Book- 4 Chapter-VII, VIII, IX

UNIT II Text Book- 1 Chapter- XV, XVII
Text Book- 2 Chapter-XVII
Text Book- 3 Chapter-XII

UNIT III Text Book- 1 Chapter –IV, V, VIII, IX, XI
Text Book- 2 Chapter- IX, X, XI, XII, XIII
Text Book- 5 Chapter-XXXXIV

UNIT IV Text Book- 1 Chapter –XXVI, XXX
Text Book- 2 Chapter – XIX, XXX, XXXI
Text Book- 6 Chapter – XI, XIII, XV, XVI

UNIT V Text Book- 1 Chapter –XVI, XXVIII, XXIX
Text Book- 2 Chapter-XX, XXX

REFERENCES BOOKS

1. R. Kotscheva, and M.E. Teerell, "Food service planning; layout and equipment", 3rd edition, MacMillan Publication Co., New York, (1985).
2. .H Delfakis, W.C. Scanion, and J. B.Van Burch, "Food service Management", South Western Publilcation Co., Cincinatti, Ohia, (1992).
3. J.P. Palacio,V. Harger,G. Shgart and M. West,"Introduction to food service", 17th edition,Mac Millan publication Co., New York,(1994).
4. D.R. Lillicap and J.A. Cousins, "Food and Beverage Service", 4thedition, ELBS, (1994).

SEMESTER- III: CORE -IX
NUTRITION AND PHYSICAL FITNESS

Course Code :14PND3C9
Hours/Week : 6
Credit : 5

Max. Marks : 100
Internal Marks : 40
External Marks : 60

Objectives:

To enable the students to

1. Understand the components of health and fitness and the role of nutrition in these.
2. Make nutritional, dietary and physical activity recommendations to achieve fitness and well-being.
3. Develop ability to evaluate fitness and well-being.

UNIT – I

18 hours

Body composition and fitness

- 1.1 Body Composition-** classification (Fat mass and fat free Mass) and its components, factors influencing body mass composition. Techniques for measuring body composition
- 1.2 Fitness-**definition, parameters of fitness- cardiovascular endurance, muscular strength, muscular endurance, flexibility and body composition

UNIT -II

18 hours

Assessment and benefit of exercise

- 2.1 Benefit of exercise-** physiological, psychological and sociological. Physical activity guidelines.
- 2.2 Assessing personal fitness-** preparticipation, screening and risk assessment.
- 2.3 Role of exercise in disease prevention** – diabetes, cardiovascular disease, obesity, bone health and cancer.

UNIT – III

18 hours

Energy systems and electrolyte balance

- 3.1 Reviews of different energy systems for endurance and power activity-** Fuels and nutrients to support physical activity .Shifts in carbohydrate and fat metabolism, mobilization of fat stores during exercise.
- 3.2 Water and electrolyte balance-** Losses and their replenishment during exercise and sports event, effect of dehydration, sports drinks.

UNIT-IV

18 hours

Nutrition for sport persons

- 4.1** Definition, physiological and significant changes during exercise, types of stress faced by sports persons, nutrition needs of sports persons-macro and micronutrient needs, role of water and electrolytes.
- 4.2 Role of nutrition and recommendations** – pre-exercise, during and post –exercise
- 4.3** Nutrition supplement and ergogenic aids.

UNIT-V

18 hours

Yoga and nutrition fitness in special conditions

5.1 Yoga and fitness- # effects on general vitality and on immune, endocrine, neurons, digestion and muscular systems, dietary pattern. Awareness about the alternative systems for health and fitness like ayurveda, yoga, vegetarianism and traditional diets#.

5.2 Nutrition and fitness in special conditions- space mission and high altitude-changes in body composition, nutrient requirements, food system and suitable types of food.

#.....# self-study portion.

TEXT BOOKS

1. BalaramThapar, Health and Physical Fitness, Rajat publications, New Delhi(2010).
2. Paul Insel, R. Elaine Turner and Don Ross, Nutrition, Third Edition, Jones and Bartlett Publishers (2007).
- 3.D. Eleanor, Schlenker and Sara Long Roth, Essentials of Nutrition and Diet Therapy, Tenth Edition Library of Congress Cataloging-in- Publication Data (2011).
4. Smolin and Grosvenor , Nutrition Science and Application, Library of Congress Cataloging-in – Publication Data (2008).
5. Anjana Agarwal and A. Shobha Udipi, Textbook of Human Nutrition, First Edition, Jaypee Brothers Medical Publishers (p) Ltd, (2014).

