

Mahatma Gandhi University
Of
Medical Sciences & Technology, Jaipur

Syllabus
B.Sc. Clinical Nutrition & Dietetics
(3 Years Degree Course)

Edition 2020-21

Notice

1. Amendments made by the University in Rules/ Regulations of the courses shall automatically apply.
2. The University reserves the right to make changes in the syllabus/ books/ guidelines, fee-structure or any other information at any time without prior notice. The decision of the University shall be binding on all.
3. The jurisdiction of all court cases shall be Jaipur Bench of Hon'ble Rajasthan High Court only.

SYLLABUS

B.Sc. Clinical Nutrition & Dietetics ()

(3 Years Degree Course)

Rules & Regulations

1. TITLE OF THE COURSE

The title of the course shall be “B.Sc. Clinical Nutrition & Dietetics”.

2. DURATION OF COURSE/TRAINING

The course shall be of three years duration from the date of commencement of academic session

3. MEDIUM OF INSTRUCTION

English shall be the medium of instruction.

4. ELIGIBILITY FOR ADMISSION:

- For admission a candidate should have passed the 10+2 (Senior Secondary) Examination or its equivalent Examination Science stream i.e. Physics, Chemistry and Biology Subjects with 45% marks in the aggregate for General Category and 40% for SC/ST/OBC/MBC candidates or as per Govt. Guidelines from a recognized Board.
- Candidate should have completed the minimum age of 17 years as on 31st December of the year of admission.

5. CRITERIA FOR ADMISSION

Selection shall be done by an Admission Board of the University strictly on merit. It will consist of two- step process –Written Entrance Examination followed by Counseling/Personal Interview (PI).

6. RESERVATION POLICY

Reservation shall be applicable as per policy of the State Government.

7. ENROLMENT

Every candidate who is admitted to the Course in Mahatma Gandhi Medical College shall be required to get himself/herself enrolled with the Mahatma Gandhi University of Medical Sciences & Technology after paying the prescribed eligibility and enrolment fees.

A candidate shall deposit enrolment fees along with tuition fees at the time of his/her admission to the course. Such a candidate who fails to submit, through the college Principal, duly filled enrolment form along with original documents including migration certificate required for enrolment within two months of his/her admission or up to November 30 of the year of admission whichever is later, he/she will have to pay late fee prescribed by the University.

8. MIGRATION RULES

- No student, once admitted to the course and enrolled by the University, will be permitted to migrate to any other Course/ University.
- No student will be admitted to the Course on migration from any other Course/ University.

9. ATTENDANCE

Minimum 75% attendance in each year, both for theory and practical classes separately. Student with deficient attendance will not be permitted to appear in University examination.

10. CONDUCTION OF THE UNIVERSITY EXAMINATION:

University examination shall be conducted twice in a year; that is Main and Supplementary Examination. Supplementary examination shall be conducted after 2-4 months of the main examination.

11. SCHEME OF EXAMINATION

i. Theory

- (a) Each Theory paper examination shall be of 3 hours duration and of maximum marks **70**.
- (b) Internal assessment shall be of **30** marks for each Theory Paper.

Theory Papers	Theory		Paper Set & Evaluated	
	Total Marks	Pass Marks	No. of Internal Paper Setters	No. of External Paper Setters
Ist Year: Three Theory Papers	300	150	3	
IInd Year: Three Theory Papers	300	150	3	
IIIrd Year: Three Theory Papers	300	150	2	1

- (c) For the First and Second year examinations – these respective above theory papers shall be set by the Internal Examiners covering their respective areas of syllabus. For each question paper there shall be a separate Internal Examiner. The answer books shall be evaluated by the concerned Internal Examiners (Papers Setters).
- (d) In Third (Final) Year examination, one of the papers shall be set and evaluated by an External Examiner. In other words, one of the Internal has to be substituted by the External Examiner. The External Examiner (Paper Setter) shall evaluate his/her paper.
- (e) The Paper Setter shall set the questions within the prescribed course of study of the concerned paper. There will be a set pattern of question papers duly approved by Academic Council. Model question paper is annexed herewith.
- (f) It is to be noted that the Internal and External Examiners of all the three years (First, Second and Third year) shall be appointed by the President of the University. This exercise shall be conducted through the office of the Controller of the Examinations of the University. The External Examiner of Third year shall also be appointed by the President out of the panel of names submitted by the Concerned Coordinator of the course through the Dean to the Controller of Examinations for appointment of Examiners by the President of the University.
- (g) Passing Marks: A candidate will have to obtain at least 50% marks in each Theory paper including internal assessment to pass. This shall include the marks obtained in Theory paper of 70 marks and internal assessment for that paper of 30 marks.

