



छत्रपति शाहू जी महाराज विश्वविद्यालय, कानपुर

CHHATRAPATI SHAHU JI MAHARAJ UNIVERSITY, KANPUR

(पूर्ववर्ती कानपुर विश्वविद्यालय कानपुर)

Formerly Kanpur University, Kanpur – 208024

A Documentary Support

For

Metric No. – 1.1.1

Programme Outcomes & Course Outcomes

Under the

Criteria - I

(Curriculum Design and Development)

Key Indicator - 1.1

In

Metric No. – 1.1.1

B.Sc. Human Nutrition


Co-ordinator
Internal Quality Assurance Cell
CSJM University, Kanpur


(Registrar)
C.S.J.M. University
Kanpur
REGISTRAR
C.S.J.M. UNIVERSITY
KANPUR

School of Health Sciences
CSJM University, Kanpur

Ordinance & Syllabus

for

B.Sc. in Human Nutrition
(B.Sc.-HN)

Academic Programme

Ordinance according to
NEP-2020

Duration: 3 years (Six Semesters)

Ram Kishore

Veer

Manish Kumar

Digvijay

B.Sc. in Human Nutrition

ORDINANCE

Chapter

"A"

1. B.Sc.-Human Nutrition degree will be under the **faculty of Medicine** of C.S.J.M. University, Kanpur.
2. **Duration of Course:**
 - B.Sc.-Human Nutrition course will be a full time course.
 - Duration will be Three years (06 Semesters).
3. **No. of Seats:**
Total no. of Students to this course - **40**.
4. **Admission.**

Eligibility Criteria:

For admission in this course candidate has to pass 10 + 2 (Any stream) conducted by any Board or University incorporated by law and recognized by this University with minimum 50% marks in aggregate in Physics, Chemistry & Biology (relaxation of 5% marks for SC/ST student).

Mode of Admission:

As per the University Norms.

5. **Medium of instruction:**
English shall be the medium of instruction in the class and in the University examination.
6. **Method of Teaching:**
The method of teaching adopted shall be a combination of lectures, demonstrations and practicals by the full time faculty, visiting or part time or guest faculty.
7. **Examination:**
 - As per the University norms**Duration of Examination:**
 - Each theory paper shall be of three-hours duration OR as per the University norms.
8. **Attendance to appear in the end semester examination:**
The permission to appear in end semester examination shall be granted to such candidate only who have fulfilled the condition of 75% attendance in each subject separately in theory and practical as per the university rule.
Regarding attendance requirements students will have to fulfill the condition of 75% attendance. 15% relaxation in attendance, in exceptional circumstances can be made by the Vice Chancellor on the recommendation of the Director/Coordinator/Head of the Institute/Department.

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B.Sc. HUMAN NUTRITION

Programme Objective

1. To make student will understand the importance of food and meaning of nutrition.
2. To enable the student to understand the role of nutrition in human life.
3. To learn and gain knowledge about basics innutrition.
4. To acquire knowledge about functions of food, RDA, food sources of nutrients
5. To enable students to develop a thorough understanding of nutrition and the ability to communicate those principles to the public.
6. To enable student to learn about nutrients in food, how the body uses them, and the relationship between diet, health, and disease.
7. To learn to apply therapeutic diets to treat disease.
8. To gain knowledge and skills to respond to the diverse needs of patients, families and carers within a variety of settings.
9. To learn about balanced lifestyle and improve people's diets, while helping them to keep a healthy weight, boost their immune system.

Programme Outcome

1. The students will acquire knowledge qualitative and quantitative estimation of the nutrients in food.
2. The student will know about the metabolic condition of the life style related diseases.
3. The student will be able to explain the risk factors for degenerative diseases and toward the management of the several disease conditions.
4. The student will be able to apply nutrition knowledge, plan and counsel the patients.
5. The student will be able to develop skills in planning, calculating, modifying the nutrient requirements and in preparation of therapeutic diets, acquire skills in diet counselling and feeding of patients.

Programme Specific Outcome

1. To develop skill and confidence to make informed decisions about healthy diet in health and Disease.
2. To learn composition and chemistry of different foods and changes that occur during cooking/processing of foods.
3. To apply the knowledge of food microbiology, sanitation and hygiene in food production and service.
4. To study the fundamentals of the science of nutrition in relation to macro and micronutrients.
5. To understand the working and management of the dietary departments of the various organizations.

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SCHEME OF EXAMINATION

B.Sc. in Human Nutrition (First Semester) University Examination

S. No.	Subjects	Subject code	THEORY MARKS			PRACTICAL MARKS			Total marks
			Theory Paper	Internal Assessment	Total	Practical	Internal Assessment	Total	
1	Fundamentals of Nutrition	BHN-101	75	25	100	75	25	100	200
2	Food Microbiology-I	BHN-102	75	25	100	75	25	100	200
3	Human Physiology-I	BHN-103	75	25	100	75	25	100	200
4	Nutritional Biochemistry-I	BHN-104	75	25	100	75	25	100	200
5	First Aid and Emergency Care	BHN-105	75	25	100	-	-	-	100
Grand Total									900

B.Sc. in Human Nutrition (Second semester) University Examination

S. No.	Subjects	Subject code	THEORY MARKS			PRACTICAL MARKS			Total marks
			Theory Paper	Internal Assessment	Total	Practical	Internal Assessment	Total	
1	Family Meal Management	BHN-201	75	25	100	75	25	100	200
2	Food Microbiology-II	BHN-202	75	25	100	75	25	100	200
3	Human Physiology-II	BHN-203	75	25	100	75	25	100	200
4	Nutritional Biochemistry-II	BHN-204	75	25	100	75	25	100	200
5.	Diet Counselling	BHN-205	-	-	-	-	-	100	100
Grand Total									900

B.Sc. in Human Nutrition (Third semester) University Examination

S. No.	Subjects	Subject code	THEORY MARKS			PRACTICAL MARKS			Total marks
			Theory Paper	Internal Assessment	Total	Practical	Internal Assessment	Total	
1	Basics of Food Science	BHN-301	75	25	100	75	25	100	200
2	Basics Dietetics	BHN-302	75	25	100	75	25	100	200
3	Community Nutrition-I	BHN-303	75	25	100	75	25	100	200
4.	Food Science-I	BHN-304	75	25	100	75	25	100	200
5.	Diet Survey	BHN-305						100	100
Grand Total									900

B.Sc. in Human Nutrition (Fourth semester) University Examination

S. No.	Subjects	Subject code	THEORY MARKS			PRACTICAL MARKS			Total marks
			Theory Paper	Internal Assessment	Total	Practical	Internal Assessment	Total	
1	Advanced Nutrition	BHN-401	75	25	100	75	25	100	200
2	Community Nutrition-II	BHN-402	75	25	100	75	25	100	200
3	Food Science-II	BHN-403	75	25	100	75	25	100	200
4.	Field Visit	BHN-404						100	100
Grand Total									700

B.Sc. in Human Nutrition (Fifth semester) University Examination

S. No.	Subjects	Subject code	THEORY MARKS			PRACTICAL MARKS			Total marks
			Theory Paper	Internal Assessment	Total	Practical	Internal Assessment	Total	
1	Food Institutional Management	BHN-501	75	25	100	75	25	100	200
2	Advanced Dietetics-I	BHN-502	75	25	100	75	25	100	200
3.	Diet Therapy	BHN-503	75	25	100	75	25	100	200
4	Diet Counselling and Patient care	BHN-504	75	25	100	75	25	100	200
									800

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B.Sc. in Human Nutrition (Sixth semester) University Examination

S. No.	Subjects	Subject code	THEORY MARKS			PRACTICAL MARKS			Total marks
			Theory Paper	Internal Assessment	Total	Practical	Internal Assessment	Total	
1	Advanced Dietetics-II	BHN-601	75	25	100	75	25	100	200
2	Food Quality Analysis (Elective)	BHN-602	75	25	100	75	25	100	200
	Virology (Elective)	MLT-604							
3	Project work	BHN-603				160	40	200	200
Grand Total									600

INTERNAL ASSESSMENT

- It will be for theory and practical both.
- It will be done through the whole semester.
- Candidate must obtain at least 40% marks in theory and practicals separately in internal assessment to be eligible for the semester university examination.

- **Internal assessment (Theory)** will be done as follows:

- Mid-term/ class test etc. = 10 marks
 - Assignments/Project/Quiz/ Presentations etc. = 10 marks
 - Attendance = 05 marks
- Total = 25 marks**

- **Internal assessment (Practical)** will be done as follows:

- Laboratory Manual/Assignments/Class test etc. = 10 marks
 - Day to day performance/continuous evaluation/record etc = 10 marks
 - Attendance = 05 marks
- Total = 25 marks**

CRITERIA FOR PASSING

- As per the University Norms.

DIVISION:

- As per the University Norms.

DEGREE:

- The degree of B.Sc. in Human Nutrition course of the University shall be conferred on the candidates who have pursued the prescribed course of study for not less than six semesters and have passed examinations as prescribed under the relevant scheme.

