

Mother Teresa Women's University

Ph.D Foods and Nutrition

Paper I - Research Methodology

Unit I

Meaning of Research – process of research, objectives of research. Developing a research proposal, presentation of a problem, objectives, method, work plan, Personnel, facilities and budget. Identifying the problem- defining and delimiting the problem, types of research – fundamentals, applied, action experimental and descriptive. Research ethics: research ethics, principles and challenges in Foods and nutrition, Challenges for conducting clinical research, Regulatory ethical issues for dietary supplements.

Unit II

Hypothesis – meaning and importance, kinds of hypothesis. Variables – meaning and identification in relation to the research problem – independent, dependent, control and intervening variables. Different type of experimental designs – experimental designs with one variable, experimental design with two or more variables, two by two designs, before and after control group, post test only control group design, salmon four group design.

Unit III

Research tools – questionnaire, interview schedule, observation, experimentation, attitude scale, check list, socio gram. Scaling techniques – different types – nominal, ordinal, ordinal, interval and ratio. Characteristics of tools – reliability and validity. Sampling design – probability, non- probability sampling.

Unit IV

Data analysis – quantitative, qualitative, presentation of data – tables, graphs, illustrations, foot notes and bibliographical presentations. Research reports – basic concepts of research report. **Unit V**

Normal probability and its uses. Parametric tests – large and small samples, Non-parametric tests, Analysis of Variance – one way and two way classifications. Multiple and partial correlation.

References

1. Kothari, Chakravanti Rajagopalachari. *Research methodology: Methods and techniques*. New Age International, 2004.
2. Singh, Yogesh Kumar. *Fundamental of research methodology and statistics*. New Age International, 2006.
3. Goddard, Wayne, and Stuart Melville. *Research methodology: An introduction*. Juta and Company Ltd, 2004.
4. McNeill, Patrick. *Research methods*. Routledge, 2006.
5. Bhandarkar, P. L., T. S. Wilkinson, and D. K. Laldas. "Methodology & Techniques of Social Research Himalaya Publishing House." (2000).
6. Corbetta, Piergiorgio. *Social research: Theory, methods and techniques*. Sage, 2003.
7. Chiang, Chin Long. *Statistical methods of analysis*. World Scientific, 2003.

Specialization paper

Advanced paper in foods and nutrition

Unit -I

Functions of food: food groups, classification of food groups. Nutrients: definition, classification, macronutrients: Carbohydrates, proteins, and fats: functions, requirements, food sources, and deficiencies. Carbohydrates: Types, classification, digestion, and transport. Dietary fibre, fructo-oligosaccharides, resistant starch – chemical composition and physiological effects Glycemic index of foods. Sweeteners – nutritive and non-nutritive.

Unit-II

Proteins: Classification, digestion, absorption and transport. Metabolism of proteins. Protein quality, methods of evaluating protein quality. Lipids: Classification, digestion, absorption, transport . Functions of EFA Role of n-3, n-6 fatty acids in health and disease. Requirements of total fat and fatty acids. Trans fatty acids. Prostaglandins.

Unit-III

Micronutrients: Vitamins and minerals: functions, requirements, food sources, and deficiencies. Macro minerals: calcium, phosphorus, magnesium, sodium, potassium &

chloride. Micro minerals: Iron, copper, zinc, manganese, iodine, fluoride. Trace minerals: Selenium, cobalt, chromium, vanadium, silicon, boron, nickel. Vitamins; Historical background, structure, food sources, absorption and transport, metabolism, biochemical function, assessment of status. Interactions with other nutrients

Unit-IV

life cycle nutrition: infancy, pre-school, school going, adolescents, pregnancy, lactation, adulthood and old age: nutritional needs, nutritional deficiencies, RDA and dietary measures.

Unit-V

Communicable and non-communicable diseases: causes, symptoms, risk factors, consequences, dietary management. Obesity, cardiovascular diseases, gastro intestinal diseases, liver diseases, renal and excretory system dysfunctions, degenerative diseases: cancer and types. Osteoporosis, osteo arthritis, and bone disorders.

References

1. Srilakshmi B, Dietetics, sixth edition, New age Publishing Press, New Delhi, 2011
1. Stacy N, William's Basic Nutrition and Diet Therapy, 12th edition, Elsevier publications, UK, 2005.
2. Mahan LK, Stump SE and Raymond JL, Krause's Food and Nutrition Care Process, 13th Edition, Elsevier Saunders, Missouri, 2012
3. Barasi, Mary. *Human nutrition: a health perspective*. Crc Press, 2003.
4. Roday S, Food science and Nutrition, Oxford university press, New Delhi, 2007
5. Mahan LK, Stump SE and Raymond JL, Krause's Food and Nutrition Care Process, 13th Edition, Elsevier Saunders, Missouri, 2012.
6. Robinson CH, Normal and Therapeutic nutrition, Oxford and IBH publishing company, Bombay, 2010.