ii. Practical and Viva-Voce Examination

- (a) Each year there shall be practical and viva-voce examination of 100 marks. It shall consist of one University practical exam of 70 marks and internal assessment of 30 marks. It shall be conducted after the Theory examination is over. A candidate will have to obtain atleast 50% marks in practical and viva-voce examination inclusive of internal assessment to pass.
- (b) The pattern of practical examination shall be as follows –

B. Sc. Course	Practical	Practical Examiners
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	Total Marks	Pass Marks	
First Year	100	50	Two Internal Examiner(s)
Second Year	100	50	Two Internal
Third Year	100	50	One Internal & One External Examiner

iii. Result

1. A candidate will have to obtain at least 50% marks separately in each Theory paper including internal assessment and a minimum of 50% marks in the practical examination inclusive of internal assessment for him to be declared pass.
2. A Candidate who has failed in theory paper/s will reappear in respective theory papers/s in supplementary examination.
3. Candidate who has failed in Practical examination only will reappear only in practical examination in Supplementary examination.

iv. Supplementary Examination

- (a) Eligibility for the failed candidates to appear at the supplementary examination shall be as below –
 - i. Failed in Theory Paper(s) and failed in Practical – shall reappear in the respective failed Theory paper(s) and Practical examination.
 - ii. Failed in Theory paper/papers and passed in Practical examination – shall reappear only in the concerned failed Theory paper(s).
 - iii. Passed Theory papers but failed in Practical – shall reappear only in the Practical Examination.
- (b) There shall be a supplementary examination within two months of the declaration of the result of the main examination. Internal assessment marks obtained in main examination in the concerned failed paper/papers/ practical shall be carried forward for working out the result of supplementary Theory paper(s) and or practical examination. Such candidate who has secured less than 50% marks in the internal assessment will be allowed to improve his internal assessment marks in the repeat supplementary internal assessment examination.
- (c) Marks secured by the candidate in passed main examination/supplementary examination Theory paper(s) and/or practicals, as the case may be, will be carried forward for working out his result.
- (d) **Result:**
 - i. A candidate obtaining at least 50% marks in the supplementary Theory paper(s) and 50% marks in the supplementary practical examination, as the case may be, shall be declared successful.
 - ii. A candidate who has failed in supplementary theory paper(s) examination shall have to reappear only in the failed theory paper(s) at the subsequent examination.
 - iii. A candidate who has failed in supplementary practical examination shall have to reappear both in theory (all papers) and practical at the next main examination.

v. Promotion to Second/Third Year

1. A candidate appeared in the University examination and failed in theory paper(s) /Practical examination shall be promoted to next year
2. A candidate will be allowed to appear for the Final (3rd) year examination only when the backlog of all papers (theory and practical) of first year and second year exams is cleared
3. The student is required to complete the course within 6 years from the joining of the course

vi. **Result - Division:** Successful candidates will be categorized as under –

1.	Those, securing 50% and above but less than 60% in the aggregate marks of First, Second & Third year taken together	-	Pass
2	Those, securing 60% and above but less than 75% in the aggregate marks of First, Second & Third year taken together	-	Pass with I Division
3	Those, securing 75% and above in the aggregate marks of First, Second & Third year taken together	-	Pass with Honours

12. GRACE MARKS

1. A student who appears in the whole examination in first attempt and obtains the required minimum pass marks in the total aggregate of an examination but fails to obtain the minimum pass marks in one subject (in theory and / or practical as the case may be) will be awarded the grace marks up to a maximum of 05 marks according to the following scale, provided the candidate passes the examination by award of such grace marks:

Marks obtained by the candidate above the required minimum aggregate pass marks		Grace marks can be given up to
Up to 6 marks	-	02
Up to 12 marks	-	03
Up to 18 marks	-	04
19 marks and above	-	05

2. No grace marks would be awarded to a candidate who appears in part/ supplementary/remand examination. Non appearance of a candidate in any part of the examination on account of any reason will make him ineligible for grace marks.
3. A candidate who passes the examination after the award of grace marks in a paper/practical or the aggregate will be shown in the marks sheet to have passed the examination by grace. Grace marks will not be added to the marks obtained by a candidate from the examiners.
4. If a candidate passes the examination but misses First or Second Division by one mark as applicable to the Faculty, he will be given one mark in the paper in which he gets the least marks and also in the aggregate of the subject as well as the complete examination to upgrade his division and make him entitled for the first or second division, as the case may be. Indication of this up-gradation will be given in the tabulation register as well as in the marks sheet of the candidate.
5. Non appearance of a candidate in any part of the examination will make him ineligible for grace marks.
6. A candidate who is awarded grace marks in any subject to pass the examination will not be entitled for distinction in any subject.
7. The place of the candidate who is awarded given grace marks to pass the examination or given one mark for up-gradation of his division in the examination merit list will, however, be determined by the aggregate marks he secures from the examiners.

