

UNIVERSITY OF KALYANI
KALYANI, NADIA, WEST BENGAL

SYLLABUS
FOR
THREE YEARS DEGREE COURSE
IN
FOOD & NUTRITION (HONOURS)
IN

Part – I, Part – II & Part – III

Examination Pattern

w.e.f. – 2016 – 2017

DISTRIBUTION OF MARKS

Part – I Examination (1 Year Course)

Full Marks – 200

Paper - I	:	Food Science (Theoretical)	75
Paper – II	:	Physiology (Theoretical)	75
Paper – III	:	Food Science & Physiology (Practical)	50

Part – II Examination (1 Year Course)

Full Marks – 200

Paper – IV	:	Human Nutrition & Food Commodities (Theoretical)	75
Paper – V	:	Community Nutrition & Epidemiology (Theoretical)	75
Paper – VI	:	Community Nutrition & Food Commodities (Practical)	50

Part – III Examination (1 Year Course)

Full Marks – 400

Paper – VII	:	Nutritional Biochemistry (Theoretical)	80
Paper –VIII	:	Clinical Nutrition & Diet Therapy (Theoretical)	80
Paper – IX	:	Food Microbiology, Food Hygiene & Food Processing (Theoretical)	80
Paper – X	:	Nutritional Biochemistry & Food Microbiology (Practical)	80
Paper – XI	:	Diet Therapy & Food Preparation (Practical)	80

PART I: FIRST YEAR

PAPER – I: FOOD SCIENCE

FULL MARKS – 75

No. of lectures - 75

- 1) Basic concept of food, nutrients, nutrition & malnutrition.
- 2) Classification of food, classification of nutrients and food groups.
- 3) **Carbohydrates**- definition, classification with structure and properties of mono-, di- & poly- saccharides, sources, daily requirements, functions, effect of too high –too low carbohydrates on health. Blood glucose, effect of different carbohydrates on blood glucose and glycemic index.
- 4) **Lipids**- definition, classification & properties, fatty acids – compositions, properties, types, sources, daily requirements, function, role & nutritional significance of PUFA, MUFA, SFA, omega - fatty acids .
- 5) **Proteins**- amino acids- classifications, types, structure & functions. Proteins - definition, classifications, structure & properties, sources, daily requirements and functions. Effect of too high & too low protein on health, assessment of protein quality (BV, NPU, PER). Factors effecting protein bio-availability including anti-nutritional factors.
- 6) **Dietary fiber**- classification, sources, composition, properties & nutritional significance. Role of fiber in disease prevention with mechanism.
- 7) **Mineral & trace elements**- sources, daily requirements, physiological role, bio-availability &. deficiency & excess symptoms (calcium, phosphorus, iron, fluoride, zinc, selenium, iodine, chromium).
- 8) **Vitamins**- water & fat soluble vitamins, sources, daily requirements, physiological & biochemical role, bio-availability, symptoms of deficiency & excess vitamins, anti-vitamins, pseudo-vitamins and pro-vitamins.
- 9) **Water**- functions, requirements, water balance maintenance mechanism.
- 10) **General idea** - GM food, super food, organic food, prebiotics & probiotics, antioxidant, fast food, junk food, convenience food, nutraceuticals and phytochemicals.

