

SYLLABUS

the suggestions and constructive criticism of the faculty should be by the student for further improving the improving the case

udy report/survey report/field work shall be hand written and more than 100 pages and is to be submitted in triplicate so as the office of the Registrar at least three weeks before the ent of the theory examination. Only such candidates who shall to offer case study/field work/survey report (if provided in the xamination) in lieu of a paper as those who have secured at arks in the aggregate, irrespective of the number of papers in lidate actually appeared at the examination.

SCHEME OF EXAMINATION AND COURSES OF STUDY

FACULTY OF SCIENCE

M.Sc.

FOOD AND NUTRITION

Previous Examination, 2020

Final Examination, 2021



Unit - III

1. Diets for persons with high energy requirements, stress, injury.
2. Water and electrolyte balance: Losses and their replenishment during exercise and sport events, effect of dehydration, sports drinks.

Unit - IV

7. (a) Significance of physical fitness and nutrition in the prevention and management of weight control, obesity, diabetes mellitus, osteoporosis, bone health and cancer.
(b) Nutritional and exercise regimes for management of obesity and osteoporosis.
review of various dietary regimes for weight and fat reduction, dieting effect and weight cycling.
8. Defining nutritional goals/guidelines appropriate to health promotion, prevention and management of the above chronic conditions and disorders.

Unit – V

1. Nutrition and exercise regimes for pre and post-natal fitness and health.
2. Alternative systems for health and fitness like ayurveda, yoga, Tai Chi, Vegetarianism and traditional diets.

Reference :

1. Mahan, L.K. and Escott, S. (2000) : Krause's Food and Nutrition Therapy, 10th Edition, W.B. Saunders Ltd.
- 2.Sizer, F. and Whitney, E. (2000) Nutrition-concepts and Concepts, 8th Edition, Wadsworth Thomson Learning.
3. Whitney, E.N. and Rolfes, S.R. (1999) : Understanding Nutrition, 6th Edition, West/Wadsworth. An International Thomson Publishing Co.

PRACTICAL

Hours of Instruction/week : 3

Max.

Contents:

1. Measurement of Physiological parameters like heart rate, blood pressure.
2. Review of existing alternative diet related systems for health and health.
3. Market survey and analysis of processed and finished products.
4. Supplements available for sports person in the market.
5. Nutritional assessment survey of a group of people to study their diet and fitness.
6. Preparation of nutrient rich dishes.
7. Preparation of diet counseling aids.

PAPER IX (C)

CASE STUDY

Practical
Instruction/week : 3 **Max. Marks : 50**

and preparation of diets with modifications in –
ss, Trauma
sis
ns
complications
ery
ey diseases
r diseases
cer
s
ract surgery
ion of diet counseling aids for common disorders.
survey for commercially available food supplements and
al support substrates.

sky (Ed.) (1998) : Nutrition in Exercise and Sports, 3rd Edition,
ess.
a, J. Nutrition, Physical activity and health in early life, Eds.
, I, CRC Press.

E., Oison, J.A. Shike, N, and Ross, A.C. (eds) 1999 : Modern
in Health & Disease, 9th Edition, Williams & Wilkins.
W. Katch, F. and Katch, V. (1996) Exercise Physiology., Energy
and Human Performance 4th Edition, Williams and Wilkins,
phia.

and Science in Sports and Exercise.

onal Journal of Sports Nutrition, Combined Practical for Optional.

PAPER IX (B)
Nutrition For Health and Fitness
Examination : 3 hrs. **Max. Marks : 50**

paper shall contain three sections: Section A contains 10
p from each unit of 1.5 marks each. The candidate is required
l the questions. The answers should not exceed 50 words.
all contain 5 questions, one from each unit with internal choice.
n shall be of 3 marks. The candidate is required to answer all
he answers should not exceed 200 words. Section C shall
estions of 5 marks each, one from each unit. The candidate is
answer 4 questions. The answer shall not exceed 500 words.

Unit – I
n, Components and assessment criteria of age: Specific fitness
th status.

practical part (Whenever Prescribed) of a subject/Paper se
2. A candidate for a pass at each of the Pervious ar
Examination shall be required to obtain (i) atleast 36% r
aggregate of all the paper prescribed for the examination ar
36% marks in practical (s) whenever prescribed the examinatio
that if a caindidate fails to atleast 25% marks in each indivi
work. Wherever prescribed, he shall be deemed to have
examination not with standing his having obtained th
percentage of marks required in the aggregate for the exam
division will be awarded at the Pervious Examination, Divi
awarded at the end of the Final Examination combined ma
at the Pervious and the Final Examination taken togeth
below:

First Division 60% of the aggregate marks taken
Second Division 48% of the Previous and the final e

3. If a candidate clears any paper (s) Practical(s)/D
Prescribed at the Previous and or/final examination after a
period of three years, then for the purpose of working out his
minimum pass marks only viz 25% (36% in the case of pra
be taken into account in respect of such paper(s) Practical(s)
are cleared after the expert of the aforesaid period of three ye
that in case where a candidate require more than 25% mark
reach the minimum aggregate as many marks out of the
secured by him will be taken into account as would enable
the deficiency in the requisite minimum aggregate.

4. The case study report/survey report/field work shall be
and shall not be of more than 100 pages and is to be s
triplicate so as to reach the office of the registrar at least 3 w
the commencement of the theory examination. Only suc
who shall be permitted to offer case study/survey report/
provided in the scheme of examination) in lieu of a paper a
have secured at least 55% marks in the aggregate, irrespe
number of paper in which a candidate actually appe
examination.

Physiology	75	25
Food and Nutritional Biochemistry	75	25
Food and Nutrition & Food Microbiology	75	(25+25)=50
Total	300	100
Total of M. Sc. Previous (400+100)	400	

**M.Sc. (Final) Food and Nutrition
Programme of Study and Examination Scheme**

Nomenclature of Paper	Marks	
	Theory	Practical
Food Service Management	50	50
Food Science	50	50
Nutrition Food Safety and Quality Control	50	50
and Therapeutic Nutrition	50	50
Internal Paper/Case study (only one paper)	-	-
Nutrition in critical care	50	50
Nutrition for health and fitness	50	50
Nutrition study in relevant area	100	-
Total	250	250
Total of M. Sc. Final		500
Total Of M.Sc. (Previous & Final) 400+ 500		900

Paper I

Research Methodology

Marks. Max. Marks : 75
The question paper shall contain three sections. Section A shall contain two questions two from each unit of 2 marks each. The candidate is required to answer all the questions. The answers should not exceed 50 words. Section B shall contain 5 questions one from each unit with internal questions. Each question shall be of 5 marks. The answers should not exceed 100 words. The candidate is required to answer all the questions. Section C shall contain 5 questions of 10 marks each, one from each unit. The candidate is required to answer 3 questions. The answer shall not exceed 150 words.

