NUTN

SUBJECT : NUTRITION

Scope and Overview of the Subject :

Nutrition as a subject addresses diverse disciplines including both theoretical and practical approaches in the field of Food and Nutrition, Diet and Disease Care, Food Safety and Hygiene, Food Service Management and Public Health Care including community Nutrition on a larger scale .The subject provides ample scope for professional avenues of Higher Education and career opportunities as an Academician (Research Scholar/Professor / Teacher) / Dietitian / Nutritionist / Public Health Professional (NGO)/ Food Analyst / Health Advisor /ICDS Worker / Health Educator in various institutes and organizations .

Course Objective / Learning Objective :

The Nutrition Curriculum at Senior Secondary level under the West Bengal Council of Higher Secondary Education has been framed to enable the learners to

- Acquaint them with basic knowledge and understanding of the subject matter which will act as a foundation for higher studies in Nutrition like B.Sc. (Food and Nutrition/ Nutrition Management), Vocational courses like BSc Clinical Nutrition and Dietetics and other related diploma and short term courses of various Universities.
- Apply the basics of Nutrition both theoretical and practical field in their future courses related to the subject like Nutrition Advisor/ Consultant Nutritionist/ Dietitian /Health Educator etc.
- Prepare for a diverse field of opportunities apart from the core subject like related fields of Nursing and GNM courses, OT Technician, ICDS worker etc.
- Develop functional skills in the learners for their domain of career and employment in this field.
- Be enriched and equipped forhigher studies in the related field.
- Appreciate the discipline for professional career.

Course Outcome / Learning Outcome :

After undertaking the course the students will be able to;

- Apply the basics of Nutrition with respect to health of self , community and society
- Utilize the knowledge and skills learnt in Nutrition Management and Food Science.
- Be sensitized to the different aspects of Nutrition as a subject and take informed career choices related to it.
- Inculcate healthy food habits and life style enable prevention of and management of diseases.
- Relate to various topics of other interdisciplinary subjects like Chemistry and Biological Sciences and Human Development.

CLASS - XI

SUBJECT : NUTRITION (NUTN)

SEMESTER – I

FULL MARKS : 35 **CONTACT HOURS : 60 HOURS**

COURSE CODE : THEORY

UNIT	TOPICS	CONTAC THOURS	MARKS
Unit-I : **INTRODUCTION TO FOOD, NUTRITION AND HEALTH**	I. **Basic concept of Food, Nutrition, Nutrients and Nutrition Science** ▪ Food – definition, components of food, ▪ Classification of food according to physiological functions performed, components in it and source of origin. ▪ Social and Psychological functions of food ▪ Nutrients - definition, types – macro and micronutrients in food ▪ Proximate and protective principles of food ▪ Energy from food and calorie concept ▪ Standard food, Adequate food and Balanced diet. ▪ Nutrition – definition, five phases of Nutrition in body (outline only, detail to be discussed in later units) ▪ Relation between Food and Nutrition. ▪ Nutrition Science and its application (elementary idea)	10	
	II. **Concept of Health in relation to Nutrition** ▪ Health – definition, dimensions of health – namely physical, mental and social, positive health Indicators. ▪ Malnutrition as a health disorder – definition, causes of malnutrition in India ▪ Classification of Malnutrition – Over, Under and Imbalance. ▪ Specific deficiency disorders (outline only, details to be covered in later units) ▪ Nutritional Status - concept and methods of assessment of Nutritional status namely – Anthropometric, Biochemical, Clinical, Diet Survey etc. ▪ Biophysical examination,Functional assessment and use of growth chart for assessment of Nutritional Status.	10	10