PAPER – II: PHYSIOLOGY

FULL MARKS – 75

No. of lectures- 75

1. **Structure & functions of cell and cellular organelles** – structure and function of plasma membrane, nucleus, mitochondria, golgi bodies, endoplasmic reticulum, ribosome, lysosome and peroxisome.
2. **Gastro-intestinal system** - structure & function of various organs of GI system, gastric motility, digestion & absorption of food, role of enzymes & hormones on digestion and absorption of food.
3. **Cardio vascular system** – blood - composition of blood, function of blood, erythropoiesis, blood group, blood transfusion & its hazards, coagulation of blood. Heart - structure & function of heart, heart rate, cardiac cycle and cardiac output. Blood pressure & its regulations, circulation of blood (general course of circulation & foetal circulation).
4. **Excretory system** - structure & function of kidney, bladder, formation of urine, role of kidney in homeostasis, non excretory functions of kidney. Structure & function of skin.
5. **Respiratory system** - structure of respiratory system, mechanism of respiration & its regulation, O₂ & CO₂ transport, static & dynamic functions of lung and acclimatization in high altitude.
6. **Nervous system** - elementary anatomy of nervous system, function of different parts of the brain in brief, signal propagation through nerves & synapse, sympathetic & parasympathetic nervous system, regulations of body temperature and special senses.
7. **Musculo-skeletal system** - type of muscles, structure & functions of skeletal system. Osteogenesis and remodeling of bone & teeth (general idea).
8. **Endocrine system** - structure & functions (hypothalamus, pituitary, thyroid, parathyroid, pancreas, adrenal gland, ovary, testes, placenta and gastrointestinal tract) and symptoms of deficiency & excess.
9. **Immune system** - cellular immunity, humoral immunity, active & passive immunity and complement system.
10. **Reproductive system** – description and hormonal regulation of puberty (male & female), menopause and menstrual cycle, spermatogenesis and oogenesis.

PAPER – III (PRACTICAL): FOOD SCIENCE AND PHYSIOLOGY

FULL MARKS – 50

1. Qualitative analysis of mono, di & poly sacchharide & their identification in unknown sample.
2. Qualitative analysis of fats & oils & their identification in unknown sample.
3. Qualitative analysis of protein in foods & their identification in unknown sample.
4. Identification of prepared slides : a) Lungs, b) Suprarenal gland, c) Thyroid, d) Pituitary, e) Testes, f) Ovary, g) Kidney, h) Liver, i) Pancreas, j) Stomach, k) Small intestine, l) Large intestine, m) Spinal cord, n) Cerebellum and o) Cerebrum.
5. Preparation of blood film & identification of white blood cell, counting of blood cells (WBC & RBC).
6. Determination of heamoglobin (acid heamatin method/Drabkin's methos).
7. Determination of bleeding time, clotting time of blood and blood group.
8. Measurement of blood pressure and measurement of maximum O2 consumption by Queen college test.
9. Squamous epithelium staining.

Suggested textbooks and references:

1. Guyton A.C. and Hall, J.E.: Text book of medical physiology, Prism Books (Pvt.) Ltd.
2. Simbulingam: Medical Physiology.
3. Geetha N.: Medical physiology.
4. Srilakshmi B. : Nutrition science, New Age International Publishesr.
5. Ganong : Medical Physiology.
6. Chatterjee Chandi Charan : Text Book of Medical Physiology, London W.B..
7. Sunetra Roday : Food Science & Nutrition, Oxford University Press.
8. Mann and Truswell: Essentials of Human Nutrition, Oxford University Press.
9. Wilson : Anatomy and Physiology in Health and Illness, Edinburgh Churchill Livingatome.
10. Sharma S.K. and Kalwit H. K.: Objective Food Science.
11. PotterN.N, & Hotchkiss Food Science.

PART-II: SECOND YEAR

PAPER-IV: HUMAN NUTRITION & FOOD COMMODITIES

FULL MARKS - 75

No. of lectures - 75

HUMAN NUTRITION

- 1. General concept-** nutritional science, concept & definition of nutrition, scope of nutrition.
- 2. Recommended Dietary Allowances (RDA)** - definition, formulation of RDA, importance of RDA, dietary guideline, reference man & reference woman.
- 3. Energy in Human Nutrition** - idea of energy & its unit, energy balance, assessment of energy requirements- deficiency & excess, concept of physical activity level (PAL), determination of energy in food, BMR & its regulations, SDA & resting energy expenditure.
- 4. Nutritional Requirement During Infancy -**
 - a) Breast feeding** - colostrum & breast milk- its composition, basic principle, importance, initiation of breast feeding. Advantages of exclusive breast feeding.
 - b) Supplementary Feeding-** introduction & classification. weaning- Its initiation, principle, advantages & disadvantages, management of weaning. bottle Feeding- advantages & disadvantages, care & sterilization of bottle, preparation of formula food, mixed feeding, differences between artificial feeding & breast feeding.
- 5. Special care of child** – preterm and low birth weight babies- causes, features and nutritional care.
- 6. Nutritional requirement during development** - growth and development from infancy to adulthood – somatic, physical and mental development, puberty, pre-pubertal and pubertal changes, importance of nutrition for adequate development.
- 7. Nutritional requirement** - preschool children, school going children, adolescence and adult.
- 8. Nutritional requirement during pregnancy** - physiology of pregnancy, factors (both nutritional & non nutritional) affecting pregnancy outcome, importance of adequate weight gain during pregnancy, ante-natal care & its schedule, nutritional requirement during pregnancy, nutritional modification & supplementation and deficiency of nutrients & its impact on both mother & foetus. Complications during pregnancy & its management.
- 9. Nutritional requirement during lactation** - physiology of lactation, galactogogues and recommended dietary allowances.
- 10. Geriatric nutrition** - RDA, physiological & metabolic changes and complications.
- 11. Sports nutrition** - RDA for athletes, pre-game meal and sport's meal. Ergogenic aids for sports persons from nutritional point of view. Doping in sports.