To enable the student to understand the types, tools and methods of research and development and the significance of statistics and research methodology in food science research.

Understand the types, tools and methods of research and development and the significance of statistics and research methodology in food science research.

Understand and apply the appropriate statistical technique for the

1. Nutrition Update Series.
2. American Journal of Clinical Nutrition
3. European Journal of Clinical Nutrition
4. Nutritional Reviews
5. World Review of Nutrition and Dietetics
6. Journal of Applied Nutrition
7. WHO Expert Committee-TRS.

PAPER IX (A)

Nutrition in Critical Care

Duration of Examination : 3 hrs. Max. Marks : 75
The question paper shall contain three sections. Section A shall contain two questions two from each unit of 1.5 marks each. The candidate is required to answer all the questions. The answers should not exceed 100 words. Section B shall contain 5 questions, one from each unit with internal questions. Each question shall be of 3 marks. The candidate is required to answer 3 questions. The answers should not exceed 200 words. Section C shall contain 5 questions of 5 marks each, one from each unit. The candidate is required to answer 4 questions. The answer shall not exceed 150 words.

Unit – I

1. Nutritional Screening
2. Nutritional screening tools.
3. Nutritional status assessment of critically ill.
4. Nutritional support systems.
5. Life saving measures for the critically ill.

Unit -II

1. Immuno enhancers
2. Conditionally essential nutrients.
3. Immuno suppressants.
4. Role of special diets in critical care.

Unit - III

1. Pathophysiological, clinical and metabolic aspects – units of the special nutritional requirements; nutritional goals and the therapy in critical illnesses like –

- (i) Stress , trauma
- (ii) Sepsis
- (iii) Burns
- (iv) CV complications & surgery
- (v) Surgery
- (vi) ESRD, dialysis, transplant

Unit –IV

- (vii) Multiple organ failure

cardiovascular diseases.
kidney diseases.
burns (burns)
surgery
survey of commercial nutritional supplements and nutritional substrates.
of Diet Counseling aids for common disorders.
udies: Selection of 3 to 5 admitted patients from a unit of a
Study of clinical. Nutritional, biochemical profile of the patient
mission, during hospital stay and at discharge. Therapeutic
tion of the diet for that condition. Dietary counseling of the
Study of accepts ability and compliance of diet planning,
ance diets on discharge. Report writing.
L.K. and Esocott-Stump, S. (2000): Krauses Food Nutrition and
rapy, 10th edition. W.B. Saunder Ltd.
E. Olson, J.A. Shike, M and Ross, A.C. (1999): Modern Nutrition
and Disease 9th edition. Williams and Wilkins.
ump S (1998): Nutrition and Diagnosis Related Care 4th edition
and Wilkins.
J.S. James. W.P.T. and Ralph A (2000): Human Nutrition and
10th edition. Churchill Livingstone.
S.R.(1993): Nutrition and Diet Therapy 7th editon. Times Mirror/
College Publishing.
and sheer. K. (1994) Applied Nutrition and Diet Therapy.
W.A. and Watkins. J.B.(1985): Nutrition in Pediatrics, Bostontle
nd Co.
A.C. and Hall, J.E.(1999): Textbook of Medical Physiology 9th
V.B. Saunders Co.
A.C.(1990) Boyd's Textbook Pathology 9th edition Lea and
Philadelphia
A et al (1998): Harrison's Principle of Internal Medicine. 14th
cGraw Hill.
ancer Research Fund(1997), Food, Nutrition and the Prevention
A Global perspective, Washington E.D. WCRF.
n C.H. and Lawler M.E et al Normal and Therapeutic Nutrition
Mac Millan Pub Col 1986.
S.R. Nutrition and Diet Therapy C.V. Mosloy Co. 1973
?. Clinical Dietetics and Nutrition 3rd edition. Oxford University
ombay 1989.
ã.H. and Bengoa J.M. Eds. WHO Monograph Series 62 1976.
HO Monograph and Technical Series.
and Singh K. Diet Planning Through Lifestyle in Helath and Di

3. Definition and identification of a Research problem
Selection of research problem
Justification
Theory, hypothesis, basic assumptions, limitations and of the problem
4. Variables
Types of variables independent and dependent variable and quantitative, discrete and continuous. Error product
intervening, extraneous and attribute variables, methods
variables.
5. Theory of probability
Population and sample
Probability sampling, simple random, systematic random
two stage and multi stage sampling, cluster sampling
Non-Probability sampling: purposive, quota and volunteer
snowball sampling.

Unit - II

1. Basic Principles of Research Design
Purposes of research design: Fundamental, applied
exploratory and descriptive, Experimental, Survey and causal
post facto.
Longitudinal and cross sectional correlational
2. (a) Qualitative research methods:
Theory and design in quantitative research.
Definition and types of qualitative research
Methods and techniques of data collection
(b) Data gathering instruments: Observation, questionnaire
sealing methods, case study, reliability and validity of
instruments.
3. Quantitative research:
(a) Design strategies in Research - Descriptive studies, E
of types of descriptive studies
Co-relational studies (Populations/individuals)
Case reports and case studies
Cross sectional surveys
(b) Use of descriptive studies in research. Hypothesis form
discipline studies. Issues in the design and conduct of
studies.

Unit - III

1. Selecting a problem and writing a research proposal
Selection of problem area, topic and defining the problem
Literature search - reviewing related literature, referencin

tables, diagrams, Graphs and other illustration.
ation of findings.
writing as a means of communication.
forms of scientific writing
in journals, Research notes and reports, Review articles,
aphs, Dissertations, Bibliographies.
Dissertation / Research report/Article
aries - title page, acknowledgement index, List of tables list of
plates photographs. Etc.
Footnotes quotations
ing, Margins, Pagination indentations.
duction Scope, Objective, Hypothesis
ew of related literature
odology
ults and discussions
mary, conclusions and recommendations
ography
ract

g content, Continuity, clarity, validity internal consistency and
y during writing each of the above parts.

Unit - IV

and scope of statistics, role of statistics in research limitation
ics.
ual understanding of statistical measures: Classification and
n of data. Measurement of central tendency, Measures of
cy distribution, Histogram, Frequency. Polygons Ogive.
ion of Student's 't' test for small samples. Difference in
n for means and difference in means

Unit - V

on, Coefficient of Correlation, Rank Correlation
ion and Prediction.
of Variance - one way and two - way classification.
ental Designs
mpletely randomized design
omized block design
quare design
orial design
nd analysis
puters its role in research. World Processing. Use of computers
rocessing Analysis and Presentations.

and tuberculosis.
4. Diet in gastritis, peptic ulcer (gastric and duodenal). Etiolo
clinical findings, treatment, dietary modifications, chemical
thermal irritants, four stage diets.