UNIT I Text Book- 5 Chapter-V
 Text Book- 1 Chapter- I

UNIT II Text Book- 1 Chapter- II

UNIT III Text Book-2 Chapter -VIII
 Text Book-3 Chapter-XIV

UNIT IV Text Book- 2 Chapter -VIII
 Text Book- 4 Chapter -XIII
 Text Book- 5 Chapter -XIII

UNIT V Text Book- 5 Chapter -XIV

REFERENCE BOOKS

1. E.N. Whitney & S.R. Rolfes, Understanding Nutrition, Eight Edition, West/Wadsworth, an International Thomson publishing Co(1999).
2. M. C. Ardle, W. Katch and V. Katch, Exercise Physiology Energy Nutrition and Human Performance, Fourth Edition, Williams and Wilkins Philadelphia (1996)
3. Barbak Ann Dushman, Complete Guide to Fitness and Health, American College of Sports Medicine Library and Congress Catalogin Publication Data (2011).
6. L.K. Mahan & S. Ecott-Stump, Krause's Food Nutrition and Diet Therapy, Tenth Edition, W.B. Saunders Ltd (2000).
7. F. Sizer & E. Whitney, Nutrition- Concepts & Controversies, Eighth Edition, Wadsworth Thomson learning (2000).
8. M.E. Shills, J.A. Olson, N. Shike and A.C. Ross, Modern Nutrition in Health & Disease, Ninth Edition, Williams & Wilkins (1999).

**SEMESTER-III: CORE - X
ADVANCED FOOD SCIENCE**

Course Code : 14PND3C10

Max. Marks : 100

Hours/Week : 6

Internal Marks : 40

Credit : 5

External Marks : 60

Objectives:

To enable the students to

1. Understand the Composition of various food stuffs.
2. Familiarize students with changes occurring in various foodstuffs as a result of processing, storage and cooking.

UNIT-I

18 hours

Colloids and Emulsions:

- 1.1. **Colloids** (sols, gels) - definition, characteristics, properties-physical and chemical, factors influencing their formation
- 1.2. **Emulsions**-definition, characteristics, types, properties-physical and chemical, emulsifying agents and uses.
- 1.3. **Foams**-definition, characteristics, uses, types, properties-physical and chemical, #factors affecting foam stability#.

UNIT-II

18 hours

Cereals, Pulses and Leavening agents:-

- 2.1. **Cereals & Millets**- types (major & minor), composition, starch- types (amylose, amylopectin) and sources; Properties- retrogradation, gelation and dextrinisation, gelatinization, gluten formation and factors affecting gelatinization and gluten formation.
- 2.2. **Pulses**-types (major & minor), composition, toxicity in pulses (lathyrism, favism, haemagglutinins, saponins, goitrogens, tannins). #Germination – process and effects#.
- 2.3. **Leavening agents** -definition, characteristics, types and uses.

UNIT-III

18 hours

Fruits and Vegetables:

- 3.1. **Fruits**- composition, pigment and acids present in fruits, #enzymatic browning and its Prevention#.
- 3.2. **Vegetables**- composition, classification of pigments, effect of heat and acid on pigments, flavour and bitter compounds present in vegetables.
- 3.3. #Role of fibre in cooking and Role of fruits and vegetables in food preparations#.

UNIT-IV

18 hours

Fats and Sugar:

- 4.1. **Fats**- types of food fats- visible & invisible; Properties- #rancidity (types and prevention) #, hydrogenation, winterization, iodine number, saponification value.
- 4.2. **Sugar**- types of Sugar, stages of Sugar cookery; Crystallization - meaning and factors affecting crystallization, crystalline (fondant, fudge) & non-crystalline candies (brittle, caramel) and Caramelisation.

UNIT-V

18 hours

Animal foods and Beverages

- 5.1. **Egg**- composition, properties- denaturation, coagulation – definition and factors affecting coagulation; #Evaluation of egg quality#.
- 5.2. **Meat** – structure, composition, post mortem changes, tenderization of meat and changes during cooking.
- 5.3. **Milk**- effect of heat, types of milk and milk products, non-enzymatic browning; #Pasteurization- definition, methods, effects#; Fermented beverages- types and their processing
- 5.4. **Alcoholic beverages**- processing of beer, wine, rum, brandy and toddy.
- 5.5. **Non alcoholic beverages**- malted and carbonated beverages.

#.....# self-study portion.

TEXT BOOKS

1. B. Srilakshmi, “Food Science”, New Age International Pvt. Ltd., Chennai (2006).
2. V. A. Vaclavik. & E. W. Christian, “Essentials of Food Science”, 2nd edition, Springer, New Delhi (2003).
3. R. Roday, “Food Science & Nutrition”, Oxford University Press (1999).
4. B. Sivasankar, “Food Processing & Preservation”, Prentice hall of India Pvt.Ltd, New Delhi(2002).

