SYLLABUS FOR

3-Year Multidisciplinary UGProgramme

(Minor Discipline)

And

Special Minor Course for Honours with Research

PHYSIOLOGY

2023

WEST BENGAL STATE UNIVERSITY

Course and Curriculum with effect from 2023-2024

Name of Programme: 3-Year Multidisciplinary UG Programme

Minor Course in Physiology

Programme Specific Objectives:

The Physiology Minor Programme is designed to provide students with a strong foundational understanding of the structure and functions of the human body, with special emphasis on physiological mechanisms, biochemical principles, and their clinical correlations. The programme aims to develop a comprehensive knowledge of Body Fluids, Cardiovascular, Respiratory, Gastrointestinal, Nutritional, Excretory, Nervous, Endocrine, Reproductive, Sports, and Environmental Physiology. It equips students with essential laboratory skills for accurate physiological measurements, clinical diagnostics, and experimental observations through practical exercises involving tissue identification, blood analysis, pulmonary function testing, and cardiovascular assessments. The curriculum further seeks to cultivate an analytical and research-oriented approach by linking theoretical concepts with practical demonstrations, fostering a deep understanding of how organ systems interact in maintaining homeostasis. In addition, it prepares students for interdisciplinary learning by integrating aspects of Physiological Chemistry, Nutrition, Public Health, and Ergonomics, thereby creating awareness about applied physiology in health, disease prevention, sports performance, and environmental adaptation. Overall, the programme aims to instil scientific curiosity, professional ethics, and practical competence necessary for higher studies, biomedical research, or allied health careers.

Outcome of the Programme:

Upon successful completion of the Physiology Minor Programme, students will be able to demonstrate a comprehensive understanding of human physiological systems, their regulatory mechanisms, and their pathological alterations. They will acquire the ability to interpret physiological data, analyse clinical parameters, and correlate experimental findings with theoretical concepts. Learners will develop proficiency in basic laboratory techniques such as preparation of blood smears, determination of blood groups, measurement of arterial blood pressure, electrocardiography, pulmonary function tests, enzyme assays, and nutritional assessments. They will also gain a clear insight into metabolic processes, hormonal regulation, nerve–muscle coordination, and reproductive physiology, along with practical knowledge of sports and exercise physiology, public health nutrition, and environmental influences on human health. The programme outcome includes the development of critical thinking, problem-solving ability, and teamwork skills essential for scientific and community-based work. By the end of the course, students will be well-prepared to apply their physiological knowledge in diverse fields including healthcare, sports science, nutrition, education, and biomedical research, with a strong sense of social responsibility and ethical commitment towards promoting public health and human wellbeing.

Basic Structural Framework of Syllabus

SEMESTER	COURSE CODE (Multidisciplinary Program)	COURSE CODE (Honours/Honourswith Research)	NAME OF THE PAPER	DISTRIBUTION OF CREDITS	TOTAL CREDITS
I	PHYCOR101T	PHYMIN101T	M1T: BODY FLUIDS AND CARDIO- RESPIRATORY PHYSIOLOGY	THEORY- 3 CREDITS	5 CREDITS
	PHYCOR101P	PHYMIN101P	M1P: BODY FLUIDS AND CARDIO- RESPIRATORY PHYSIOLOGY LAB	PRACTICAL - 2 CREDITS	
II	PHYCOR202T	PHYMIN202T	M2T:PHYSIOLOGICAL CHEMISTRY, GASTROINTESTINAL AND NUTRITIONAL PHYSIOLOGY AND EXCRETION	THEORY- 3 CREDITS	5 CREDITS
	PHYCOR202P	PHYMIN202P	M2P:PHYSIOLOGICAL CHEMISTRY, GASTROINTESTINAL AND NUTRITIONAL PHYSIOLOGY AND EXCRETION LAB	PRACTICAL - 2 CREDITS	
III	PHYCOR303T	PHYMIN303T	M3T: NERVE- MUSCLE PHYSIOLOGY AND NERVOUS SYSTEM	THEORY- 3 CREDITS	5 CREDITS
	PHYCOR303P	PHYMIN303P	M3P: NERVE- MUSCLE PHYSIOLOGY AND NERVOUS SYSTEM LAB	PRACTICAL - 2 CREDITS	
IV	PHYCOR404T	NA	M4T: ENDOCRINOLOGY AND REPRODUCTION	THEORY- 3 CREDITS	5 CREDITS
	PHYCOR404P	NA	M4P: ENDOCRINOLOGY AND REPRODUCTION LAB	PRACTICAL -2 CREDITS	

V	PHYCOR505T	NA	M5T: SPORTS AND EXERCISE PHYSIOLOGY	THEORY- 3 CREDITS	5 CREDITS
	PHYCOR505P	NA	M5P: SPORTS AND EXERCISE PHYSIOLOGY LAB	PRACTICAL - 2 CREDITS	
VI	PHYCOR606T	NA	M6T: PUBLIC HEALTH AND COMMUNITY NUTRITION AND ENVIRONMENTAL PHYSIOLOGY	THEORY- 3 CREDITS	5 CREDITS
	PHYCOR606P	NA	M6P: PUBLIC HEALTH AND COMMUNITY NUTRITION AND ENVIRONMENTAL PHYSIOLOGY LAB	PRACTICAL - 2 CREDITS	
VII	NA	PHYSMC701T	SM1T: SPORTS PHYSIOLOGY AND ERGONOMICS	THEORY-3 CREDITS	5 CREDITS
	NA	PHYSMC701P	SM1P: SPORTS PHYSIOLOGY AND ERGONOMICS LAB	PRACTICAL - 2 CREDITS	

SEMESTER I

PHYCOR101T/ PHYMIN101T: (THEORY)
BODY FLUIDS AND CARDIO-RESPIRATORY PHYSIOLOGY
3 Credits (1+1+1)

Course Objective

The course is designed to endow learners with a comprehensive understanding of the physiological organization and functional dynamics of body fluids, the cardiovascular system, and the respiratory system. It seeks to elucidate the intricate mechanisms underlying blood formation, circulation, gas exchange, and regulatory control of cardiac and respiratory activities. Through an integration of theoretical and practical components, the course aspires to cultivate analytical insight, experimental proficiency, and clinical orientation in students—thereby fostering a deep appreciation of the harmony between structure and function in human physiology.