INTRODUCTION TO WOMEN'S STUDIES (COMPULSORY PAPER)

UNIT-I

Definition - Meaning – Genesis – Growth and Scope of women's studies in India, Women's Studies- An International perspective. Socialization: Meaning, Definition, and Stages – Agencies of Socialization. Social construction of Gender-Sex & Gender, Gender discrimination, gender stereotyping, Gender Roles, and Gender needs – practical and strategic.

UNIT-II

Concept of Women's Studies: (a) Status – Concept – meaning – Definition, Types of status achieved and Ascribed status, Factors, and Indicators on the status of women. (b) Status of women in Indian Society: Pre and post independence periods. Issues Related to Female children & Women, Female foeticide, Female Infanticide, child marriage Dowry, Divorce, Widow hood, Female commercial sex workers, Domestic violence, problems of Elderly and single women, and marginalized groups, (SC/ ST/ Devadasis, women prisoners, women living with HIV/AIDs and women who are physically and mentally challenged).

UNIT-III

Status of Women in India: A) Demographic Indicators: i) Sex Ratio: Definition – Sex ratio in India, Factors responsible for adverse sex ratio in India, Consequences of adverse sex ratio, measures to achieve the balance between the sexes. (a)Family, Meaning – Definition & Ethos of Joint Nuclear – patriarchal & matriarchal families (b)Marriage – Definition – Monogamy, Polygamy Polyandry. (c)Multiple Roles of Women- Role conflict, Role change.

UNIT-IV

Fertility: Definition - crude birth rate, fertility rate in India, Factors responsible for the higher fertility rate in India, measures to bring down fertility rate in India.

iii) Mortality & Morbidity- Definition, Crude death rate, infant mortality rate and maternal mortality rates in India, Causes for high female morbidity and maternal mortality rates , Measures to bring down the rates

UNIT-V

Economic Indicators: i) Role of women in economic development, female labour force in India, main workers and marginal workers in rural & urban areas, sectoral distribution of male and female workers, labour force participation by economic status, declining trend in female work participation rates –causes, measures to improve work-participation rates.

C) Political Indicators Women's participation in Political process- women as voters, candidates, party leaders bureaucrats, women's wing of political parties, their effective campaign for women's rights & responsibilities, statistical data about the women's representation in Local bodies, State assemblies, & Parliament, critical analysis of their performance.

References:

- 1) Yadav .C.P: Ency of Women's problems and their remedies
- 2) Sharma Kanta : Women's role in the family
- 3) M.K.Roy: Violence against Women
- 4) P.A Reddy: Problems of Widows in India
- 5) N.S.Nagar: Women and Politics
- 6) Kumar Raj: Women in Agriculture and Trade
- 7) Kumar Raj: Women and Marriage.
- 8) Sushma Srivastava: Women and Family Welfare

Coursework papers

S.no	Paper name
1	Advances in foods and nutrition
2	Food processing, quality control and food safety
3	Community and public health nutrition
4	Medical nutrition therapy
5	Advanced food analysis and food processing
6	Food processing and post-harvest technology
7	Food technology: perishable and non-perishable foods
8	Food biotechnology and post production technology
9	Diet therapy for life style diseases
10	Nutrition and fitness

Advances in foods and nutrition

UNIT- I

Food Science and Application: cereals, pulses, vegetables and fruits, nuts and oilseeds, milk and milk products, tea, coffee, and cocoa, spices and condiments, meat, fish, poultry and egg, fats and oils:- Active principles and changes of active principles during cooking and their nutritional implications. Nutritional factors and anti nutritional factors. Food adjuncts- Applications of natural and synthetic flavours, colors, preservatives. Functional foods- Latest

trends in the concept of functional foods; their role in designer foods, nutraceuticals and food analogues and as phytochemicals and antioxidants. Genetically modified foods- potential problems and solutions.

UNIT- II

Biochemical Aspects of Macro Nutrients: Energy: Energy metabolism- BMR, SDA and energy requirement, respiratory quotient and metabolism in starvation, interrelationship between the nutrients. Carbohydrate: Digestion, absorption and metabolism, effects of deficiency and toxicity. Protein: Digestion, absorption and metabolism, effects of deficiency and toxicity. Protein quality evaluation- methods and application, Amino acids- Essential and non essential amino acids, role of amino acids in health and diseases. Fat: Digestion, absorption and metabolism, types of fatty acids, their role in health and disease. Fibre –Role of fibre in health and diseases.

UNIT- III

Biochemical Aspects of Micro Nutrients: Vitamins (Fat soluble Vitamins and water soluble vitamins) :- Function, digestion, absorption and metabolism, effects of deficiency and toxicity, bio assay and its interrelationship. Minerals and Trace elements :- function, absorption, metabolism, effects of deficiency ,toxicity and interrelationship. Water and electrolyte balance.