13. REVALUATION / SCRUTINY

Revaluation of answer book(s) of the B.Sc. Courses is permissible in not more than 25% of the theory papers within 15 days from the date of declaration of examination result on submission of his/her application on the prescribed form alongwith the requisite fees. Such answer book(s) shall be re-evaluated as per University rules. Revaluation of answer book(s) shall not be permitted for second attempt in any paper.

Scrutiny (re-totaling) of answer book(s) of the B.Sc. Courses is permissible within 15 days from the date of declaration of examination result on submission of his/her application on the prescribed form alongwith the requisite fees as per University Rules.

Permission for revaluation / scrutiny

1. In 1st Attempt – Revaluation shall be permitted in 25% of the appeared papers. Scrutiny shall be permitted for all the papers.
2. In 2nd Attempt – Only scrutiny shall be permitted in all the papers. Revaluation shall not be permitted.
3. Revaluation shall also be permitted in 25% of such papers in which a candidate appears for the 1st time irrespective of his attempt in the whole examination.
4. Candidates passing all the subjects of one examination at different times shall be issued their mark- sheets showing actual attempts taken by them in passing the particular examination.
5. For determining the attempt, following criteria shall be followed –

S. No.	Situatio n	Attempt in next examination	
1.	Candidate is detained in all subjects	His attempt in all the subjects in the next examination will be treated as	1 st Attempt
2.	Candidate permitted in all subjects But did not appear in all permitted subjects	His attempt in the next examination will be treated as	1 st Attempt
3.	Candidate is detained in one / few subjects Permitted for the rest of the subjects Appeared in permitted subjects	His attempt in the detained subject(s) in the next examination will be treated as	2 nd Attempt
4.	Candidate is detained in one / few subjects Permitted in the rest of the subjects Did not appear in the permitted subjects	His attempt in the next examination In detained subject(s) will be treated as In permitted subject(s) will be treated as	1 st Attempt
5.	Candidate permitted in all subjects But did not appear in few subjects	His attempt in the permitted subjects in the next examination will be treated as	2 nd Attempt

Curriculum Outline
Distribution of Teaching
hours

**1ST Year B.Sc. Clinical Nutrition &
Dietetics**

Course Title	Hours
Paper I Fundamentals of Nutrition & Food Science (Theory)	200
Paper II Nutritional Biochemistry (Theory)	200
Paper III Anatomy & Physiology (Theory)	200
Paper I Fundamentals of Nutrition & Food Science (Practical)	200
Paper II Nutritional Biochemistry (Practical)	200
Paper III Anatomy & Physiology (Practical)	200
Total Theory Hours	600
Total Practical hours	600
Total Hours :	1200

**2nd Year B.Sc. Clinical Nutrition &
Dietetics**

Course Title	Hours
Paper I Human Nutritional Requirements (Theory)	200
Paper II Nutritional Microbiology (Theory)	200
Paper III Problems in Human Nutrition (Theory)	200
Paper I Human Nutritional Requirements (Practical)	200
Paper II Nutritional Microbiology (Practical)	200
Paper III Problems in Human Nutrition (Practical)	200
Total Theory Hours	600
Total Practical Hours	600
Total Hours :	1200

3rd Year B.Sc. Clinical Nutrition & Dietetics

Course Title	Hours
Paper I Institutional food administration (Theory)	200
Paper II Public health & community nutrition (Theory)	200
Paper III General & therapeutic nutrition (Theory)	200
Paper I Institutional food administration (Practical)	200
Paper II Public health & community nutrition (Practical)	200
Paper III General & therapeutic nutrition (Practical)	200
Total Theory Hours	600
Total Practical Hours	600
Total Hours :	1200

SYLLABUS

B.Sc.- Clinical Nutrition & Dietetics

(3 Years Degree Course)

Learning Objectives:

At the completion of this course, the student should be –

1. Recognize “Health for all” as a national goal & right of all citizens and by undergoing training, student will be able to fulfil his/ her social obligations towards realization of this goal
2. Learn various aspects of National policies on health & devote him/ her to its practical implementation
3. Develop scientific approach, acquire educational experience for proficiency in profession and promote healthy living
4. Student will be able to learn different aspects of Nutrition applicable to daily living & how we can provide quality of life by preventing & curing diseases
5. He/ she will be familiar with basic essential for implementation of National Health
6. Programmes including practical aspects of family welfare, maternal & child health, health & nutrition education
7. Able to identify community nutrition problems & learn to work to resolve these by designing & instituting corrective steps and evaluating outcome of such measures
8. He/ she will be able to identify clinical needs of patients & design diet regime for them

Expectation from the future graduate in the providing patient care

1. He / she will develop a sense of nutritional well being for under nourished & overnourished population
2. Students can relate themselves with medical profession by taking care of nutritional needs of patients
3. Students will develop skills to assess nutritional status of patients & community
4. Will develop promotive, preventive, curative & rehabilitative aspects of common nutritional & therapeutic problems
5. He/ she will develop skills of diet & behavioral counselling of patients & community
6. Students will acquire skills of communication, cooking, nutrient calculation, nutrition & health education, development of IEC material for community nutrition etc.
7. They will develop skills to identify signs & symptoms of nutrition related problems