Topics in Details

Body Fluids

Blood- formation, composition, circulation, and functions. Blood vessels: artery, vein, capillaries. Hemoglobin- structure, types, functions. Blood disorders- anemia, thalassemia, leukemia, hemophilia. Blood groups (ABO & Rh systems), Blood transfusion, and Blood storage. Lymph - formation, composition, circulation, and functions.

Cardiac Physiology

Anatomy of Heart. Electrical Activity of the heart: Electrocardiogram, Cardiac Arrhythmias, Hypertrophy and Cardiomyopathy. Cardiac Cycle, Heart sounds, Cardiac Output. Cardiovascular regulatory Mechanisms: Local, Hormonal, Neural. Arterial blood pressure, Korotkoff sounds. Coronary Circulation.

Respiratory Physiology

Anatomy of Respiratory tract and Lungs. Pulmonary Function: Mechanics of breathing, Gas Exchange in the lungs & tissues, Pulmonary Circulation, Other Functions of the Respiratory System. Oxygen & Carbon Dioxide Transport, Hypercapnia (respiratory acidosis) and hypocapnia (respiratory alkalosis). Neural & Chemical Regulation of Respiration. Forms of Hypoxia. Chronic obstructive pulmonary disease (COPD). Artificial Respiration.

PHYCOR101P/ PHYMIN101P: (PRACTICAL)
BODY FLUIDS AND CARDIO-RESPIRATORY PHYSIOLOGY LAB
2 Credits

Topics in Details

Study and Identification of Stained Sections of Different Mammalian Tissues and Organs- Artery, Vein, Trachea, Lungs, Bone

Preparation of blood smear and identification of blood cells. Determination of blood group.

Sphygmomanometric measurement of arterial blood pressure at rest. Measurement of oxygen saturation by pulse oximeter before and after exercise. Measurement of peak expiratory flow rate.

Demonstration: Differential count of WBC. Total count of RBC and WBC. Bleeding time and clotting time. Pneumographic recording of effects of talking, drinking, laughing, coughing, exercise, hyperventilation and breath holding. Study of Kymograph and its accessories. Electrocardiogram. Cardiopulmonary Resuscitation (CPR).

Course Outcomes

Upon successful completion of this course, students will acquire a profound understanding of the physiological organization and functional interrelationships of the body fluids, cardiovascular, and respiratory systems. They will be able to elucidate the composition, formation, and circulation of blood and lymph, and comprehend their vital roles in maintaining homeostasis. Learners will develop the ability to interpret electrocardiograms and identify common cardiac abnormalities, alongside a conceptual grasp of cardiac cycle dynamics, blood pressure regulation, and respiratory mechanisms. Through practical training, they will attain competence in blood grouping, cellular identification, and the measurement of physiological parameters such as arterial pressure, oxygen saturation, and pulmonary function. The course further enables students to correlate theoretical knowledge with clinical relevance, fostering insight into disorders like anemia, respiratory acidosis and alkalosis, hypoxia, and chronic obstructive pulmonary disease (COPD), while understanding the significance of life-saving procedures such as cardiopulmonary resuscitation (CPR). Ultimately, the course nurtures analytical thinking, experimental skill, and clinical awareness, forming a strong foundation for higher studies and professional pursuits in the biomedical sciences.

SEMESTER II

PHYCOR202T/ PHYMIN202T: (THEORY)
PHYSIOLOGICAL CHEMISTRY, GASTROINTESTINAL AND NUTRITIONAL PHYSIOLOGY AND EXCRETION
3 Credits (1+1+1)

Course Objectives

This course is designed to impart a comprehensive understanding of the biochemical and physiological foundations underlying human life processes. It aims to elucidate the structural organization, classification, and functional significance of biomolecules such as carbohydrates, proteins, lipids, nucleic acids, and enzymes, along with their roles in metabolism and regulation. Learners will explore the physiological mechanisms of digestion, absorption, and excretion, the regulation of nutritional balance, and the metabolic interrelationship between nutrients. The course also emphasizes the study of renal physiology and associated excretory pathways, integrating theoretical concepts with practical exercises that enhance analytical and experimental skills relevant to physiological chemistry and human nutrition.

Topics in Details

Physiological Chemistry

Classification, structure, Properties and Functions of Carbohydrates, Proteins and lipids, DNAs and RNAs, Enzymes. Coenzymes, Cofactor, Prosthetic Groups. Mechanism of enzyme action. Michaelis-Menten equation, Hyperbolic kinetics, Enzyme Inhibition. Factors regulating enzyme activities. Isoenzymes, Allosteric enzymes, Ribozymes, Abzymes, Rate limiting enzymes.

Gastrointestinal and Nutritional Physiology

Anatomy of Gastrointestinal tract. Digestion & absorption, Mechanism and Regulation of Gastric HCl secretion. Gastrointestinal hormones, Exocrine Functions. Gastrointestinal Diseases- Constipation, irritable bowel syndrome (IBS), inflammatory bowel disease (IBD), gastroesophageal reflux disease (GERD), functional dyspepsia, hemorrhoids, colitis, ulcers, colorectal cancer, gall stone, fatty liver disease.

BMR, RQ, RDA, SDA, NPU, Biological value of Proteins. Vitamins. Minerals. Calorie requirement. Balanced diet. ACU. Metabolism of carbohydrates, proteins and lipids.

Excretion

Anatomy and function of Renal System. Micturition. Renal Circulation, Non-excretory function of kidney. Chronic kidney disease. Other excretory organs: Skin, Liver, Large intestine, and Lungs.

PHYCOR202P/ PHYMIN202P: (PRACTICAL)
PHYSIOLOGICAL CHEMISTRY, GASTROINTESTINAL AND NUTRITIONAL PHYSIOLOGY AND EXCRETION LAB
2 Credits

Topics in Details

Qualitative tests for the identification of physiologically important substances: Hydrochloric acid, lactic Acid, Uric Acid, Glucose, Galactose, Fructose, Sucrose, Lactose, Albumin, Gelatin, Peptone, Starch, Dextrin, Urea, Glycerol, Bile salts.

Study and Identification of Stained Sections of Different Mammalian Tissues and Organs- Tongue, Salivary Glands, Esophagus, Stomach, Duodenum, Jejunum, Ileum, Large intestine, Liver, Pancreas, Kidney.

Demonstration: Identification of normal and abnormal constituents of urine. Quantitative estimation of glucose and sucrose and lactose by Benedict's method. Quantitative estimation of amino nitrogen [Sorensen's formol titration method (percentage as well as total quantity)], Urine albumin-creatinine ratio (ACR).

