

**University of Rajasthan
Jaipur**

SYLLABUS

M.Sc. (HOME SCIENCE)

FOOD AND HUMAN NUTRITION

(Semester Scheme)

I & II SEMESTER-2020-21

III & IV SEMESTER-2021-22

Paj/Vad
Dy. Registrar (Acad.)
University of Rajasthan

M.Sc. Home Science
FOODS AND HUMAN NUTRITION

First Semester Examination,

Scheme of Examination:

1. Each theory paper EoSE shall carry 100 marks. The EoSE will be of 3 hours duration. Part 'A' of the theory paper shall contain 10 Short Answer Questions of 20 marks, based on knowledge, understanding and applications of the topics/texts covered in the syllabus. Each question will carry two marks for correct answer.
2. Part "B" of paper will consist of four questions as suggested below except in cases where a different scheme is specified in the syllabus.
 - First question will contain 6 parts out of which 4 to be answered carrying weightage of 5 marks each. Word limit for each answer will be 50-70 words.
 - There shall be 3 questions (with internal choice) of 20 marks each. The word limit for each answer will be 1000 words.
3. Each laboratory EoSE will be of 100 marks and of four/six hours duration and involve laboratory experiments/exercises, and viva-voce examination with weight-age of marks in ratio of 75:25.

Course Structure:

The details of the courses with code, title and the credits assigned are as given below.

Abbreviations used:

Subject Code: FHN

Course category:

CCC: Compulsory Core Course

ECC: Elective Core Course

SSECC: Self Study Elective Core Course

SSCCC: Self Study Compulsory Core Course

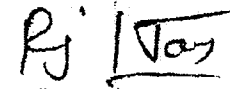
DIS: Dissertation

Contact hours

L: Lecture

T: Tutorial

P: Practical


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First Semester

S. No.	Subject Code	Course Title	Course Category	Credit	Contact Hours Per Week					EoSE Duration (Hrs)	
					L	T	P	Th	P	Th	P
1.	FHN 701	Nutritional Biochemistry-I	CCC	4	4	0	0	3	0		
2.	FHN 702	Food Science and Quality Control	CCC	4	4	0	0	3	0		
3.	FHN 703	Human Nutritional Requirements	CCC	4	4	0	0	3	0		
4.	FHN 711	Human Nutritional Requirements	CCC	6	0	0	9	0	4		
5.	FHN A01	Research Methodology	ECC	4	4	0	0	3	0		
6.	FHN A02	Human Physiology	ECC	4	4	0	0	3	0		
7.	FHN A11	Nutritional Biochemistry-I	ECC	4	0	0	6	0	4		
8.	FHN A12	Food Science and Quality Control	ECC	4	0	0	6	0	4		
9.	FHN A13	Human Physiology	ECC	2	0	0	3	0	4		
				36							

CCC = 18, ECC = 18
Total = 36 credits

3

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2.	FHN 702	Food Science and Quality Control	CCC	4	4	0	0	3	0		
3.	FHN 703	Human Nutritional Requirements	CCC	4	4	0	0	3	0		
4.	FHN 711	Human Nutritional Requirements	CCC	6	0	0	9	0	4		
5.	FHN A01	Research Methodology	ECC	4	4	0	0	3	0		
6.	FHN A02	Human Physiology	ECC	4	4	0	0	3	0		
7.	FHN A11	Nutritional Biochemistry-I	ECC	4	0	0	6	0	4		
8.	FHN A12	Food Science and Quality Control	ECC	4	0	0	6	0	4		
9.	FHN A13	Human Physiology	ECC	2	0	0	3	0	4		
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5.	FHN A01	Research Methodology	ECC	4	4	0	0	3	0		
6.	FHN A02	Human Physiology	ECC	4	4	0	0	3	0		
7.	FHN A11	Nutritional Biochemistry-I	ECC	4	0	0	6	0	4		
8.	FHN A12	Food Science and Quality Control	ECC	4	0	0	6	0	4		
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SEMESTER I

NUTRITIONAL BIOCHEMISTRY- 1(THEORY)

Paper Code : FHN 701

Credits: 4

Max. Marks : 100

Teaching Hours : 4 Hours / Week

Total Teaching Workload: 60 Hours/ Semester

Objectives :

1. To augment the biochemistry knowledge acquired at the undergraduate level.
2. To understand the basic nature of bio molecules.
3. To become proficient for specialization in nutrition.
4. To understand the mode of action of hormones in the human body.