(3 Year B.Sc. Degree Course)

1. COURSE OF STUDY : B.Sc. Clinical Nutrition & Dietetics

1.1 PART-I

a) Theory

Paper I: Fundamentals of Nutrition & Food Science

1. Introduction to Food Science
2. Optimum nutrition, balanced diet, reference man, reference woman
3. Structure, Physical & Chemical properties of different types of foods constituents - Cereals & grains, Pulses & legumes, Vegetables & fruits, Nuts & oilseeds, Milk & milk products, Meat & poultry, Sugar & fat.
4. Alterations in chemical, physical & nutritional properties of foods constituents during processing - sol, gel, emulsion, retrogradation, gelatinization, maillard reaction, caramalization
5. Different food processing & preservation methods (roasting, frying, boiling, baking, fermentation, germination, grilling, drying, freezing, canning etc)
6. Food regulation – laws, standards & agencies (National & International)
7. Food quality control techniques & identification of adulteration

Paper II:Nutritional Biochemistry

1. Introduction to nutritional biochemistry
2. pH, buffer & acid base balance
3. Introduction, Physical, chemical characteristics & metabolism of Carbohydrates
4. Introduction, Physical, chemical characteristics & metabolism of Protein,
5. Introduction, Physical, chemical characteristics & metabolism of Fat,
6. Introduction, sources, deficiency & toxicity of minerals,
7. Introduction, sources, deficiency & toxicity of Vitamins
8. Water & electrolyte balance
9. Fibre – soluble/ insoluble/ digestible/ undigestible
10. Respiration & biological oxidation of food
11. Hormones
12. Enzymes
13. Nucleic acid

Paper III:.....(name of paper) Anatomy & Physiology

Anatomy & Physiology of

1. Cell,

2. Blood,
3. Muscular system,
4. Skeleton system
5. Circulatory system,
6. Respiratory system,
7. Digestive system,
8. Excretory system,
9. Sense organs,
10. Nervous system
11. Endocrine glands
12. Reproductive system

b) Practical

Paper I: Fundamentals of Nutrition & Food Science

1. To prepare recipes as per different food preparation methods like boiling, roasting, frying, sauting, baking
2. To prepare recipes as per different value addition processings like fermentation, malting, germination etc
3. To prepare recipes as per different food preservation methods like canning, pickling, drying, roasting, freezing
4. Sensory evaluation of foods
5. Project presentation on market survey on ready to eat/ ready to cook food products
6. Identifying physical & chemical properties of cereals fats & oils, milk, egg, sugar etc.
7. Identifying food adulteration

Paper II: Nutritional Biochemistry

1. Cleaning of glasswares & safety procedures in biochemistry lab
2. Principles of biochemistry – Introduction to working principles of : spectrophotometry, chromatography, electrophoresis, titration, colorimeter
3. Titrimetric estimations - estimation of calcium, vitamin C
4. Estimation of Protein by Kjeldahl's Method
5. Estimation of Iron by colorimetric method
6. Estimation of glucose by colorimetric method
7. Determination of fat in foodstuff by Soxhlet method
8. Determination of reducing sugars by Nelson's method

Paper III: Anatomy & Physiology

1. Demonstration & identifying different body organs in human body
2. Measurement of blood pressure, pulse rate, Measuring temperature
3. Identifying blood groups

1.2 PART-II

a) Theory

Paper I:Human Nutritional Requirements

1. Energy – Introduction, basal metabolic rate, calculating energy requirements, energy expenditure using bomb calorimeter, indirect calorimeter etc, specific dynamic action of food, deriving nutritional requirements & recommended dietary allowances for energy for different age groups, specific dynamic action of food
2. Protein - Deriving nutritional requirements and recommended dietary allowances for entire life span (infancy to old age) for protein & amino acids (Depletion repletion method, growth, factorial approach & other techniques for deriving adequacy of nutrient in diet)
3. Minerals & Vitamins - Deriving nutritional requirements and recommended dietary allowances for entire life span (infancy to old age) for vitamins & minerals
4. Critical evaluation of International recommended dietary allowances – American, Canadian, FAO/WHO/UNU & Recommended dietary allowances & guidelines for Indians
5. Evaluation of protein quality
 - Analytical methods for the determination of nitrogen and amino acids in foods.
 - Biological methods
 - Clinical methods
 - Biochemical methods