UNIT - III

1. Diet in disturbances of the GIT-small intestines and col
(child and adult). Classification modification of diet, fi
nutrition adequacy. Constipation and flatulence. Dietary c
in ulcerative colitis- symptoms, dietary management.
2. Diet in diseases of the liver, gall-bladder and pancreas-
functions, etiology, symptoms and dietary management
viral hepatitis A and B cirrhosis of liver and hepatic co
alcohol in the liver diseases. Dietary treatment in chole
pancreatitis.
3. Diabetes: etiology, classification, signs and symptoms, typ
meal management, dietary treatment oral hypoglyco
carbohydrate, lipid and protein metabolism in diabetes, s
term complications of diabetes.

Unit IV

1. Diet in Renal Diseases-basic renal function, symptoms
tree ment in acute and chronic glomerulonephritis, nephro
acute and chronic renal failure, Dialyses- hemodialysis a
dialysis Urinary calculi-causes, treatment, acid and alkali a
foods and neutral foods. Dietary treatment.
2. Diet in cardiovascular diseases- acute and choronic des
heart, multiple risk factors, atherosclerosis, plaque
hyperlipidemia different types of hyperlipoproteinemia, treat
management.
3. Diet for hypertension-primary and secondary hypertension
in development of hypertension Dietary management
diets.

Unit V

1. Feeding infants-problems in feeding children in the hosp
2. Nutritional Education and Diet Counseling.
3. Diet and Drug Interaction- effects of drugs on food and n
ingestion, digestion, absorption, metabolism and require
of food nutrients and nutritional status on absorption ar
drugs.
4. Nutrition Cancer- nutrition for the cancer patient. role of di
cancer metabolic effects of cancer. Cancer cachexia, nutr
of cancer therapy.

PRACTICAL

National Policy (1993) : Dept. of WCD. Govt. of India.
Education for the public (1997) : FAO Food and Nutrition Programme
1988) : Dietary Guidelines for Indian as Manual National Institute of Nutrition, Hyderabad.

J.B., Habichi, J., Tabatabai, and Valverde, (1984): Nutritional Assessment World Health Organisation Geneva.

1987) : T. and Sheshadri, S. (1987) : Nutrition Monitoring and Evaluation Oxford University Press. N. Delhi.

1988) : Education for Health - A Manual on Health education in Health care, WHO.

1984) : K. and Tilford, S. (1984) : Health Education Effectiveness, Equity and Equity (2nd edition) Chapman & Hall London.

PAPER VIII

CLINICAL AND THERAPEUTIC NUTRITION

Duration : 3 hours. Max. Marks : 50

The question paper shall contain three sections. Section A shall contain 10 questions two from each unit of 1.5 marks each. The candidate shall answer all the questions. The answers should not exceed 50 words. Section B shall contain 5 questions, one from each unit with internal choice. Each question shall be of 3 marks. The candidate is required to answer 4 questions. The answers should not exceed 200 words. Section C shall contain 5 questions of 5 marks each, one from each unit. The candidate is required to answer 4 questions. The answer shall not exceed 200 words.

The question paper will enable the students to :

1. Understand the etiology, physiology and metabolic anomalies of acute and chronic diseases and patient needs.

2. Assess the effect of the various diseases on nutritional and dietary requirements.

3. Plan and recommend and provide appropriate nutritional care for patients with nutritional and treatment of various diseases.

UNIT - I

1. History of Diet Therapy - growth of dietetics. Purposes and principles of diet therapy. Therapeutic diets. Modifications of normal diet. Classification of therapeutic diets.

2. Role of dietitian, definition of nutritional care, interpersonal relationship with patient, assessment of nutritional status of outdoor and indoor patients.

3. Identification of high risk patients. Assessment of patient nutritional status based on interpretation of patient data-clinical, biochemical, bio-

of Health-related Programmes. International Nutrition for Developing Countries, Boston.

6. Van Maanen (1983) : Quantitative Methodology, Sage Publications.

7. Cook, T.D. and Reinhardt C.S. (1979) Qualitative and quantitative research in Evaluation Research. Sage Publishing London.

8. Patton, M.Q. (1980) Qualitative Evaluation Methods, Sage Publications.

9. Pettitti, D.B. (2000) : Meta-analysis, Decision Analysis and Effectiveness Analysis : Methods for Quantitative methods in Health Care Research. Oxford University Press, New York.

10. Hunter, J.E. and Schmidt (1990) : Methods of Meta analysis Correcting for Error and Bias and Research findings sage Publications.

11. Walker, R. (1983) : Applied Qualitative Research. Gower, London.

12. Morgan, D. (1988) : Focus Groups as Qualitative Research. Sage Publications, London.

13. Creswell, J. (1994) : Research Design Qualitative and Quantitative Approaches, Thousand Oaks. CA. Sage Publication.

14. Morgan, D. (1993) : Successful Focus Groups, Sage Publications.

15. Mischler, E.G. (1986) : Research interviewing Context and Theory. Harvard University Press. Cambridge.

16. Denzin, N.K. And Lincoln, Y.S. (1994) Hand book of qualitative research. Sage Publications.

17. Janesick, V.J. (1998) : Stretching exercise for Qualitative research. Sage Publication.

18. Mienert, C.L. (1986) Clinical Trials Design Conduct and Analysis. New York.

19. Schlesselman J.J. (1982) : Case Control Studies : Design, Conduct and Analysis Oxford New York.

20. Bryman. A and Cramer, D. (1994) : Quantitative Data Analysis for the Social Scientists.

21. Bryman, A and Cramer D. (1996) : Quantitative Data Analysis using Minitab's. Rutledge, London.

22. Cameron, M.E. and Van Staveren, W.A. (1988) : Manual on methods for food consumption studies. Oxford University press, Oxford.

23. Quandt, S.A. and Ritendbaubh, S (1986) : Training Manual for Dietitians. Anthropology, American Association of Anthropology, Washington.

24. Kothari, CR. (1990) Research Methodology Methods and Techniques (2nd Ed) Wishwa Prakashan, C.A. Division of Wiley Eastern Ltd. Delhi.

25. Baumgartner, TA. And strong, CH (1994) Concluding Research in Health and Human Performance. Brown and Blackwell (A Division of Wm. C. Brown Communications Ltd.) London.

26. Singleton, Jr. RA.: Straits, BC. And straits, MM. (1993) : A Handbook of Social Research, Oxford University Press N.Y.