Course Outcomes

Upon successful completion of this course, students will acquire a profound understanding of the molecular and physiological principles governing metabolism, digestion, nutrition, and excretion. They will be able to explain the structural and functional properties of biomolecules and enzymes, interpret enzyme kinetics and regulatory mechanisms, and relate biochemical pathways to physiological processes. Learners will comprehend the anatomy and functions of the gastrointestinal and renal systems, the digestion and absorption of nutrients, and the maintenance of internal biochemical equilibrium. Through practical training, they will gain proficiency in qualitative and quantitative biochemical testing, tissue identification, and urine analysis. The course further enables students to correlate physiological chemistry with clinical and nutritional relevance, thereby fostering scientific reasoning, experimental precision, and a holistic appreciation of human physiological integrity.

SEMESTER III

PHYCOR303T/ PHYMIN303T: (THEORY)
NERVE - MUSCLE PHYSIOLOGY AND NERVOUS SYSTEM
3 Credits (1+1+1)

Course Objectives

This course is designed to provide an in-depth understanding of the physiological mechanisms governing nerve, muscle, and nervous system functions. It aims to elucidate the ionic and molecular basis of nerve excitation and conduction, synaptic transmission, and neuromuscular communication. Learners will gain insight into the structure, properties, and contractile mechanisms of skeletal, cardiac, and smooth muscles, along with the functional organization of the central, peripheral, and autonomic nervous systems. The course further aspires to acquaint students with the neural control of body activities, reflex actions, sensory perception, and higher neural functions, thereby fostering a comprehensive appreciation of the integrative role of the nervous system in maintaining homeostasis.

Topics in Details

Nerve Physiology

Introduction, Ionic basis of Excitation & Conduction, Properties of Mixed Nerves, Nerve Fiber Types, Synapses: Structure, Types, Properties, Mechanism of Synaptic Transmission through Electrical & Chemical Synapses, Neurotransmitters, Neuromodulators & Neurotrophins, Structure of Neuromuscular Junction, Mechanism of Transmission through Neuromuscular Junction.

Muscle Physiology

Introduction, Structure & Properties of Skeletal, Cardiac & Smooth Muscles, Mechanism of Skeletal, Cardiac & Smooth Muscle Contraction & Relaxation, Chemical Changes during Muscle Contraction, Isotonic & Isometric Muscle Contraction.

Nervous system

Brief Anatomy of Brain & Spinal Cord. Corticospinal tract. Structure & Functions of Central, Peripheral and Autonomic Nervous Systems. Structure of Reflex Arc. Brief Anatomy, Structure & Functions of Cerebral Cortex, Cerebellum, Thalamus, Hypothalamus, Basal Ganglia, Limbic System, Physiological Basis of Sleep, Insomnia. The Electroencephalogram. Special Senses- Vision, Audition, Olfaction & Taste.

PHYCOR303P/ PHYMIN303P: (PRACTICAL)

NERVE - MUSCLE PHYSIOLOGY AND NERVOUS SYSTEM LAB
2 Credits

Topics in Details

Study & Identification of Stained Sections of Different Mammalian Tissues and Organs: Skeletal Muscle, Cardiac Muscle , Smooth Muscle, Spinal Cord, Cerebral Cortex, Cerebellum, Skin, Tongue.

Measurement of Grip Strength. Determination of Visual Acuity by Snellen's Chart. Determination of Colourblindness by Ishihara Chart. Reaction Time by Stick Drop Test. Short Term Memory Test (Shape, Picture, Word). Two Point Discrimination Test. Experiments on Superficial (Plantar) and Deep (Knee Jerk) Reflex.

Course Outcomes

Upon successful completion of this course, students will acquire a profound understanding of the physiological principles underlying nerve impulse generation, conduction, and transmission through synapses and neuromuscular junctions. They will be able to explain the structural and functional properties of different muscle types and analyze the biochemical and mechanical aspects of muscle contraction and relaxation. Learners will comprehend the anatomy and functional significance of major brain regions, spinal cord, and neural pathways, correlating them with motor control, sensory processing, and reflex mechanisms. Through practical exercises, students will develop proficiency in assessing neuromuscular and sensory responses—such as reflex testing, grip strength measurement, reaction time, visual and color perception, and memory evaluation. Ultimately, the course nurtures analytical reasoning, experimental skill, and neurophysiological insight, forming a solid foundation for advanced exploration in neuroscience and human physiology.

SEMESTER IV

PHYCOR404T : (THEORY)
ENDOCRINOLOGY AND REPRODUCTION
3 Credits (1+1+1)

Course Objectives

This course is designed to provide learners with an in-depth comprehension of the endocrine and reproductive systems, emphasizing the structural, functional, and regulatory aspects of hormone secretion and action. It aims to elucidate the histological organization and physiological roles of major endocrine glands—pituitary, thyroid, pancreas, adrenal, parathyroid, kidneys, heart, and pineal—along with their integrated influence on metabolism, growth, and homeostasis. The course further seeks to impart knowledge of male and female reproductive physiology, encompassing gametogenesis, hormonal regulation, menstrual cycle, pregnancy, and reproductive disorders. Through a blend of theory and laboratory practice, the course aspires to foster analytical understanding, experimental precision, and clinical correlation in the field of endocrinology and reproductive physiology.

Topics in Details

Endocrine Functions of Pituitary, Thyroid & Pancreas

Pituitary Gland- Histological Structure of Anterior & Posterior Pituitary. Functions of Growth Hormone, ACTH, TSH, Pituitary Gonadotropins, Prolactin, Posterior pituitary hormones (Oxytocin, Vasopressin), Pituitary hyper- and hypo-function. **Thyroid Gland-** Histological structure of thyroid gland, Secretion of Thyroid Hormones, Transport of Thyroid Hormones, Effects of Thyroid Hormones, Hyper- and hypo-function of thyroid gland. Calcitonin: Role on Calcium Metabolism. **Endocrine Functions of the Pancreas-** Histological structure of pancreas, Secretion of Insulin, Effects of Insulin, Insulin resistance, Glucagon, Hypoglycemia & Diabetes Mellitus.