FOOD COMMODITIES

1. Nutritional aspects of different types of foods, its variety, processing and its preparations

- i) cereals & millets
- ii) pulses & legumes
- iii) milk & milk products
- iv) poultry & egg
- v) meat & fish
- vi) fruits & vegetables
- vii) sugar & other sweetening agents, artificial sweetener
- viii) fats & oils
- ix) salt
- x) beverages

2. Raising & leavening agents used in cookery & bakery – description, importance and caution about their use.

3. Food adjuncts - spices, condiments, essences & food colours- their origin, classifications, use & storage and medicinal use of Indian spices (turmeric, ginger, garlic, fenugreek, coriander).

PAPER-V: COMMUNITY NUTRITION AND EPIDEMIOLOGY

FULL MARKS - 75
No. of lectures - 75

1. **Community** - concept of community & its type, factors affecting health of community - environmental, social, cultural & economic and dimension of health - positive health & absence of disease.
2. **Community health data** - life span & vital statistics of infants and child & maternal mortality. Statistical data analysis (mean, median, mode, Student's t- test).
3. **Epidemiology of nutrition related disease** - study of epidemiological approach, determinant of diseases and preventive & social means.
4. **Nutritional assessment** - different anthropometric measurement, interpretation of these measurements, clinical signs, BMI, body fat percentage, biochemical & biophysical methods of test and use of growth charts.
5. **Diet survey**- its need & importance, methods of diet survey, concept of consumption unit and distribution of food in individual family.
6. **Concept of nutritional surveillance system** - international, national and regional agencies & organizations and nutritional interventions programme- ICDS, mid day meal programme, national prophylaxis programme.
7. **Malnutrition**- introduction, causes (social, environmental, cultural, socio-economic, clinical & nutritional factors), prevention of malnutrition.
8. **Community food protection**- epidemiology of food borne diseases- mode of transmission, control & prevention.
9. **Community water & waste management**: importance of water to the community, etiology & effect of toxic agents, water borne infectious agent, source of water, safe drinking water, potable water, waste & waste disposal and sewage treatment & disposal – solid & liquid waste.
10. **Immunization**- its importance, scheduled for children, adult, foreign traveler and role of individuals, family & community in promoting health.
11. **Food supply in natural calamities**- disaster classification. Food management- packed food & dry food, advantages & disadvantages.
12. **Fundamental aspect of computer application** - data analysis & management.

PAPER- VI (PRACTICAL): COMMUNITY NUTRITION and FOOD COMMODITIES

FULL MARKS- 50

1. Anthropometric measurement of infant- length, weight, chest circumference, mid upper arm circumference, comparisons with normal and interpretation of nutritional assessment data & its significance.
2. Weight for age, weight for age, weight for height, Z Scores, BMI, WHR and Ponderal Index.
3. Test for body compositions - measurement of fat from skin fold thickness using modern equipments.
4. Growth charts- growth chart plotting & its interpretations.
5. Visit to community area for clinical assessment, signs of nutrient deficiencies specially PEM (Kwashiorkor, Marasmus) and assessment of community nutrition status as per ICMR chart scoring.
6. Household measurement of common food stuffs – measurement of cooked food through routine devices and their conversion into metric system.
7. Community field survey - visit to ICDS center and primary school for mid day meal programme.
8. Diet survey report - survey of different family from different economic classes according to ICMR, estimation of food & nutrient intake, household food consumption, diet, adult consumption unit, 24 hrs dietary recalls.