UNIT- IV Nutritional through life cycle Pregnancy :- RDA and nutritional importance, complications, foetal mal development related to nutrition. Weight management. Teenage pregnancy and Twin pregnancy and its complications. Lactation :- special nutritional consideration during lactation. Infancy & childhood :- RDA and nutritional importance, changing nutritional needs in special condition - Pre term infants and Malnutrition. Adolescents:- Recent rents in growth and development and changing nutritional requirements. Eating disorders and changes in foods habits and their effects. Adults :- Nutritional importance for men and women, menstrual abnormalities and complications. Nutritional in post menopausal women, osteoporosis and diet modification. Geriatric Nutrition :- Metabolic changes in aging, nutrition in aging process. Nutritional problems in changing society :- Psychosocial influences on food habits, food and gender, Religion, moral ethics, cultism and quackery, myths, taboos and superstition, physiological aspects of food choice and demographic choice. Malnutrition in learning situation, global trends and policy

approaches. Implications of new approaches for nutrition education. World food problem, food security in global & national level.

UNIT- V

Biochemical basis of health and diseases Metabolic alteration in- obesity diabetes, cardiovascular disease, liver disorder, renal disorders, febrile conditions, cancer, AIDS, trauma and burns. Nutritional in born error of metabolism, nutrition and immunity, drugs food-nutrient interaction, role of antioxidants in health and diseases.

References

1. Potter, Norman N., and Joseph H. Hotchkiss. *Food science*. Springer Science & Business Media, 2012.
2. Sri Lakshmi, B. *Food science*. New Age International, 2003.
3. Vaclavik, Vickie A., Elizabeth W. Christian, and Elizabeth W. Christian. *Essentials of food science*. Vol. 42. New York: Springer, 2008.
4. Sembulingam, Kirma, and Prema Sembulingam. *Essentials of medical physiology*. JP Medical Ltd, 2012.
5. Ashalatha, P. R., and G. Deepa. *Textbook of Anatomy & Physiology for Nurses*. JP Medical Ltd, 2012.
6. Parija SC, *Textbook of Microbiology & Immunology*, 2nd Edition, Elsevier India, 201
7. AnandanarayananR and Panicker CK, *Textbook of Microbiology*, Seventh edition, University Press, Hyderabad, 2009.
8. Srilakshmi B, *Dietetics*, sixth edition, New age Publishing Press, New Delhi, 2011
9. Gopalan C., Ramanathan, P.V. Balasubramanian, S.C., *Nutritive value of Indian foods*, NIN, Hyderabad, 2001
10. Verma P, *Food ,Nutrition & Dietetics*, 1st edition, CBS publishers & distributors PVT Ltd, New Delhi, 2015
11. Edelstein S, *Lifecycle Nutrition- An evidence based approach*, 2nd edition, Jones & Bartlett learning publications, 2015,
12. Mahan LK, Stump SE and Raymond JL, *Krause's Food and Nutrition Care Process*, 13th Edition, Elsevier Saunders, Missouri, 2012
13. Sharma M, *Textbook of Nutrition*, 1st edition, CBS publishers & distributors PVT Ltd, New Delhi, 2017

14. Longvah T, Ananthan R, Bhaskar K, Venkaiah K, Indian Food Composition Tables, National Institute of Nutrition, 2017
15. Abraham S, Nutrition Through Lifecycle, 1st edition, New age international publishers, New Delhi, 2016

Food processing, quality control and food safety

UNIT I

Status of food processing Industry in India: Status, scope, need and major constraints in growth of food processing in India. Production trends of cereals (rice, wheat & corn) pulses turdhal, bengal gram and green gram) fruits and vegetables and milk and milk products, flesh foods and egg. Food processing; Production of bakery items, breakfast cereals, dhal milling, jams and squashes, milk powder – cost, capacity and supplier of each of the equipment, setting up of pilot plant for bakery and fruit processing unit.

UNIT II

Principles of quality control and evaluation General principles of quality control, quality attributes of raw materials, process control and finished product evaluation , subjective and objective methods of evaluation of foods Physico-chemical characteristics of bakery products (bread, biscuits, cookies, and cakes), fruit and vegetable products (jam, squash & puree) milk and milk products (milk powder – toned & skimmed, cheese & ice cream)and pulses. Basic tests for identification of microbial contamination, water activity in processed foods – definition and importance.

UNIT III

Food hazards safety and sanitation Food safety, hazards, food toxins, causes and effects, types of food toxicants endogenous naturally occurring and synthetic toxicants. Adulteration and tests to detect adulterants, heavy metal and pesticide contamination, risk assessment for chemical and biological food hazards, sanitation and safety – significance and hygienic management, safety measures adopted in food industry.

UNIT IV

Food Safety Management System ISO :- primary production, establishment design, facilities and control of operations. Hazard Analysis Critical Control Point (HACCP):- principles and

step in implementation. Indexing Of Nutritional Quality (INQ) :- As an evaluation tool in the food industry. Food Safety And Standards Act (FSSAI) :- Structure , powers of officers ,functions of food analyst. Codex Alimentarius:- Structure, details and general principles of the functioning of National Codex Commission. Patent: - Definition, Requirement, patent laws in India.

UNIT V

Packaging and Labelling Principles and characteristics of packaging materials. Labelling and its types, codex guidelines, FDA guidelines for nutrition claims and ensuring proper labelling . Recent developments on the food labelling front in India. Food fortification and enrichment: - definition, need, scope, kind of fortification in cereals, fruits, vegetables, milk and milk products, fats and oils and processed foods.