COURSE OF STUDY B.Sc. in Human Nutrition (First Semester)

Sl.	Subjects	Subject Code	Teaching hours			Credit Hours
			Theory	Practical	Total	
1	Fundamentals of Nutrition	BHN-101	40	40	80	4
2	Food Microbiology-I	BHN-102	40	40	80	4
3	Human Physiology-I	BHN-103	40	40	80	4
4	Nutritional Biochemistry-I	BHN-104	40	40	80	4
5.	First Aid and Emergency Care	BHN-105	80	-	80	4
					Total	20

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B.Sc. in Human Nutrition (Second Semester)

Sl.	Subjects	Subject Code	Teaching hours			Credit Hours
			Theory	Practical	Total	
1	Family Meal Management	BHN-201	40	40	80	4
2	Food Microbiology-II	BHN-202	40	40	80	4
3	Human Physiology-II	BHN-203	40	40	80	4
4	Nutritional Biochemistry-II	BHN-204	40	40	80	4
5.	Diet Counselling	BHN-205	-	80	80	4
					Total	20

B.Sc. in Human Nutrition (Third Semester)

Sl.	Subjects		Teaching hours			Credit Hours
			Theory	Practical	Total	
1	Basics of Food Science	BHN-301	40	40	80	4
2	Basics Dietetics	BHN-302	40	40	80	4
3	Community Nutrition-I	BHN-303	40	40	80	4
4.	Food Science-I	BHN-304	40	40	80	4
5.	Diet Survey	BHN-305	-	80	80	4
					Total	20

B.Sc. in Human Nutrition (Fourth Semester)

Sl.	Subjects		Teaching hours			Credit Hours
			Theory	Practical	Total	
1	Advanced Nutrition	BHN-401	40	40	80	4
2	Community Nutrition-II	BHN-402	60	60	120	6
3	Food Science-II	BHN-403	40	40	80	4
4.	Field Visit	BHN-404	-	120	120	6
					Total	20

B.Sc. in Human Nutrition (Fifth Semester)

Sl.	Subjects	Subject Code	Teaching hours			Credit Hours
			Theory	Practical	Total	
1	Food Institutional Management	BHN-501	40	40	80	4
2	Advanced Dietetics-I	BHN-502	60	60	120	6
3	Diet Therapy	BHN-503	40	40	80	4
4.	Diet Counselling and Patient care	BHN-504	60	60	120	6
					Total	20

B.Sc. in Human Nutrition (Sixth Semester)

Sl.	Subjects	Subject Code	Teaching hours			Credit Hours
			Theory	Practical	Total	
1	Advanced Dietetics-II	BHN-601	60	60	120	6
2	Food Quality Analysis (Elective)	BHN-602	60	60	120	6
	Virology (Elective)	MLT-604				
3	Project work	BHN-603	-	180	180	8
					Total	20

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B.Sc.-Human Nutrition-First Semester

SUBJECT CODE – BHN-101

FUNDAMENTALS OF NUTRITION

Min. Hrs. – Theory: 40 hrs. & Practical: 40 hrs.

Course Objectives

- To understand the functions and role of nutrients, their requirements and the effect of deficiency and excess (in brief)

Course Outcomes

- The student will be able to apply basic nutrition knowledge in making food choices and obtaining an adequate diet.
- The student gains competence in connecting the role of various nutrients in maintaining health.

THEORY

1. Definition of food, nutrition, health, Dimension of health and function of food- Physical, social and mental health.
2. Food guide – Basic food groups, my plate
3. Carbohydrates: Classification, functions, Digestion & absorption, food sources, storage in body, deficiency diseases.
4. Proteins – Classification, composition, functions, digestion and absorption, food sources, storage in body, essential & non-essential amino acids, functions, Protein deficiency.
5. Fats & oils: Classification, composition, saturated and unsaturated fatty acids, functions, digestion and absorption, food sources, storage in body, deficiency.
6. Water - as a nutrient, function, sources, requirement, water balance & effect of deficiency.
7. Minerals - macro & micronutrients. - functions, sources. Bioavailability and deficiency of Calcium, Iron, Iodine, Sodium & Potassium (in very brief)
8. Vitamins (water & fat soluble) - definition, classification & functions.

PRACTICALS

1. Weights and measures.
2. Introduction to Recommended Dietary Allowances/Nutritive value of foods.
3. Preparation of essential macro (protein, fibre) and micronutrient (calcium, iron vitamin C, A and B) rich recipe, calculation of nutritive value and cost per serving.
4. Visit to analytical lab for demonstration of protein and fat estimation.

TEXT BOOKS

- Antia F.P., Philip Abraham, Clinical Dietetics and Nutrition, Oxford University Press; 4th edition.2000
- Passmore R. and Davidson S. (1986) Human nutrition and Dietetics. Liming stone publishers.2000
- Robinson C.H. Careme, Chenometh W.L., Garmick A.E. 16th edition Normal Therapeutic nutrient. Publish by Mc Millan Company New York.1986

REFERENCE BOOKS

- Kathleen Mahan L., Sylvia Escott-Stump, Krause's food, nutrition and diet therapy (11th edition). Saunders company, London.2000

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SUBJECT CODE - BHN 102

FOOD MICROBIOLOGY-I

Min. Hrs. – Theory: 40 hrs. & Practical : 40 hrs.

Course Objective

- To acquire an elementary knowledge about microorganisms

Course Outcome

- The student gains knowledge about the origin of food microbiology, learns to classify and understand the characteristic features of microorganisms.
- The student will be able to understand the bacterial growth and culturing of bacteria.

THEORY

1. **General characters and classification of Bacteria.**
2. **Characteristics of Bacteria**-Morphology - Shape, Capsule, Flagella, Inclusion, Granule, Spore.
3. **Growth and Maintenance of Microbes**-Bacterial division, Batch Culture, Continuous culture, bacterial growth- total count, viable count, bacterial nutrition, oxygen requirement, CO₂ requirement, temperature, pH, light.
4. **Sterilization and Disinfection**-Physical agents- Sunlight, Temperature less than 100°C, Temperature at 100°C, steam at atmospheric pressure and steam under pressure, irradiation, filtration. Chemical Agents- Alcohol, aldehyde, Dyes, Halogens, Phenols, Ethylene oxide.
5. **Culture Media**-Definition, uses, basic requirements, classification, Agar, Peptone, Transport Media, Sugar Media, Anaerobic Media, Containers of Media, Forms of Media
6. **Staining Methods**-Simple, Grams staining, Ziehl-Nelson staining or AFB staining, Negative Impregnation.
7. **Collection and Transportation of Specimen** -General Principles, Containers, Rejection, Samples- Urine, Faeces, Sputum, Pus, Body fluids, Swab, Blood.
8. **Disposal of Laboratory/Hospital Waste**-Non-infectious waste, infected sharp waste disposal, infected non-sharp waste disposal.

PRACTICALS

1. Identification of instruments
2. Preparation of swabs/sterile tubes & bottles..
3. Preparation of smear.
4. Staining: Gram & Ziehl -Nelson staining
5. Identification of Culture media.
6. Identification of common microbes

TEXT BOOKS

- Benson Harold. Microbiological Applications Wn. C. Brown Publishers, U.S.A.2015
- Frazier, W.C. and Westhoff D.C .Food microbiology, Mc Graw Hill Inc.2016
- Jay James: Modern food microbiology, Van Nostrand Reinhold Company Inc.2000
- Pelczar, Chan, Krieg, Microbiology;Tata Mc. Graw Hill ,1999
- Jacquelyn G Black Microbiology principles and Explorations John Wiley and Sons, Inc,2000
- Microbiology Prescott Harley Klen Mc. Graw Hill,2000

REFERENCE BOOKS

- Essentials of Food microbiology John Garbutt,1995
- College microbiology S.Sundara Rajan.1994
- Microbiology Schaums Outlines I E ALCAMO Tata Mc Graw –Hill Publishing Company Ltd New Delhi,2000

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SUBJECT CODE - BHN 103

HUMAN PHYSIOLOGY-I

Min. Hrs. – Theory : 40 hrs. & Practical : 40 hrs.

Course Objective

- Students will be able to learn the terminology of the subject.
- Provide basic knowledge of cells, tissues, blood and to understand anatomy and physiology of human body.

Course Outcome

- This subject will develop and understanding of the structure and function of organs and organ systems in normal human body.

THEORY

1. **Cell** - Structure and functions.
2. **Blood** - Blood cells, Haemoglobin, Blood groups, Coagulation Factors, Anaemia
3. **Skeletal System** -Bones, joints & bone deformities in brief, **Muscles** : structure, classification & function.
4. **Cardiovascular System**-Heart rate, Cardiac cycle, cardiac output, blood pressure, hypertension, radial pulse.
5. **Lymphatic system** -Lymph glands and its function, spleen -structure and functions.
6. **Respiratory System** -Ventilation, Functions, Lungs volumes and capacities.
7. **Gastrointestinal System** -Process of digestion in various parts.

PRACTICALS

1. Microscope & its uses.
2. Microscopic appearance of prepared slides.
3. Examination of pulse, BP and respiratory rate.
4. Elicitation of Reflexes & jerks.