UNIT	TOPICS	CONTAC THOURS	MARKS
Unit –II : **MACROMOLECULES IN NUTRITION**	**I. <u>Carbohydrates in Nutrition:</u>** ▪ Basic concept of Carbohydrates as compounds of carbon, definition. ▪ Dietary sources and daily requirements ▪ Structural Classification of carbohydrates based on simple sugar units in them (elementary concept) ▪ Chemical structure of Hexoses(Glucose and Fructose straight chain only) and basic concept of isomer. ▪ Monosaccharaides –(Glucose, Fructose and Galactose only) ▪ Concept of ketohexose, aldohexose, reducing and non-reducing sugar with examples. ▪ Elementary idea of Polymer and Monomer ▪ Disaccharides and their products on hydrolysis (elementary concept) ▪ Polysaccharides (elementary concept, chemical structure not required) ▪ Physiological functions of carbohydrates. ▪ Dietary Fiber types and its role in health ▪ Effect of excess and deficiency of carbohydrates in humans. **II. <u>Proteins in Nutrition:</u>** ▪ Protein definition. ▪ Amino acids – Definition, Amino acids as structural units of Protein. ▪ General structural formula of amino acids, peptide bond and formation of dipeptide. ▪ Protein precipitation, coagulation (denaturation) ▪ Nutritional classification of amino acids- Essential and non-essential amino acids ▪ Dietary sources and daily requirements ▪ Classification of proteins according to source of origin, structure and nutritive quality. ▪ Vegetable protein *Vs*. Animal protein ▪ Physiological functions of protein ▪ Deficiency and excess intake effects	**15** **15**	**25**

UNIT	TOPICS	CONTAC THOURS	MARKS
	▪ Nitrogen Balance (elementary concept) Assessment of protein quality-PER, DC, BV, NPU and chemical score (elementary concept), Reference protein. **III. <u>Fats and oils in Nutrition :</u>** ▪ Fats – definition, dietary sources, daily requirement ▪ Chemical structure of Fat (as a compound of fatty acid and glycerol) ▪ Chemical properties of Fat namely Saponification, Hydrolysis, Hydrogenation, Rancidity. ▪ Physiological functions of Fat ▪ Classification of fats according to dietary sources, visibility , state at room temperature and chemical structure(elementary) ▪ Vegetable oil *vs*. Animal Fats ▪ Fatty acids as component of fat molecules (elementary concept of the following) Nutritional classification of fatty acids-Essential Fatty Acids (EFA), Saturated Fatty acids (SFA), Unsaturated Fatty Acids (UFA). Poly Unsaturated Fatty Acids (PUFA) omega 3 and 6 –nutritional significance , Mono Unsaturated Fatty Acids (MUFA), Trans fatty acids ▪ Cholesterol - types in serum (elementary concept), normal serum level of total Cholesterol. Effect of excess level.	**10**	

<u>SEMESTER-I</u> :

CLASS TYPE	CONTACT HOURS
Theory Classes	60
Practical Classes	40
Remedial /Tutorial / Home Assignments	10
TOTAL	**110**

CLASS - XI

SUBJECT : NUTRITION (NUTN)

SEMESTER – II

FULL MARKS : 35 **CONTACT HOURS : 60 HOURS**

COURSE CODE : THEORY

UNIT	TOPICS	CONTACT HOURS	MARKS
Unit-I : MICRO-MOLECULES IN NUTRITION - I	**I. Vitamins in Nutrition :Basic concept:** ▪ Vitamins definition, history of term vitamin ▪ Elementary concept and examples of Antivitamin, Provitamin, Pseudo vitamin, Avitaminosis, Hypervitaminosis. ▪ Characteristic features of vitamins (elementary). ▪ Classification of Vitamins based on solubility, Difference between fat and water soluble vitamins. **II. Vitamins (Fat soluble):** ▪ Fat soluble vitamins – A,D,E,K- elementary concept of their chemical name, dietary sources, daily requirements, physiological functions , deficiency symptoms /diseases and excess intake effects. (Deficiency diseases to be detailed in later semesters). **III. Vitamins (Water soluble) and new concept of neutraceuticals:** ▪ Water soluble vitamins – B complex , Vit C- elementary concept of their chemical name, dietary sources, daily requirements, physiological functions, deficiency symptoms / diseases and excess intake effects (Deficiency diseases to be detailed in later semesters) ▪ Current application of Nutrition in health sciences: Elementary concept of Antioxidants, Phytochemicals, Nutraceuticals, Prebiotics and Probiotics, Functional foods	1 8 12	9
UNIT-II: MICRO-MOLECULES IN NUTRITION - II	**I. Minerals in Nutrition:** ▪ Minerals – Definition, Macro and Microelements / Trace elements (elementary concept) ▪ Macro elements – Calcium, Phosphorous, Magnesium, Sodium and Potassium – their dietary sources, daily requirements, bioavailability (Ca only), physiological functions and deficiency symptoms, effects of excess intake (Deficiency diseases to be detailed in later semesters)	10	11