References

1. Ronald H. Schmidt, and Gary E. Rodrick., “Food Safety Handbook”, John Wiley & Sons, New Jersey, 2005.
2. Yasmine Motarjemi and Huub Lelieveld., “Food Safety Management - A Practical Guide for the Food Industry”, Elsevier, New York, 2014.
3. FSSAI., “Manual of Food Safety Management System”, FSS Act, 2006, Ministry of the Health and Family Welfare, New Delhi, 2006.
4. FSSAI., “Food Safety and Standards Regulations – 2011”, Ministry of the Health and Family Welfare, New Delhi, 2011.
5. Early, R. (1995). Guide to Quality Management Systems for the Food Industry, Blackie, Academic and Professional, London.
6. Inteaz Alli, “Food Quality Assurance: Principles and Practices”, 2nd Edition, Taylor and Francis, UK, 2014.
7. Surendar S. Ghokrokta., “Science and Strategies for Safe Food”, CRC Press, USA, 2017.
8. Jood S and Khetarpaul N, Food preservation, Agrotech Publishing, Udaipur, 2002
9. Manay S and Swamy S, Foods: Facts and Principles, New Age International (P) Limited, Chennai, 2005.
10. Swaminathan, M. Advanced Textbook on Food Science and Nutrition, Vol:2, Second edition, Reprinted, Bangalore Printed and publishing Co Inc, Bangalore, 2003.

1. Journal of Food science and technology
2. Indian food packer
3. Processed food
4. Food Technology
5. Proceedings of International Food convention

Community and public health nutrition

UNIT-I

Nutrition for the community Nutrition of the individual, family and community – general concept Common nutrient deficiency in the community: - PEM, Vitamin-A, B1, B2, Niacin, Vitamin-C, Vitamin-D, Calcium, Iron and iodine- prevalence, causes, symptoms and Programme. Defects of malnutrition on rural population, urban slums, agricultural labourer, tribal and hill population. Nutritional and development of women and children; Empowerment of Women. Assessment of nutritional status – direct and indirect methods.

UNIT-II

Nutrition education with special reference to water and food Definition, planning, conducting and evaluation. Tools of nutrition education- merits and demerits, curriculum designs for nutrition education, nutrition education through health care systems. Environmental sanitation, method of protecting water and rain water harvesting Healthy nutrition through local produce. Concept of nutrition garden and organic farming, Nutrition oriented agricultural planning and production.

UNIT-III

Population and Food availability Size and growth rate of population in India. The food problem and policy. Measures to solve problem. Food security in India – problems and management: estimates of hunger and poverty: food deprivation and food availability in natural calamities. Effective food security management. Intra family food distribution, food fads and fallacies. Demography, vital statistics and population control.

UNIT-IV

Nutrition Intervention Programmes and Nutritional Health Programmes National- ICDS, Nutritious noon meal scheme, NNMB, PHC, MCH, MNP International - CARE, WHO, FAO, UNICEF. National Health Programmes- NTCP, NFCP, NLMP, MEP, AIDS control programme, National Immunisation Programme and IDDC. National anaemia prophylaxis programme, Vitamin A prophylaxis programme and Goitre control programme.

UNIT-V

Health Indices- IMR, MMR and Morbidity rates - Menace of population water and sanitation, air and health. Epidemiology and control of communicable diseases – definition, etiology, transmission of bacterial, viral, parasitic infections, HIV, Hepatitis and cervical cancer. Vaccine preventable diseases —Immunization schedules.

References

- 1.Park, K. "Park's textbook of preventive and social medicine." *Preventive Medicine in Obstet, Pediatrics' and Geriatrics*, 2005.
- 2.Bamji, Mahtab S., Kamala Krishnaswamy, and G. N. V. Brahmam, eds. *Textbook of human nutrition*. Oxford & IBH, 2016.
- 3.Swaminathan, M. "Use of food exchange lists in dietary calculations, Essentials of food and nutrition, The Bangalore printing and Publishing co." *Ltd 2* , 2007.
- 4.Bamji, M.S., Rao, P.N., Reddy, V (Eds): *Textbook of Human Nutrition*, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 2003.
- 5.Swaminathan M, *Essentials of Food and Nutrition. An Advanced Textbook Vol. I*, The Bangalore Printing and Publishing Co. Ltd, Bangalore, 2007.

Journals:

1. Reports of the State of World's Children, WHO and UNICEF, Oxford University.
2. Reports of National Family Health Survey, International Institute for Population Science, Mumbai.
3. Indian Journal of Medical Research, ICMR, New Delhi,
4. Indian Journal of Pediatrics, Valley Nicro, Missouri, U.P.
5. Indian Journal of Nutrition and Dietetics, Avinashilingam Deemed University, Coimbatore.