L. and Robin, D.S. (1997) : Statistics for Management (8th Ed.) Hall of India Pvt Ltd. N. Delhi

Sp. (1987) : Statistical Methods (25th Ed.) Sultan Chand and Delhi.

Dr, GW and Cochram, QWG. (1968) : Statistical Methods Oxford Publication Co. N. Delhi.

PAPER II

Applied Physiology

Marks: 75 **Max. Marks : 75**

The question paper shall contain three sections. Section A contains two from each unit of 2 marks each. The candidate is to answer all the questions. The answers should not exceed 50 words. Section B shall contain 5 questions one from each unit with internal choice. Each question shall be of 5 marks. The answers should not exceed 100 words. The candidate is required to answer all the questions. Section C shall contain 5 questions of 10 marks each, one from each unit. The candidate is required to answer 3 questions. The answer shall not exceed 1000 words.

The question paper will enable Students to :
 1. Demonstrate their understanding of some of the relevant issues and topics in physiology
 2. Enable the students to understand the integrated function of all system
 3. Provide a grounding of nutritional science in physiology.
 4. Demonstrate the interrelation of Structure and function in various organs and systems
 5. Demonstrate the changes in disease conditions.

Unit - I

1. Structure and functions of cell and cell organelles. Structure of cell membrane, active transport of nutrients and metabolites, cellular communications.
 2. Circulatory System: Structure and function of the heart and blood vessels. Regulation of cardiac output. Cardiac cycle. Blood pressure. Factors affecting it, Heart failure.
 3. Hemostasis: Formation: Composition, blood clotting and homeostasis. Properties of blood, composition of blood, Blood cells, Normal values of Blood, Plasma and Serum, Formation and Functions of erythrocytes, hemoglobin, erythropoiesis and anemia. Leucocytes-genesis and functions. Regulation of pH of blood and body fluids blood groups and compatibility blood indices. Use of Blood for investigation and diagnosis of specific disorders blood coagulation-mechanism, disorders causing excessive bleeding, anticoagulants.
 4. Regulation of body temperature, thermogenesis, thermolysis, pyrexia,

15. Bryan, F.L. (1992) Hazard Analysis Critical Control Point evolution to Identifying Hazards 7 Assessing Risks associated with food preparation and storage, WHO Geneva.

16. Kirk, R.S. and Sawyer, R (1991) Pearson, Composition and Analysis of Food, Longman Scientific & Technical 9th E.d, England.

17. Food & Agricultural Organization (1980) Manuals of food quality control 2 Additives contaminants techniques, Rome.

18. Bureau of Indian Standards: Specifications and Standards for Food, New Delhi.

19. Herschderfer (1987): Quality Control in food industry, food safety and technology- a series of Monographs. Academic Press London.

20. Lyon D.H. Francombe. M.A. Hasdell . T.A. Lawson K (1985) Guidelines for sensory analysis in food product development and control. Chapman and Hall.

21. Jellinek G (1985) Sensory evaluation of food. Theory and practice. Horwood Chichester.

22. Lawless. H.T. Klein. B.P. (1991) Sensory Science: Principles and applications food, Marcel Dkker Inc. New York.

23. Amerine , M.A. Pangbom, R.M. Roessler ,E.B. (1965) Principles of sensory evaluation of food, Academic Press New York.

24. Salunkhe, D.K.(1974) Storage, Processing and nutritional value of fruits and vegetables, CRS Press, Ohio.

25. Encyclopaedia of Food Technology, AVI Publication.

26. Girdhari Lal (1967): Preservation of Fruits and Vegetables, New Delhi.

27. Desrosier, N.W. and Desrosier, J.N. (1977) The Technology of Food Preservation ,AVI Publishing Co. Connecticut.

28. Joslyn, M.A. and Heid J.L. (1964) Food processing operations: plant management, machines, materials and methods, AVI Publishing Co. Connecticut.

29. Owen, A.Y. and Franke. R.T. (1986) : Nutrition in the Community: Principles of Delivering Services. 2nd Edition Times Mirror/Mosby.

30. Park. K. (2000) : Park's Textbook of Preventive and social medicine. 18th Edition. M/s. Banarasidas Bhano Jabalpur.

31. SCN News, UN ACC/SCN Subcommittee on Nutrition.

32. State of the World's Children, UNICEF.

33. Census Reports.

34. Berg. A (1973) : The Nutrition Factor, the Brookings Institution, Washington.

35. Beaton, G.H., and Bengoa, J.M. (Eds) (1996): Nutrition in Primary Health Care. Medicine.

36. Bamji, M.S., Rao, R.N., Reddy. V. (Eds) (1996): Textbook of Nutrition. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.

37. Gopalan. C. and Kaur, S. (Eds) (1989) : Women and Nutrition.

of Demonstration as a technique for Nutrition Education
analysis and critical appraisal of a TV/Video film (presented before
).
ical Appraisal of existing interventions and programmes in the
r sector and the government and suggestions to improve the
-à-vis target groups in society and specific needs.
eillance systems used in Nutritional and Health programmes.
ment of a plan for a nutrition intervention project in the community
(et groups need to be specified). Implementation of intervention
eeks followed by assessment of impact. Reporting on impact
sible improvements.

erience in operational public nutrition programmes: nutrition
ation centres. Fortification programmes cost analysis.
f sensory experiments-selection of panel, training of panel,
panel, development of score card data analysis, interpretation
s,
al tests for sensory evaluation- conduct test to know the
y, acceptability of a new product, to Know likes & dislikes.
ment of purity & quality using appropriate standard tests in
food group.
ion of purity & quality using appropriate standard tests in
food group.
ion of squashes, syrups sauces, pickles chutneys (any three
on should be prepared in bulk)
lization of recipes in relation of nutritive value. cost & time.
Commercial food manufacturing. Packaging units where food
are developed & tested.

W. (1994) New Food product development. CRC Press
d motteb Civilic. G.V. Carr B.T. (1991) Sensory evaluation
es. CRC Press.
M.O. (1986) Sensory evaluation of food. Marcel Dekkr Inc.
and Rao, E. S. (2001) Food Science Experiments and
ons CBS Publishers & Distributors, New Delhi,
(1995) Guide to Quality management Systems for the food
Blackie Academic & Professional, London,
/A and Gould R.W.(1988): Total Quality Assurance for the food
s, CTI Publications Inc. Baltimore.
z, Y and MeLoan, CE (1996): Food Analysis:Theory & Practice
blishers & Distributors , N Delhi,
and Treptow. H (1993): Quality Assurance in Tropical Fruit
ng Speinger- Verlag Berlin.