TEXT BOOKS

- Chatterjee CC; Text Book of Physiology – Vol I & II.2000
- Chaudhuri SK; Concise Medical Physiology. New Central Book Agency (P) Ltd,2000.
- Guyton AC, Hall JE; Text book of Medical Physiology.9th Ed. Prism Books (Pvt.) Ltd. Bangalore.1999

REFERENCE BOOKS

- Wilson; Anatomy and Physiology in Health and Illness. Edinburgh, Churchill Livingstone.1998
- WinWord; Sear's Anatomy and Physiology for Nurses. London, Edward Arno.1999
- Koeppen BM and Stanton BA: Berne and Levy Physiology, 7th Ed. Elsevier.2017
- Rhoades R and Pflanzer R Human Physiology, 4th ed. Thomson.2003
- Eroschenko VP di Fore's Atlas of Histology, di Fiore's Atlas of Histology with Functional Correlations, 11th Edition. Lippincott Williams & Wilkins.2007
- McLaughlin D, Stamford J and White D: Bios Instant Notes on Human Physiology,1st Ed. Taylor & Francis,2006

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SUBJECT CODE - BHN 104
NUTRITIONAL BIOCHEMISTRY-I
Min. Hrs. – Theory : 40 hrs. & Practical : 40 hrs.

Course Objective

- To enable the student to understand the chemical characteristics of different classes of nutrients.
- To explain the process of digestion, absorption and metabolism of macronutrients and micronutrients.

Course Outcome

- The student will have knowledge of biochemical pathways of different nutrients, how they function biochemically and physiologically.
- The student will get information about the role of diet and the nutrients present in them.

THEORY

1. **Basics of energy metabolism, nutrition & dietetics** -Unit of measuring energy, calorific value of food, BMR & factors affecting it, SDA of food, calculation of energy requirement, balanced diet, nutrition in health & diseases (protein energy malnutrition).
2. **Chemistry of carbohydrates & their related metabolism** - Introduction, definition, classification, biomedical importance Brief outline of metabolism: Glycogenesis & glycogenolysis (in brief), Glycolysis, citric acid cycle & its significance, HMP shunt & Gluconeogenesis (in brief), regulation of blood glucose level.
3. **Amino acids** - Definition, classification, essential & non-essential amino acids.
4. **Chemistry of Proteins & their related metabolism** - Introduction, definition, classification, biomedical importance Metabolism: Transformation, Decarboxylation, Ammonia formation & transport, Urea cycle.
5. **Chemistry of Lipids & their related Metabolism**-Introduction, definition, classification, biomedical importance, essential fatty acids, identification of fats & oils (saponification no, acid no, iodine no, acetyl no, reichert- miesel no. etc.) Brief out line of metabolism: Beta oxidation of fatty acids, Ketosis, Cholesterol & it's clinical significance, Lipoproteins in the blood composition & their functions in brief, Atherosclerosis.
6. **Enzymes**-Introduction, definition, classification, coenzymes, isoenzymes, properties, factors affecting enzyme action, enzyme inhibition, diagnostic value of serum enzymes - Creatinine kinase, Alkaline phosphatase, Acid phosphatase, LDH, SGOT, SGPT, Amylase, Lipase, Carbonic anhydrase etc.
7. **Acid base balance concepts & disorders** - pH, Buffers, Acidosis, Alkalosis

PRACTICALS

1. Biomedical Waste Management
2. Laboratory Organization – Glassware, Plastic-ware, Instruments etc.
3. Identification of Carbohydrates (qualitative tests).
4. Identification of Proteins
5. Estimation of Glucose in urine by Benedict's method.

TEXT BOOKS

- Murray RK, Bender DA, Botham KA, Mayes PA and Rodwell IVW (2015):
- Harper's Biochemistry, 30th Ed. Lange Medical Book.2014
- Handler P, Smith EI, Stelten DW: Principles of Biochemistry, McGraw Hill Book Co.2000
- Nelson DL and Cox MM : Lehninger Principles of Biochemistry. 7th Ed. WH Freeman.2017
- Devlin TM (2010): Text Book of Biochemistry with Clinical Correlations. John Wiley and Sons.

REFERENCE BOOKS

- Berg JM, Tymoczko JL, Gatto GJ and Stryer Biochemistry, 8th Ed WH Freeman and CoAcDeb : Fundamentals of Biochemistry. 2015

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SUBJECT CODE - BHN 105

FIRST AID AND EMERGENCY CARE

Min. Hrs. – Theory: 80 hrs.

Course Objective

- To acquire knowledge about Basic First Aid & Emergency Care.
- Identify and take appropriate measures including disinfection and sterilization for the prevention of diseases in the hospital and community.

Course Outcome

- The student will be able to understand the basic concept First Aid and Emergency Care.

THEORY

1-Introduction of First Aid

Definition, aims and importance of First Aid. Rules/General Principles of First Aid
Concepts of Emergency.

2-Procedure and Techniques in First Aid

Preparation of First Aid kit, Dressing bandaging and splinting
Transportation of injured patient
CPR-Mouth to mouth, Sylvester, Schafer, External Cardiac Massage

3-First Aid in Emergency

Asphyxia, Drowning, Shock
Wound and bleeding, Injuries of the Soft and dense tissue
Injury of joint and bone, Falls, Hanging
Foreign body ear, ear and nose and throat
Burns and Scalds
Poisoning – Ingestion, inhalation, bite and stings

4-Assessing a Casualty and vitals parameters

Assessing the sick or injured, Mechanisms of injury
Primary Survey, Secondary survey
Head-to-toe examination, monitoring vital signs
Community Emergencies and Community Resources
Fire, Explosion, Floods, Earth-Quakes and Famines
Role of PT in disaster management

5-Community Resources-Police, Ambulance Services

Voluntary agencies-local-state, national and International

6-Emergency Management

Principle of Emergency care, Triage
Airways obstruction, Basic knowledge of First aid and management of burn
Basic Knowledge of First Aid for medical and Surgical emergency
Basic knowledge of first aid management of heat stroke
Basic knowledge of first aid management of snake bite and poisoning
Emergency Disaster Management
Natural calamities – Flood, earthquake, volcanic eruptions
Man made disaster – Explosion, War, Fire Accidents

7-The Unconscious Casualty

Breathing and circulation, Life-saving priorities
Unconscious adult, Unconscious child, Unconscious infant, how to use an AED

8-Techniques and Equipment

Removing clothing, removing headgear, casualty handling, First Aid materials, Dressing, Cold compresses, Principles of bandaging, Roller bandages, Tubular gauze bandages, square knots, hand and foot cover, Arm sling, Elevation sling, improvised slings.

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9-BLS and ACLS

BLS guideline for adult and pediatrics

CPR techniques, choking, ACLS basic guidelines.

TEXT BOOKS

- First Aid and Emergency Care Paperback by SN liamson. – 1 January 2012
- Text Book of First Aid and Emergency Nursing (Paperback, C. Manivannan, T. Latha Manivannan)2000

REFERENCE BOOKS

- First Aid and Emergency Care, 2/Ed. N.C. Jain,2000

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B.Sc.-Human Nutrition-Second Semester

SUBJECT CODE - BHN 201

FAMILY MEAL MANAGEMENT

Min. Hrs. – Theory: 40 hrs. & Practical: 40 hrs.

Course Objectives

- To determine physiological changes at different stages of lifecycle.
- To discuss, contrast and evaluate the roles of nutrition within the complex processes of pregnancy, lactation, child development and ageing.
- To discuss the impact of socioeconomic, cultural and psychological factors on food and nutrition behaviour.

Course Outcomes

- The student will learn and apply the latest in research-based nutrient needs of infants, children, adolescents, adults, pregnant and lactating females.
- The student gains competence on meeting nutrition needs and establishing dietary patterns to promote optimum health and reducing the impact of chronic diseases in the elderly.

THEORY

1. **Nutrition in pregnancy** - Physiological changes in pregnancy, nutritional requirements. food selection, complications of pregnancy.
2. **Nutrition during lactation** - Physiology of lactation, nutritional requirements.
3. **Nutrition during infancy** - growth & development, nutritional requirements, breast feeding, infant formula, introduction to supplementary foods.
4. **Nutrition during early childhood (Toddler/Preschool)**- Growth & nutrient need, nutrition related problems, feeding patterns.
5. **Nutrition of school children**- Nutritional requirement, importance of snacks, school lunch.
6. **Nutrition during adolescence** - Growth & nutrient needs, food choices, eating habits, factor influencing needs.
7. **Nutrition during adulthood** - Nutritional requirements, feeding pattern.
8. **Geriatric nutrition**- Factors affecting food intake and nutrient use, nutrient needs, nutrition related problems.

PRACTICALS

1. Planning and preparation of a balanced diet for a pregnant woman.
2. Planning and preparation of a balanced diet for a lactating woman.
3. Preparation of weaning foods.
4. Planning and preparation of a balanced diet for pre-school child.
5. Preparation of packed lunch for school going child.
6. Planning and preparation of a balanced diet for adolescent.
7. Planning of meals for adult belonging to different income group.
8. Planning meal for senior citizen.
9. Project work with proper diet plan based on survey.