6. Proceedings of the Nutrition Society of India, NSI, Hyderabad

Medical nutrition therapy

UNIT-I

Assessment of nutritional status of the hospitalized patients, Diet counselling. Role of Dietitian in assessing patients needs Based on Clinical, Bio clinical, Biophysical and personal data. Current trends in nutritional support: Parenteral and enteral nutrition- Feeding of premature and LBW babies- pre and post operative diets Incorporation of Novel Therapeutic foods in the exchange lists followed in Hospitals, Periodical nutritional screening of patients

UNIT II

Gastro intestinal tract disorders-ulcer,constipation,diarrhea,dumping syndrome, irritable bowelsyndrome,ulcerativecolitis,HitausHernia,RegionalEnteritis,Diverticulosis,Malabsorption Syndrome. Liver, gallbladder and pancreatic disorders, Stress & trauma. Nutrition and management in- Musculo skeletal disorders, Immuno deficiency & AIDS.

UNIT III

Etiopathophysiology, metabolic and clinical aberrations, diagnostic features, complications, prevention and recent advances in the nutritional management of Renal disorders, Cancer, Neurological disorders, Infection & febrile conditions and Respiratory problems

UNIT IV

Etiopathophysiology, metabolic and clinical aberrations, diagnostic features, complications, prevention and recent advances in the nutritional management of- Weight imbalances, diabetes Mellitus , other metabolic disorders and Cardio-vascular diseases.

UNIT V

Herbs and medicinal plants – medicinal uses Functional foods: Types & medicinal uses Antioxidants- types, role & mechanism of action in scavenging free radicals, role in health & disease Phytochemicals- Occurrence, types & role in health & diseases Probiotic & Prebiotic foods for health benefits.

Reference

1. Sharma M, Textbook of Nutrition, 1st edition, CBS publishers & distributors PVT Ltd, New Delhi, 2017.
2. Longvah T, Ananthan R, Bhaskar K, Venkaiah K, Indian Food Composition Tables, National Institute of Nutrition, 2017
3. Abraham S, Nutrition Through Lifecycle, 1st edition, New age international publishers, New Delhi, 2016
4. Verma P, Food ,Nutrition & Dietetics, 1st edition, CBS publishers & distributors PVT Ltd, NewDelhi, 2015
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7. Stump SE, Nutrition and diagnosis related care, 7th edition, Lippincott, 2012
8. Stacy N, William's Basic Nutrition and Diet Therapy, 12th edition, Elseivier publications, UK, 2005
9. Whitney EN and Rolfes SR, Understanding Nutrition, 9 th edition, West/Wordsworth, 2002
10. Garrow JS, James WPT, Ralph A, Human Nutrition and Dietetics 10th edition, Churchill Livingstone, NY, 2000
11. Groff JL, Gropper SS, Advanced Nutrition and Human Metabolism 3 rd edition, West / Wadsworth, UK. 2000

JOURNALS

1. International journal of food, nutrition and public health
2. Indian journal of nutrition and dietetics
3. Nutrition Update Series.
4. World Review of Nutrition and Dietetics.
5. Journal of The American Dietetic Association
6. American Journal of Clinical Nutrition

7. Nutrition Review.

Advanced food analysis and food processing

Unit-I

Applications of the following in the food analysis: Microscopic techniques in food analysis: Scanning Electron Microscope, Transmission Electron microscopy, Laser particle size analysis. Thermal methods in food analysis: Differential scanning calorimetry, Differential thermal analysis.

Unit-II

Chromatographic methods in food analysis: Column, size exclusion and ion exchange. High Performance liquid chromatography, Gas liquid chromatography. Visible and ultraviolet spectroscopy, FTIR spectroscopy. Flame photometry and atomic absorption spectroscopy.

X-ray methods: Diffraction, Fluorescence. Electrophoresis, capillary zone electrophoresis. Nuclear magnetic resonance.

UNIT-III

Microwave and Radio Frequency Processing: Mechanism of Heat Generation, Applications in Food Processing: Microwave Blanching, Sterilization and Finish Drying.

High Pressure processing: Concept, Equipments for HPP Treatment, Mechanism of Microbial Inactivation and its Application in Food Processing.

Aseptic Processing-methods of sterilization, aseptic packaging systems. 4. Nanotechnology: Principles and Applications in Foods.

UNIT-IV

Electrical Resistance Heating of foods., Membrane Technology: Micro-filtration, Ultra-filtration, Nano-filtration and Reverse Osmosis and their Application.

Supercritical Fluid Extraction and its Application. 8. Principles and Applications of Hurdle Technology.

UNIT-V

Ultrasonic Processing: Properties of Ultrasonic, Application of Ultrasonic in Processing. 10. High Voltage Pulse Techniques in Food Processing. Biodegradable Food Films and Coatings and Applications.