Unit - III
1. Excretory System: Physiology of kidneys. Structure and
nephron. Urine formation Normal and abnormal constitu
Role of kidney in maintaining pH of blood, water, elect
base balance diuretics.
2. Musculo-Skeletal System - structure and function of bo
and connective tissue. Disorders of the skeletal syste
muscles, structure and function.
3. Immune system: Structure and functions of thymus and sple
of WBC and production of antibodies. Role of inflammation
Allergy and hypersensitivity. Nutritional immunity an
interactions

Unit - IV
1. Nervous system: Review of structure and function of neuro
of nerve impulse, Synapses. The resting Potential, the ac
and its characteristics. Mechanism of Synaptic. Transmi
action. Role of neurotransmitters. Organization of the ce
System Structure and function of brain and spinal cord,
efferent nerves, Blood brain barrier, CSF Hypothalamus a
various Body functions - obesity, Sleep and memory.
2. Endocrine System: Endocrine Glands- Structure, functio
Storage, Secretion, Regulation of hormonal secretion. M
action of hormones. The Nero endocrine axis. E
Physiological of Diabetes and stress hormones. P
functions and abnormalities in secretion of pituitary, Thyroid
hormones, adrenocortical and reproductive hormones.
endocrine glands.
3. Sense Organs: Review of structure and functions. Role
ear, Nose and tongue in perception of stimuli. Physiolo
hearing taste and smell.

Unit - V
1. Techniques of assessment of nutritional status of in
populations.
2. Direct and indirect methods, advantages and limitations
PRACTICAL
Hours of instruction per week : 1 **Max. Mar**
Contents :
1. Estimation of hemoglobin.
2. Identification of blood groups.
3. Preparation of blood slide.
4. Identification and counting of blood cells.
5. Haemotocrit and sedimentation rate.

(1985) : Functions of the Human Body 4th edition W.B. Saunders Philadelphia.

and Hail J.B. (1996) : Textbook of Medical Physiology 9th edition Prime Books (Pvt.) Ltd. Bangalore.

and Waugh. A (1996) : Ross and Wilson Anatomy and Physiology of Human Body 8th edition Churchill Livingstone.

.C. (1992) : Human Physiology Vol I and II 11th edition Medical Science Publishers, Calcutta.

and Neil F. Samean. (1974) : Wridht's Applied Physiology. Macmillan and Co.

(1974) : Introduction to Human Physiology Macmillan and Co.

(1972) : An Introduction to Human Physiology. Macmillan and Co.

Katch F.I. and Katch V.L. (1966) : Exercise Physiology, Energy and Human Performance 4th edition Williams and Wilkins, Baltimore.

Text book of Physiology Vol and II Avichal Publication Co., New Delhi.

(2000), 3rd Ed. Modern Experimental Biochemistry, Person Education.

(1980) 6th Ed. Quantitative Problems in Biochemistry, Longman.

Garg, V.C. and Khosla, A. (1987), 5th Ed. Senior Practical Biochemistry, R Chand & Co., New Delhi.

(1965), 14th Ed. Hawk's Physiological Chemistry, Tata Mc Graw-Hill Co. Ltd.

N., Madhavan Nair and K. Kalyanasundaram, S, (1983), A Laboratory Techniques, NIN, ICMR.

(1999), 8th Ed. Instrumental Methods of Chemical Analysis, Spectroscopic Publishing House.

A.K.s and Jain, P.C. (1986), 2nd Ed. Chemical Analysis: An Analytical Approach, S. Chand and Company Ltd.

Lowenlock, A.H. and Bell, M. (1980), 5th Ed. Practical Clinical Biochemistry, Heinemann Medical Books Ltd.

(1962) 3rd Ed. A Textbook of Quantitative Inorganic Analysis by the author, Longman Book Society and Longman.

PAPER III

ADVANCED NUTRITIONAL BIOCHEMISTRY

Max. Marks : 75

The question paper shall contain three sections. Section A shall contain questions two from each unit of 2 marks each. The candidate is to answer all the questions. The answers should not exceed 50 words. Section B shall contain 5 questions one from each unit with internal marks. Each question shall be of 5 marks. The answers should not exceed

- (c) Food based interventions including fortification and improvements of food and supplementary feedings.
 - (d) Nutrition education for behaviour changes. Participatory approach.
2. Community Nutrition Programme Management
 - (a) Planning - identification of problem, analysis of cause and effect, identification of constraints, selection of intervention. setting a strategy.
 - (b) Implementation and supervision
 - (c) Operations monitoring, surveillance and evaluation (including impact evaluation).

UNIT IV

1. Food quality assurance- Introduction to quality assurance, concept of quality control, Principles of Quality assurance, quality assurance, in process quality assurance, finished product quality assurance.
2. Food safety and toxicology- Introduction, Hazards- Microbiological, Nutritional, Environmental, physical, Biological, Chemical Hazards. A method to prevent food borne diseases.
3. Naturally occurring toxicants and food contaminants- Lead, Arsenic, Favism. Hamagglutins, Ackee fruit poisoning, Presser and toxins. Toxicants in natural spices and flavours, food fat, glycosides. Carcinogens, Goitrogens, Solanine, Sapogenins, minerals Antivitamins Radioactive materials.
4. Food Additives- Introduction, Role of different additives in maintaining the quality of food product, Antioxidants, Chelating agents, Curing agents, Emulsifiers, Flavour and Flavour enhancers, Flour improvers, Humectants & Anticaking agent, Leave behind preservatives, Nutrient supplement, Nonnutritive Sweeteners. PH Control agents, Stabilizers & Thickeners, Preservatives, Additives and Food packaging.

UNIT V

1. Food packaging-Functions of food packaging, requirements for food packaging, food packaging materials and forms, standardization of food packaging.
2. Government regulation of food and nutrition labeling- Introduction and nutrition law and acts, food labeling, nutrition labeling.
3. Evaluation of food quality
 - (a) Sensory evaluation-
 - (b) Objective evaluation- Advantages, disadvantage, basic guidelines.
4. New food product development- Defining new food product, classification & characterization of new food product, development tool.

PRACTICAL

Hours of instruction per week : 3 **Max. Marks : 25**

Section B shall contain 5 questions, one from each unit with internal question shall be of 3 marks. The candidate is required to answer 3 questions. The answers should not exceed 200 words. Section C shall contain 5 questions of 5 marks each, one from each unit. The candidate is required to answer 4 questions. The answer shall not exceed 200 words.

The examination will enable the student to :
1. Acquire a holistic knowledge base and understanding of the nature and extent of nutrition problems and their prevention and control for the different strata and upper socio-economic strata in society.
2. Understand the causes/determinants and consequences of nutrition problems in society.
3. Acquaint with various approaches to nutrition and health intervention programmes and policies.