TEXT BOOKS

- Shubhangini A Joshi : Nutrition and Dietetics 2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.
- Srilakshmi. B.: Dietetics, 5th edition, New Age International(P) Limited Publishers, New Delhi

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REFERENCE BOOKS

- Vincent Hegarty©, Decisions in Nutrition. Times Mirror/Mosby College Publishing, St. Louis. Williams's: Nutrition and diet Therapy.6th edition. Times Mirror/Mosby College Publishing, St.Louis,2000
- Antia, F.P.: Clinical Nutrition and Dietetics, Oxford University Press, Delhi,1999
- Gordon M Ward law Perspectives in Nutrition 4th ed. WCB/Mcgraw Hill. International edition.1999
- Mahan, L.K., Arlin, M.T.: Krause's Food, Nutrition and Diet therapy, 11th edition, W.B.Saunders Company, London.2000
- Passmore, R and Davidson S.Human Nutrition and Dietetics. Living stone Publishers.1988
- Robinson, C.H; Lawler, M.R. Chenoweth, W.L; and Garwick, A.E(1986):Normal and Therapeutic Nutrition,17th Ed., Mac Millan Publishing Co,1986
- Shil's M E, Alfon J A, Shike M Modern Nutrition In health and Diseases 8th ed.1994

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SUBJECT CODE - BHN 202

FOOD MICROBIOLOGY-II

Min. Hrs. – Theory : 40 hrs. & Practical : 40 hrs.

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Course Objective

- To acquire an elementary knowledge about microorganisms.
- To develop an understanding of spoilage microorganisms and their effects on food.
- To develop an understanding of foodborne diseases and their aetiology.
- To develop critical thinking about problems and issues concerning beneficial and harmful microorganisms in food.

Course Outcome

- The student gains knowledge about the origin of food microbiology, learns to classify and understand the characteristic features of microorganisms.
- The student realizes the importance of various aspects in connection with spoilage of different food commodities.
- The student will gain fundamental understanding of the relationship between environment, microorganisms and food borne infections and intoxications.

THEORY

1. **Introduction of microbiology** and its relevance to everyday life. General characteristics of bacteria, fungi, virus, protozoa, and algae
2. **Microorganisms**- Classification, morphology, growth and reproduction
3. **Factors affecting Bacterial Growth- Physical factors and nutritional factors**
4. **Food Spoilage**- Nature, Causes, Contamination, Composition of spoilage, Changes in foods caused by spoilage organisms. Influence of processing, Spoilage of important food commodities and food Products-Meat, Fish, Egg and Milk, Fruits and Vegetables, Cereal
5. **Environmental Microbiology**- Water borne diseases, Air borne diseases, Soil borne diseases, Sewage and diseases
6. **Food poisoning- organism causing food poisoning**
 - a. Infections- Salmonella, Shigella, E.coli, Vibrio cholerae,
 - b. Intoxications-Staphylococcus aureus, Clostridium Botulinum
 - c. Viruses
 - d. others
7. **Food borne diseases**
8. **Industrial importance of microorganisms**

PRACTICALS

- Identification of microorganisms, their morphology & structure.
- Isolation & detection of bacteria.
- Relevance of microbial standard for food safety
- Total Plate count.

TEXT BOOKS

- Frazier WC and Westhoff D C and Vanitha NM : Food Microbiology, 5th Ed. MaGraw Hill Education.2017
- Jay JM Modern Food Microbiology, 3rd Ed. CBS Publishers & Distributors.2005
- Pelczar M, Chan ECS, Krieg N: Microbiology: Application Based Approach, Tata McGraw Hill Education.2009

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REFERENCE BOOKS

- Benson HJ : Microbiological Applications: Complete Version: A Laboratory Manual in General Microbiology, 8th Ed. McGraw-Hill Publishing Co.2001
- Colling CE and Lyne PM : Microbiological Methods, Butterworth. London.1976
- Bamrart G : Basic food Microbiology, 2nd Ed. (Reprint), Spinger.2012
- Wood BJ: Microbiology of Fermented Foods, Vol I & II, 2nd Ed. Spinger.2000
- Joshi VK : Biotechnology: Food Fermentation Microbiology, Biochemistry & Technology, Vol I & Vol II, Educational Publishers & Distributors.2009
- Tortora GJ, Funke BR and Case CL : Microbiology, 11th Ed. Pearson Education India.2016
- Black JG : Microbiology: Principles and Explorations, 7th Ed. John Wiley & Sons. 2008

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SUBJECT CODE - BHN 203
HUMAN PHYSIOLOGY-II
Min. Hrs. – Theory : 40 hrs. & Practical : 40 hrs.

Course Objective

- To provide knowledge about terminology and comprehensive knowledge of Physiology.

Course Outcome

- The student will be able to understand about Human Physiology.

THEORY

1. **Endocrinology**-List of Endocrine glands, Hormones: Their secretion and functions (in brief).
2. **Excretion system** -Structure of nephron, Urine formation
3. **Central Nervous System**-Parts, Sliding Filament Theory, Neuro Muscular Junction, Wallerian Degeneration, Motor Nervous system - Upper motor neuron system & lower motor neuron system. Sensory nervous system, Sympathetic Nervous system & Parasympathetic nervous system.
4. **Skin** - Structure and functions
5. **Reproductive System**-Structure and functions of male & female reproductive organs, menstruation, puberty, menopause, fertilization and development of fertilized ovum, placenta and its function.
6. **Special Senses**-Structure and function of eye and ear, common diseases of eye and ear (in brief)

PRACTICALS

1. Elicitation of Reflexes & jerks.
2. Estimation of Hb, RBC, WBC, TLC, DLC & ESR.

TEXT BOOKS

- Chatterjee CC; Text Book of Physiology – Vol I & II.2000
- Chaudhuri SK; Concise Medical Physiology. New Central Book Agency (P) Ltd.1998
- Guyton AC, Hall JE; Text book of Medical Physiology.9th Ed. Prism Books (Pvt.) Ltd. Bangalore.1977

REFERENCE BOOKS

- Wilson; Anatomy and Physiology in Health and Illness. Edinburgh, Churchill Livingstone.2000
- WinWord; Sear's Anatomy and Physiology for Nurses. London, Edward Arno.1965
- Koeppen BM and Stanton BA: Berne and Levy Physiology, 7th Ed. Elsevier,2017
- Rhoades R and Pflanzer R: Human Physiology, 4th ed. Thomson.2003
- Eroschenko VP: di Fore's Atlas of Histology, di Fiore's Atlas of Histology with Functional Correlations, 11th Edition. Lippincott Williams & Wilkins.2007
- McLaughlin D, Stamford J and White D : Bios Instant Notes on Human Physiology,1st Ed. Taylor & Francis,2006

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SUBJECT CODE - BHN 204
NUTRITIONAL BIOCHEMISTRY-II
Min. Hrs. – Theory : 40 hrs. & Practical : 40 hrs.

Course Objective

- To explain the hormones, vitamins, Diabetes Mellitus etc.

Course Outcome

- The student will be able to understand the hormones, Vitamins, hyperglycemia, Liver function tests etc.

THEORY

1. **Hormones** -Classification, general mode of action, hormones of Pituitary, Thyroid, Parathyroid, Adrenals, Reproductive Glands, Pancreas, hormonal disorders, counter regulatory hormones.
2. **Vitamins**-Water & fat soluble vitamins, sources, requirement, biochemical functions & deficiency disorders.
3. **Water Metabolism**-Distribution of fluids in the body, ECF, ICF, Water metabolism, dehydration.
4. **Hyperglycaemia & hypoglycaemia-Diabetes mellitus** - definition, types, features, gestation diabetes mellitus, glucose tolerance test, glycosuria, Hypoglycaemia & its causes.
5. **Liver functions and their assessment based on –**
 - a) Carbohydrate metabolism
 - b) Protein metabolism
 - c) Lipid Metabolism
 - d) Measurements of serum enzyme levels
 - e) Bile pigment metabolism: Jaundice - its types and their biochemical findings.
 - f) Renal functions tests
 - g) Various tests, GFR & clearance.
6. **Tumour markers & their clinical applications** -Including onco foetal antigens, CEA etc.
7. **General concepts & functions of immunoglobulins.**

PRACTICALS

1. Urine analysis – normal & abnormal constituents of urine.
2. Glucose tolerance test & Glycosylated haemoglobin.

TEXT BOOKS

- Murray RK, Bender DA, Botham KA, Mayes PA and Rodwell IVW : Harper's Biochemistry, 30th Ed. Lange Medical Book.2015
- Handler P, Smith EI, Stelten DW: Principles of Biochemistry, McGraw Hill Book Co.2004

REFERENCE BOOKS

- Nelson DL and Cox MM : Lehninger Principles of Biochemistry. 7th Ed. WH Freeman.2017
- Devlin TM : Text Book of Biochemistry with Clinical Correlations. John Wiley and Sons.2010
- Berg JM, Tymoczko JL, Gatto GJ and Stryer: Biochemistry, 8th Ed WH Freeman and Co,2015

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SUBJECT CODE - BHN 205

DIET COUNSELLING

Practical : 80 hrs.