Paper II:Nutritional Microbiology

1. Introduction to food microbiology – History, relative humidity, water activity, pH of food
2. Microorganisms important in food – their classification, morphology & physiology
3. Cultivation of microorganisms, sterilization & disinfection
4. Food spoilage – sources of contamination, factors responsible & chemical changes due to spoilage
5. Role of micro organisms in spoilage of different kinds of foods – Cereals, Pulses, Vegetables & fruits, Milk & milk product, Meat & meat products, Fats, oil & sugar, Nuts & oilseeds
6. Common techniques applied to prevent spoilage of foods mentioned in above foods
7. Food hazards - Food borne infections & intoxication, disease outbreak
8. Microorganisms useful - Prebiotics & Probiotics
9. Food sanitation: Microbiology of food plant sanitation, personnel testing, water & milk testing, food testing

Paper III:Problems in Human Nutrition

1. Major Nutritional problems- Protein energy malnutrition, kwashiorkor, marasmus, anemia, vitamin A deficiency, Iodine deficiency disorder.
2. Minor Nutritional Problems- scurvy, beri- beri, pellagra, rickets, osteomalacia, osteoporosis, zinc deficiency & fluorosis - Their prevalence, etiology, biochemical & clinical manifestations, diagnostic techniques, preventive & therapeutic measures

3. Assessment of Nutritional Status, Various techniques for assessment of nutritional status:
 - a. Anthropometric measurements: Definition, measurements, tools/instruments. Technique for measurements, standards for references, indices, classification, interpretation of data. Use of anthropometry for onetime assessment, growth monitoring and emergency situation.
 - b. Clinical examination
 - c. Biochemical estimations
 - d. Dietary survey
4. Introduction to causative factors, biochemical and clinical manifestation, treatment and therapeutic measures of following Inborn errors of metabolism: Disorders of amino acid metabolism i.e. Phenylketonuria, hypertyrosinaemia, hypervalinaemia, hyperhistidinaemia, hyper lysinaemia, homocystinuria. Carbohydrate metabolism i.e. Pentosuria, galactosaemia, Lipid metabolism i.e. Hyper chylomicronaemia, pure hypercholesterolaemia, mixed hyperlipidaemia, responding to vitamin therapy.
5. Naturally occurring toxins & antinutritional factors present in foods & complications occurring due to them

b) Practical (Code)

Paper I:Human Nutritional Requirements

1. Techniques used in nutrition research for deriving recommended dietary allowances for energy - Calculation of BEE & energy requirement of different height, weight, age, sex, temperature situations using different methods – Kleiber's formula, Harris benedict equation, Broca index, FAO / WHO/ UNU equations & others & a comparative analysis of all
2. Techniques used in nutrition research for deriving recommended dietary allowances for protein
3. Evaluation of protein quality in different food stuffs using following methods
4. a) Calculation of chemical scores / amino acid score
5. b) Calculation of NDpCal% in different types of premixes
6. To Compare intake of a person with the RDAs
7. To compare one's dietary intake with RDAs for Protein, Iron, Calcium, folic acid, sodium
8. To compare one's dietary intake with RDAs for fat, saturated/ unsaturated/ omega 3 fatty acids

Paper II:Nutritional Microbiology

1. Principle, use & maintenance of microscope
2. Techniques of preparation & culturing of different types of media
3. Techniques of staining
4. Isolation of bacteria in pure cultures
5. Study of morphological, microscopic characteristics of culture characteristics, biochemical characteristics, - A fermentation reaction, B Starch Hydrolysis, C

IMVICtest, D H₂S test, E Nitrate reduction F Lipolysis G Coagulase test, H – Cotalove test etc

6. Growth characteristics of bacteria – a. determination of microbial no., plate & slide count of bacteria & molds b. Generation time
7. Morphological culture & some biochemical studies for yeast, molds, important in Food Microbiology for identification in foods, culture for molds & special media preparation for yeasts & molds
8. Microbiological analysis of water, milk & different foods
9. Microbiological examination of tableware, equipment & container in food plant organization
10. Industrial field visit to see food safety following norms

Paper III:Problems in Human Nutrition

1. Assessment of nutritional status of different age/ activity pattern or professional groups using following methods:
 - a. Nutritional Anthropometry – Recording & interpretation of weight, height, chest, head & MUA circumference & skinfold thickness data
 - b. Clinical assessment – identification of clinical manifestations of the various deficiency disease & excess
 - c. Biochemical assessment to identify the deficiency disease – PEM & anemia
 - d. Dietary survey – Use of different techniques to assess the dietary intake of a given population
2. Plan & prepare recipes for PEM, anemia, vitamin A deficiency

1.3 PART-

III a

Theory

Paper I:Institutional food administration

1. Food Service – Planning & Management
 - I. Planning – a). Food service system & their development – an Introduction
 - b). Planning for layout & equipments
 - II. Management – a). Organization & management
 - b). Financial management
 - c). Energy & time management
 - d). Laws affecting food service operations
2. Food service system – Operations
 - I. Food Management
 - a). Food acceptability and sensory evaluation
 - b). Menu planning
 - c). Food purchasing
 - d) Quantity food production – management, kitchen production, quantity & quality control
 - e). Receiving & store room management
 - f) Food cost control – Designing for profit & product pricing