Contents:

UNIT- I

1. **Carbohydrates:** classification, isomers, ring structure, proof of ring structure, reaction due to CHO group, sugar derivatives of biological importance, polysaccharides (homoglucans and heteroglucans), detailed structure of starch.
2. **Lipids:** Classification, Structure and chemical properties and characterization of
 - Saturated and unsaturated, Fatty acids, essential Fatty acids and their importance
 - Steroids
 - Fat
 - Phospholipids: Rancidity – Definition, types, mechanism, prevention

UNIT- II

3. **Proteins:** Importance, classification of amino acids (Essential and Non Essential Amino Acids), reactions of amino acids, structure of proteins, properties, proof of peptides bond, methods of separation and determination of amino acids and peptides, estimation of amino acid sequence.
4. **Nucleic Acids :** Structure , importance and role of
 - Bases
 - Nucleotides
 - Nucleosides
 - DNA
 - RNA
 Synthesis of DNA & RNA (In Brief)

UNIT- III

5. **Hormones:** mode of action and biochemical role of
 - Interstitial Cell Stimulation Hormones
 - AdrenoCortico Tropic Hormone
 - Follicle Stimulating Hormone
 - Growth Hormone
 - Thyroid Stimulating Hormone
 - Steroidal Hormone (Adrenal Cortex, Sex Hormones)
6. **Blood Chemistry** Composition, haemoglobin, erythropoeisis, plasma proteins (Types, properties and methods of separation of plasma proteins), coagulation of blood.

References :

1. Martin DW, Mayes PA and Rodwell VW. Harper's Review of Biochemistry. 19th Edition. LANGE Medical Publications, MARUZEN Asia, 1983.
2. Pike RL and Brown ML. NUTRITION an Integrated approach. 3rd Edition, John Wiley and Sons, New York, 1984.
3. Oser BL. Hawk's Physiological Chemistry. 14th Edition. McGraw Hill Book co. New York, 1965.
4. Nelson DM and Core MM. Principles of Biochemistry 4th ed. Freeman & Co., 2005.
5. Devlin TM. Text Book of Biochemistry with clinical Correction, 5th ed. Wiley & Sons, 2002.
6. Chatterjee MN, Shinde R. Textbook of Medical Biochemistry. 4th Edition, Jaypee Brothers Medical Publishers (P) Ltd. New Delhi, 2000.
7. West ES, Todd WR, Mason HS and Van Bruggen JT. Textbook of Biochemistry. 4th Edition. MacMillan Co. Collier Ltd. London, 1974.
8. Murray RK, Granner DK, Meyer PA and Rodwell VW. Harper's Illustrated Biochemistry. 26th edition. McGraw Hill Asia, 2003.
9. Robinson CH and Lawler MR. Normal and Therapeutic Nutrition, Macmillon, New York, 1986.
10. Lehninger AR. Biochemistry. 2nd Edition. Kalyani Publishers, 1975.
11. White A, Handler P and Smith EL. Principles of Biochemistry. McGraw Hill Book Co., New York, 1959.

FOOD SCIENCE AND QUALITY CONTROL (THEORY)**Paper Code : FHN 702****Credits: 4****Max. Marks : 100****Teaching Hours : 4 Hours / Week****Total Teaching Workload: 60 Hours/ Semester****Objectives :**

1. To enable students to understand the physico-chemical properties of foods.
2. To make the students aware about effects of common food processing techniques on food.
3. Understand and know various aspects of food product development.

Contents :**UNIT- I**

1. Physical, chemical and functional properties of protein, carbohydrates, lipids, water, pigment and flavours.
2. Physical Properties of Food -Hydrogen – ion concentration, oxidation – reduction potentials, surface tension, adsorption, viscosity, plasticity, iso-electric points or proteins, colloidal chemistry of foods - sols, gels, foams and emulsions.

UNIT- II

3. Food Processing Technique: freezing, thermal processing, dehydration, irradiation
4. Chemical, physical nutritional alteration occurring in food products during food processes: freezing, thermal processing, dehydration, irradiation and environmental control.
5. Quality control and management.