Suggested textbooks and references:

1. Park : Park's Textbook of preventive and Social Medicine. 9th edition. M/s. Banarasidas Bhanot. Jabalpur
2. Mathur J.S.: Preventive and social Medicine. A Comprehensive Text Book,CBS Pub & Dist. ,New Delhi.
3. Sundarlal, Adarsh & Pankaj. Text Book of Community Medicine Preventive & Social Medicine, CBS Pub & Dist. New Delhi
4. Srilakshmi B.: Food science, New Age International Publication.
5. Srilakshmi B.: Dietetics, New Age International Publishers.
6. Manne Sakuntala: Food Science.
5. Hughes, O. and Bennion, M : Introductory Foods, Macmillan & Co., New York.
6. Lavies, S.: Food Commodities.
7. Clark N.: Nancy Clark's Sports Nutrition Guidebook.
8. Guthrie A. H.: Introductory Nutrition, The C. V. Mesby Company.
9. Beghin, 1. Cap. M & Dujardan. B.: A Guide to Nutrition Status Assessment. W. H. O. Geneva.
10. Gopalan, C. etal : Nutritive value of Indian Foods, Indian Council of Medical Research.
11. Gopalan. C.; Nutrition Foundation of India, Special Publication service.
12. Ritchie, J.A.S.: Learning Bettor Nutrion FAO, Rome.
13. Swaminathan, M.: Essentials of Foods and Nutrition, Vols -I , II & III. Ganesh and Co. Madras.
14. WHO: A growth chart for International use In Maternal and Children Health Care, Geneva.
15. FAO/WHO/UNO: Technical Report Series, 724 (1985). Energy and Protein Requirement, Geneva.
16. WHO Technical Reports Series for different Nutrients.
17. Indian Council of Medical Research: Nutrient Requirements and Recommended-Dietary Allowance for Indians, New Delhi.
18. Smith, G.W: Preventive Medicine and public health. Macmillon Co.. New York..
19. Jelliffe, D. B.: Assessment of the Nutritional Status of the Community; World Health Organisation.
20. Sain, D. R. Lockwood, R., Scrimshaw, N. S. : Methods the Evaluation of the Impact of Food and Nutrition Programmes, United Nations University.
21. Swaminathan M.: Food & Nutrition, Vol-I, II & III. (The Bangalore Print & Pub. Bangalore)
22. Bamji M.S. and Rao N.P. & Reddy V. (Eds.) : Text Book of Human Nutrition (Oxford & IBH Pub. New Delhi.
23. Gopaldas, T. Seshadri, S. : Nutrition Monitoring a Assessment: Oxford University Press.
24. Victor R. Preedy (Ed) Handbook of Anthropometry: Physical Measures of Human Form in Health and Disease, Springer publications.
25. Das D. & Das A.. Statistics in Biology and Psychology Academic Pub. Kolkata.

PART-III: (THIRD YEAR)

PAPER-VII: NUTRITIONAL BIOCHEMISTRY

FULL MARKS – 80

No. of lectures - 80

1. **Introduction to nutritional biochemistry** - its scope and objectives in nutrition.
2. **Molecular aspects of transport** - passive diffusion, facilitated diffusion and active transport.
3. **Protein**- general reaction of amino acid metabolism, urea cycle and nitrogen balance.
4. **Enzyme**- definition, types & classification, definition of co-enzyme, specificity of enzyme isozymes, enzyme kinetics, factors affecting enzyme action, velocity of enzyme catalyzed reaction, enzyme Inhibition and its type.
5. **Intermediary metabolism**- carbohydrate metabolism, TCA cycle & energy generation, gluconeogenesis, glycogenesis, glycogenolysis, blood sugar regulation.
6. **Lipid** - beta-oxidation & outline of fatty acid biosynthesis (saturated & unsaturated), synthesis & utilization of ketone bodies, ketosis, fatty liver and LDL/HDL ratio.
7. **Lipoprotein**- types, compositions and role & significance in diseases.
8. **Nucleic acids**- structure of DNA & RNA, general concept & outline of replication, transcription and translation.
9. **Fluids**- electrolytes, acids - base balance and pH & buffer systems.
10. **Antioxidant**- source and physiological action.
11. **Metabolic adaptations**- fasting and exercise.

