

# BPT II YEAR

**YEAR: II YEAR**

**COURSE CODE: 22PT201**

**TITLE OF THE COURSE: PATHOLOGY**

**COURSE OBJECTIVES:**

THE COURSE WILL ENABLE STUDENTS TO UNDERSTAND THE CONDITIONS IN MICROBIOLOGY AND PATHOLOGY AND ITS APPLICATION IN RELATION WITH PHYSIOTHERAPY. STUDENTS WILL LEARN THE PATHOLOGICAL CHANGES IN VARIOUS CONDITIONS, DISEASES AND DISORDERS, WHICH ARE COMMONLY TREATED BY PHYSIOTHERAPY.

**COURSE OUTCOMES:**

THE EXPECTED OUTCOMES OF THIS COURSE IS THAT AFTER THE PRESCRIBED HOURS OF LECTURES AND DEMONSTRATIONS IN ADDITION TO CLINICAL APPLICATIONS THE STUDENT WILL BE ABLE TO UNDERSTAND THE CAUSES, SIGNS, SYMPTOMS, INVESTIGATIONS, DIFFERENTIAL DIAGNOSIS, FINAL DIAGNOSIS, MANAGEMENT IN RELATION WITH PHYSIOTHERAPY.

<b>COURSE TITLE – Pathology</b> <b>COURSE CODE – 22PT201</b>															
Hours				Hours per week				Evaluation pattern							
Th	Prac	SPT	Total	Th	Prac	SPT	Total	Theory			Th Aggre gate	Practical		Th+Pra c	
								IA	Written exam	VV		IA	Final Exam		Final Exam
60	00	00	60	2	-	-	2	10	40	-	-	-	-	-	50

S I N O .	Topic	Th e o r y h o u r s
<b>UNIT – I : GENERAL PATHOLOGY</b>		
1	<b>Introduction of Pathology</b> - Must know	1
2	<b>Cell injury</b> - Must know <ul style="list-style-type: none"> <li>Aetiology and Pathogenesis with a brief recall of important aspects of normal cell structure.</li> <li>Reversible cell injury: Types, Sequential changes, Cellular swellings, vacuolation, Hyaline changes, Mucoid changes.</li> <li>Irreversible cell injury: Types of Necrosis &amp; Gangrene,</li> </ul>	4

		<p>Autolysis.</p> <ul style="list-style-type: none"> <li>• Pathologic calcification: Dystrophic and Metastatic.</li> </ul> <p><b>-Desirable to know</b></p> <ul style="list-style-type: none"> <li>• Intracellular Accumulations - Fatty changes, Protein accumulations, Glycogen accumulations, Pigments - Melanin / Hemosiderin.</li> </ul> <p><b>-Nice to know</b></p> <ul style="list-style-type: none"> <li>• Extra cellular accumulations: Amyloidosis - Classification, Pathogenesis, Pathology including special stains</li> </ul>	
3	<b>Inflammation and Repair</b>	<p><b>- Must know</b></p> <ul style="list-style-type: none"> <li>• Acute inflammation: features, causes, vascular and cellular events. Inflammatory cells and Mediators.</li> <li>• Chronic inflammation: Causes, Types, Classification non specific and granulomatous with examples</li> <li>• Repair, Wound healing by primary and secondary union, factors promoting and delaying the process.</li> <li>• Healing in specific site including bone healing</li> </ul>	3
4	<b>Immunopathology</b>	<p><b>-Must know</b></p> <ul style="list-style-type: none"> <li>• AIDS - Aetiology, Modes of transmission, Diagnostic procedures, handling of infected material and health education,</li> </ul> <p><b>- Desirable to know</b></p> <ul style="list-style-type: none"> <li>• Immune system: General concepts.</li> <li>• Hypersensitivity: type and examples, antibody and cell mediated tissue injury with examples.</li> <li>• Auto-immune disorders: Basic concepts and classification, SLE</li> </ul>	3
5	<b>Infectious diseases</b>	<p><b>- Must know</b></p> <ul style="list-style-type: none"> <li>• Mycobacterial diseases: Tuberculosis, Leprosy and Syphilis.</li> </ul> <p><b>- Desirable to know</b></p> <ul style="list-style-type: none"> <li>• Bacterial disease: Pyogenic, Diphtheria, Gram negative infection, Bacillary dysentery.</li> <li>• Viral diseases: Poliomyelitis, Herpes, Rabies, Measles, Rickettsia, Chlamydia infection</li> <li>• Fungal disease and opportunistic infections.</li> <li>• Parasitic diseases: Malaria, Filariasis, Amoebiasis, Kala-azar, Cysticercosis, Hydatid cyst.</li> </ul>	4
<b>UNIT – II : GENERAL PATHOLOGY + HEMATOLOGY + SYSTEMIC PATHOLOGY</b>			