1. The Student shall do the diet counseling of normal persons as well as patients suffering from various diseases and shall plan appropriate diet plan for them.
2. They shall maintain Logbook regarding it.
3. At the end of the semester their Logbooks will be evaluated by the faculty concerned.

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B.Sc.-Human Nutrition-Third Semester

SUBJECT CODE – BHN-301

BASICS OF FOOD SCIENCE

Min. Hrs. – Theory: 40 hrs. & Practical: 40 hrs.

Course Objectives

- To know the role of food in health.
- To know the chief nutrition provided by each category of five food groups.

Course Outcomes

- The student will be able to apply basic nutrition knowledge in making foods choices and obtaining an adequate diet.

THEORY

1. **Cereal**-Definition, Structure, and composition, Nutritive value, Processing- Milling, polishing, parboiling, flaking, parching, roasting, products of cereals, breakfast cereals, role of cereals in cookery.
2. **Pulses**: composition and nutritional value, processing of pulses- soaking, germination, milling, decortication, fermentation, toxicants naturally occurring in pulses, role of pulses in cookery.
3. **Fruits and vegetables**: Classifications, composition and nutritive value, role of fruits and vegetables in cookery, changes during cooking, effect of heat, acid and alkali, storage,
4. **Milk and milk products**: Definition, types of milk, Composition and nutritive value of milk, processing of milk, and milk products.
5. **Fats and Oils**-Composition and Nutritive value of fat, Refining and Processing of fats, specific types of fat, role of fat in cookery.
6. **Nuts and Oil seeds**: Nutritive Value, Classification & importance

PRACTICALS

1. Cereal cookery
2. Pulse Cookery
3. Fruits and Vegetables Cookery
4. Milk cookery

TEXT BOOKS

- Norman N Potter, Joseph H Hotchkiss : Food science Technology,1990
- Srilakshmi B : Food Science. New Age International Publishers, New Delhi,2019

REFERENCE BOOKS

- Arora K., Gupta K.V.,: Theory of cooking 1988
- Bennen Marion : Introductory foods ,1986
- Lavies. : Food commodities. Heinemann Ltd, London ,1985
- Lowe Bella : Experimental cookery,1987
- Peckham : Foundation of food preparation ,1965

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SUBJECT CODE – BHN-302
BASIC DIETETICS
Min. Hrs. – Theory : 40 hrs. & Practical : 40 hrs.

Course Objectives

- To understand the foundation sciences which underpin therapeutic dietetic practice, the principles of disease prevention and health promotion, the principles of therapeutic intervention practice.
- To understand the organization, management and provision of healthcare both in the hospital and in primary care.

Course Outcomes

- The student will be able to understand the transition of diet from clear liquid to full-liquid to soft and then normal.
- The student will be able to study and understand the Diet and its principles.
- The student will be able to identify three routes used to deliver nutrients to clients and potential complications with these routes.

THEORY

1. **Basic Concepts of Diet Therapy**-Nutrition Care Process: Definition of MNT
2. **Nutritional Assessment** (ABCD), Nutritional Diagnosis, Nutrition Intervention, Monitoring & Evaluation of Nutritional Care
3. **Modifications of the Normal Diet**-General or Regular, Adequate or House Diet, Soft Diet, Liquid Diets- Clear Liquid Diet, Full Liquid Diet
4. **Mode of Feeding**- Enteral or Oral Route- Enteral (via) tube feeding- Parenteral – Peripheral Vein Feeding, Total Parental Nutrition (TPN)
5. **Nutrition for Weight Management, Assessment of obesity** – BMI, Waist Hip-Ratios, Skin folds Thickness, Etiology – Genetic Factors, Physiological Factors, Behavioral factors, Treatment – Dietary Management, Fad diets and their consequences
6. **Underweight**– Etiology, Health hazards, Treatments.
7. **Nutrition during Febrile Disorders:**
 - a) Classification of fevers
 - b) Metabolism in fever
 - c) General Dietary Considerations
 - d) Acute & chronic fevers -Typhoid & Tuberculosis

PRACTICALS

1. Preparation of Clear Fluid diet, Full fluid Diet and Soft Diet
2. Diet plan for Obese and Overweight
3. Diet plan for Under weight
4. Diet plan for Typhoid and Tuberculosis

TEXT BOOKS

- Antia, F.P: Clinical Nutrition and Dietetics, Oxford University Press, Delhi,2000
- Srilakshmi, B;Dietetics, New Age International(P) Limited Publishers, New Delhi,2019
- Williams's: Nutrition and diet Therapy.6th edition. Times Mirror/Mosby College Publishing, St.Louis,1988

REFERENCE BOOKS

- Mahan, L.K., Arlin, M.T.: Krause's Food, Nutrition and Diet therapy, 11th edition, W.B.Saunders Company, London.1965
- Robinson,C.H;Lawler,M.R.Chenoweth,W.L;and Garwick,A.E:Normal and Therapeutic Nutrition; Published by Mc Millan Company New York.1978
- Shubhangini A Joshi: Nutrition and Dietetics 2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.2018

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SUBJECT CODE – BHN-303

COMMUNITY NUTRITION-I

Min. Hrs. – Theory: 40 hrs. & Practical: 40 hrs.

Course Objectives

- Understand the concept of health from the individual and community perspective.
- Understand the common nutritional problems of the community their causes, symptoms, treatment and prevention.
- To know the schemes, programmes and policies of Government of India to Combat Malnutrition.
- To study direct and indirect methods of nutritional assessment.

Course Outcomes

- The students will have a clear understanding about the concept of health care delivery at different levels in a community.
- The students will be able to describe the major causes and impact of communicable and non-communicable diseases and their pathology.
- Defining, assessing, and understanding the health status of population, determinants of health and illness and factors contributing to health promotion and disease prevention.

THEORY

1. **Concept of Community**- types of community, factors affecting health of the community. Health Care- Levels of health care- Primary Health Care- Primary health care, health care delivery, National immunization schedule,
2. **Role of public nutritionist in health care**
3. **Nutrition and health in National development.**
4. **Malnutrition**- meaning. factors contributing to malnutrition, PEM, over nutrition.
5. **Nutritional disorders**- Epidemiology, clinical features, prevention and dietary treatment for Protein Energy malnutrition, nutritional anaemias & vitamin deficiency disorders.
6. **Methods of assessing nutritional status:** Sampling techniques, Identifications of risk groups, Direct assessment -Anthropometric-Definition, types, parameters, advantages and limitations, Clinical Estimation-Definition, types, parameters, advantages and limitation, Biochemical estimation- Definition, types, parameters, advantages and limitations, Diet surveys- Definition, types, parameters, advantages and limitations, Indirect assessment- ecological parameters and vital statistics

PRACTICALS

1. Measure the height, weight, mid-arm circumference (MUAC) of 10 college going girls and comment on their nutritional status.
2. Conduct dietary recall (24 hrs) on an adolescent girl and comment on her nutritional status
3. Plan and prepare suitable low cost recipe for adolescent girls/rural women/school going children/pregnant woman/lactating woman.
4. Develop relevant aids for health education- for adolescent girls/rural women/school going children/pregnant woman/lactating woman, using following aids: Poster, Charts-bar chart, pie chart, tree chart, pictorial chart, pull chart, flip chart, overlay chart, Flash cards, Flannel graph, Demonstration

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TEXT BOOKS

- Bamji SM, Rao NP and Reddy V, Text book of human nutrition, oxford and IBH publishing co., New Delhi.2009
- Gopalan C, Combating undernutrition-basic issues and practical approaches, Nutrition Foundation of India.2019

REFERENCE BOOKS

- Gopalan C, Women and nutrition in India, NFI, New Delhi.2019
- Jelliffe D.D. The assessment of Nutritional Status of the Community. WHO, monograph series.1975
- Michael.J.G,Barrie.M.M:Public health nutrition, Blackwell publishing.1986
- Nweze Eunice Nnakwe., Community Nutrition – planning health promotion and disease prevention., Jones And Bartlett publishers.1996
- Park.K, Park's textbook of preventive and social medicine.,12th edition.M/S Banarsidas bhanot publishers.1996
- Reddy V, Prahlad RaoN, Sastry G and Nath KK, Nutrition trends in India, Hyderabad, NIN.1989

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SUBJECT CODE – BHN-304
FOOD SCIENCE-I
Min. Hrs. – Theory : 40 hrs. & Practical : 40 hrs.

Course Objectives

- To know the role of food in health.
- To know the chief nutrition provided by eggs, meat and meat products.
- To know the chief nutrition provided by sugar and sugar related products.
- To study the function and role of spices in cookery.
- To study different types of beverages.

Course Outcomes

- The student will be able to apply basic nutrition knowledge in making foods choices and obtaining an adequate diet.