References

1. Swaminathan, M., Food Science, Chemistry and Experimental Foods, Bappco Publishers, 2005.
2. Paul, P.C., and Palmer, H. H., Food Theory and Applications. John Wiley and Sons, Newyork, 2000 Revised.
3. Srilakshmi, M., Food science, New Age International (P) Ltd., Publishers 2010.
4. Robertson, G.L. Food Packaging: Principles and Practice (2nd ed.), Taylor & Francis, 2006.
5. Peppler, H.J. and D. Perlman, Microbial Technology: Fermentation Technology, 2nd Edition, Vol. II Academic Press / Elsevier, 2004.
6. Stanbury, P.F., A. Whitaker and S.J. Hall, Principles of Fermentation
7. Technology, 2nd Edition Aditya Books (P) Ltd, 2005
8. Nielson S, Food Analysis Laboratory Manual, 3rd edition, Springer International Publishing, 2017
9. Cheung PCK and Mehta BM (Eds), Handbook of Food chemistry, 1st edition, SpringerVerlag Berlin Heidelberg, 2015
10. Cappuccino J, Sherman, N, Microbiology: A Laboratory Manual, 10th edition, Pearson, 201364
11. Garg N and Garg KL, Laboratory Manual of Food Microbiology, 1st edition, KG Mukerji Publishers, 2010

Other references

1. Richard Coles, Derek McDowell, Mark J. Kirwan, Food Packaging Technology, Blackwell Publishers, 2003
2. Aaron L. Brody, E. P. Strupinsky, Lauri R, Active Packaging for Food Applications, CRC Press, U.S.A., 2001

3. Ahvenainen, R. (Ed.) 2003 Novel Food Packaging Techniques, CRC Press, Han, J.H. (Ed.) 2005 Innovations in Food Packaging, Elsevier Academic Press
4. Desrosier, N.W. and James N. The technology of food preservation. AVI Publishers, 2007.

Food processing and post-harvest technology

UNIT-I

Physical principles in food processing operations- Thermal processing- heat resistance of microorganisms, nature of heat transfer, protective effects of food constituents, types of thermal treatments. Post harvest Technology: Importance, principles & scope of post harvest treatments, value-addition.

Rice Technology - Production, processing, milling of rice, parboiling, processes, by products of rice milling and their utilization.

Wheat Technology - Production, processing, manufacture of breakfast cereals.

Pulses - Production, types of processing of different pulse products. Technology of oil seeds - Processing, meal concentrates and isolates.

Paddy and wheat parboiling-systems, equipment, Advances in heat transfer and fluid flow in grain processing operations. Crop drying methods/systems and Crop dryers-selection

UNIT-II

Post-harvest of fruits & Vegetables: physiological and biochemical changes in fruits and vegetables; ripening of climacteric and non-climacteric fruits. Physiological post-harvest disorders - chilling injury and disease; prevention of post-harvest diseases and infestation; Handling and packaging of fruits and vegetables; factors affecting post harvest losses; Standards and specifications for fresh fruits and vegetable.

UNIT-III

Milk and Meat - Production, processing, smoking and curing of meat, grading.

Poultry - Production, preparing poultry for consumption, packaging. Fish - Production, effect of handling practices, storage of eggs.

Fermentation Technology: Functional foods and Technologies to meet special needs.

Spoilage and preservation of different groups of foods - Meat, eggs and poultry, fish and other sea foods, canned food. Food borne disease: Bacterial, food-borne important, Mycotoxins.

UNIT-IV

Quality assurance programme : Quality plan, documentation of records, process control and HACCP, hygiene and housekeeping, corrective action, quality and programme and total quality process.

UNIT-V

Product Evaluation : Sampling for product evaluation and line control. Specification and Food standards, International, National Mandatory, Voluntary. Sample preparations. Reporting results and reliability of analysis. Test for specific raw food ingredients and processed Food including additives: a. Nutrient analysis b. Tests of adulterants

References

1. Jood S and Khetarpaul N, Food preservation, Agrotech Publishing, Udaipur, 2002
2. Manay S and Swamy M S, Foods: Facts and Principles, New Age International (P) Limited, Chennai, 2005.
3. Swaminathan, M. Advanced Textbook on Food Science and Nutrition, Vol:2, Second edition, Reprinted, Bangalore Printind and publishing Co Inc, Bangalore, 2003.
4. Balachandran, K. K. *Post-harvest technology of fish and fish products*. Daya Books, 2001.
5. Sudheer, K. P., and V. Indira. *Post harvest technology of horticultural crops*. Vol. 7. New India Publishing, 2007.
6. Aulakh, Jaspreet, Anita Regmi, Joan R. Fulton, and Corinne E. Alexander. "Estimating post-harvest food losses: Developing a consistent global estimation framework." (2013).
7. Richard Coles, Derek McDowell, Mark J. Kirwan, Food Packaging Technology, Blackwell Publishers, 2003
8. Aaron L. Brody, E. P. Strupinsky, Lauri R, Active Packaging for Food Applications, CRC Press, U.S.A., 2001
9. Ahvenainen, R. (Ed.) 2003 Novel Food Packaging Techniques, CRC Press, Han, J.H. (Ed.) 2005 Innovations in Food Packaging, Elsevier Academic Press

10. Desrosier, N.W. and James N. The technology of food preservation. AVI Publishers, 2007.

Food technology: perishable and non-perishable foods

Technology of Meat and Fish Processing a) Meat -Sources and types of meat, meat products in India, its importance in national economy, Recent trends in meat processing. b) Slaughtering of animals and poultry, inspection and grading of meat, Factors affecting post-mortem changes, properties and shelf-life of meat. c) Fish- Types of fish, composition, structure and post-mortem changes in fish. d) Fish protein concentrates (FPC), fish protein extracts (FPE), fish protein hydrolysis (FPH).