UNIT I Text Book 2 Chapter III
 Text Book 3 Chapter XIII

UNIT II Text Book 1 Chapter II & III
 Text Book 2 Chapter IV & XV
 Text Book 3 Chapter IV

UNIT III Text Book 1 Chapter VIII
 Text Book 2 Chapter VII
 Text Book 3 Chapter VIII

UNIT IV Text Book 2 Chapter XIV
 Text Book 3 Chapter VI

UNIT V Text Book 1 Chapter V, VI, VII & XII
 Text Book 2 Chapter IX, X & XI
 Text Book 4 Chapter XXIV

REFERENCE BOOKS

1. N. Potter and H.J. Hotchkiss, "Food Science", 5th edition, CBS publishers and distributors, New Delhi (1996).
2. C. G. Peckhan & H. J. Graves, "Foundations of food preparations", Macmillan Publishing Co., New Delhi (1979).
3. N. S. Manay & M. Shadaksharaswamy, "Foods-Facts & Principles", 2nd edition, New Age International Pvt. Ltd., New Delhi (2005).
4. M. N. Ahmed, "Food Science and Nutrition", 1st Edition, Anmol Publications Pvt. Ltd., New Delhi (2005).
5. A. Sharma, "Textbook of Food science & Technology", 1st edition, International book distributing co., (2006).
6. S. Jan, "Elements of Food Science", New India Publishing Agency, New Delhi (2013).
7. S. R. Mudambi, S. M. Rao & M. V. Rajagopal, "Food Science", New Age International Pvt. Ltd. Publishers, New Delhi (2007).
8. NIIR Board, "Handbook on Fruits, vegetables & Food processing with canning & preservation", 2nd edition, Asia Pacific Business Press Inc., Delhi.

SEMESTER-III: CORE - XI
RESEARCH METHODOLOGY AND STATISTICS

Course Code : 14PND3C11	Max. Marks : 100
Hours/Week : 6	Internal Marks : 40
Credit : 5	External Marks : 60

Objectives:

To enable the students to

1. Understand the importance of research
2. Learn about the various applications of students in the research
3. Familiarize on writing the project reports

UNIT I

18 hours

- 1.1 Meaning of Research, objectives of research, Types of Research and their application. Research Design – Qualities of good research, problems encountered by a researcher.
- 1.2 **Sampling**– Introduction, methods -Random sampling methods (random, stratified, systematic, cluster sampling), Non-Random sampling methods(judgement, convenience, quota sampling) sampling and non-sampling errors.

UNIT II

18 hours

- 2.1 **Methods of data collection** - primary and secondary, Primary data - Questionnaire, preparation of schedules, Interview method. Secondary data - Sources of secondary data, precautions while using secondary data.
- 2.2 **Classification of data**- Classification – meaning and objectives, types of classification, formation of discrete and continuous frequency distribution, Tabulation –parts of a table, general rules of tabulation, Types of tables.

UNIT III

18 hours

- 3.1 **Representation of data** – Diagrammatic and graphical representation , Significance of diagrams and graphs, general rules for constructing diagrams, Types of diagrams, graphs of Time series, graphs of frequency distribution.

UNIT IV

18 hours

- 4.1 **Statistical analysis** Measures of central Tendency – Mean, Median, Mode, their relative advantages and disadvantages, Measures of dispersion- Mean deviation, standard deviation, quartile deviation. Correlation analysis, types of correlation, regression, difference between correlation and regression.
- 4.2 **Tests of significance**- large and small samples, “t” and “f” test, chisquare test, ANOVA technique – ANOVA table, types, one way and two way, ANOVA in research.

UNIT V

18 hours

5.1 Report writing-layout of research report, significance of report writing, steps in report writing, types of research report, oral presentation, mechanism of report writing, precautions and essentials of writing a good research report, footnotes and bibliographical citations.

TEXT BOOKS

1. C.R.Kothari, Research Methodology(2002).
2. P. Shanthi Sophia and Bharathi, Second Edition, Computer Oriented Statistical Methods/Probability and Statistics, Charulatha publication(2000).
3. R.S.N.Pillai and V. Bagavathi, Statistics, Chand and Company Limited(2001).

UNIT I Text Book- 1 Chapter-I, II

UNIT II Text Book- 3 Chapter- VI

UNIT III Text Book-3 Chapter-VI, VIII

UNIT IV Text Book- 3 Chapter –IX, XII, XIII, XX

UNIT V Text Book- 1 Chapter -IX

REFERENCE BOOKS

1. S.P. Gupta , Statistical Methods, 31stEdition, Sultana Chand and Sons (2002).
2. R.P.Devadas,A Handbook on Methodology of Research, Sri Ramakrishna Vidhyalaya, Coimbatore(1989).
3. P. Ramakrishnan, Biostatistics, Saras Publication(2001).
4. H.M.C. Donald, Burney , Research Methods, Fifth edition, Thomson and Wadsworth Publications(2002).