THEORY

1. **Egg**-Structure, Composition and Nutritive value of egg, Assessment methods for the quality of egg, Role of egg in Cookery, Preservation of egg.
2. **Meat and meat Products**-Definition of meat, classes of meat, Composition and Nutritive value of meat, Post-Partum changes, ageing, Tenderization, Curing, Cutting and Grading of meat and other fleshy foods, Role of meat in Cookery.
3. **Sugars and Sugar Related Products**-Nutritive value and Composition, Properties, Role of Sugar in Cookery, Artificial Sweeteners.
4. **Spices and Condiments**-General function of Spices, Specific Spices, Role of Spices in Cookery.
5. **Beverages and Appetizers**-Classification, Coffee, Chicory, Tea, Types of tea.
6. **Current trends in food science.**

PRACTICALS

1. Egg cookery
2. Sugar and Jaggery- Syrup formation, crystallization and caramelization
3. Preparation of different types of beverages.
4. Preparation of Leavened products, curd setting.
5. Preparation of Fermented products

TEXT BOOKS

- Srilakshmi B : Food Science. New Age International Publishers, New Delhi.2019
- Norman N Potter, Joseph H Hotchkiss: Food science Technology,2000

REFERENCE BOOKS

- Arora K., Gupta K.V., Theory of cooking 1988
- Bennen Marion : Introductory foods ,1986
- Lavies. : Food commodities. Heinemann Ltd, London ,1985
- Lowe Bella : Experimental cookery,1987
- Peckham : Foundation of food preparation ,1965

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SUBJECT CODE – BHN-305

DIET SURVEY

Practical : 80 hrs.

1. The students shall do the diet survey of patients suffering from various diseases.
2. They shall maintain Logbook regarding it.
3. At the end of the semester their Logbooks will be evaluated by the faculty concerned.

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B.Sc.-Human Nutrition-Fourth Semester

SUBJECT CODE – BHN-401

ADVANCED NUTRITION

Min. Hrs. – Theory: 40 hrs. & Practical: 40 hrs.

Course Objectives

- To understand the concept of BMR and the factors affecting energy requirement functions and role of nutrients, their requirements and the effect.
- To study the role of functional foods, nutraceuticals and Organic foods.

Course Outcomes

- The student will be able to understand the concept of BMR and the factors affecting energy requirement functions and role of nutrients, their requirements and the effect.
- The student will be able to understand the role of functional foods, nutraceuticals and Organic foods.

THEORY

1. **Estimating energy requirement for individuals and groups-** Food groups, Balanced diet.
2. **Exchange list, Energy requirements:** -Factors affecting energy requirements, BMR - activity, age, climate, diet induced thermogenesis (SDA), Physiological conditions. RDA (ICMR) - RDA, function, uses
3. **Electrolytes:** Electrolyte- Sodium, Chloride, Potassium- sources and disorder due to their deficiency/ excess intake.
4. **Functional foods -Phytonutrients:** Phytates, Tannins and Polyphenols, their sources and functions.
5. **Nutraceuticals and Organic Foods.**
6. **Effect of cooking & heat processing on the nutritive value of foods.**
7. **Processed supplementary foods**
8. **Food Sanitation in hygiene**

PRACTICALS

1. General concepts of weights and measures. Eye estimation of raw and cooked foods
2. Preparation of food from different food groups and their significance in relation to health.
3. Preparation of supplementary food for different age group and their nutritional significance
4. Planning and preparation of low cost diet for Grade I and Grade II malnourished child

TETXT BOOKS

- Antia F.P., Philip Abraham, Clinical Dietetics and Nutrition, Oxford University Press.
- William S.R., Nutrition and Diet Therapy fourth edition C.V. Mos Company.1999
- Robinson C.H. Careme, Chenometh W.L., Garmick A.E. Normal Therapeutic nutrient. Publish by Mc Millan Company New York,1986

REFERENCE BOOKS

- Kathleen Mahan L., Sylwia Escott-Stump, Krause's food, nutrition and diet therapy. Saunders company, London.1998
- Passmore R. and Davidson S. Human nutrition and Dietetics. Liming stone publishers.1997
- Shil's M.E., Alfon J.A., Shike M, Modern nutrition in health and diseases,1998

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SUBJECT CODE – BHN-402
COMMUNITY NUTRITION-II
Min. Hrs. – Theory : 60 hrs. & Practical : 60 hrs.

Course Objective

- Understand the concept of health from the individual and community perspective.
- Understand the common nutritional problems of the community their causes, symptoms, treatment and prevention.
- To know the schemes, programmes and policies of Government of India to Combat Malnutrition.
- Understand the modern methods of nutritional quality of food.

Course Outcomes

- Defining, assessing, and understanding the health status of population, determinants of health and illness and factors contributing to health promotion and disease prevention.
- The students will be able to understand the concept of Nutrition Security and get familiarized with the various approaches and strategies for combating malnutrition.

THEORY

1. **Improvement of nutrition of a community:**
 - a) Modern methods of improvement of nutritional quality of food, food fortification, enrichment and nutrient supplementations.
 - b) Nutrition education themes and messages in nutrition and health, Antenatal and postnatal care.
2. **Nutritional and infection relationship:** Immunization and its importance, Food borne infection and intoxication diseases, foods involved, methods of prevention, Infestation of food borne diseases, Outbreak, Prevention signs and control of infection.
3. **National and International agencies in uplifting the nutritional status** -WHO, UNICEF, CARE, ICMR, ICAR, CSIR, CFTRI. Various nutrition related welfare programmes, ICDS, SLP, MOM, and others (in brief).
4. **Community nutrition programme planning** - Identification of problem, analysis of causes, resources constraints, selection of interventions, setting a strategy, implementations and evaluation of the programme.

PRACTICALS

1. Assessment of nutritional status of an individual/community using anthropometry and dietary survey-
 - A) Preparation of schedule
 - B) Survey work
 - C) Analysis of data
 - D) Writing of report.
2. Development of audio visual aids- radio script; popular article; chart/posters leaflets etc. Planning, implementation and evaluation of nutrition education for a target group.

TEXT BOOKS

- Bamji SM, Rao NP and Reddy V, Text book of human nutrition, oxford and IBH publishing co.,New Delhi.1999
- Gopalan C,Combating undernutrition-basic issues and practical approaches, Nutrition Foundation of India.2000

REFERENCE BOOKS

- Gopalan C,Women and nutrition in India, NFI,New Delhi.2019
- Jelliffe D.D. The assessment of Nutritional Status of the Community. WHO, monograph series.1987
- Michael.J.G,Barrie.M.M:Public health nutrition,Blackwell publishing.1988
- Nweze Eunice Nnakwe.,Community Nutrition – planning health promotion and disease prevention., Jones And Bartlett publishers.1986
- Park.K,Park's textbook of preventive and social medicine.,12th edition.M/S Banarsidas bhanot publishers.1998
- Reddy V, Prahlad RaoN, Sastry G and Nath KK, Nutrition trends in India, Hyderabad NIN,1993

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SUBJECT CODE – BHN-403

FOOD SCIENCE-II

Min. Hrs. – Theory: 40 hrs. & Practical: 40 hrs.

Course Objectives

- To know the methods and principles of food preservation.
- To learn about the methods of evaluation of food quality.
- To know about the various adulterants and methods of detecting them.
- To learn about food additives and food packaging.

Course Outcomes

- The student will gain knowledge about food preservation, food adulteration and food additives.
- The student will understand the methods of quality evaluation of food.

THEORY

1. **Food Preservation**, food spoilage, causes of food spoilage, method of preservation, principles of food preservation, Class I and Class II preservatives, Preparation of jam, jelly and marmalade
2. **Evaluation of food Quality**-Definition, types of evaluation-sensory evaluation and objective evaluation, difference types of tests performed under sensory evaluation and objective evaluation,
3. **Food Adulteration**-Definition, types of adulteration-incidental, intentional and metallic, Food safety and standard act-BSI, AGMARK, FSSAI,
4. **Food Additives**-Definition, Classification of food Additives-Preservatives, Colours, Flavouring agents, Sweeteners, Emulsifiers, Stabilisers, Antioxidants, Chelating agents, Flour improvers,
5. **Food Packaging**- Functions, Classification, materials used in Food packaging, Law related to food packaging.

PRACTICALS

1. Sensory evaluation of common recipes
2. Determination of Ash content in food
3. Determination of Moisture content in food
4. Detection of starch, sucrose, formalin, boric acid, and urea in milk.
5. Detection of Vanaspati in Ghee/Butter.
6. Detection of Khesari dal
7. Detection of Metanil yellow in turmeric
8. Detection of Argemone oil in edible oil.
9. Detection of artificially colour / foreign matter in tea (dust/leaves)
10. Preparation of Jam, Jelly, marmalade, murabba, ketchup, sauce etc.

TEXT BOOKS

- Norman N Potter, Joseph H Hotchkiss: Food science Technology, 1987
- Srilakshmi. B :Food Science. New Age International Publishers, New Delhi. 2019
- Arora K., Gupta K.V : Theory of cooking ,1998
- Bennen Marion : Introductory foods ,1998

REFERENCE BOOKS

- Lavies. (1998) : Food commodities. Heinemann Ltd, London, 1998
- Lowe Bella: Experimental cookery 1987
- Peckham : Foundation of food preparation ,1987

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SUBJECT CODE – BHN-404

FIELD VISIT

Practical : 120 hrs.