UNIT	TOPICS	CONTACT HOURS	MARKS
	▪ Microelements – Iron, Iodine, Fluorine and Chlorine – their dietary sources, daily requirements, bioavailability (Fe only), physiological functions and deficiency symptoms , effects of excess intake (Deficiency diseases to be detailed in later semesters) **II. <u>Water in Health and Nutrition :</u>** ▪ Role of water in human physiology ▪ Water Balance and daily water intake amount, thirst center of brain ▪ Nervous, endocrine and renal mechanism of water balance regulation (outline and elementary concept only) ▪ Effect of positive and negative water balance	2	
Unit-III: **MEAL PLANNING AND FOOD GROUPS**	**I. <u>Meal planning :</u>** ▪ Meal planning concept, aims and objectives, principles and the governing factors of meal planning ▪ Steps in Meal planning (outline concept only) ▪ Advantages of Meal planning ▪ Adult Consumption Unit or Man Value **II. <u>Food Groups and Commodities :</u>** ▪ Basic food groups highlighting ICMR 2010 Classification. ▪ Food Pyramid and its role in Balanced Diet ▪ Plate method (My plate of the day) for balanced diet concept ▪ Food Commodities in food groups and only brief idea of their nutritive value namely: Cereals and Millets, Pulses and Legumes, Soya bean, Fruits and Vegetables, Milk and Milk products, Poultry , Egg, Meat, Fish Nuts, Oil seeds, Sugar and Jaggery, Honey. ▪ Low cost balanced diet. ▪ Vegetarianism and its types.	2 10	7
Unit-IV: **MEAL PREPARATION AND DAILY ALLOWANCES FOR INDIANS**	**I. <u>Meal preparation</u>** ▪ Cooking – objectives, need and advantages ▪ Different methods of cooking – their process, temperature involved and advantages. ▪ Effect of cooking on different nutrients	5	8

UNIT	TOPICS	CONTACT HOURS	MARKS
	▪ Precautions for prevention of loss of nutrients while cooking or pre-preparation of food. ▪ Means to increase nutritive value of food ▪ Process of preparation of the following with retention of proper nutritive value: Rice, vegetables, meat, fish and egg ▪ Kitchen Sanitation and Kitchen garden- it's utility. **II. <u>Balanced diet for different age groups :</u>** ▪ Balanced Diet concept, RDA for Indians – 2020 (NIN), concept of EAR (NIN 2020) latest updated values. ▪ Rules for preparing a balanced diet and Nutritional allowances in different age groups namely (elementary concept only): a. Adult nutrition (Reference Man and Women) b. Preschoolers nutrition c. Nutrition for Schoolgoing children and packed lunch, d. Adolescent nutrition and their feeding problem like Anorexia and Bulimia Nervosa, use of junk food, fast food - ill effects e. Geriatric nutrition	**10**	

<u>SEMESTER-II</u> :

CLASS TYPE	CONTACT HOURS
Theory Classes	60
Practical Classes	20
Remedial / Tutorial / Home Assignments	10
TOTAL	**90**

Total Teaching Learning Contact Hours in each Academic Year inclusive of theory, practical and remedial sessions = (110 hours in Semester I and 90 hours in Semester II) = 200 contact hours.