SEMESTER-III: CORE -XII
TECHNIQUES IN FOOD ANALYSIS - PRACTICAL

Course Code : 14PND3C12P	Max. Marks	: 100
Hours/Week : 6	Internal Marks	: 40
Credit : 5	External Marks	: 60

1. Determination of moisture content present in food sample
2. Determination of pH content of fruit juices
3. Estimation of fibre content present in given sample
4. Estimation of protein (Kjeldhal Apparatus)
5. Estimation of fat (Soxhlet Apparatus)
6. Ashing of food and preparation of ash solution for mineral estimation
7. Estimation of Vitamins – Carotene, Ascorbic acid, Thiamine & Riboflavin.
8. Estimation of Minerals – Iron, Calcium, Phosphorus, Sodium & Potassium.
9. Determination of acid number and iodine number and peroxide value

SEMESTER- III: CORE BASED ELECTIVE-III
FOOD PROCESSING

Course Code : 14PND3CE3

Max. Marks : 100

Hours/Week : 6

Internal Marks : 40

Credit : 5

External Marks: 60

Objectives:

To enable the students to

1. Impart the basic concepts and principles of food processing.
2. Provide adequate knowledge on application aspects of food processing.
3. Learn about the various packaging methods and food processing units in india.

UNIT-I

18 hours

Introduction to food processing:

1.1 Food processing: Definition, scope, merits and demerits.

1.2 Cereal processing:

Rice-processing, parboiling- hot soaking process, by-products -ricebran, processed products-rice flakes, rice puff, rice starch. Wheat-milling, processed products-semolina, macroni and noodles. Corn - milling, by products- bran, germ, powder, processed products-flour, syrup, flakes and pop corn. Millet processing- ragi, jowar, bajra.

1.3 Breakfastcereal: Ready-to-cookcereals,ready-to-eatcereals – rice and wheat.

UNIT-II

18 hours

Pulse and oil processing:

2.1 Pulse Processing : Processing-cleaning, grading, pitting, splitting and polishing, extrusion technology. Elimination of toxic constituents.

2.2 Oilseeds processing: Oilseed pressing, solvent extraction, purification, degumming, refining, bleaching,deodorization,hydrogenation,plasticizingandtempering,by-products-oilcake. Processed products: Margarine, shortening, mayonnaise and salad dressing.

UNIT-III

18 hours

Vegetables, fruits and dairy processing:

3.1 Canning, Freezing, Dehydration of Fruits and Vegetables

3.2 (a) Vegetables processing:Freezing of vegetables -potato, cauliflower, carrot.

(b) Fruits processing:Preprocessing of tomatoes –field processing, washing in lye, peeling, freeze peeling, peeling in calcium chloride solution. Preparation & preservation of fruit juices. Dehydrated products-juice powders. Preserved products-jam, jellies, ketch-up's and sauces.

3.3 Dairy processing: Clarification, separation, standardization, pasteurization, homogenation and packaging of milk. Milk products: (a) non fermented- whey protein concentrates, skim milk, cream, khoa, ice-cream(b)fermented- cheese processing.

UNIT-IV

18 hours

Meat, poultry, fish and egg processing:

4.1 Meat processing: ageing, tenderising, curing, smoking, freezing of meat. Processed products: Gelatin, casing, sausages.

4.2 Poultry processing: slaughter, bleeding, scalding, defeathering, eviscerating, chilling, packaging, Processed products: dehydrate form of poultry.

4.3 Fish processing: Dehydration, chilling and smoking, Processed products: Fish protein concentrates.

4.4 Egg processing: pasteurization, freezing and drying, processed products: egg substitutes, egg powder .

UNIT-V

18 hours

Food packaging and processing units:

5.1 Food packaging: Meaning, functions, recent developments in packaging materials, laws related to packaging (standard of weight and measure), packaging of specific foods-cereal, pulses, milk, fruits and vegetables. Nutritional labeling.

5.2 Food processing units in India: #Introduction and role of Indian Institute of crop processing technology (IICPT, Thanjavur); Indian grape processing board (IGPB, Pune, Maharashtra); National meat and poultry processing board (NMPPB), National research centre for Banana (NRCB, Trichy) in the field of food processing#.

#.....# self - study portion.

TEXT BOOKS

1. N.N. Potter, Food Science, AVI Publishing company, INC, Westport, Connecticut (1996).
2. B. Srilakshmi, Food Science, Fifth Edition, New Age International Publishers (2010).
3. N.C. Kent, Technology of cereals , Fourth Edition, Wood Head Publishing Limited , Cambridge England (2004).
4. Experts of NIIR, Processing, Dehydration, Canning, Preservation of Fruits and Vegetables, NIIR board, National Institute of Industrial Research, New Delhi.
5. Experts of NIIR, Hand book on Fruits, Vegetables & Food Processing with Canning & preservation, NIIR board, National Instituted Industrial Research, New Delhi.