UNIT- III

6. Important food quality attributes
 - Sensory quality - colour, texture, flavor and taste
 - Microbiological quality nutritional quality evaluation for food products.
 - Food Adulteration
 - Self life studies

7	<p>New Product Development</p> <ul style="list-style-type: none"> • Market Research • Consumer dynamics • Process of development and standardization • Labeling • Marketing • Quality Evaluation • Entrepreneurship
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References :

1. Manay NS and SheelaKrishnaswamy M. Foods Facts and Principles.3rd edition,New Age International (P) Limited, publishers, New Delhi, 2008.
2. Potter NM. Food Science, The AVI Publishing Co., Inc., Connecticut, 1995.
3. Fennema OR. Food Chemistry. Marcell Dekker, Inc., New York,1996.
4. Charley H. Food Science, John Wiley and Sons,Inc., New York,1982.
5. Lowe B. Experimental Cookery. John Wiley and Sons, Inc. New York, 1955.
6. Meyer LH. Food Chemistry, CBS Publishers and Distributors, New Delhi,2004.
7. Kramer A and Twig B. Quality Control for the Food Industry. Vol. I and II, AVI Publishing Co.,London, 1984.
8. Hubbard MR. Statistical quality control for the food industry. Van Nostrand Reinhold, New York, 1990.
9. Fuller GW. New Food Product Development from Concept to Market Place, CRC Press, New York, 1999.
10. Winbond W. Techniques of Food Analysis, Allied Scientific Publishers, 1999.
11. Chandrashekhar U. Food Science and Applications in Indian Cookery, Phoenix Publishing House, 2002.

HUMAN NUTRITIONAL REQUIREMENTS (THEORY)

Paper Code :FHN 703

Credits: 4

Max. Marks :100

Teaching Hours :4 Hours/Week

Total Teaching Workload :60 Hours/Semester

Objectives :

1. To understand the basis of human nutritional requirements and recommendations through life cycle.
2. To understand the methods of evaluating protein quality and improving the same.
3. To understand the nutritional requirements in special conditions.

Contents :

UNIT- I

1. Nutritional requirements and recommended allowances for macro and micro nutrients for the entire life span (infancy to old age).
2. A critical review of the following:
 - Methods of determining requirements and allowances and body weights
 - Energy requirements- units, definition, assessment, methods for determining requirements, energy requirements for infants, children, adolescents, adults, pregnancy, lactation.
 - Protein requirements – protein quality and protein requirements, human amino acid

	<p>requirements, quality of protein, methods for arriving at RDAs for Indians, protein requirements during pregnancy, lactation, growth – infants, children and adolescents, adults, protein energy ratio</p> <ul style="list-style-type: none"> • Lipid requirements –functions of fatty acids, recommendations of dietary fat, RDAs for Indians, sources of fat, recommended intakes, quality of fat. • Dietary fibre – nutritional and health significance, requirements • Mineral requirements -calcium, phosphorus, magnesium, sodium, potassium, iron and zinc- Dietary requirements for different physiological ages and states. Methods for estimating requirements, dietary deficiency, biochemical functions, stores, sources, • Trace elements requirements – iodine requirements, deficiency, losses, RDAs
UNIT- II	
3.	<p>A critical review of the following:</p> <ul style="list-style-type: none"> • Vitamin requirements – Water soluble vitamins – thiamine, riboflavin, niacin, pyridoxine, folic acid, Vitamin B12, ascorbic acid-Functions, sources, requirements, deficiency, stability during processing • Fat soluble vitamins – vitamin A and vitamin D– significance, deficiency, dietary sources, requirements, role.
4.	Dietary guidelines for Indians
5.	Critical evaluation of International recommended dietary allowances – American, Canadian, FAO/WHO/UNU.
6.	<p>Nutrition requirements for special conditions</p> <ul style="list-style-type: none"> • Natural calamities and emergencies –floods, earthquakes, famine/drought • Gastronomics • High altitude • Extreme environmental temperatures-hot and cold
UNIT- III	
7.	<p>Evaluation of protein quality</p> <ul style="list-style-type: none"> • Analytical methods for the determination of nitrogen and amino acids in foods. • Evaluation of protein quality of foods from their amino acids content • Biological methods • Clinical methods • Biochemical methods • Relationship of stress and physiological state to the biological evaluation of protein quality.
References :	
<ol style="list-style-type: none"> 1. Evaluation of protein quality. Publication 1100, National Academy of Sciences, National Research Council, Washington, DC, 1963. 2. Nutritional evaluation of protein foods. PL Pellet and VR Young, The United Nations University, 1980. 3. Raghuramulu N, Madhvan Nair K and Kalyansundaram S. A laboratory of manual techniques, NIN & ICMR Hyderabad, 2003. 4. Swaminathan M. Essentials of Foods and Nutrition, The Bangalore Printing & Publishing Co. Ltd. II ed., 2008. 5. Goodhart and Shills ME. Modern Nutrition in Health and Disease, Henry Kimpton Publishers, USA, 1974. 6. Pike RL and Brown ML. Nutrition an Integrated Approach, John Wily and Sons, NewYork, 1984. 	