1. Field visit to-
 - a- To observe the working of nutrition & health-oriented programs (Survey based results)
 - b- Hospitals to observe nutritional deficiencies.
- 2- The students shall maintain Logbook regarding it.
- 3- At the end of the semester their Logbooks will be evaluated by the faculty concerned.

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B.Sc.-Human Nutrition-Fifth Semester

SUBJECT CODE – BHN-501

FOOD INSTITUTIONAL MANAGEMENT

Min. Hrs. – Theory : 40 hrs. & Practical : 40 hrs.

Course Objectives

- Understand the special characteristics of food service.
- To enable students to understand the management of human in food service establishment.
- To teach the student the mechanics of accounting in hotel and catering industry.
- Gain knowledge to develop skills in handling equipment and maintenance.

Course Outcome

- The student will be able to understand the different areas and segments of the hospitality industry.
- The student will be able to understand the development of Food Service Institutions.
- The student will understand the concept of approaches to Management, Principles and Functions of management and tools of Management.

THEORY

1. **Organization and management:** Definition and types of organization.
2. Definition functions and tools of management.
3. **Evolution of the food service industry Broad categories of catering services:** commercial and Institutional- Characteristics of the various types of food service units – Canteens, Hostels, Hospitals and Restaurants.
4. **Food selection,** purchasing, receiving and storeroom management.
5. **Personnel Management:** Recruitment, selection and training, performance appraisal
6. **Equipment selection:** Classification of equipment, Factors to be considered in equipment selection, materials and finishes used in equipment Construction, Types of equipment
7. **Menu Planning:** Definitions considerations, patterns and types, menu cycles, menu planning, menu format, menu design and display.
8. **Policy and law related to Institutional management**

PRACTICALS

1. Comparing the Layout, Equipment, Service and Accounting followed in 3 Commercial and 3 Non Commercial Institutions (Visit).
2. Developing a performance appraisal for an employee in any Food Service Institution.
3. Special cooking for birthdays, weddings corporate seminars and practical training in buffet service.

TEXT BOOKS

- Agarwal Anju. D: A practical handbook for consumers, Indian Book Houses, Mumbai.2014
- Boella M.J.: Personnel Management in the hotel and catering industry; Barrie and Jenhins London ,213
- Bessie B West, le velle Wood: Food Service in Institution. Macmillan Publishing co.2014

REFERENCE BOOKS

- Gupta B.d. " Consumption patterns in India, Tata McGraw hill.2014
- Lillicarp D. R., Food and Beverage service: BLBS Kinton and Casarani, Theory of catering. Butter and Tanner Ltd, 2003
- Kotschevr and Terrell, Food Service Planning Layout and Equipment,1987
- Mahmood A Khan, Food Service Operations.Avi Publishing. 1
- Handbook of Food Preparations – A.M. Home Economics Association1987.
- Sweetman, M.D., 4, Mackeller. Food Selection and Preparations1978
- Oliver B. Watson. School Lunch Room ServiceLender H. Ketshevar and Marget Food Service Planning: layout Equipment,1986

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SUBJECT CODE – BHN-502
ADVANCED DIETETICS-I
Min. Hrs. – Theory: 60 hrs. & Practical : 60 hrs.

Course Objectives

- To understand the foundation sciences which underpin therapeutic dietetic practice, the principles of disease prevention and health promotion, the principles of therapeutic intervention practice.
- To understand the organization, management and provision of healthcare both in the hospital and in primary care.

Course Outcomes

- The student will be able to study aetiology, symptoms and treatment of GIT diseases.
- The student will be able to study aetiology, symptoms and treatment of different metabolic disorders.

THEORY

1. **Concept of Diet therapy:** Growth and source of dietetics, purpose and principles of therapeutic diets, modification of normal diet, classification of therapeutic diets
2. **Routine hospital diets:** Preoperative and postoperative diets, study and review of hospital diet. Basic concepts and methods of -Oral feeding, Tube feeding, Parental nutrition, Intravenous feeding.
3. **Diet in gastritis, peptic ulcer-** symptoms, clinical findings, dietary modification, adequate nutrition, amount of food and intervals of feeding, chemically and mechanical irrigating foods, four stage diet (Liquid, soft, convalescent, liberalized diet).
4. **Diet in disturbances of small intestine and colon-**
Diarrhoea- (child and adult)- classification, modification of diet, fibre, residue. fluids & nutritional adequacy.
Constipation- flatulence - dietary considerations.
Ulcerative colitis (adults)- symptoms, dietary treatment.
Spruce, coeliac disease- disaccharide intolerance, dietary treatment.
5. **Diet in diseases of the GIT:** Liver, gall bladder and pancreas, Aetiology, symptoms and dietary treatment.
6. **Gout:** Nature and occurrence of uric acid, causes, symptoms and diet.

PRACTICAL

1. Planning and preparing diets for GIT diseases.
2. Planning and preparing diets for Liver and gall bladder diseases
3. Planning and preparing diets for gout patients.
4. Planning and preparing diets for gastritis, peptic ulcer etc.

TEXT BOOKS

- Antia, F.P. : Clinical Nutrition and Dietetics, Oxford University Press, Delhi, 1999
- Shubhangini A Joshi : Nutrition and Dietetics 2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi, 2002
- Srilakshmi. B: Dietetics, New Age International(P) Limited Publishers, New Delhi, 2019

REFERENCE BOOKS

- Mahan, L.K., Arlin, M.T.: Krause's Food, Nutrition and Diet therapy, W.B.Saunders Company, London, 2003
- Robinson, C.H; Lawler, M.R. Chenoweth, W.L; and Garwick, A.E Normal and Therapeutic Nutrition, 1986
- Therapeutic Nutrition, Mac Millan Publishing Co, 1978
- Williams's : Nutrition and diet Therapy. Times Mirror/Mosby College Publishing, St.Louis, 1998

Ramkishore

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Manish Kishore

Digvijay

SUBJECT CODE – BHN-503
DIET THERAPY
Min. Hrs. – Theory : 40 hrs. & Practical : 40 hrs.

Course Objectives

- To understand the use of nutrition care process model to make decisions, able to understand and identify nutrition-related problems and determine and evaluate nutrition interventions.

Course Outcomes

- The student will be able to compare the hyper-metabolic (burns, surgery, trauma, surgery) conditions that increase resting energy expenditure and hence kilo caloric requirements.
- The student will be able to understand the types of food allergies, list the foods that people are prone to cause allergies.
- The student will understand why malnutrition is commonly seen in clients with HIV or AIDS.
- The student will be able to understand the nutritional therapy in various metabolic disorders.

THEORY

1. **Nutrition in Surgical Conditions-** General Considerations, Pre-Operative and Postoperative Diet.
2. **Burns-** Medical Management, (Fluid & Electrolyte Repletion, Wound healing, Nutritional Therapy.
3. **Infections-**UTI and viral diseases (HIV, COVID19 etc. and its Nutritional Therapy).
4. **Food Allergy and Food Intolerance-**Definitions, Symptoms, Risk Factors, Food Intolerances, Diagnosis, Treatment, Nutritional management.
5. **Anaemias:** General concept, aetiology, classification, and dietary management of Nutritional anaemia.
6. **Cancer-**Nutritional care in Cancer- Pathophysiology, Causes, Types, Treatment-Nutrition management, Role of Antioxidants, Nutritional problems in cancer treatment
7. **Drug and Nutrient Interactions** -Drugs Effects on Food Intake

PRACTICALS

Planning and preparation of diet for the following conditions:

- i) Surgery and Burns
- ii) Anaemia
- iii) Different types of Cancer

TEXT BOOKS

- Anderson L, Dibble MV, Turkki PR, Mitchall HS, and Rynbergin HJ: Nutrition in Health and Disease. J. B. Lipincott & Co. Philadelphia.1986
- Joshi SA: Nutrition and Dietetics, Tata McGraw Hill Publications, New Delhi,1987
- Anita FP and Abraham P: Clinical Dietetics and Nutrition. Oxford University Press, Delhi.1999

REFERENCE BOOKS

- Mahan LK and Escott-Stump S: Krause's Food and Nutrition Therapy. WB Saunders Company, London.1956
- Robinson. CH, Lawler MR, Chenoweth WL and Garwick, AE: Normal and Therapeutic Nutrition, Macmilian Publishing Co.1986
- Williams SR: Nutrition & Diet Therapy. Times Mirror/Mosby College Publishing, St. Louis.2000
- Begum RM: A textbook of Food, Nutrition and Dietetics, 3rd Ed. Sterling Publishers, New Delhi.2003
- Hutchison, R: Food And The Principles Of Dietetics, Kessinger Publishing, LLC,1975

Ram Krishore

Venka

Manish Kestop

Digvijay

SUBJECT CODE – BHN-504

DIET COUNSELLING AND PATIENT CARE

Min. Hrs. – Theory: 60 hrs. & Practical: 60 hrs.

Course Objectives

- Utilize knowledge from the physical and biological sciences as a basis for understanding the role of food and nutrients in health and disease processes.
- To apply technical skills, knowledge of health behavior, clinical judgment, and decision-making skills when assessing and evaluating the nutritional status of individuals and communities and their response to nutrition intervention.