UNIT I

Text book – 2 Chapter – II

Text book – 3 Chapter – IV, XI

Net Ref [www.Fao.org/fileadmin/.../post_harvest_compendium -
MILLET.pdf](http://www.Fao.org/fileadmin/.../post_harvest_compendium_-_MILLET.pdf).

Net Ref [www.isites.harvard.edu/.../Millet%20processing
%20and%20botanical%20nam...](http://www.isites.harvard.edu/.../Millet%20processing%20and%20botanical%20nam...)

UNIT II Text book –2 Chapter – III
Text book –1Chapter – XVI

UNIT III Text book –1 Chapter – XVIII
Text book –5 Chapter – X, XI, XVII, XIX
Text book –2 Chapter – V
Text book –4 Chapter – XXI
Ref book –3 Chapter – II

UNIT IV Text book – 1 Chapter – XIV, XV

UNIT V Text book – 2 Chapter – XVII
Net Ref www.iicpt.edu.in,
www.igpb.in,
www.nmppb.gov.in,
www.nrcb.res.in/

REFERENCES BOOKS

1. Avantina Sharma, Text book of Food Science & Technology, International Book Distributing co., Lucknow (2006).
2. Neelam Khetarpul, Bakery Science and Cereal Technology , Daya publishing house, New Delhi (2005).
3. Satish Kumar Sharma, Post Harvest Management & Processing of Fruits & Vegetables, New India Publishing agency, New Delhi (2010).

**.SEMESTER- III: CORE BASED ELECTIVE-III
NUTRITIONAL COUNSELLING AND EDUCATION**

Course Code : 14PND3CE3	Max. Marks	: 100
Hours/Week : 6	Internal Marks	: 40
Credit : 5	External Marks	: 60

Objectives:

- 1.To understand the principles and methods of counselling.
- 2.To apply counselling methods to patients with different diseases

UNIT I **18 hours**

- 1.1 **Nutritional Counselling** - counselling techniques, stage of change. Activities that facilitate behavior change, understanding cultural factors, developing Discrepancy, avoiding arguments / defensiveness, rolling with resistance, supporting self- efficacy.
- 1.2 **Intervention Model** – Interviewing, assessment of current eating behavior and #assessment of readiness to change#.

UNIT II **18 hours**

- 2.1 **Nutritional Counselling Sessions** – not ready to change counselling sessions - asking open – ended questions, reflective listening, affirming, summarizing, eliciting self-motivational statements, #intention to change, ending the session#.
- 2.2 **Ready to change counselling sessions**- action plan, arranging for the next contact, resistance behaviors & potential strategies to modify them-reflecting, double-sided reflection, shifting focus, emphasizing personal choice, reframing.

UNIT III **18 hours**

- 3.1 **Psychology**- Introduction, definition., basic concepts –attention, perception, learning, memory,# personality, cognition, motivation #.
- 3.2 **Counselling Psychology**-Introduction, definition, meaning and importance.

UNIT IV **18 hours**

- 4.1 **Counselling Process**-various phases/ stages in counselling process.Types of Counselling: crisis counselling, facilitative counselling, preventive counselling and # development counseling #.
- 4.2 **Counsellor-Counselee Relationship** - nature and characteristics, factors influencing the relationship. Counselling and Psychotherapy, values in counselling.

UNIT V **18 hours**

- 5.1 **Family Counselling** - family planning counselling, abortion counselling, importance of counselling for children and adolescents.
- 5.2 **Geriatric counseling** - for patients with specific diseases like HIV/AIDS, cancer, and # diabetes #.

- UNIT I** Refbook – 3 Chapter – V
- UNIT II** Refbook –1Chapter – XVII
- UNIT III** Ref book –2Chapter – XXIV
- UNIT IV** Ref book –2Chapter – XXIV
- UNIT V** Ref book –1Chapter – XXX, XXXII, XXXVIII
 Ref book –3Chapter –V

REFERENCE BOOKS

1. L.K. Mahan and M.T. Arlin, Krause’s Food Nutrition and Diet Therapy, Eleventh Edition, W.B.Saunders Company, London (2000).
2. Robinson, Normal and Therapeutic Nutrition, Seventeenth Edition, Oxford & LBM Publishing, Bombay (1990).
3. M. E. Shils, J. A. Olson, M. Shike, & A.C. Ross, Modern Nutrition in Health & Disease, Tenth Edition, Lippincott Williams and Wilkins (2006).
4. Currie, Joe, Barefoot Counseling, A Premier in Building helping Relationships, Asian Trading Cooperation, Bangalore (1976).
5. K.K. Bhatia, Principles of Guidance and Counselling, Kalyani Publishers Ludhiana (2002).
6. Nelson – Jones, Richard, Practical Counselling and helping Skills, Better Yourself Books, Bombay (1994).