Endocrine Functions of Adrenal, Parathyroid, Kidneys, Heart & Pineal

Adrenal Gland- Histological Structure of Adrenal gland, Adrenal Medulla, Function of Medullary Hormones, Adrenal Cortex, Effects of Adrenal Androgens & Estrogens, Physiologic Effects of Glucocorticoids, Effects of Mineralocorticoids, Summary of the effects of Adrenocortical Hyper & Hypofunction. **Parathyroid Glands**- Parathormone functions: role on Calcium & Phosphate Metabolism. **Endocrine Functions of the Kidneys, Heart, & Pineal Gland-** The Renin-Angiotensin System, Erythropoietin, Atrial Natriuretic Peptide, Melatonin.

Reproduction

The Male Reproductive System: Structure, Gametogenesis, Endocrine Function of the Testes, Control of Testicular Function, Abnormalities of Testicular Function

The Female Reproductive System: The Menstrual Cycle, Ovarian Hormones, Control of Ovarian Function, Abnormalities of Ovarian Function. Mammary Gland- Structure, Development, Functions, and Mammography. Pregnancy: Physiological changes during pregnancy. Placenta: Structure & functions. Puberty, Precocious & Delayed Puberty, Menopause. Polycystic ovary syndrome (PCOS), In vitro fertilization (IVF), Intrauterine insemination (IUI).

PHYCOR404P: (PRACTICAL)

ENDOCRINOLOGY AND REPRODUCTION LAB
2 Credits

Topics in Details

Study and Identification of Stained Sections of Different Mammalian Tissues and Organs: Pituitary Gland, Pancreas, Adrenal gland, Thyroid gland, Kidney, Pineal Gland Testes, Ovary.

Demonstration: Pregnancy test from human urine by kit method. Staining (H&E) of tissue slides.

Course Outcomes

Upon successful completion of this course, students will attain a profound understanding of the endocrine control of physiological processes and reproductive functions. They will be able to explain the structure, secretion, and hormonal regulation of major endocrine glands, and correlate their hyper- and hypo-functional states with related disorders such as diabetes mellitus, thyroid dysfunction, and adrenal abnormalities. Learners will comprehend the endocrine mechanisms governing gametogenesis, menstrual regulation, pregnancy, and reproductive pathophysiology, including conditions such as PCOS, infertility, and menopause. Through practical training, students will develop competence in identifying endocrine and reproductive tissues microscopically and performing diagnostic demonstrations such as pregnancy testing. Ultimately, the course nurtures conceptual clarity, experimental skill, and clinical insight, preparing students for advanced studies and research in human physiology, endocrinology, and reproductive biology.

SEMESTER V

PHYCOR505T : (THEORY)
SPORTS AND EXERCISE PHYSIOLOGY
3 Credits (1+1+1)

Course Objectives

This course is designed to impart a comprehensive understanding of the physiological principles underlying exercise, physical performance, and sports medicine. It aims to elucidate the mechanisms of energy production during various intensities of physical activity, cardio-respiratory adaptations to exercise, and the physiological basis of fatigue, recovery, and training. The course emphasizes the importance of regular physical activity in maintaining health and wellbeing, and explores the scientific foundations of aerobic and anaerobic conditioning, nutrition, and ergogenic aids. Through theoretical study and practical experimentation, learners will develop insight into exercise testing, performance assessment, and the prevention and management of sports-related injuries, thereby fostering an integrated appreciation of human performance and fitness optimization.

Topics in Details

Sports and Exercise Physiology

Importance of regular exercise in health and wellbeing. Basic concept of Bioenergetics, Energy sources during exercise (Phosphagen, Anaerobic system and Aerobic system). Cardio-respiratory responses during different grades of exercise. Concept of excess post exercise oxygen consumption (EPOC), physiological fatigue and recovery. Aerobic work Capacity: Measurement, physiological factors and applications. Training: Principles of physical training, Training to improve aerobic and anaerobic power. Effect of overtraining and detraining. Nutritional supplements and ergogenic aids. Sports injury and its' management. Basic idea sports rehabilitation and sports medicine.

PHYCOR505P: (PRACTICAL)
SPORTS AND EXERCISE PHYSIOLOGY LAB

2 Credits

Topics in Details

Measurement of blood pressure before and after exercise. Recording of recovery heart-rate after standard exercise. Determination of VO2max by Queen's College Step Test. Measurement of body fat percentage. Six minute walk test. Measurement of endurance time by hand grip dynamometer. Modified Harvard step test and determination of physical fitness. Field visit: Gymnasium with all the modern fitness equipment.

Course Outcomes

Upon successful completion of this course, students will acquire an advanced understanding of the physiological responses and adaptations of the human body to exercise and training. They will be able to explain the bioenergetic pathways involved in energy metabolism, analyze cardio-respiratory adjustments during graded exercise, and interpret factors influencing aerobic capacity, endurance, and physical fitness. Learners will gain proficiency in assessing cardiovascular efficiency, oxygen consumption (VO_2max), muscular strength, and body composition through standardized laboratory and field tests. They will also comprehend the principles of training, overtraining, and sports nutrition, and recognize the role of ergogenic aids, sports medicine, and rehabilitation in enhancing performance and recovery. Ultimately, the course cultivates scientific acumen, practical competence, and a holistic understanding of exercise physiology applicable to health promotion, athletic excellence, and professional advancement in sports sciences.

SEMESTER VI

PHYCOR606T : (THEORY)

PUBLIC HEALTH AND COMMUNITY NUTRITION AND ENVIRONMENTAL PHYSIOLOGY
3 Credits (1+1+1)

Course Objectives

This course is designed to endow learners with a comprehensive understanding of the principles of public health, community nutrition, and environmental physiology. It aims to elucidate the interrelationship between nutrition, health, and environment in sustaining human wellbeing and preventing disease. Students will gain knowledge of community health issues, dietary requirements, nutritional deficiencies, and food-related hazards, along with preventive and control measures. The course also focuses on major environmental pollutants—air, water, soil, sound, and radiation—and their physiological impacts on human health. Through a combination of theoretical learning, field surveys, and practical demonstrations, it seeks to foster awareness of balanced diet formulation, disease prevention, environmental sustainability, and the promotion of holistic public health.

Topics in Details

Public Health and Community Nutrition

Definition: hygiene, health and public health. Basic idea about community health and public health issues. Vector Borne Epidemic Diseases: Malaria and Dengue etiology and control. Dietary fibers. Basic idea on PEM, marasmus, kwashiorkor and their prevention. Recommended dietary allowances, malnutrition, LBW, Xerophthalmia, Iodine deficiency disorders (IDD), Iron deficiency, micronutrient disorders. Food allergy. Food toxicity, Food Borne Diseases: causes, symptoms and control. Effect of processing on nutritive values of foods. Food Additives and Adulterants: definition, examples and human health hazards. Antioxidants. Nutritional genomics. Nutraceuticals.