CLASS – XI
(PRACTICAL GUIDELINES)
SUBJECT : NUTRITION (NUTN)

FULL MARKS : 30 **CONTACT HOURS : 60 HOURS**

COURSE CODE : PRACTICAL

1.	**Unit I: Nutrition and Health (Investigatory project)** 1. Assessment of Nutritional Status of schoolgoing children using any two anthropometric measurements (like Height, Weight, BMI etc.) and clinical symptoms.
2	**UNIT II: Macromolecules in Nutrition :** 1. Detection of presence of the following nutrients in supplied food sample through physical observation and chemical tests • Carbohydrates (mono, di and polysaccharide – starch only) • Protein (albumin only) • Fats
3.	**UNIT III: Meal preparation from Food Commodities :** 1. Measurement of food commodities: Measurement of actual weight and estimated approximate household weight of common food stuffs. 2. Meal preparation and calculation of nutritive value of the item prepared: ▪ Preparation of any 2 food items from cereals or millets like i. Rice / Semolina porridge ii. Poushtik roti or Paratha with cereals and vegetables or channa or legumes . iii. Sooji upma or cheera (poha), iv. Oats porridge or Oats chilla with vegetables, v. Multi millet brown bread sandwich or roti from millet mix etc. ▪ Preparation of any 2 food items using milk or eggs like i. Cottage Cheese or pudding or porridge (payesh) ii. Eggnog or egg poach or omelette or egg sandwich etc ▪ Preparation of nutritious fibre and micronutrient rich school tiffin. [like Roti sabji or Sabji Paratha or Vegetables Sandwich or Vegetable pancake or fruit chat etc] **OR** ▪ Preparation of protein and fibre rich snack for Pregnant mother[like soya chana ghugni or chana chat or egg veg sandwich or Moong chilla with vegetables etc]
	QUESTION PATTERN : 1. Investigatory project on Nutritional Status 06 2. Macromolecules in nutrition: Nutrient detection in food 08 3. Meal preparation from food commodities 08 4. Laboratory Notebook 05 5. Viva 03 **TOTAL MARKS 30**

CLASS - XII

SUBJECT : NUTRITION (NUTN)

SEMESTER – III

FULL MARKS : 35 **CONTACT HOURS : 60 HOURS**

COURSE CODE : THEORY

UNIT	TOPIC	CONTACT HOURS	MARKS
UNIT I: NUTRITIVE PHASE OF DIGESTION AND ABSORBTION	**I. BIOCHEMICAL AND BIOPHYSICAL ASPECTS IN NUTRITION :** ▪ Enzyme - definition and examples, characteristic features and enzyme activity, primary concept of coenzyme, cofactor, prosthetic group, apo-enzyme, holoenzyme, regulatory enzyme. Types of enzyme with special reference to digestive and metabolic enzymes ▪ Various biophysical process related to absorption : diffusion, osmosis, facilitated diffusion, active and passive transport (elementary concept with examples) **II. BREAKDOWN OF FOOD : DIGESTION AND ABSORPTION** ▪ Alimentary system and parts of alimentary canal (elementary concept) ▪ Digestion -process, site , digestive juices their source, components and functions namely - saliva, gastric juice, pancreatic juice, succus entericus and bile. ▪ Digestion and absorption of carbohydrates, proteins and fats.	**4** **15**	**12**
UNIT II NUTRITIVE PHASE OF METABOLISM	**I. UTILISATION OF FOOD : METABOLISM OF CARBOHYDRATES PROTEIN AND FATS :** ▪ Metabolism meaning and types ▪ Carbohydrate metabolism with special reference to Cori cycle and blood sugar regulation role of hormones, hypoglycemia and hyperglycemia, glycosuria. ▪ Aerobic breakdown of Carbohydrates namely glycolysis and TCA Cycle, glycogenolysis. ▪ Anabolism of carbohydrates, Glycogenesis and Gluconeogenesis (outline concept only) ▪ Protein metabolism with special reference to amino acid pool, deamination and urea synthesis through ornithine cycle, transamination, decarboxylation and transmethylation and site of protein synthesis. ▪ Fat Metabolism elementary concept of beta oxidation only and outline concept of Ketone bodies. (all metabolic pathway in flow chart) **II. ENERGY REQUIREMENT OF HUMANS AND CONCEPT OF CALORIE :** ▪ Calorie concept, measurement of calorie value of food and energy requirement of humans (elementary and outline concept) ▪ Physiological fuel value of food, SDA. ▪ BMR and factors controlling it. ▪ Reference man and woman. ▪ Energy requirement during rest and different physical activities and physiological conditions. (as per ICMR 2020)	**20** **5**	**13**