SEMESTER- III: EXTRA CREDIT- I
HOSPITALITY ADMINISTRATION

Course Code : 14PND3EC1	Max. Marks	: 100*
Hours/Week :	Internal Marks	: -
Credit : 5*	External Marks	: 100*

Objectives:

To acquaint the students with housekeeping department and its management in the hospitality industry.

To enable students to manage resources in the housekeeping department to fulfill the hospitality function.

UNIT I

Types of institutions offering hospitality services.

UNIT II

Hospitality functions

2.1 Role of housekeeping in hospitality industry.

2.2 Housekeeping in relation to commercial and welfare section.

UNIT III

Management of housekeeping department

3.1 Layout of housekeeping department

3.2 Planning, organization and communication of housekeeping activities

3.3 Coordination with other departments

3.4 Roles/ responsibilities of personnel in the housekeeping department.

UNIT IV

Administrative policies

4.1 **Personnel management:** recruitment, training, handling personnel promotion, evaluation, distribution of jobs, job schedules, job analysis.

4.2 Procurement policies, buying techniques, stores, stock control.

4.3 **Cost control:** inventory management, budget process, controlling expenses.

4.4 **Safety, security and sanitation:** safety, fire fighting, first aid safety in equipment use, pest control, sanitation standard.

4.5 Uniforms, types selection, distribution and control.

UNIT V

Maintenance: repairs and redecoration programmes.

TEXT BOOKS

1. West's and Wood's, Introduction to Food service, Second Edition, Mac Mhillan Publishing New York (1998).
2. Sudhir Andrews, Hotel Housekeeping Training Manual, Tata McGraw Hill Publishing Company Lt, New Delhi (1995).
3. Mahesh Rawat, Hotel Operations & Management, First Edition, Yking Publication books Jaipur (2010).
4. Mohini Singh, Hotel Housekeeping, Tata MaGraw – Hill Education Private Limited, New Dehli (2012).

UNIT I Text book –1 Chapter –I

UNIT II Text book –3 Chapter – III

UNIT III Text book –2 Chapter – IV, V
Text book –3 Chapter – IV, V

UNIT IV Text book –2 Chapter – VII,XI
Text book –3 Chapter – VI, VII, VIII, IX

UNIT V Text book –3 Chapter –XIII

REFERENCE BOOKS

1. Andrews Snoher, Hotel Housekeeping Training Manual, Tata McGraw Hill IPublication Co. Ltd., New Delhi (1978).
2. C. Dix, Accommodation Operations, MacDonald l& Evans (1979).
3. C. Jones and J.V. Paul, Accommodation Management, A System Approach, Batsford (1980).
4. M. Kesavana, Hotel Information System, Casell (1977).
5. C.J. Branson and M. Lennox, Hotel and Hospital Housekeeping, Fifth Edition., Redwood Books, Trowbridge Wilshrire London (1988) .
6. R. Lewis, T.Begg's, M.Shaw and S. Croffot, The Practice of Hospitality Management, , Vol. I & II, AVI Publishing Co. Inc. Westport Connecticut (1986).
7. M. David Allen, Accommodation and Cleaning Services, Vol. I & II, Houston Hutchinson and Co. (Publishers Ltd.) (1983).
8. Sudhir Andrews, Hotel Housekeeping Training Manual, Tata McGraw Hill Publishing Company Lt, New Delhi(1995).

**SEMESTER- IV: CORE COURSE-XIII
ADVANCES IN FOOD MICROBIOLOGY**

Course Code : 14PND4C13	Max. Marks	: 100
Hours/Week : 6	Internal Marks	: 40
Credit : 5	External Marks	: 60

Objectives:

This course will enable the students to

1. Understand deeply about the micro-organisms in food.
2. Learn the importance of the micro-organism in food spoilage, advanced techniques in preserving food.
3. Gain knowledge about the role of microbes in fermentation technology.
4. Aware about emerging trends in the field of the food microbiology.

UNIT-I

18 hours

Introduction to food microbiology:

- 1.1 Food microbiology:** History and scope, food spoilage, food preservation and food infection.
- 1.2 Physiological characteristic of important micro-organism in food:** Bacteria- salmonella, clostridium, staphylococcus, lactobacillus, streptococcus, acetobacter. Virus- hepatitis, poliomyelitis. Mould- aspergillus, rhizopus. Yeast- saccharomyces cerevisiae.
- 1.3#Economic importance of micro-organism:** Bacteria, yeast and mould#.

UNIT-II

18 hours

Factors affecting growth and detection of micro-organisms:

- 2.1 Intrinsic parameters** - Nutrient content, pH, buffer capacity, redox- potential(Eh), antimicrobial barriers, water activity.
- 2.2 Extrinsic parameters** - Relative humidity, temperature, gaseous atmosphere.
- 2.3 Methods for microbial examination of food-** Indicator organisms, direct examination, cultural techniques, enumeration methods-most probable number counts, alternative methods-dye-reduction test, rapid method-immunological methods- enzyme linked immune-absorbent assay (ELISA).