II Service management

- a). Table & dining room management
 - b). Delivery & service of food in different systems
- ## III Manpower management
- a). Administrative leadership
 - b). Personnel function
 - c). Staff planning and pay-roll control
 - d). Unions and contract negotiations
- ## IV Plant & equipment management
- a). Maintenance, b). Sanitation, c). Safety & security

Paper II:Public health & community nutrition

1. Introduction
 - a) Concept & scope of public health & community nutrition, ecology of health, health delivery systems
 - b) Major demography of Rajasthan & India
- c) Major public health problems in India
- d) National health policy; Existing health & nutrition programmes in India
2. Determinants of food consumption & nutritional status of community -
 - a). Impact of population explosion in context of world and India, impact of population explosion on quality of life, family size, nutrition
 - b). Agricultural production, storage & distribution: role of science & technology in increasing food production
- c) Economic & socio cultural factors
3. Nutrition & behaviour
 - a). Factors affecting food habits & behaviour
 - b). How to modify or correct faulty food behaviour
4. Nutrition of a community
 - a). Economics of malnutrition
 - b). Improvement of nutrition of a community – Fortification, conservation, education
5. Programmes in community health & Nutrition
 - a). Programme planning: Diagnosis of a problem, setting objectives, suitability & relative cost of various alternatives
 - b). Programme implementation & administration:
6. Availability & distribution of nutrition & health care delivery services in India, Role of public health nutritionists
 - a) Organization of existing programmes
 - b) Role of various National & International government & voluntary agencies
7. Monitoring & evaluation in relation to existing problems
8. Nutritional surveillance – Objectives, indicators in nutritional surveillance & their characteristics, data sources, agencies for nutritional surveillance in India.

Paper III: General & Therapeutic Nutrition

1. Body composition
 - a) Significance and methods used for measurement of body composition in nutrition.

b) Application of body composition in nutrition

2. Growth & development
 - a) Cellular Growth and development during life cycle.
 - b) Gerontology
 - c) Prenatal & post natal development
3. Planning meals for normal human at different stages of life
4. Planning meals at different physiological states – pregnancy & lactation
5. Factors in patient care, psychological aspects, assessing needs
6. Adaptation of normal diet to progressive diets- liquid/ soft/ full
7. Special feeding methods
8. Nutrition, immunity & infection
9. Incidence, etiology, pathology, metabolic changes, dietary management in -
 - a) Surgery & burns
 - b) Gastrointestinal tract problems
 - c) Liver & gall bladder
 - d) Renal problems
 - e) Cardiovascular diseases
 - f) Allergies & autoimmune disorders
 - g) Neurological problems
 - h) Obesity & Diabetes
 - i) Cancer patients
10. Eating disorders
 11. Drug, nutrient interaction in brief

b) Practical

Paper I: Institutional food administration

1. Market survey for perishable, non perishable & processed food items with prices
2. Planning & preparation of meals for various occasions & Institutions with cost effective resources management
3. Institutional visit to see food administration
4. Table setting & meal presentation methods
5. To make a sample of job description & job specification for any post in a food service industry
6. Organize a canteen in any college event
7. To make model to show work simplification methods

Paper II:Public health & community nutrition

1. Assessment of nutritional status of a community & interpretation of data
2. Programme planning & implementation - Identifying their nutrition related problem & programme planning & education to improve it & evaluation
3. Developing low cost nutritive recipes for vulnerable community

4. Planning & conducting nutrition education projects for community using different extension methods & audio visual aids
5. Plan & prepare premixes for complementary feedings, pregnant & lactating females etc
6. Developing messages for nutrition & health education

Paper III: General & Therapeutic Nutrition

1. Three months practical training in hospital for diet counseling

- a) Diet counseling of Pregnant & lactating women
- b) Diet counseling of pediatric patients
- c) Diet counseling of surgery patients (hernia, cholelithiasis, cholecystitis, lapcoli, cellulitis, pancreatitis, bariatric surgery)
- d) Counselling for enteral & parenteral feeds
- e) Diet counseling for cardiac patients
- f). Diet counseling for endocrinological disorders (diabetes & other endocrine diseases) g). Diet counseling for hepatic patients
- h). Diet counseling for renal patients
- i). Counselling for trauma & infection cases (TB, Burn, RTA, Fever)

2. Presentation of 1 case study

3. Planning & developing recipes for different types of diseases – cardiac, diabetic, celiac, anemic, renal, hepatic, cancer, obese

2. REFERENCE BOOKS

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5. Clinical Dietetics Manual – Indian Dietetics Association
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11. Global Hunger Index. WHO
12. Global strategy for health for all by the year 2000, WHO, 1981
13. Proceedings by Nutrition society of India. NIN, Hyderabad.
14. Use of growth charts for promoting child nutrition. A review of global experiences by
– C. Gopan & Meera Chaterjee, Nutrition Foundation of India, Special publication series-2
15. Catering management – an integrated approach. Malhan S. and Sethi M 1989
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18. Fuller J. Chefs. Manual of kitchen management B.F. Balefore 1977
19. Nutritional problems of India – P.K. Shukla