UNIT - I

1. Nutrition and key concepts - community, nutritional anthropology, community health & community nutrition. Role of public nutritionists in health care delivery. Ecology of Health & Specific determinants of food intake.

2. Population Dynamics - Demographic transition, population structure, population behaviour, population policy, fertility, nutritional and quality life - population relationship.

3. Economics and Economics of malnutrition - Social and behavioural determinants of malnutrition, economic losses - reduced physical and mental efficiency, loss due to premature deaths, underutilization of health services, women and the ultimate cost of under nutrition. Impact on national development. Cost-benefit, cost effectiveness and cost efficiency.

4. Nutrition and public policies relevant to nutrition & Primary health care of community - National health care delivery system, determinants of malnutrition, status, indicators of health.

UNIT - II

1. Prevalence and background of the problem of malnutrition in India. Nutritional status - anthropometric and non-nutritional indicators.

2. Planning and conducting a nutritional status assessment survey. Sampling - scope and objectives of survey, defining population and sampling, selection of samples.

3. Data collection and standardizing parameters. Organizing the survey-organizing team, materials, training and field supervision. Evaluation of methodology, verification and cross checking of data. Reporting of data and reporting.

- 4. Become proficient for specialization in nutrition.
- 5. Understand integration on the cellular level metabolic and nutritional disorders and imbalances.

UNIT - I

1. Carbohydrates-and type of polysaccharides. Important monosaccharides. Carbohydrates - Utilization function and control of Carbohydrate Homeostasis, Dietary fiber-Physiological effects, Recommended levels of dietary fiber.

2. Lipids-Classification of lipids and fatty acids, chemical reactions of lipids-hydrolysis, saponification, hydrogenation, hydroxylation, acetylation. Characteristics of fats. Saponification number, Reichert-Meissel number, UV absorption. Rancidity of fats and prevention. - Utilization & function, essential fatty acids, role of n3 and n6 fatty acids, triglycerides, Phospholipids, Sterols, Lipoprotein classification and importance.

UNIT - II

1. Proteins-classification of amino acids, reactions, methods of amino acids-chromatography, micro-biological, electrochemical methods. Peptide bonds, Structure of Proteins, Denaturation and renaturation. Plasma proteins-nature, properties, functions. Structure and function of Myoglobin and Haemoglobin. Proteins - Utilization & function in metabolism & assimilation of protein turnover, Hormonal control of protein metabolism, Evaluation of protein quality.

2. Nucleic Acid-Synthesis and breakdown of purines and pyrimidines. Structures of DNA and RNA. DNA replication and transcription. Genetic code. DNA repair systems. Recombinant DNA technology. Mutation, regulation of gene expression and protein biosynthesis.

UNIT-III

1. Vitamins-structure, metabolism and biochemical role. (Fat soluble and water soluble)

2. Minerals-functions of all essential minerals in nutrition. Emphasis on the biological role of Trace elements. (Macro Elements, Trace Elements, Ultra Trace Elements)

3. Hormones-biochemical role of adrenocorticotrophic hormone, growth stimulating hormone, leutinising hormone, human chorionic gonadotropin, growth hormone, thyroxine, thyroid stimulating hormone, Insulin, Glucagon, hormone of the Adrenal cortex, male and female sex hormones. Mechanism of action of hormones.

UNIT - IV

1. Enzymes-classification, general properties, catalysis, specificity, isolation and purification, intracellular distribution and regulation. Allosteric enzymes, Isoenzymes. Kinetics-effect of time, temperature, pH on velocity of enzyme catalyzed reactions, inhibition

β-oxidation of odd and even numbered saturated fatty acids, mitochondrial and extramitochondrial system for de novo synthesis, malic acid system for chain elongation. Biosynthesis of cholesterol and metabolism of Ketone bodies. Ketosis. Biosynthesis of triglycerols and phospholipids, mono acylglycerol pathway. Essential amino acids.

Relationship between carbohydrate and lipid metabolism at cellular level, enzymatic level hormonal level and regulatory level.

Urea cycle, creatine and creatinine and creatinase, deamination of amino acids, metabolism of non protein amino acids. Biologically active peptides and polypeptides.

Errors of Metabolism: incidence, clinical changes and treatment of ketonuria, maple syrup urine disease, homocystinuria, leucine hypoglycemia, galactosemia, hereditary fructose intolerance, phenylketonuria and familial hypercholesterolemia.

PAPER – III

ADVANCE NUTRITIONAL BIOCHEMISTRY

PRACTICAL

Instruction/week : 2

Max. Marks : 25

Qualitative analysis of carbohydrates.

Qualitative analysis of amino acids.

Qualitative analysis of proteins.

Determination of acid value, saponification value and iodine number.

Determination on estimation of nitrogen by kjeldhal method.

Determination on estimation of soxhlet method.

Determination of PH

Determination of chromatography and electrophoresis techniques.

S., Todd, W.R., Nelson, H.S. and Vanbrugger, T.T. : Textbook of Biochemistry Oxford and IBH Publishing Corp.

Handler, Pland Smith, E.T. Principles of Biochemistry Mc-Graw Hill Company.

W. and Brown R.L. Nutrition and Integrated Approach 3rd Ed. McGraw Hill and Lousie New York.

L. Biochemistry W.H. Freeman and Co. and distributors (Indian branch)

K., Granner D.K., Mayes P.A. and Rodnerr V.W. (2000) : 25th edition Harper's Biochemistry Macmillan Work Publishers.

, D.T., (1971): Introduction to Practical Biochemistry Tata Mc Graw Hill Publishing Co. Ltd., Bombay.

L. and Lox M.M. (2000) : 3rd edition. Lehninger's principles of

Hours of Instruction/Week : 3

Max

Objectives :

1. Be familiar with tests used for various food components.
2. Know the tests used for detection and/or estimation of substances naturally present/added to foods.
3. Understand the effect of cooking and processing on food colour flavour, texture, consistency and overall acceptability.
4. Apply this knowledge for ensuring quality of food products and/or eliminating adverse effects associated with cooking & processing.

Contents :

1. Starch cookery -
 - (a) Study the microscopic structure of different starches by iodine cooking.
 - (b) Study the gelatinization properties of food starches and factors affecting the gelatinization properties & setting of starches.
2. Sugar cookery -
 - (a) Study the effect of temperature on solubility of sugar at different concentrations at which solutions become saturated.
 - (b) Study the effect of sugar on the boiling point of water.
 - (c) Determine the effect of heat on sugar solutions and their behaviour corresponding to thread & cold water test.
 - (d) Demonstrate the process of sugar recrystallization through the preparation of fondant, fudge and shakarpara.
 - (e) Study the process of inversion, melting and caramelization of sucrose.
3. Milk cookery - determine the relative density of milk at different temperatures. effect of heat and acid on the proteins of milk.
4. Egg cookery - study the effect of cooking time on the color and acceptability of whole egg. observe the effect of method of cooking on coagulation property of eggs.
5. Visits to commercial food manufacturing packaging units and products ate developed and tested.