UNIT-III

18 hours

Contamination, spoilage, preservation and microbial toxins of foods:

- 3.1** Cereals and cereal products, Fruits and Vegetable products, Milk and milk product, Meat, fish and eggs.
- 3.2 Microbial toxins in food-** mycotoxins, aflatoxin, sea foods toxicants.

UNIT-IV

18 hours

Micro-organisms and food-borne disease:

- 4.1 Bacteria** – salmonella, clostridium botulinum, Escherichia coli.
- 4.2 Virus-** poliomyelitis, hepatitis A and E, gastro enteritis virus.
- 4.3 Porotoza-** entamoebahistoltyca, giardia lambia.

UNIT-V

18 hours

Fermentation and current trends in food microbiology:

5.1 Lactic acid bacteria- Antimicrobial activity, Health promoting effects, Malo-lactic fermentation.

5.2 Yeast fermentation

5.3 Fermented foods- yoghurt, sauerkraut, cucumber, meat, fish, vinegar, tempeh, soya sauce.

5.2 Current trends in food microbiology: Encapsulation Technology to protect probiotics.

#.....# self – study portion.

TEXT BOOKS

1. W.C. Frazier, Food Microbiology, Fourth Edition, TataMcGraw Hill Book Company, New Delhi (2008).
2. Pelczar and Krieg, Microbiology, Fifth Edition, Tata McGraw Hill Book Co., London (2006).
3. M.R.Adams and M.O. Moss, Food microbiology, New Age International publishers, New Delhi (2005).
4. A. K. Joshua, Microbiology, Fourth Edition, Popular Book Depot Publishers, Chennai (2001).

UNIT I Text book –3 Chapter – I
Text book –1 Chapter – II
Text book –5 Chapter – I

UNIT II Text book –3 Chapter – III, X

UNIT III Text book –1 Chapter – XI, XIII, XIV, XV, XVI, XVII, XVIII, XXV

UNIT IV Text book – 3 Chapter – VII, VIII

UNIT V Text book – 3 Chapter – IX
Net Ref www.cdn.intechopen.com/pdfs/.../In_Tech_Encapsulation_technology_to_prote...

REFERENCE BOOKS

1. A.J. Salle, Fundamental Principles of Bacteriology, Seventh Edition, Tata McGraw Hill Book Company, New Delhi (2007).
2. K. Vijaya Ramesh, Food Microbiology, MJP Publishers, Chennai (2007).

**SEMESTER-IV: CORE –XIV
PUBLIC HEALTH NUTRITION**

Course Code : 14PND4C14

Hours/Week : 6

Credit : 5

Max. Marks : 100

Internal Marks : 40

External Marks : 60

Objectives :

To enable students

1. To understand national nutritional problems and their implications.
2. To become familiar with the national and international contributions towards improvement of nutrition in India.
3. To become better prepared to evaluate nutrition projects in the community.

UNIT- I

18 hours

Population Dynamics :

1.1 Demographic transition- Demographic Cycle

1.2 Demographic trends in India – age and sex composition, age pyramids, sex ratio, dependency ratio, density of population, family size, urbanization, Literacy and education, life expectancy

1.3 Fertility behavior – age at marriage, duration of married life, spacing of children, education, economic status, caste and religion, nutrition, family planning and other factors
fertility related statistics, birth and death rates, growth rate

UNIT-II

18 hours

2.1 Nutrition and National Development

Nutrition in National Development in terms of socio – economic, industrial and agricultural development

2.2 Major Nutritional problems – Etiology, prevalence, Clinical manifestations, preventive and therapeutic measures of

Malnutrition - Vicious cycle, Under nutrition in Children and adults

Macro and Micro Nutrient Deficiencies – PEM, Anaemia,

Vitamin A, fluorosis, Iodine deficiency, osteoporosis

Prophylaxis Programme – Vitamin A, Anaemia

2.3 Determinants of Nutritional Status - Low birth weight, faulty child feeding practices, dietary inadequacy, frequent infections, large families, high family illiteracy, taboos and superstitious

Nutritional Assessment – anthropometry, clinical examination, laboratory and biochemical assessment, dietary assessment.

UNIT- III

18 hours

Food and Nutrition Security

Food production, access, distribution, per capita food availability of food grains, losses, consumption, food security

3.1 Policies for improving availability of cereal and non-cereal foods

3.3 Performance in access to food and nutrition

Performance in access to food – hunger, food insecurity at household level, employment

growth, real wages Socio-cultural aspects and Dietary patterns: Their implications for nutrition and health.