PAPER- VIII: CLINICAL NUTRITION AND DIET THERAPY

FULL MARKS – 80

No. of lectures- 80

1. **Basic concepts of diet therapy**- modification of normal diet to therapeutic diet, its principle & classification and routine hospital diets.
2. **Obesity**- underlying causes, classification, measurement of degree of obesity and nutritional modification for weight management.
3. **Under weight**- etiology, assessment, high energy diet for weight gain, anorexia nervosa and bulimia.
4. **Fever**- classification of different fevers and diet for febrile conditions, infections & surgical conditions.
5. **Gastro-intestinal diseases** - factors, etiology, diagnostic test and dietary management of GI tract diseases (diarrhea, inflammatory bowel syndrome, ulcerative colitis, Crohn's disease & constipations)
6. **Diseases of liver**- cirrhosis, viral hepatitis, Wilson's disease, liver function test and dietary care & managements.
7. **Gall bladder & pancreatic disease**- causes, symptoms and dietary management of cholecystitis, cholelithiasis, & pancreatic disease.
8. **Diabetes Mellitus & Diabetes Insipidus**- classification, causes, pathophysiology, symptoms, complications, diagnosis and dietary management.
9. **Cardio-vascular disease** - atherosclerosis, hyperlipidemia, hypertension, etiology & risk factors, lipid profile test. treatment , dietary care for ischemic heart disease and prevention of cardio vascular disease.
10. **Renal disease**- etiology, symptoms, diagnostic test & dietary management of glomerulo-nephritis, acute & chronic nephritis, renal failure, uremia & renal stone and dialysis & its dietary care.
11. **Allergies**- definition, symptoms, diagnostic test and dietary management food selection.
12. **Anaemia**- causes, diagnostic test and dietary management.
13. **Inborn error of metabolism** - Dietary management of lactose intolerance, alkaptonurias, phenylketonuria and galactosemia.

PAPER-IX: FOOD MICROBIOLOGY & FOOD HYGIENE & FOOD PROCESSING

FULL MARKS – 80

No. of lectures- 80

1. **Important micro-organisms in food**- beneficial & harmful effects in brief.
2. **Methods of Disinfects & Sterilization** – methods, their advantages, limitation.
3. **Microbial Spoilage of different kind of foods**-
 - i) Cereal & Millets
 - ii) Pulses & Legumes
 - iii) Milk & Milk Products
 - iv) Poultry & Egg
 - v) Meat & Fish
 - vi) Fruits & Vegetables
 - vii) Sugar & Other sweetening agents
 - viii) Fats & Oils
 - ix) Salts
 - x) Beverages
4. **Preservation of the food commodities** - Different process of food preservation, food poisoning.
5. **Communicable & infective diseases control** - Nature of communicable & infective disease , infection, contamination, transmission- direct & indirect, vector borne diseases, infective organism & it's causative agents, environmental agents, epidemiological principles of disease control, disinfection and decontamination.
6. **Preserved food**- jam, jellies, pickles, squashes, syrup- their compositions, manufacture, use and nutritional aspects.
7. **Importance of the sanitation & hygiene** – kitchen & food plants, hygienic handling of food.
8. **Common food additives** - adulterants of food & their effect on health, common house-hold methods to detect adulteration of food.
9. **Sanitary quality** - microbiological criteria for food, water, & milk testing.
10. **Food adulteration**- laws governing food standards- PFA, FPO, ISI, AGMARK. food security.
11. **Food service Management**- definition, principles, functions & its approaches, traditional management, system approach, management by objective & total quality management, resource & personal management.
12. **Industrial processing** - of oil, milk, vanaspati, vinegar, citric acid & soya sauce.
13. **Laboratory instrumentation & Kitchen equipments** - (principle, mechanism of action, function) autoclave, centrifuge machine, spectrophotometer, incubator, hot air dryer, lyophilizer, microwave oven, air fryer, kitchen chimney.