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2. Mody, N.I. Experimental food chemistry, Avi publishing company Westport, Connecticut.
3. A manual of laboratory techniques, National Institute of Nutrition, Hyderabad.
4. Sathe, A.V. (1999) A first course in food analysis, New age international (p) limited Publishers, New Delhi.
5. Sethi M. and Rao. E.S. (2001) Food science Experimental Methods

thermal processing.

Hydration - Effect of food properties on dehydration.

Irradiation - Food irradiation, direct and indirect effect, safety and wholesomeness of irradiated food.

Microwave heating - Properties of microwaves, microwave food processing.

Non-thermal heating.

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D.D. and Grosch, W. (1999) Food Chemistry. Springer-Verlag, Heidelberg

Parrot, S. and Parot. A (1997) Food Proteins and their Applications. Marcel Dekker Inc.

B. Austin, J. and Partridge, D.A. (1991) Vitamin C : Its Chemistry and Biochemistry. The Royal Society of Chemistry T.G. House, Science Centre, Cambridge CB4 4WF

F. (1995) Safety of Irradiated Foods Marcel Dekker Inc, New York

S.E. and Larsson, K. (editors) (1997) Food Emulsions. Marcel Dekker, New York

I. (ed) (1994) Functional Foods Chapman and Hall, Inc.

Prasad, S. (ed) (2001) Nondestructive Food Evaluation Marcel Dekker, New York.

M.P. (1991) Biotechnology in the Food Industry Prentice-Hall

L.O., and Gelardi, R.C. (1991) Alternative Sweeteners Marcel Dekker, New York.

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S.S. and Arora, J.K. (2000) Food Processing: Biotechnological Applications Asiatic Publishers Inc. New Delhi.

S.N. (2000) Food Safety - A Techno-legal Analysis Tata McGraw Hill Publishing Co. Ltd., New Delhi.

S.N. (2000) Food Additives - Characteristics - Detection and Control Tata McGraw Hill Publishing Co. Ltd.

14. Vogel A.I. (1962) 3rd Edition A Textbook of Quantitative Inorganic Chemistry. The English Language book society and Logman.

15. Raghuramulu N, Madhavan Nair and K. Kalyansundaram : Manual of Laboratory Techniques NIN, ICMR.

16. King E.J. and Wootton, I.D.P. (1956) : 3rd Edition. Modern Medical Biochemistry. J and A Churchill Ltd.

17. Phermner D.T. (1987) : 3rd Edition An Introduction to Biochemistry McGraw Hill Book Co.

18. Winton A.L. and Winton K.B. (1999) : Techniques of Food Analysis. Scientific Publishers.

19. Plummer, D.T. (1971): Introduction to practical Biochemistry. Craw Hill Publishing Co. Ltd., Bombay.

PAPER IV

ADVANCED NUTRITION AND FOOD MICROBIOLOGY

Duration : 3 hrs. Max. Marks : 100

Note : The question paper shall contain three sections. Section A contains 10 questions two from each unit of 2 marks each. The candidate is required to answer all the questions. The answers should not exceed 20 words. Section B shall contain 5 questions one from each unit of 5 marks each. Each question shall be of 5 marks. The answers should not exceed 200 words. The candidate is required to answer all the questions. Section C shall contain 5 questions of 10 marks each, one from each unit. The candidate is required to answer 3 questions. The answer should not exceed 500 words.

Objectives :

To enable the students to:

1. Understand the body composition and pattern of growth and development as influenced by nutrition.
2. Be aware of the current trends in the area of human nutrition requirements - the methods of determining nutrient requirements - current figures of nutritional requirements.
3. Interpret and critically evaluate parameters of nutritional status and assessment.
4. Know advances in the field of energy, carbohydrate, lipid and protein nutrition.
5. Know recent developments in the field of vitamins and minerals.
6. Understand the importance of vegetarian diet.

UNIT - I

1. Body composition - Normal body composition methods of measuring body composition, compositional changes during life cycle - (a) Human foetal development

UNIT - II

needs and recommended dietary allowances- general
of deriving RDA, RDA recommendations by nutrition expert
y nutrition expert groups for energy and nutrients.

rgy - Assessment of energy requirements, reference man and
factorial approach for estimating energy requirements, energy
ents during life cycle. Guidelines for the use of RDA of energy,
y in energy requirements and their implication for assessing
efficiency.

ein - Protein quality, protein requirements during life cycle,
alorie ratio of diets.

Fat intake, invisible fat and their significance in Indian diet,
fat, EFA requirements, fat requirements for various age groups,
nit of fat.

erals & Vitamins - Sodium, Potassium, trace elements, iron,
, thiamine C and Vitamin D.

: Energy content of food, Physiological fuel value-review,
ment of energy expenditure : BMR, RMR, thermic effect of
& physical activity, methods of measurement, Regulation of
metabolism - control of food intake, digestion, absorption &
ght.

ork and exercise - fueling muscles, using Glucose as a muscle
performance, fueling muscles using fat. The body response to
Power food : What should an athlete eat, principle for meeting
nutrition needs in the training diet.

anism

UNIT - III

ion to food preservations, role of bacteria and fungi, sources,
y, morphology, cultural and physiological characteristics and
ical activities.

affecting Growth of Microorganisms-intrinsic and extrinsic factors
water activity, oxidation reduction potential, nutritional
ents, temperature, relative humidity, gaseous, environment,
l structure of food and inhibitory substances.

of isolation and Detection of Microorganisms of their products

ventional methods.

id method (Newer techniques)

unological methods-fluorescent, antibody, radio immune assay,

c.

imical methods-Thermostable, nuclear, ATP measurement and

Hydrogen ion concentration (pH), Osmotic pressure, Isoe
of proteins, Solutions, Colloidal Systems - Properties
Systems, Types of Colloidal dispersion existing in food sy
gels, foams and emulsions, browning reactions in food
and non - enzymatic.

UNIT - II

1. Functional properties of food constituents in terms of th
and physiochemical properties-

(a) Polysaccharides. Sugars and Sweeteners

(i) Starch : Structure, Functional properties of Starch - G
Gelatin. Retrogradation . Dextrinization. modified food sta

(ii) Non-starch polysaccharides: Cellulose, Hemi-cellu
substances. Gums and Lignins.