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MODEL PAPER

B.Sc. CND -I
Code

Short Name

B.Sc. Clinical Nutrition & Dietetics Part-I (Main) Examination Month Year

Paper - I **Fundamentals of Nutrition & Food Science**

Time: Three Hours

Maximum Marks: 70

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book

Draw diagrams wherever necessary

Attempt all questions

- | | | |
|-----|---|--------|
| Q.1 | Essay type - Explain dry methods of food preservation ? | 15 |
| Q.2 | Essay type - Describe chemical & physical properties of cereals | 15 |
| Q.3 | Long Answer Type | |
| | a) Describe physical & chemical properties of egg? | 10 |
| | b) What are different types of food adulterations? | 10 |
| Q.4 | Short Notes (any 4 out of 6) | 4x5=20 |
| | a) Balanced Diet | |
| | b) Reference man & women | |
| | c) Caramelization | |
| | d) Write methods of identification of fresh quality of egg | |
| | e) Saponification number | |
| | f) Physical properties of emulsion with example | |

MODEL PAPER

B.Sc. CND -I
Code

Short Name

B.Sc. Clinical Nutrition & Dietetics Part-I (Main) Examination Month Year

Paper - II **Nutritional Biochemistry**

Time: Three Hours
Maximum Marks: 70

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book
Draw diagrams wherever necessary

Attempt all questions

- | | | |
|-----|--|--------|
| Q.1 | Essay Type - Explain Glycolysis with diagram. | 15 |
| Q.2 | Essay Type - Explain major & minor nutrients in our diet with their sources & functions. | 15 |
| Q.3 | Long Answer Type | |
| | a) Types of fatty acids | 10 |
| | b) Explain physical & chemical properties of fat. | 10 |
| Q.4 | Short Notes (any 4 out of 6) | 4x5=20 |
| | a) Sources of vitamin B12 | |
| | b) Functions of protein | |
| | c) Importance of dietary fibre | |
| | d) PUFA | |
| | e) Essential amino acids | |
| | f) Who invented double helix structure of DNA & express it in labelled diagram | |

MODEL PAPER

B.Sc. CND - I
Code

Short Name

B.Sc. Clinical Nutrition & Dietetics Part-I (Main) Examination Month Year

Paper - III **Anatomy & Physiology**

Time: Three Hours
Maximum Marks: 70

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book

Draw diagrams wherever necessary

Attempt all questions

- | | | |
|-----|---|--------|
| Q.1 | Essay Type - Explain circulatory system with diagram. | 15 |
| Q.2 | Essay Type - Describe blood cells with their functions. | 15 |
| Q.3 | Long Answer Type | |
| | a) Describe digestion of protein in human body | 10 |
| | b) What is the physiology of respiratory system | 10 |
| Q.4 | Short Notes (any 4 out of 6) | 4x5=20 |
| | a) Functions of blood | |
| | b) Describe about structure & function of cell. | |
| | c) Explain about structure of liver. | |
| | d) Write about functions of spleen | |
| | e) Make diagram of eye. | |
| | f) Write names of Pituitary hormones | |

MODEL PAPER

B.Sc. CND -II
Code

Short Name

B.Sc. Clinical Nutrition & Dietetics Part-II (Main) Examination Month Year

Paper - I **Human Nutritional Requirements**

Time: Three Hours
Maximum Marks: 70

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book
Draw diagrams wherever necessary

Attempt all questions

- | | | |
|-----|---|--------|
| Q.1 | Essay Type - Describe methods for evaluation of protein quality. | 15 |
| Q.2 | Essay Type - How iron requirements were derived for a pregnant woman? | 15 |
| Q.3 | Long Answer Type | |
| | a) Describe different methods to assess energy expenditure. | 10 |
| | b) Explain direct & indirect calorimetry. | 10 |
| Q.4 | Short Notes (any 4 out of 6) | 4x5=20 |
| | a) Explain about NDP cal% | |
| | b) Dye binding method. | |
| | c) Biological value of proteins | |
| | d) Name techniques for assessment of energy requirements | |
| | e) Explain about SDA. | |
| | f) How to calculate RDA for energy for infants. | |