UNIT- IV

18 hours

Approaches and strategies for improving nutritional status and health:

Increased agricultural production and animal husbandry foods and Nutrition Gardens

4.1 Issues and policies on access to food and Nutrition – income, women and health, growth and poverty

Social protection measures- PDS, TPDS

4.2 Food based interventions including fortification and genetic improvement of foods, Supplementary feeding

UNIT-V

18 hours

National, International and voluntary organization to combat nutritional problems

5.1 National Nutrition policy –XII five year plan, Recommendations, Action Plan

Action Programmes (**International**)– WHO, ICDS, FAO, UNICEF, World Bank, Voluntary services, CARE

5.2 National organization – ICMR, NIN,CSWB, SSWB, FNB, NNMB, CFTRI, DFRL, NIPCCD

5.5 Nutrition Education - Definition, importance, Principle in Planning, Programme Execution and Evaluation, Mass Media, Types, Preparation of Educational Material-Coverage, Evaluation

..... # self -study portion.

TEXT BOOKS

1. M.S. Bamji,N. Prahlad Rao, V. Reddy.Textbook of Human Nutrition, Second Edition,Oxford and PBH Publishing Co,Pvt.Ltd,New Delhi(2004).
2. M. Swaminathan, Essentials of Food and Nutrition.An Advanced Textbook Vol.I, Printing and Publishing Co.Ltd, Bangalore (2007).
3. B. Srilakshmi, Nutrition Science, Sixth Edition, New Age International (Pvt)Ltd, New Delhi (2007).

UNIT : I	Ref Book : 1	Chapter VIII
UNIT –II	Text Book - 1	Chapter IX, X, XI, XII, XIII, IXX, XX , XXI , XXII, XXXVII
UNIT –II	Text Book - 2	Chapter XVIII, XV
UNIT- III,	Net Ref	www.oxfamindia.org www.Planningcommission.nic.in
UNIT - IV	Net Ref	www.oxfamindia.org www.fao.org
UNIT - V	Text Book : 3	Chapter – XXII

REFERENCE BOOKS

1. A. Park, Textbook of preventive and Social Medicine, Nineteenth Edition, M/S Banarasids, Bharat Publishers, Jabalpur (2007).
2. D.P Bhatt, Health Education, Khel Sahitya Kendra Publishers, New Delhi (2008)
3. M.J. Gibney, B.M Margetts, J.M Kearney, L. Arab, Public Health Nutrition, Blackwell Publishing Co. UK (2004)
4. Michael, *et al*, "Public Health Nutrition", Blackwell Science, UK (2004).

JOURNAL REFERENCE :

UNIT-III - Indian Journal of Medical Research : 138, Sep 2013, PP 373-382

SEMESTER- IV: EXTRA CREDIT - II
CONSUMER IN THE MARKET

Course Code :14PND4EC2

Max. Marks : 100*

Hours/Week :

Internal Marks :

Credit : 5*

External Marks : 100*

Objectives:

1. To familiarize the students with the Indian economy and the rising of consumerism.
2. To have an overview of the consumer behavior and the consumer movement.

UNIT I

Introduction to Indian Economy:

Introduction, History of Indian economy- Indian economy at the time of independence and after the independence. Current scenario of Indian economy.

UNIT II

(a) Market and Marketing:

Introduction, meaning, classification of markets, objectives, features of modern marketing & role of marketing in economic development.

(b) Modern way of Marketing:

Telemarketing, E - business, E - commerce, E - marketing, E - banking and E - trading.

UNIT III

The Indian Consumers:

Indian cultures, Profile of Indian consumers, classification of Indian consumers, consumer credit facility – segment wise classification of the middle class.

UNIT IV

Consumer Behaviour:

- (a) Definitions, importance of studying consumer behavior, types of buyers, factors influencing the consumer behavior.
- (b) Buying Motives:- definition, types of buying motives, importance of buying motives.

UNIT V

Consumerism:

- (a) **Introduction:** -Evolution of consumerism, unique problems of Indian consumers, consumer exploitation in India- pricing, adulteration, duplication, artificial demand, sub- standard, product risk, advertising, warranty & services, fitness.
- (b) Consumer protection act 1986 – Introduction, rights of consumers, three –tier machinery for redressal of consumer grievances – District, state and national level.

TEXT BOOK

1. R. S. N. Pillai and Bagavathi, Modern Marketing, S. Chand & Company Ltd, New Delhi (2010).

UNIT I Net Ref [www.nios.ac.in/media/documents/sececocour/english/pdf.
www.164.100.47.134/intranet/Currenteconomicscenario.pdf](http://www.nios.ac.in/media/documents/sececocour/english/pdf.www.164.100.47.134/intranet/Currenteconomicscenario.pdf).

UNIT II Text book –1 Chapter – I, XIX, XXXXVII

UNIT III Text book –1 Chapter – XXI

UNIT IV Text book – 1 Chapter – XX

UNIT V Text book – 1 Chapter – XXII

REFERENCE BOOK

1. J.Jayasankar, Marketing, Margham Publications Chennai (2012).