(iii) Sugars and Sweeteners Functional properties
Sweeteners. Hygroscopicity, Solubility, Hydrolysis, D

Caramelization, the Maillard reaction. Crystallization. F
Food applications - Crystalline candies. Amorphous cand

sweetener.

UNIT - III

1. Functional properties of proteins in different foods during
(a) Cereals and Cereal products - Flours and flour qu

Factors affecting hydration of gluten. roles of ingredier
process. Cereal produces - Extruded foods, breakfast ce
germ, bulgar, puffed and flaked cereals.

(b) Milk and Milk Products - Milk proteins, effect of heat, e
and salt on milk protein. Processing of milk (pas
Homogenization, Evaporation, Drying and Fermentation).
- milk, butter, cream, cheese, whey and ice cream.

(c) Eggs and Egg Products - Egg proteins, Processing of
Freezing, Functional properties of egg - Coloring, Er
Denaturation and Coagulation, Foaming.

(d) Meat and Poultry - Meat proteins, Factors affecting qua
postmortem changes; Effect of cookery - Heat, pH, Salt, T

3. Fats and Oils - identification of Natural fats and oils, Flavor
fats and oils, the Technology of Edible oils and fats, Funct

fat Colour, Flour, Texture, Tenderness, Emulsifier, Cookin

UNIT - IV

1. Additional Food Constituent - Their role in improv
properties.

(i) Enzymes - Enzymes in food Processing, Carbohydrate
Lipases, Oxidoreducataase, Immobilized enzymes.

(ii) Pigments - Pigments in food processing - Chlorophyll
Anthocyanins, Flavonoids, Tannins, Betalins, Quinones, an

Instruction/week : 2 **Max. Marks : 50**

ization of recipes.
preparation and modification in basic recipes.
food production and cost calculations.
ion of menu cards of various types.
anning and table setting.
ance of account and record keeping.
fferent types of food service; institutions and study the following:
tion, physical plan and layout, menu cards, serving style, table
personnel work schedule, hygiene and sanitation, safety
es.
experience in organization and management of a college
/ hostel/ hotels.
g and preparations for special occasions birthday, festivals,
unches.

1966. Chefs Manual and Kitchen Management, B.T. Badts
, London.
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n, Willey Eastern Limited, New Delhi.
, Wood, L. Harger, V.F. and Shugert, G.S. 1977, Food Service in
ns. John Wiley and Sons, NewYork.
var, L.H. 1961, Food Service, Layout and Equipment Planning,
ey and Sons. Inc., USA.

**PAPER VI
FOOD SCIENCE**

Max. Marks : 50

The question paper shall contain three sections. Section A
questions two from each unit of 1.5 marks each. The candidate
answer all the questions. The answers should not exceed 50
on B shall contain 5 questions, one from each unit with internal
question shall be of 3 marks. The candidate is required to
questions. The answers should not exceed 200 words. Section
ain 5 questions of 5 marks each, one from each unit. The
required to answer 4 questions. The answer shall not exceed

s designed to help student to :
nowledge regarding the physical and chemical properties of the
stituents.

vegetables, fermented daily products, tea and coffee. Singl
fats, amino acids and enzymes from microorganisms.

Unit - V

1. Food Preservation-Physical methods. Chemical prese
natural antimicrobial compounds. Food Borne Diseases-in
intoxications. Bacterial and viral food borne disorders.
important animal parasites. Mycotoxins.
2. Food Sanitation-microbiology in food plant sanitation, ba
water, sewage and waste treatment and disposal. Microb
food product.
Indicators of food safety and quality-microbiological crit
and their significance.
3. HACCP system and food safety used in controlling mi
hazards.
Food control and enforcement agencies. Microbiological
food and water.

**PRACTICAL
PART A**

Hours of Instruction/week : 3 **Max.**
Objectives :

The aim of the course is to :

1. Familiarize students with basic techniques used in studies
in nutritional sciences.
2. Acquaint students with the methods of estimating nutrient r
3. Orient students towards planning of metabolic studies.

Contents :

1. Estimation of protein quality using different methods - PE
NDP - Cal %
2. Assessment of nutritional status of 0-5 years old children us
growth chart-weight for age, height for age. weight for hei
thickness, head & chest circumference & various other in
3. Field Observation on some nutritional problems-case stud
the nutritional status using anthropometry, clinical a
biochemical estimations & dietary survey.

PART B

Contents :

1. Cleaning and sterilization procedures for glassware.
2. Preparation and sterilization of laboratory media.
3. Staining of bacteria-gram's staining, use of oil imm

Inc. Missouri, USA.

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 ology and Immunity II : Systematic Bacteriology 7th edition
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 ley and sons inc.

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 rs Inc, Maryland.

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 onal Students Edition.

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 entals and Frontiers, ASM Press, Washington, D.C.

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 rnational (P) Ltd.

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ant, C and D.F. Splitls Toesser (1992) : Compendium of Methods
 iological Examination of Foods 3rd Edition American Public
 ssociation, Washington. D.C.

e; Oslan, JA. Shike, M. and Ross, A.C. (editors) (1999) Modern
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 ert consultation Technical report series 724 WHO, Geneva.

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10. Ecology of Foods and Nutrition.
11. Metabolism
12. Circulation.
13. Proc. Nutr. Soc. India.
14. Indian Journal of Nutrition and Dietetics.
15. NFI Balletin-Bulletin of Nutrition Foundation of India.
16. Lancet.
17. Br. J. Nutrition.

**M.Sc. Final
 PAPER V**

INSTITUTIONAL FOOD SERVICE MANAGEMENT

Duration : 3 hrs. Max. Mar

Note : The question paper shall contain three section
 contains 10 questions two from each unit of 1.5 marks each. T
 is required to answer all the questions. The answers should n
 words. Section B shall contain 5 questions, one from each uni
 choice. Each question shall be of 3 marks. The candidate i
 answer all questions. The answers should not exceed 200 w
 C shall contain 5 questions of 5 marks each, one from ea
 candidate is required to answer 4 questions. The answer sha
 500 words.

Objectives :
 To enable the students to understand the process of plannin
 and controlling the management of food and other resources i

Unit I

1. Types of Food Service Institutions.
2. Definition of Catering Management.
3. Principles of Management.
4. Functions and Tools of management in food service inst

Unit II

1. Personnel Management.
2. Selection and training, desirable qualities.
3. Menu Planning.
4. Types and writing of menu.
5. Food Service.
6. Styles of service.

Unit III

1. Meal service management.
2. Quantity food production.
3. Standardization of recipes.
4. Quality control, use of left over foods.