Technology of Milk and Egg Processing a) Sources and composition of milk, processing of market milk, Standardization, toning, homogenization, pasteurization, sterilization, storage, packaging, transportation and distribution of milk. b) Processed milk products - Cream, butter, ghee, cheese, condensed milk, evaporated milk, whole and skimmed milk powder, ice cream, khoa, channa, paneer, Judging and grading of milk and its products. c) Egg Processing Technology -Structure and composition-nutritive value and functional properties of eggs. d) Factors affecting egg quality and measures of egg quality. Recent development in eggs processing.

Fruit and Vegetable Processing Technology a) Principle and methods of Fruit and Vegetable processing Technology Composition and related quality factors for processing. b) Principles of storage of fruits and vegetables. c) Types of storage- Natural, ventilated low temperature storage, Controlled Atmosphere and Modified Atmosphere storages, Fruit product order and quality control

Pulses and Oil Seeds a) Pulses- composition, importance in Indian diet, Types of pulses and legumes, principles of pulse milling, different methods of dhal milling, milling of major legumes. b) Uses of by products, recent development in pulse technology. c) Oilseeds- Types, Importance of fats and oils in human nutrition, Chemical, physical and functional properties

of fats and oils, suitability of oil seeds for processing, importance of oil seeds processing in India. d) Preparation of protein concentrates and isolates and their use in high protein foods, Fermented and traditional products from oil seeds.

Cereals and Millets a) Wheat - Structure and nutrient distribution, types, milling of wheat, quality of flour and flour treatment. b) Rice – Structure and nutritive value, milling-parboiling of rice, effect of aging of rice, rice products-enrichment with vitamin and minerals, by product utilization, Production and quality of breakfast cereals, macaroni products and malt. c) Millets - Introduction to millets, new varieties, production trends of - barley, oat, corn, sorghum, pearl millet and foxtail millet-Chemical constituents-processing, d) Pearling and malting of millets, wet and drymilling, germ oil, Preparation of extruded products and their derivatives

References

1. Chavez-Gonzalez, Monica, José Juan Buenrostro-Figueroa, and Cristobal N. Aguilar, eds. *Handbook of Research on Food Science and Technology: Volume 1: Food Technology and Chemistry*. CRC Press, 2019.
2. Shetty, Kalidas, and Dipayan Sarkar, eds. *Functional Foods and Biotechnology: Biotransformation and Analysis of Functional Foods and Ingredients*. CRC Press, 2020.
3. Wansink, Brian. *Marketing nutrition: Soy, functional foods, biotechnology, and obesity*. Vol. 21. University of Illinois Press, 2005.
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Food biotechnology and post production technology

Unit-I

Role of Biotechnology on Food Industries a) Food additives, synthesis of acidulants – citric acid, gluconic acid, lactic acid, itaconic acid; sweeteners – glucose syrup and High Fructose Corn Syrup (HFCS): thickeners and gelling agents - xanthan gums. b) Vitamins and amino acids – vitamin A., ergosterol, riboflavin, vitamin B12, fatty acid; amino acids – lysine, methionine, glutamate. c) Food fermentations – alcoholic beverages, cheese making, fermented soya based foods, meat fermentation, vinegar (SS)

Unit-II

Microbial Growth and Fermentation Systems Microbial cell growth (SS), microbial metabolism, regulation of metabolism and product secretion. Fermentation systems – batch and continuous process – fermenter design, bioprocess control Enzyme Technology – soluble enzymes, immobilized enzymes, amylases, invertase, glucose isomerases. – synthesis and applications of enzymes in food industries

Unit-III

Agents Causing Food Loss And Control Measures Types and reasons for losses of foods ,extent and cost of losses Agents causing losses - insects, rodents, microorganisms, Birds and other physical agents Importance and methods of sanitary handling (SS) Physical, chemical ,biological measures to control insects, rats, rodents and birds; Fumigants, fumigation, safety measures and integrated pest control

Unit-IV

Introduction To Post Production Technology And Agencies Controlling Food Losses Need for post production technology, important measures adopted by Government to augment food production, Green, Blue, and white revolution (SS) Role of SGC, FCI,CWC,SWC,IGS, Pest Control of India(PCI) in controlling food losses.

Unit-V

Food Processing I Importance of processing- methods of processing cereals (wheat, rice, maize), breakfast cereals Processing of pulses Processing of fruits and vegetables, meat, fish, poultry, egg Processing of sugars Food Processing II Processing of oil seeds Processing of milk and milk products Processing of condiments and spices Beverages, tea, coffee and cocoa (SS)

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2. Journal of Food Science and Technology by Association of Food Scientists and Technologists, CFTRI India
3. Food Technology, Abstracts, Central Food Technological Research Institute, Mysore.
4. Food Processing, Pitman Publishing Company, New York, USA
5. Journal of Food Science, The Institute of Food Technologists, Illinois, USA.
6. Nutrition and Food Science, Forbes Publications Ltd., Hatree House, Queenway, London.