PAPER-X (PRACTICAL): NUTRITIONAL BIOCHEMISTRY & FOOD MICROBIOLOGY

FULL MARKS- 80

1. Microbiological study of foods (study of bacteria in food sample by gram staining).
2. Colorimetric estimation of glucose with preparation of standard curve.
3. Estimation of total & reducing sugar in food by Berfoed's method.
4. Estimation of lactose in milk.
5. Estimation of blood glucose by GOD-POD method.
6. Determination of acid value, saponification & iodine number in neutral fats & oil.
7. Identification of amino acid in unknown mixtures.
8. Estimation of blood serum protein by biurate method.
9. Colorimetric estimation of DNA by using diphenylamine.
10. Estimation of lipid profile of blood (triglyceride, cholesterol, LDL using kit).
11. Biochemical identification of food additives in some common foods (tea, turmeric, oil, laddu & milk).
12. Visit to food processing industry.

PAPER-XI (PRACTICAL): DIET THERAPY & FOOD PREPARATION

FULL MARKS- 80

1. Planning & preparation of meals - for different age groups & income levels with special reference to different physiological conditions (infants, preschool going children, school going children, college student, adult, old age, pregnant woman, lactating mother, sports person).
2. Preparations of supplementary foods.
3. Preparations of oral rehydration solutions.
4. Planning & preparation of special diet- fluid, soft or semi solid, high protein, low fat & low calorie, high fiber.
5. Planning & preparation of diet in the following diseases -
 - a) peptic ulcer
 - b) viral hepatitis
 - c) anaemia
 - d) diabetes
 - e) coronary heart disease
 - f) gout
 - g) hypertension
6. Hospital visit (internship) for dietary formulation of different diseases.

Suggested textbooks and references:

1. Lehlinger A.L. Nelson D.L. & Cox M.M.: Principles of biochemistry, CBS Publishers and Distributors.
2. Stryer L: Biochemistry, Freeman W.H. and Co.
3. Handler P., Smith E.I. & Stelten, D. W.: Principles of Biochemistry, McGraw Hill Book Co.
4. Murray, R. K., Grannen, D. K., Mayes, P. A. & Rodwell. V. W.: Harper's Biochemistry. Lange Medical Book.
5. Devlin, T. M.: Text Book of Biochemistry with Clinical Correlations. John Wiley and Sons.
6. Anita F. P: Clinical Dietetics & Nutrition, Oxford University Press, Delhi.
7. Joshi S.A.: Nutrition & Dietetics Tata McGraw Hill, Publications, New Delhi.
8. William S.R.: Nutriton & Diet therapy, Times Mirror/Mosby College Publishings, St. Louis.
9. Mudambi S.R.: Fundamentals of Foods, Nutrition and Diet Therapy.
10. Srilakhshmi B.: Dietetics
11. Mahan, L.K., Arlin, M. T.: Kranses's Food, Nutrition and Diet Therapy. 8th edition, W. B. Saunders Company, London.
12. Bamji S., Rao N.P. & Reddy V. (Eds.) Text Book of Human Nutrition:Eds. M. (Oxford & IBH Pub. New Delhi).
13. Begum R.: A textbook of food, nutrition and dietetics Sterling Publishers, New Delhi.
14. Frazier W.C. & Westhoff D. C.: Food Microbiology, McGraw Hill Inc.
15. Robinson C.H. Lawaler M.R., Chenoweth, W.L., & Garwick, A.E.: Normal and Therapeutic Nutrition. 17th edition, MacMilian Publishing Co.
16. Joshi, S. A.: Nutrition and Dietetics, Tata McGraw Hill, Publications, New Delhi.
17. James J. N.: Modern Food Microbiology, Van Nestrand Reinhold Company Inc.
18. Pelezar, M.I. and Reid, K. D.: Microbiology, McGraw Hill Company, New York.
19. Benson Harold, J.: Microbiological Application, Publishers, U.S.A.
20. Colling, C.E. and Lyne, P.M.: Microbiological Methods Butterworth. London.
21. A.K.Banerjee & Banerjee N.: Fundamentals of Microbiology & Immunology, NCBA, Delhi, Kolkata.
22. Pyke, M.: Catering Service and Technology, John Murrey Pube, London.
23. SivasankarB.: Food Processing and Preservation, PHI Learning private Limited.