Environmental Physiology

Air Pollution: definition, sources, air pollutants, effects of air pollution on human health, concept of ozone hole, green house effects and global warming. Water Pollution: definition, types, health hazards, water pollutants, concept of safe drinking water standards. Soil Pollution: causes, health hazards, solid waste management, bioremediation, phytoremediation. Sound Pollution: definition, concept of noise, source of sound pollution, effects of sound pollution on human health. Radionuclide Pollution: ionizing radiations, effects of ionizing radiation on human health, permissible doses.

PHYCOR606P : (PRACTICAL)

PUBLIC HEALTH AND COMMUNITY NUTRITION AND ENVIRONMENTAL PHYSIOLOGY LAB

2 Credits

Topics in Details

Survey on the status of dietary intake in the surrounding area through visits. Real-time hands-on session on National Air Quality Index available on official website of Central Pollution Control Board, Govt. of India.

Demonstration: Formulation of balanced diets for growing child, adult man and woman, pregnant and lactating woman. Diet management of obese, diabetic, hypertensive persons and athletes.

Course Outcomes

Upon successful completion of this course, students will acquire a profound understanding of the concepts of hygiene, health, and public health, along with the nutritional and environmental determinants of community wellbeing. They will be able to identify and explain the etiology, prevention, and control of nutritional and vector-borne diseases, as well as understand the physiological consequences of malnutrition and micronutrient deficiencies. Learners will develop competence in planning balanced diets for individuals across different age groups and physiological conditions, and in managing diet-related disorders such as obesity, diabetes, and hypertension. Furthermore, they will comprehend the sources, types, and health hazards of environmental pollutants, and appreciate modern approaches such as bioremediation and phytoremediation for pollution control. The course ultimately cultivates scientific awareness, practical skill, and social responsibility, preparing students to contribute effectively to the advancement of community health, nutrition, and environmental stewardship.

SEMESTER VII

PHYSIOLOGY SPECIAL MINOR 1 (SM1) COURSE

PHYSMC701T : (THEORY)
SPORTS PHYSIOLOGY AND ERGONOMICS
3 Credits (1+1+1)

Course Objectives

This course is designed to provide learners with an in-depth understanding of the physiological principles underlying physical work, exercise performance, and ergonomics. It aims to elucidate the body's bioenergetic mechanisms during various grades of physical activity, the cardiovascular and respiratory adaptations to training, and the physiological basis of fatigue, recovery, and performance enhancement. The course further introduces the concepts of ergonomics and occupational health, emphasizing musculoskeletal function, human locomotion, posture, and safety in work environments. Learners will also gain insights into the nutritional aspects of sports, management of sports injuries, and the role of ergogenic aids and exercise-inducing equipment. Through a balanced blend of theoretical knowledge and practical experimentation, this course aspires to foster scientific understanding, health awareness, and applied skills relevant to sports science and human efficiency.

Topics in Details

Sports Physiology

Physical Work- Its Definition & Nature. Importance of regular exercise in health and wellbeing. Energy sources during exercise (Phosphagen, Anaerobic system and Aerobic system). Cardio-respiratory responses during different grades of exercise. Concept of excess post exercise oxygen consumption (EPOC) & VO2 max. Physiological fatigue and recovery. Training: Principles of physical training. Cardiovascular & Respiratory Adaptation to Training. Effect of overtraining and detraining. Brief Idea about nutritional aspects of Sports. Sports injury and its' management. Basic idea of sports rehabilitation and sports medicine.

Ergonomics

Basic Concept of Ergonomics. Musculo-Skeletal Systems and Human Locomotion. Occupational Health and Application of Ergonomics to restrict Occupational Health Hazards. Guideline for Handtool design, task, posture, safety guidelines for tool use. Ergogenic aids. Exercise inducing equipment- Bicycle Ergometer, Treadmill, Stepping Stool. Advantages of Ergonomics. Cognitive Ergonomics. Personal Protective Device (PPD).

PHYSMC701P: (PRACTICAL)
SPORTS PHYSIOLOGY AND ERGONOMICS LAB
2 Credits

Topics in Details

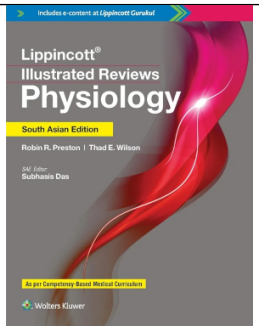
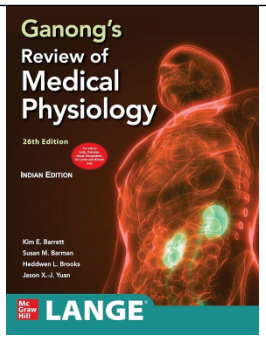
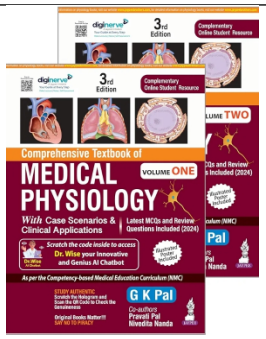
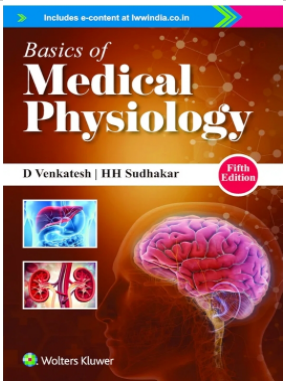
Measurement of blood pressure before and after exercise. Recording of recovery heart-rate after standard exercise. Measurement of Oxygen Saturation by Pulse Oximeter before and after exercise. Determination of VO2max by Queen College Step test. Six minute walk test. Determination of endurance time by hand grip dynamometer.