7. Trends in Biotechnology, USA .

Diet therapy for life style diseases

Unit-I

Nutritional Screening and care - Nutritional Assessment - Diagnosis - Intervention and evaluation. Diet, Nutrient and Drug Interaction a) Effect of drugs on ingestion, Digestion, Absorption and metabolism of nutrients. b) Effect of foods, nutrients and nutritional status on drug dosage and efficacy. Diet Modifications a) Normal diet as a basis for therapeutic diets b) Modification of Normal Diet and various nomenclatures of standard hospital diets c) Hospital diet - Scope and importance - Routine hospital diets - Normal / General diets - Liquid diets and formula diets - Soft diets and bland diets.

Unit-II

Dietary management of Cardio Vascular Diseases a) Prevalence, Etiology and Risk Factors, b) Clinical diagnostic tests and nutrition management for - Dyslipidemias, Atherosclerosis, Angina Pectoris and Myocardial Infarction (MI) and Congestive Cardiac Failure (CCF) c) Prevention through life style modifications d) Dietary management - Low fat, low cholesterol and medium chain triglyceride diet Dietary management of Hypertension a) Definition, Classification and Causes b) Signs & Symptoms and Complications c) Dietary management - Diet related factors influencing hypertension, DASH diet - Lifestyle modification.

Unit-III

Dietary management of Liver disease a) Types, Etiology, Symptoms and Complications b) Physiology, functions of the liver and liver function tests. c) Metabolic consequences of alcohol consumption d) Dietary management for - Hepatitis, Cirrhosis and Hepatic coma. Dietary management of Gall Bladder Diseases a) Physiology and functions of Gall Bladder b) Gall bladder function tests c) Dietary management for - Cholecystitis, Cholelithiasis, Acute Cholangitis and Cholestasis Dietary management of Pancreatic Disorders a) Physiology and functions of exocrine Pancreas b) Pancreatic function tests c) Dietary management for - Pancreatitis (Acute and chronic) and Zollinger- Ellison Syndrome.

Unit-IV

Dietary management of Diabetes mellitus a) Prevalence, Types, Aetiology and Signs and Symptoms b) Factors affecting normal blood glucose levels c) Impaired glucose homeostasis d) Diagnostic test for diabetes e) Complications of diabetes - macro-vascular and micro-vascular Management of Diabetes a) Food exchange list, b) Glycaemic index of foods, Carbohydrate counting and Resistant starch c) Sweeteners and sugar substitutes d) Meal planning approaches - With and without Insulin and during sickness. e) Medications - Oral hypoglycaemic drugs and Insulin. f) Lifestyle modification and exercise to manage diabetes mellitus. Management of Hypoglycaemia a) Types, symptoms and fasting state hypoglycaemia b) Postprandial or reactive hypoglycaemia. c) Dietary treatment in reactive hypoglycaemia.

Unit-V

Dietary management of Kidney Diseases a) Aetiology, clinical signs & symptoms b) Physiology & functions of kidney c) Kidney function tests. 1525 d) Types of kidney diseases - Glomerulonephritis, Nephrotic Syndrome, Acute Renal Failure (ARF), Chronic Renal Failure (CRF), End Stage Renal Disease (ESRD)-Dialysis and Kidney Transplant. Nephrolithiasis/Renal Calculi a) Aetiology b) Types of stones and nutritional care- acid and alkaline ash diet. c) Use of sodium, potassium and phosphorus exchange lists in diet planning of kidney diseases patient.

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Nutrition and fitness

Unit I

Exercise Physiology: Concept of energy, work and power; Effect of exercise on muscular, nervous, cardiovascular and respiratory system; Energy metabolism; energy systems during exercise; Components of energy expenditure such as BMR, thermogenic effect of food and physical activity; Energy cost of exercise; Nutrition management during exercise.

Unit II

Sports Nutrition: Need and scope of sports nutrition; Preparation for competition such as pregame meal, meal during game and post game meal; Concept of carbohydrate loading and the methods of carbohydrate loading; Nutrition management during sports/game; Ergogenic aids in sports.

Unit-III

Wellness, Fitness and Health Definition and Indicators of Health - Parameters, Components and Relationship between Wellness, Fitness and Health - Challenges and Personalized Approach. Physical Activity Training Aerobic and anaerobic training -To enhance Cardio Vascular Endurance, Flexibility and Body Composition, Measurement of PAL, Benefits of Fitness training and Gadgets for measuring PA.

Unit-IV

Stress and Health Management Stress Assessment and Management Techniques-Under Weight, Overweight and Obesity, Relaxation Techniques –Yoga and Meditation for Health.

Unit-V

Nutrition for sports and exercise performance: Energy production-ATP, aerobic and anaerobic pathway, energy continuum, Fuel for contracting muscles- sources of fuel, intensity, duration, effects of training , Nutritional requirements of exercise , Weight management. Fluids -fluid balance, daily fluid needs, fluid replacements, fluid absorption, Other considerations -alcohol, caffeine, Ergogenic aids.

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