MODEL PAPER

B.Sc. CND.-II
Code

Short Name

B.Sc.Clinical Nutrition & Dietetics Part-II (Main) Examination Month Year

Paper - II **Nutritional Microbiology**

Time: Three Hours
Maximum Marks: 70

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book

Draw diagrams wherever necessary

Attempt all questions

- | | | |
|-----|---|--------|
| Q.1 | Essay Type – Explain food safety system of India. | 15 |
| Q.2 | Essay Type - Explain with diagram different types of bacteria. | 15 |
| Q.3 | Long Answer Type | |
| | a) Describe the factors responsible for growth of micro organisms | 10 |
| | b) Explain food borne toxicity. | 10 |
| Q.4 | Short Notes (any 4 out of 6) | 4x5=20 |
| | a) Explain about different types of microorganisms | |
| | b) Explain microbiological water testing methods. | |
| | c) Explain food borne infections | |
| | d) Bacteria responsible for spoilage of milk | |
| | e) How micro organisms are cultivated ? | |
| | f) What are quality control organizations in our country ? | |

MODEL PAPER

B.Sc. CND.-II
Code

Short Name

B.Sc. Clinical Nutrition & Dietetics Part-II (Main) Examination Month Year

Paper - III **Problems in Human Nutrition**

Time: Three Hours
Maximum Marks: 70

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book

Draw diagrams wherever necessary

Attempt all questions

- | | | |
|-----|---|--------|
| Q.1 | Essay Type - Explain protein energy malnutrition. | 15 |
| Q.2 | Essay Type - Describe anthropometric measurement technique. | 15 |
| Q.3 | Long Answer Type | |
| | a) Write symptoms of zinc & selenium deficiency | 10 |
| | b) What are inborn errors of metabolism? | 10 |
| Q.4 | Short Notes (any 4 out of 6) | 4x5=20 |
| | a) Phenylketoneurea | |
| | b) Explain about 24 hrs recall method. | |
| | c) Explain about calcium & vitamin D deficiency disorders. | |
| | d) Write difference among underweight, stunting & wasting. | |
| | e) Write clinical signs of anemia & biochemical tests to diagnose it. | |
| | f) Explain about fluorosis. | |

MODEL PAPER

B.Sc. CND.-III
Code

Short Name

B.Sc. Clinical Nutrition & Dietetics Part-III (Main) Examination Month Year

Paper - I **Institutional food administration**

Time: Three Hours
Maximum Marks: 70

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book

Draw diagrams wherever necessary

Attempt all questions

- | | | |
|-----|--|--------|
| Q.1 | Essay Type - Explain work simplification methods in institutions. | 15 |
| Q.2 | Essay Type - Explain types of meal services | 15 |
| Q.3 | Long Answer Type | |
| | a) Describe steps in process of organization | 10 |
| | b) Properties of a food service manager. | 10 |
| Q.4 | Short Notes (any 4 out of 6) | 4x5=20 |
| | a) What are the points kept in mind while giving recruitment advertisement in a newspaper. | |
| | b) Describe methods of selection of personnel | |
| | c) Types of institutions where food is prepared / served | |
| | d) What is Ala carte menu service? | |
| | e) Definition of management | |
| | f) Explain about sensory evaluation techniques. | |

MODEL PAPER

B.Sc. CND.-III
Code

Short Name

B.Sc. Clinical Nutrition & Dietetics Part-III (Main) Examination Month Year

Paper - II **Public Health & Community Nutrition**

Time: Three Hours
Maximum Marks: 70

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book

Draw diagrams wherever necessary

Attempt all questions

- | | | |
|-----|---|--------|
| Q.1 | Essay Type - Describe about education methods in a community | 15 |
| Q.2 | Essay Type - Explain about ICDS | 15 |
| Q.3 | Long Answer Type | |
| | a) Describe Health & nutrition related agencies in India | 10 |
| | b) Describe in detail major nutritional problems in community | 10 |
| Q.4 | Short Notes (any 4 out of 6) | 4x5=20 |
| | a) Barriers in communication | |
| | b) Anemia | |
| | c) Name National public health programmes | |
| | d) What is PDS? | |
| | e) Write steps of a community nutrition programme. | |
| | f) Write factors affecting food availability | |

MODEL PAPER

B.Sc. CND.-III
Code

Short Name

B.Sc. Clinical Nutrition & Dietetics Part-III (Main) Examination Month Year

Paper - III **General & Therapeutic Nutrition**

Time: Three Hours
Maximum Marks: 70

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book
Draw diagrams wherever necessary

Attempt all questions

- | | | |
|-----|---|--------|
| Q.1 | Essay Type - Describe modifications with reasons in the diet of weight reduction. | 15 |
| Q.2 | Essay Type - Explain different types of enteral feedings . | 15 |
| Q.3 | Long Answer Type | |
| | a) Points to be taken into account while planning meals for an adolescent girl. | 10 |
| | b) Name the factors affecting meal plan | 10 |
| Q.4 | Short Notes (any 4 out of 6) | 4x5=20 |
| | a) What is IBD? | |
| | b) What is ESRD? | |
| | c) What is the formula to calculate GFR? | |
| | d) Write types of diets given in a hospital. | |
| | e) Which type of diet would you recommend for a liver cirrhosis patient? | |
| | f) What points will you keep in mind while planning meals for a cancer patient. | |