7. Energy and protein requirements. Report of Joint FAO/WHO/UNU Experts Consultation, Technical Report Series of No. 724, WHO, Geneva, 1985.
8. Anonymous, Nutrient Requirements and Recommended Dietary Allowances for Indians, ICMR, Hyderabad, 2010.
9. Human energy requirements. Report of Joint FAO/WHO/UNU Expert Consultation, FAO Technical Report Series No. 1, WHO, Geneva, 2004.
10. Protein and amino acid requirements in human nutrition. Report of Joint FAO/WHO/UNU Expert Consultation, Technical Report Series No. 935, WHO, Geneva, 2007.
11. Word Review of Nutrition and Dietetics, Vol. 32, Kargel, Basel, 1978.
12. Vitamin and Mineral Requirements in Human Nutrition, Report of Joint FAO/WHO Expert Consultation on Human vitamin and mineral requirements. WHO, Geneva, 2004.
13. Indicators for Assessing Vitamin A Deficiency and their Application in Monitoring and Evaluating Intervention Programme. Micronutrient series. WHO/NUT/96.10. WHO, Geneva, 1996.

HUMAN NUTRITIONAL REQUIREMENTS (PRACTICAL)

Paper Code : FHN 711

Credits: 6

Max. Marks:100

Teaching Hours :3 Practicals/Week (3 Hours/ Practical)

Total Teaching Workload : 45Practicals/Semester

Objectives :

1. To calculate requirements of energy, protein, minerals and vitamins for different age groups
2. To compare intakes with the RDAs
3. To evaluate protein quality by using different methods

Contents:

Practicals

1. **Energy requirements**
 - Calculation of BMR using different methods- 3 sets of data
 - Calculation of energy requirement for
 - Reference adult man and woman
 - Adults of different body weights and age categories
 - Infants
 - Children of 2-3 ages
 - Adolescents of 2-3 ages
 - Pregnant woman
 - lactating woman
 - Energy balance study for one week.
 - Calculation of energy requirement by indirect calorimetry
2. **Protein requirements**
 - Calculation of protein allowances for
 - Reference adult man and woman
 - Infants, and children of 2-3 ages
 - Adolescents of 2-3 ages
 - Pregnant woman
 - lactating woman
 - Protein energy ratio for different age groups

3. **Lipids**

- Comparison of fatty acid composition profile of various edible fats and oils available in the market.
- Critical analysis of labelling of processed foods for fatty acid composition profile.
- Determination of the types of fat and fat composition of the diets through 24 hour recall of a subject and compare it with suggested values for SFA, PUFA, MUFA and Essential fatty acids.
- Calculation of dietary fatty acids according to FAO/WHO recommendations for
 - Adult man and woman
 - Pregnant and lactating woman
 - Children of different ages
 - Adolescents of different ages

Fibre

4. Determination of dietary fibre through 24 hour recall and comparison with suggested values for fibre

Minerals & Vitamins

- 5.
- Estimation of calcium requirement through factorial approach
 - Visit to DEXA centre for observation of bone density measurement.
 - Estimation of iron requirement during pregnancy
 - Research design for calcium and iron balance
 - Determination of Vitamin C requirement using load test
 - Make a list of foods which fulfill one day's requirement of the following nutrients:
 - i) Calcium
 - ii) Sodium
 - iii) Iron
 - iv) Vitamin A
 - v) Potassium
 - vi) Folic acid

Dietary Guidelines

- Power point presentation of Dietary Guidelines for Indians.

6. **Nutritional requirements for Disaster Management.**

- Plan a day's menu and rations for a relief camp.

7.

Evaluation of protein quality

- Calculation of chemical score of different foods and food products.
- Calculation of NDPCal% of

8.

- A snack/ meal
- A mix for PDS system.

Research design for evaluation of protein quality by biological and clinical methods.

RESEARCH METHODOLOGY (THEORY)

Paper Code : FHN A01

Credits: 4

Max. Marks : 100

Teaching Hours : 4 Hours/Week

Total Teaching Workload: 60 Hours/Semester

Objectives :

1. To understand the basic concepts of research methodology.
2. To be able to understand the various steps of research methods.
3. To enable the students to understand various research designs, sampling techniques, methods of collecting data.
4. To enable the students to prepare and present report for dissertation purpose.