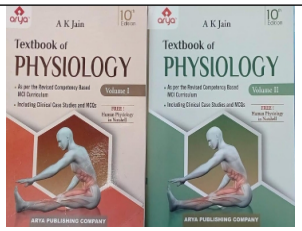
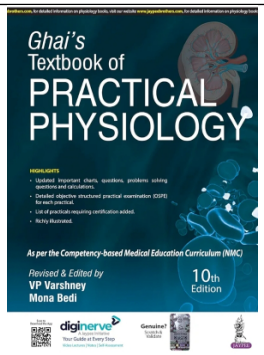
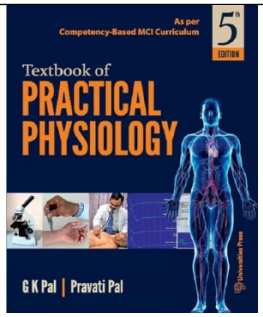
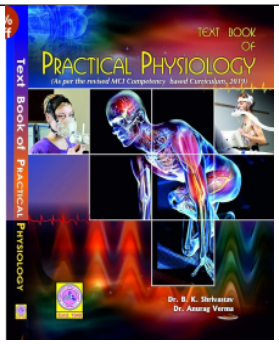
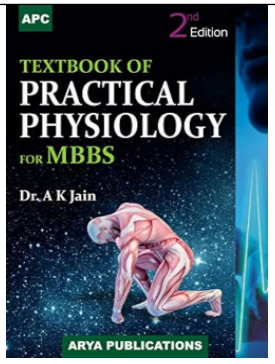
Basic Anthropometric Measurements and Determination of Body Surface Area (BSA) & Body Mass Index (BMI). Measurement of body fat percentage. Experiments on Respiratory Rate, Pulse Rate and Blood Pressure in relation with Posture.

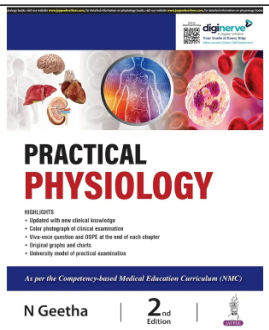
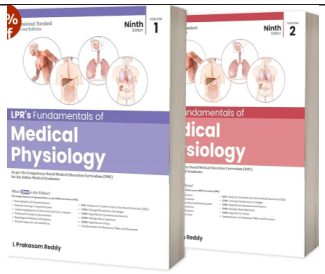
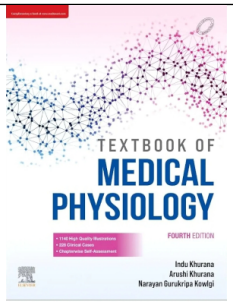
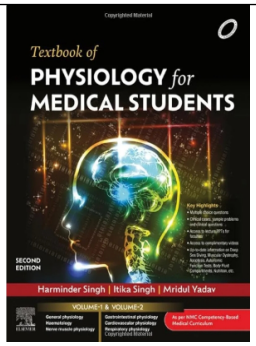
Course Outcomes

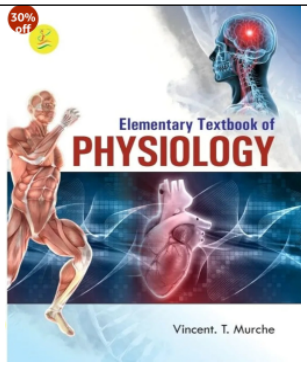
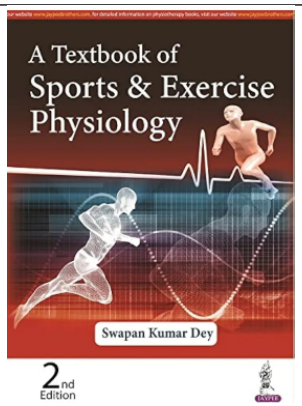
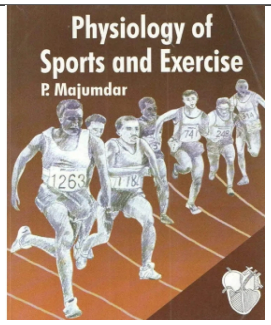
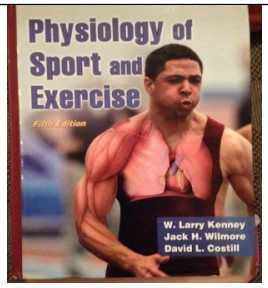
Upon successful completion of this course, students will acquire a comprehensive understanding of the physiological responses and adaptations of the human body to exercise and physical training. They will be able to explain the energy systems supporting muscular work, analyze cardiovascular and respiratory adjustments during exercise, and interpret parameters such as VO_2max, EPOC, and endurance capacity. Learners will develop practical competence in measuring vital parameters—blood pressure, heart rate, oxygen saturation, BMI, and body fat percentage—and in assessing physical fitness and recovery. They will also comprehend the principles of ergonomics, human posture, and occupational health, applying ergonomic guidelines to enhance safety, efficiency, and comfort in daily and professional activities. The course ultimately nurtures analytical thinking, experimental skill, and physiological insight, preparing students to apply their knowledge in the fields of sports science, exercise physiology, health promotion, and workplace ergonomics.

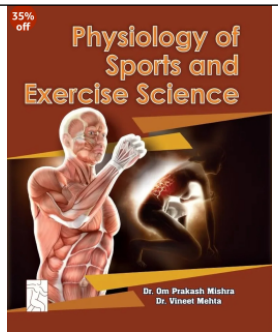
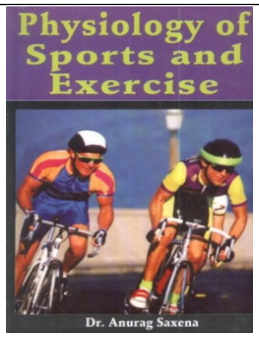
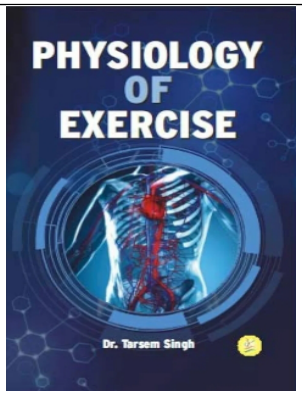
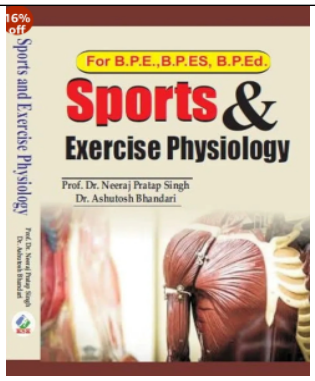
REFERENCE BOOK LIST FOR PHYSIOLOGY MINOR:-