UNIT	TOPIC	CONTACT HOURS	MARKS
UNIT III : **FOOD SAFETY AND SANITATION**	**I. <u>SPOILAGE OF FOOD AND FOOD POISONING :</u>** ▪ Classification of food according to shelf life ▪ General idea of common microorganisms in different foods. ▪ Causes of food spoilage ▪ Common Food poisoning (elementary concept - their causes/sources, symptoms and preventive measures only.) like *Salmonella*, Rota virus, Coliform, *Clostridium* and streptococcal poisoning. **II. <u>FOOD SAFETY AND PRESERVATION :</u>** ▪ Food sanitation practices, rules for food safety – HACCP, FSSAI (origin and significance), CODEX ALIMENTARIUS. ▪ Food preservation methods – concept, objectives and advantages of different food preservation methods. ▪ Household methods like freezing, drying, blanching etc. ▪ Commercial methods like aseptic canning, milk preservation through pasteurization, smoking of fish, irradiation ▪ Preservation using chemicals, sugar, salt, oil and spices. Concept of Class I and Class II preservatives (examples only). ▪ Primary concept of few common food additives. ▪ Food Adulteration (elementary idea) PFA Act, origin of ISI and AGMARK (in brief)	**6** **10**	**10**

<u>SEMESTER-III</u> :

CLASS TYPE	CONTACT HOURS
Theory Classes	60
Practical Classes	40
Remedial / Tutorial/Home Assignments	10
TOTAL	**110**

CLASS - XII

SUBJECT : NUTRITION (NUTN)

SEMESTER – IV

FULL MARKS : 35 **CONTACT HOURS : 60 HOURS**

COURSE CODE : THEORY

UNIT	TOPICS	CONTACT HOURS	MARKS
UNIT I: **DIETETICS AND DIET PLANNING**	**I. NUTRITION IN PREGNANCY AND LACTATION** ▪ Elementary concept of pregnancy as a physiological demanding condition, complications and symptoms ▪ Nutritional allowances and balanced diet for pregnant women. ▪ Nutritional allowances and balanced diet for lactating mothers. **II. NUTRITION FOR INFANTS** ▪ Breast feeding – Colostrum and mature milk; their composition and significance in growth and development of infants. ▪ Top Milk (Elementary idea), Breast feeding *vs.* artificial feeding. ▪ Nutritional allowances for infants, Concept of weaning, need and types of weaning foods. ▪ Malting of food, Multipurpose food and Bal Ahar ▪ Feeding problems of Infants and defective feeding practices in relation to malnourishment **III. DIET THERAPY IN FEW COMMON DISEASES :** ▪ Dietetics and Diet Therapy concept and objectives ▪ Modification of Normal Diet to a Therapeutic diet (elementary concept of change in feeding technique, consistency and constituents) ▪ Elementary concept of Diet in metabolic and life style disorders like: Diabetes, Hypertension, Obesity, Coronary Heart Disease - Angina, Myocardial Infarction , Ischemia and Atherosclerosis, Gout, Febrile condition (inclusive of Typhoid and Tuberculosis) and Cancer (outline, risk factors and basic dietary principle only) ▪ Elementary concept of Diet in Gastric Disorders like: Peptic Ulcer, Diarrohea, Constipation, Celiac disease and IBS only ▪ Elementary concept of Diet in Renal Disorders like Acute and Chronic Nephritis, Renal stone ▪ Elementary concept of Diet in Liver and Gall Bladder diseases likes Jaundice and Viral Hepatitis, Cholecystitis and Cholelithiasis only.	5 10 25	19