Contents:**UNIT-I**

1. Research purpose and objectives.
2. Definition and Identification of research problem, selection of problem, hypotheses, basis assumption and limitation of problem.
3. Review of literature: Importance, sources and writing review of literature.
4. Research designs: Purpose and types.

UNIT-II

5. Technique of sampling- Census and sampling methods, probability and non-probability sampling procedures, sample size.
6. Data gathering instruments, measurements and scales, reliability and validity of measuring instruments- Questionnaire, Schedule, Score card, Checklist.
7. Methods of collecting data: Questionnaire, interview technique, observation, case study, focus group discussion.

UNIT-III

8. Planning, executing and analysis of large scale surveys with special emphasis of surveys in Home Science.
9. Presentation and preparation of report for dissertation publication.
10. Bibliography: Importance of method of writing references of book, journals, proceedings and websites.

References :

1. Simpson, George, Kafka, Fritz. Basic statistics: a textbook for the first course , Oxford and IBH Publishers, New Delhi, 1977.
2. Taro Y. Sampling Theory, Prentice-Hall Publishers, New Delhi, 1967.
3. Snedecor and Cochran, Statistics Methods, Oxford and I.B.H. Publishers, Calcutta, 1968.
4. Gupta SP. Statistics Methods, Sultan Chand and Co., New Delhi, 2008.
5. Good CV and Carter DE. Methods of Research-Educational Psychological Application, Century Craft, New York, 1954.
6. Kerlinger FA. Foundation of Behavioral Research, Century Craft, New York, 1966.
7. Young PV and Schind CG. Scientific Social Survey and Research, Prentice Hall, New Delhi, 1968.
8. Philips BS. Social Research, Strategy and Tactics, MacMillan, New York, 1976.
9. Mussed P. Hand book of Research Methods in Child Development, John Wiley & Sons Inc, 1960.
10. Devdas RP and Kulandaivel. Hand Book of Research Methodology, Sri Ram Krishna mission Vidhyalaya, 1971.
11. Krishnaswamy RP. Methodology of Research in Social Sciences, 1st edition, Himalaya Publishing house, Mumbai, 1993.

HUMAN PHYSIOLOGY (THEORY)

Paper Code : FHN A02

Credits: 4

Max. Marks : 100

Teaching Hours : 4 Hours/Week

Total Teaching workload: 60 Hours /Semester

Objectives :

1. To familiarize the students with the basic anatomy of human body.
2. To enable the students to understand the physiological processes.

Contents :

UNIT- I

Hours

1. Cell structure and functions- levels of cellular organizations and functions-organelles, nucleus, cytoplasm, tissues and systems. Functions of lysosomes, endoplasmic reticulum, Golgi apparatus and mitochondria, Mitosis. Structure of cell membrane, active and passive transport of nutrients intercellular communications.
2. Endocrine system: Physiological functions of Pituitary, Thyroid, Parathyroid, Adrenal and Reproductive Hormones.
3. Digestive System: Structure and function of various organs of gastro-intestinal tract, secretory, digestive and absorptive functions. Role of liver, gall bladder and pancreas in digestion. Hormones of the GIT, gut microbiota.

UNIT- II

4. Respiratory System: Structure, function, mechanism of respiration-Pulmonary ventilation, Role of lungs in the exchange of gases. Transport of oxygen and CO₂ in the lungs, blood and tissues. Role of hemoglobin and buffer systems. Regulation of respiration.
5. Circulatory System: Structure and function of the heart and blood vessels. Regulation of cardiac output, cardiac cycle, blood-pressure and factors affecting it.
6. Excretory System: Anatomy and physiology of kidneys, structure and functions of nephron. Urine formation. Normal and abnormal constituents of urine. Role of kidney in maintaining pH of blood, water, electrolytes, acid-base balance, diuretics.

UNIT- III

7. Regulation of body temperature: Thermo genesis, thermolysis, pyrexia, hypothermia, role of skin in maintaining body temperature.
8. Musculo-skeletal system: structure and functions of bone, cartilage and connective tissue and muscle fibres. Disorder of the skeletal system. Types of muscles, structure and function.
9. Changes in muscle and bone mass during ageing and disease. Major muscles used for voluntary and involuntary actions.