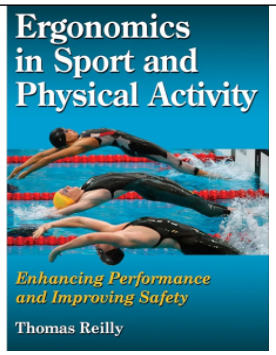
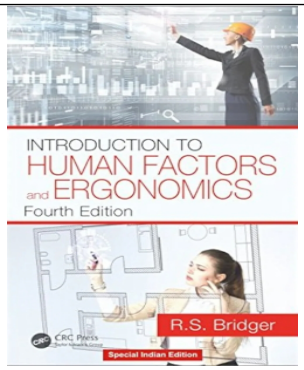
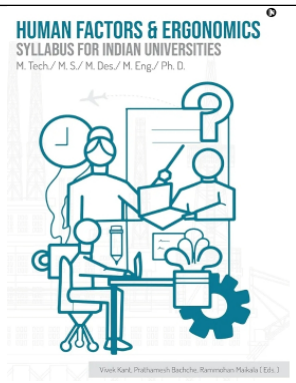
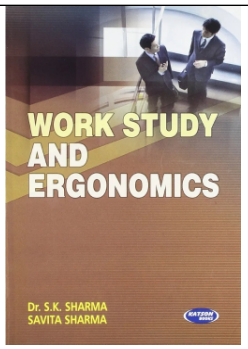
NAME OF THE BOOK	AUTHOR	EDITION	PUBLISHER	IMAGE OF THE BOOK
Lippincott's Illustrated Reviews Physiology	Preston and Wilson	South Asian Edition	Wolters-Flower (India)	
Ganong's Review of Medical Physiology	Barrett, Barman, Brooks, Yuan	26th	Mc Graw Hill, LANGE	
Comprehensive Textbook of Medical Physiology (Vol 1 & Vol 2)	GK Pal	3rd	Jaypee Brothers Publishers Pvt.Ltd	
Basics of Medical Physiology	Venkatesh & Sudhakar	5th	Wolters Kluwer	

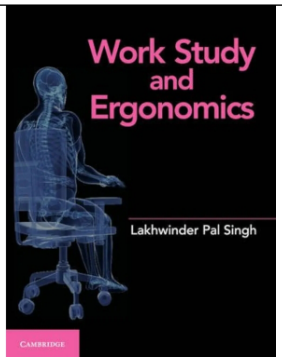
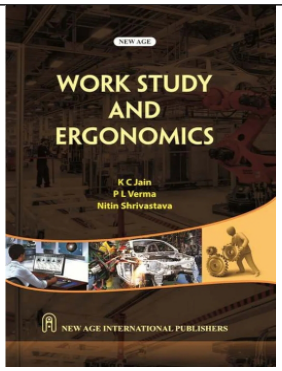
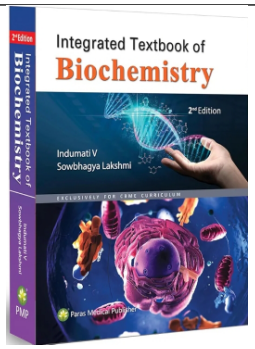
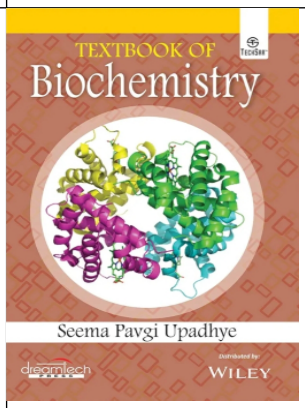
Textbook of Physiology (Vol 1 & Vol 2)	A.K Jain	10th	Arya Publishing Company	
Ghai's Textbook of Practical Physiology	VP Varshney	10th	Jaypee Brothers Medical Publishers Pvt.Ltd	
Textbook of Practical Physiology	GK Pal, Parvati Pal	5th	Universities Press (India) Pvt. Ltd.	
Textbook of Practical Physiology	Dr. B.K. Shrivastav , Dr. Anurag Verma	6th	Scientific Book Company	
Textbook of Practical Physiology	Dr. A.K.Jain	2nd	Arya Publishing Company	

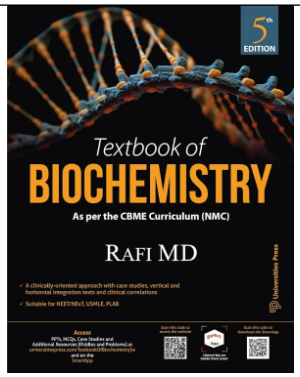
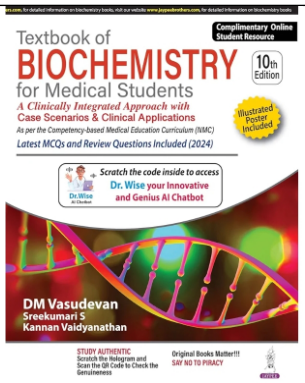
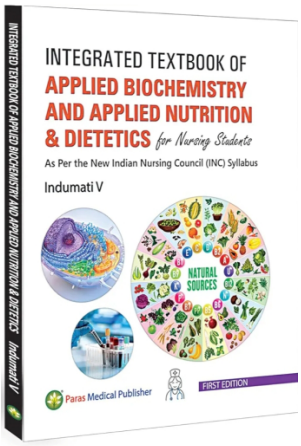
Practical Physiology	N.Geetha	2nd	Jaypee Brothers Medical Publishers Pvt.Ltd	
LPR's Fundamental of Medical Physiology (Vol 1 & Vol 2)	L Prakasam Reddy	9th	CBS Publishers & Distributers Pvt. Ltd.	
Textbook of Medical Physiology	Indu Khurana, Arushi Khurana, Narayan Gurukripa Kowlgi	4th	Elsevier	
Textbook of Physiology for Medical Students (Vol1 & Vol 2)	Harminder Singh, Itika Singh, Mridul Yadav	2nd	Elsevier	