UNIT	TOPICS	CONTACT HOURS	MARKS
UNIT II: NUTRITION FOR THE COMMUNITY	**I. COMMON DEFICIENCY DISEASES OF INDIA AND NATIONAL NUTRITIONAL PROGRAMMES TO COMBAT IT :** ▪ PEM, types, prevention and treatment ▪ Vitamin A deficiency and NAPPNB ▪ Nutritional Anemia and NNAPP ▪ Iodine Deficiency Disorder and NIDDCP ▪ Other common vitamin related disorders like Osteoporosis, Osteomalacia, Rickets and Scurvy. ▪ National Diarrhoeal Disease Control Programme (NDDCP).	**8**	**16**
	II. SUPPLEMENTARY FEEDING PROGRAMMES AND ORGANISATIONS TO COMBAT MALNUTRITION : ▪ Relation between RDA, RDI and Supplementary feeding ▪ ICDS , MDMP (Poshan Abhigyan / Pradhan Mantri Poshan Shakti Nirman Scheme) ▪ National Food Security Act (outline) ▪ Role of national and international organizations in combating malnutrition like i. FAO, WHO, UNICEF only ii. ICMR, NIN, NNMB, FNB,CINI and CFTRI only.	**8**	
	III. NUTRITION EDUCATION FOR THE COMMUNITY : ▪ Nutrition education concept: objectives and principles. ▪ Centers and aids for nutrition education ▪ Methods of Nutrition Education. ▪ Cooking demonstration as an effective tool for nutrition education.	**2**	
	IV. NUTRITIVE VALUE OF FOODS : ▪ Use of food exchange list. ▪ Calculation of nutritive value of food using food value table.	**2**	

SEMESTER IV :

CLASS TYPE	CONTACT HOURS
Theory Classes	60
Practical Classes	20
Remedial /Tutorial/Home Assignments	10
TOTAL	**90**

CLASS – XII
(PRACTICAL GUIDELINES)
SUBJECT : NUTRITION (NUTN)

FULL MARKS : 30 **CONTACT HOURS : 60 HOURS**

COURSE CODE : PRACTICAL

1	**Unit I: Food Safety and Sanitation :** Identification of common adulterants in food (any four to be done) through DART (Detect Adulteration with Rapid Test) method. i. Khesari powder in Besan (Chana flour) ii. Metanil Yellow in Turmeric powder / coloured food items iii. Iron dust in Tea leaves iv. Starch in Milk or Milk Powder v. Vanaspati in Butter vi. Brick powder in chilli powder
2	**UNIT II Dietetics and diet planning :** Preparation of food item or meal item for the following conditions or diseases and calculation of nutritive value of the item prepared. i. Balanced meal item for pregnant or lactating mother ii. High protein high calorie febrile diet iii Low residue low fibre diarrhoeal diet iv. High fibre low calorie diet for obese person
3	**UNIT III: Community Nutrition (Investigatory/Activity based Project any one from below)** Visit to different Institutions/ Centre's /Units and report submission based on activities watched (any 1 to be selected by the teacher) ▪ Hospital or Nursing Home Dietetic Unit ▪ Primary or Rural Health Care Centre ▪ ICDS Centre ▪ Food Processing Unit/ industry ▪ Dairy Farm ▪ Mid Day Meal Programme in School **OR** Health and Nutrition Education given in urban slums or rural area / village on any topic of choice using Health Education Aids
	QUESTION PATTERN : 1. Community nutrition: Investigatory or activity based project 06 2. Food Safety : Adulterant detection in food 06 3. Dietetics and Diet Planning: Meal preparation and calculation of Nutritive value 10 4. Laboratory Note book 05 5. Viva 03 **TOTAL MARKS 30**