References :

1. Guyton AC and Hall JB. Textbook of Medical Physiology 9th Edition, W.B. Saunders, Prime Books (Pvt.) Ltd Bangalore, 1996.
2. Wilson KJW and Waugh A. Ross and Wilson Anatomy and Physiology in Health and Illness 8th Edition, Churchill Livingstone, 1996.
3. Chatterjee CC. Human Physiology Volume I and II, 11th Edition, Medical Allied agency Calcutta, 1992.
4. Kale CA and Neil F Samean. Wright's Applied Physiology, 1974.
5. Griffith's M. An introduction to Human Physiology, MacMillian and Co., 1972.
6. Mc Ardle WD, Katch FI and Katch VL. Exercise physiology, energy nutrition and human performance 4th Edition, Williams and Williams, Baltimore, 1996.
7. Jain AK: Textbook of Physiology, Volume I and II, Avichal publisher Co., New Delhi, 2012.

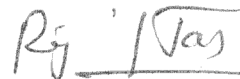
NUTRITIONAL BIOCHEMISTRY – I (PRACTICAL)**Paper Code : FHN A11****Credits: 4****Max. Marks :100****Teaching Hours : 2 Practicals / Week(3 hours/Practical)****Total Teaching Workload : 24 Practicals/ Semester****Objectives :**

1. To demonstrate the need for careful planning and organization of laboratory work and skilful execution of practical/experiments.
2. To develop an understanding of the principles of various biochemical techniques.
3. To develop competence in biochemical estimations.
4. To apply the knowledge acquired from the biochemical estimation to human nutrition.

Contents :Practicals

1.	Principles in biochemistry – Introduction to working principles of : <ul style="list-style-type: none"> • Spectrophotometry • Chromatography • Electrophoresis • Acid base titration, redox titration 	2
2.	Cleaning of glassware with soap, chromic acid and distilled water	2
3.	Titrimetric estimations <ul style="list-style-type: none"> • Determination of strength of acids and bases (single and double titration) • Oxidation reduction titration - by $KMnO_4$ • Estimation of vitamin C in lemon juice or any other fresh food stuff. 	6
4.	Preparation of buffers and measurements of their pH with indicators and pH meter.	3
5.	Estimation of Protein by Kjeldahl's Method.	5
6.	Colorimetric estimations (in unknown solution) <ul style="list-style-type: none"> • Glucose • Cholesterol 	6

FOOD SCIENCE AND QUALITY CONTROL (PRACTICAL)**Paper Code : FHN A12****Credits: 4****Max. Marks : 100****Teaching Hours : 2 Practicals / Week (3Hours/Practical)****Total Teaching Workload : 24 Practicals/Week**


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Objectives:

1. To develop an understanding of the principles of various techniques of nutritional assessment.
2. To develop competence in recording and interpretation of anthropometric measurements.
3. To develop skills in conducting dietary surveys and data interpretation.
4. To develop understanding and skills in clinical observation.

Contents :Practicals

1. Physical examination of various food grains.
2. Detection of adulteration: Milk, turmeric powder, pure ghee, wheat flour, khoa.
3. Determination of the Moisture content in two raw and two processed foods.
4. Determination of the acid insoluble ash in two raw and two processed foods,
5. Determination of the Crude fibre content in two raw and two processed foods.
6. Determination of the Protein Content in two raw and two processed foods usingkjeldahl method.
7. Determination of fat content in two raw and two processed foods.
8. Determination of the Taste Threshold for the Different Sensations – sweet, Salty, Sour.
9. Survey of convenience and ready to eat foods available in markets food list with nutrition, composition and food label.
10. Systematic development of a new food product*and its standardization within the BIS stipulated food standards and regulation and evaluate quality parameters for acceptability, labelling and cost of the finished product.
11. Visit to small scale food product unit

HUMAN PHYSIOLOGY (PRACTICAL)**Paper Code : FHN A13****Credits: 2****Max. Marks : 100****Teaching Hours :1 Practical / Week (3Hours/Practical)****Total Teaching Workload:15Practicals /Semester****Objectives:**

- 1.To make students understand the various Biochemical techniques used in for diagnosis of disease..
- 2.To make students understand test of fitness.

Contents :

1. Use of Spirometer to estimate respiratory quotient visit for demonstration
Calculation of values for different age groups and ages
 - Adults
 - Children & adolescents
2. Estimation of hemoglobin by two techniques to be used in
 - field
 - laboratory
 Estimation of Blood pH
3. Measurement of blood pressure
4.
 - Conditions required for measurement
 - Measurement of different age groups
 Tests to measure physical fitness-
5.
 - Fitness test
 - Physical endurance test
 Urine Estimations
6.
 - Albumin in urine
 - Glucose in urine
 - Acid base balance in urine
7. Case study of endocrine disorder patient