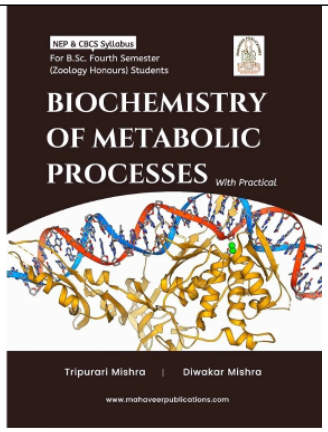
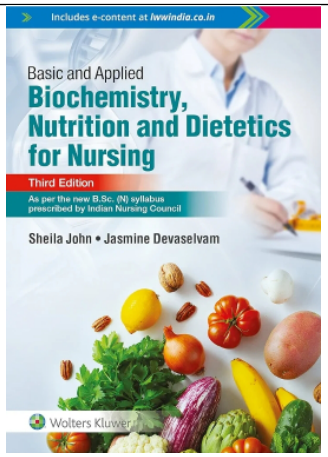
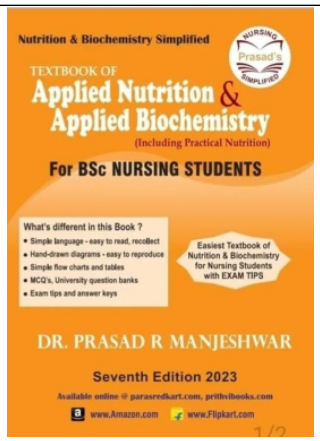
Elementary Textbook of Physiology	Vincent, Murche	1st	Sports Educational Technologies	
A Textbook of Sports & Exercise Physiology	Swapan Kumar Dey	2nd	Jaypee Brothers Medical Publishers Pvt.Ltd	
Physiology of Sports and Exercise	P. Majumdar	1st	New Central Book Agency	
Physiology of Sports and Exercise	Kenney, Wilmore, Costill	5th	Human Kinetics Publishers	

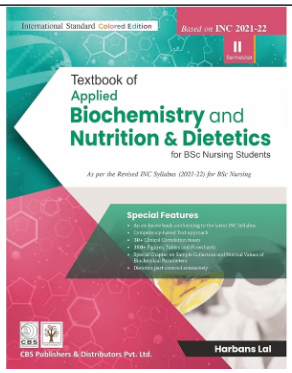
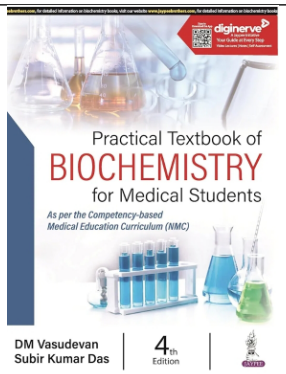
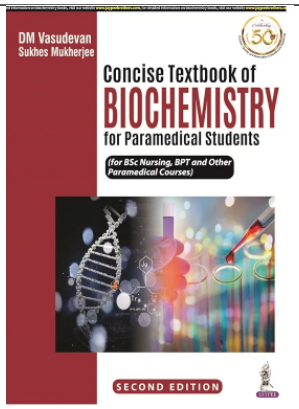
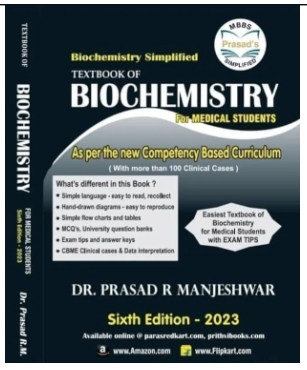
Physiology of Sports and Exercise Science	Dr. Om Prakash Mishra, Dr. Vineet Mehta	1st	Friends Publications (India)	
Physiology of Sports and Exercise	Dr. Anurag Saxena	2011th	Sports Publications	
Physiology of Exercise	Dr. Tarsem Singh	1st	Sports Educational Publisher	
Sports & Exercise Physiology	Prof. Dr. Neeraj Pratap Singh, Dr. Ashutosh Bhandari	1st	Khel Sahitya Kendra	

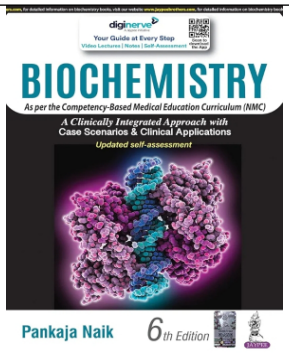
Ergonomics in Sport and Physical Activity: Enhancing Performance and Improving Safety	Thomas Reilly	1st	Human Kinetics	
Introduction To Human Factors and Ergonomics	R.S. Bridger	4th	Taylor and Francis	
Human Factors & Ergonomics Syllabus for Indian Universities	Kant, Bachche, Maikala	1st	Notion Press	
Work Study and Ergonomics	Dr. S.K.Sharma, Savita Sharma	1st	S.K.Kataria & Sons	

Work Study and Ergonomics	Lakhwinder Pal Singh	1st	Cambridge University Press	
Work Study and Ergonomics	Jain, Verma, Shrivastava	1st	New Age International Publishers	
Integrated Textbook of Biochemistry	Indumati V, Sowbhagya Lakshmi	2nd	Paras Medical Publisher	
Textbook of Biochemistry	Seema Pavgi Upadhye	1st	Dreamtech Press	

Textbook of Biochemistry	Rafi MD	5th	Universities Press (India) Pvt.Ltd.	
Textbook of Biochemistry for Medical Students	DM Vasudevan, Sreekumari S, Kannan Vaidyanathan	10th	Jaypee Brothers Medical Publishers Pvt.Ltd	
Integrated Textbook of Applied Biochemistry And Applied Nutrition & Dietetics	Indumati V	1st	Paras Medical Publisher	
Lippincott Illustrated Reviews Biochemistry	Singh & Goyal	2nd South Asian Edition	Wolters Kluwer	

Biochemistry of Metabolic Processes	Tripurari Mishra, Diwakar Mishra	1st	Mahaveer Publications	
Basic and Applied Biochemistry, Nutrition and Dietetics for Nursing	Sheila John, Jasmine Devaselvam	3rd	Wolters Kluwer	
Textbook of Applied Nutrition & Applied Biochemistry	Dr. Prasad R Manjeswar	7th	Prasad Book House	

Textbook of Applied Biochemistry And Nutrition & Dietetics	Harbans Lal	International Standard Colored Edition	CBS Publishers & Distributers Pvt Ltd	
Practical Textbook of Biochemistry	DM Vasudevan, Subir Kumar Das	4th	Jaypee Brother's Medical Publishers Pvt.Ltd	
Concise Textbook of Biochemistry	DM Vasudevan, Sukhes Mukherjee	2nd	Jaypee Brother's Medical Publishers Pvt.Ltd	
Textbook of Biochemistry	Dr. Prasad R Manjeswar	6th	Prasad Book House	

Biochemistry	Pankaja Naik	6th	Jaypee Brother's Medical Publishers Pvt.Ltd	
Biochemistry	Dr. Kailash Choudhary	5th	IFAS Publication