Course Outcomes

- Students will be able to implement strategies for food access, procurement, preparation, and safety for individuals, families, and communities.
- Students able to understand principles of diet therapy, modification of normal diet for therapeutic purposes and the role of dietitian.

THEORY

1. Introduction to term Dietician: Definition of Dietician, Difference between registered dietician & Nutritionist.
2. Role of dietician in hospital: work area of hospital dietician, role of dietician in hospital
3. Role of dietician in community: - work area of community dietician, role of community dietician.
4. Introduction to Nutrition Care Process: Definition of Nutrition Care Process, Steps of Nutrition Care Process.
5. Nutrition Assessment:-Definition, Nutrition assessment component, Critical thinking
6. Nutrition Diagnosis: nutrition diagnosis domain: - intake, clinical, behavioural – environmental, nutrition vs. medical diagnosis
7. Nutrition Interventions: Definition and objectives.
8. Nutrition Monitoring & Evaluation: Definition, Nutrition monitoring & evaluation components, nutrition goals & objectives. Evaluation of nutrition care.

PRACTICALS

1. Visit and training to hospitals/nursing homes for 7-10 days
2. Taking Case history and study preparation of report.
3. Preparation of Routine Hospital diet
4. Distribution of food from kitchen to individual patient with specific diet.
5. Dietary management of patient in different diseases and diet chart for the particular patient.
6. Role of dietitian /nutritionist in diet counselling

TEXT BOOKS

- Robinson. CH, Lawler MR, Chenoweth WL and Garwick, AE: Normal and Therapeutic Nutrition., Macmillan Publishing Co. 1986

REFERENCE BOOKS

- Mahan LK and Escott-Stump S: Krause's Food and Nutrition Therapy. WB Saunders Company, London. 1998
- Williams SR: Nutrition & Diet Therapy. Times Mirror/Mosby College Publishing, St. Louis, 2000.

Ramkishore

Venka

Manish K. Singh

Digvijay

B.Sc.-Human Nutrition- Sixth Semester

SUBJECT CODE-BHN 601

ADVANCED DIETETICS-2

Min. Hrs. – Theory: 60 hrs. & Practical: 60 hrs.

Course Objectives

- To understand the foundation sciences which underpin therapeutic dietetic practice, the principles of disease prevention and health promotion, the principles of therapeutic intervention practice.
- To understand the organization, management and provision of healthcare both in the hospital and in primary care.

Course Outcomes

- The student should be able to define and classify different metabolic disorders and describe the treatment for each type of the disorder.
- The student will understand the goals of nutritional care for persons with various disorders. List nutritional guidelines.
- The student should be able to identify the major modification in the diet for the treatment of chronic kidney disease (CKD) and CVD.

THEORY

1. **Hypertension:** classification, aetiology, symptoms and dietary management
2. **Diseases of the cardiovascular system:** Definition of infarct, ischemia, angina pectoris, myocardial infarction, heart attack and stroke, Atherosclerosis and hyperlipidaemias – classification, symptoms, dietary and lifestyle management. Prevention of cardiovascular diseases.
3. **Renal Diseases:** Aetiology, symptoms and dietary management of acute and chronic Glomerulonephritis. Nephrotic syndrome - dietary management. Uraemia – dietary Nephrolithiasis - dietary management. Use of sodium and potassium exchange list.
4. **Definition of physical activity:** exercise, physical fitness, sports physiology and sports nutrition, benefits of physical activity and exercise. Classification of Sports activities. Nutritional requirements of sports person. Pre- event meal.
5. **Diet in allergy and skin disturbances:** Definition, classification, manifestations, common food allergies and tests and their dietary management.
6. **Diet in Diabetes Mellitus:** Incidence and predisposing factors, symptoms, types. Metabolism in Diabetes, Dietary treatment & meal management, Hypoglycaemic agent, Insulin and its types Complication of Diabetes.

PRACTICALS

1. Planning and preparing diet for Hypertension
2. Planning and preparing diet for Atherosclerosis
3. Planning and preparing diet for Glomerulonephritis and Nephritic Syndrome
4. Planning and preparing diet for Renal Failure Patients.
5. Planning and preparing diet for a sports person
6. Planning and preparing diets for Diabetes mellitus.

TEXT BOOKS

- Srilakshmi, B: Dietetics, New Age International (P) Limited Publishers, New Delhi, 2019
- Shubhangini A Joshi: Nutrition and Dietetics 2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi, 2000
- Antia, F.P: Clinical Nutrition and Dietetics, Oxford University Press, Delhi, 1999

REFERENCE BOOKS

- Mahan, L.K., Arlin, M.T: Krause's Food, Nutrition and Diet therapy, 11th edition, W.B. Saunders Company, London, 1986
- Robinson, C.H; Lawler, M.R; Chenoweth, W.L; and Garwick, A.E: Normal and Therapeutic Nutrition, 17th Ed., Mac Millan Publishing Co, 1986
- Williams's: Nutrition and diet Therapy. 6th edition. Times Mirror/Mosby College Publishing, St. Louis, 2000

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Digvijay

SUBJECT CODE-BHN 602 (Elective)

FOOD QUALITY ANALYSIS

Min. Hrs. – Theory: 60 hrs. & Practical : 60 hrs.

Course Objectives

- To understand the importance of food standard and quality control.
- To understand the need for new food product development.

Course Outcomes

- The student will be able to understand the importance of food standards and food laws.
- The student will learn how to develop new food product.

THEORY

1. **Importance of Food Standards:** Quality control and assurance. Food standard, laws and regulations to ensure safety of food.
2. **Product Evaluation:** Sampling for product evaluation, sample preparation. Tests for raw food ingredients: Proximate principles, nutrient analysis.
3. **Hazards to food products:** Microbiological, environmental, natural, toxicants, pesticide residues and food additives.
4. **Product development and Evaluation** – Need for product development, how to develop a new Product, new products and ingredients, functional foods, shelf life of Product.
5. **Principles of Proximate Analysis-** Moisture, Ash, Crude Fat, Crude Fibre, Crude Protein and Carbohydrates by difference.
6. **Principles and methods of Food Analysis**

PRACTICALS

- Development of a new product and evaluation
- Determination of proximate analysis of given samples: Moisture, ash, crude fat, crude fibre, crude protein and carbohydrate by difference.
- Estimation of total sugar content, reducing and non-reducing sugars in given food samples.
- Estimation of starch content of cereals.
- Determination of iodine value and saponification number of fats.

TEXT BOOKS

- Amerine M.A., Pengtorn, R.M. Reoceanier E.B. Principles of sensory evaluation and academic Press, New York. 1986
- Bamji, M.S., Rai, P.N. and Reddy V. (eds) Food chemistry (2nd ed.) springer, New York.1998

REFERENCE BOOKS

- Bealon, G.H.and Begos J.M. (eds.) Nutrition in Preventative Medicine. WHO.1976
- Belity. H.D. an Grosch W. Food chemistry springer Verlag Berlin, Heidelberg.1986
- Damodaran, S., Parkin, K.L. and Fennema, O. R. Fennema's Food Chemistry, published by CRC Press.1987
- Meyer L.H. Food Chemistry, Reinhold Pub. Corp. 1986
- Nielsen, S.S. Food Analysis;Kluwer Academic/Plenum Publishers, New York.

Ram Krishna

Venkat

Manish Kumar

Digvijay

B.Sc. in Medical Laboratory Technology- Sixth Semester

VIROLOGY

Subject Code: MLT- 604 (Elective)

Min. Hrs. - Theory: 60 Hrs. & Practical: 60 Hrs.

Course Objectives

- To impart basic knowledge of disease causing viruses.
- To provide brief introduction of diagnostics procedures of disease causing viruses.

Course Outcome

- Student will be able to acquire basic knowledge about disease causing virus their diagnostic procedures

THEORY

- General characters of viruses
- Classification of viruses
- Lab diagnosis of viral infections
- Cultivation of viruses
- Bacteriophages.
- Retro viruses - HIV, Hepatitis virus, Pox virus,
- Picorna virus - Polio
- Orthomyxo virus - Influenza
- Arbo virus - Chikungunya, Dengue
- Herpes and Adeno virus

PRACTICAL

1. Methods of lab diagnosis of different virus.

TEXT BOOKS

- Frazier, W.C. and Westhoff D.C .Food microbiology, Mc Graw Hill Inc.
- Pelczar, Chan, Krieg, Microbiology;Tata Mc. Graw Hill

REFERENCE BOOKS

- Benson Harold. Microbiological Applications Wn. C. Brown Publishers, U.S.A
- Jay James: Modern food microbiology, Van Nostrand Reinhold Company Inc.

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SUBJECT CODE-BHN 603

PROJECT WORK

Practical: 180 hrs.

1. Basic concepts of project planning
 - a) Defining objectives- Need, problem, project, feasibility, planning, formulation. - .
Identifying resources
 - b) Methods/approaches, Project Appraisal- Project Format
2. Guideline for project writing
 - Title of the project
 - Name of the person
 - Duration of the project, type of project.
 - Aims and objectives - summary of the proposed project
 - Project information, location, people and personnel involved.
 - Working/methodology
 - Evaluation
 - Writing and reporting

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