6	<b>Growth Disturbances and Neoplasia</b>	<p><b>- Must know</b></p> <ul style="list-style-type: none"> <li>• Precancerous lesions.</li> <li>• Neoplasia: Definition, classification, Biological behaviour</li> <li>• Benign and Malignant, Carcinoma and Sarcoma.</li> <li>• Malignant Neoplasia: Grades and Stages, Local &amp; Distant spread.</li> <li>• Benign &amp; Malignant epithelial tumours</li> <li>• Benign &amp; Malignant mesenchymal tumours</li> </ul> <p><b>- Desirable to know</b></p> <ul style="list-style-type: none"> <li>• Atrophy, Hypertrophy, Hyperplasia, Aplasia, Hypoplasia, Metaplasia, Malformation, agenesis, dysplasia.</li> <li>• Carcinogenesis: Environmental carcinogens, chemical, viral, occupational.</li> </ul> <p><b>- Nice to know</b></p> <ul style="list-style-type: none"> <li>• Heredity and cellular oncogenes and prevention of cancer</li> </ul>	6
7	<b>Nutritional Disorders</b>	<p><b>- Must know</b></p> <ul style="list-style-type: none"> <li>• Marasmus, Kwashiorkor</li> <li>• Vitamin deficiency disorders, classification with specific examples</li> </ul> <p><b>- Desirable to know</b></p> <ul style="list-style-type: none"> <li>• Protein energy malnutrition</li> </ul>	2
8	<b>Genetic disorders</b>	<p><b>- Desirable to know</b></p> <ul style="list-style-type: none"> <li>• Basic concepts of genetic disorders and some common examples and congenital malformation.</li> </ul>	1
9	<b>Hematology</b>	<p><b>- Must know</b></p> <ul style="list-style-type: none"> <li>• Constituents of blood and bone marrow, Regulation of hematopoiesis.</li> <li>• Anemia: Classification, clinical features &amp; lab diagnosis.</li> <li>• Hemostatic disorders, Vascular and Platelet disorders &amp; lab diagnosis. Coagulopathies - (i) Inherited (ii) Acquired with lab diagnosis.</li> <li>• Leukocytic disorders: Leukocytosis, Leukopenias,</li> </ul> <p><b>- Desirable to know</b></p> <ul style="list-style-type: none"> <li>• Nutritional anemias: Iron deficiency anemia, Folic acid, Vit. B 12 deficiency anemia including pernicious anemia.</li> <li>• Hemolytic Anaemias: Classification and</li> </ul>	7

		<p>Investigations. Hereditary hemolytic anaemias: Thalessemia, Sickle cell anemia, Spherocytosis and Enzyme deficiencies. Acquired hemolytic anaemias. Alloimmune, Autoimmune. Drug induced, Microangiopathic Pancytopenia-Aplastic anemia.</p> <ul style="list-style-type: none"> <li>• Leukemoid reaction.</li> <li>• Leukemia: Classification, clinical manifestation, pathology and Diagnosis</li> <li>• Multiple myeloma</li> <li>• Blood transfusion; Grouping and cross matching, untoward reactions, transmissible infections including HIV &amp; hepatitis, Blood-components &amp; plasma-pheresis.</li> </ul>	
10	<b>Respiratory System</b>	<p><b>- Must know</b> Pneumonia, Bronchitis, Bronchiectasis, Asthma, Tuberculosis</p> <p><b>- Desirable to know</b> Occupational lung diseases, Carcinoma of lungs</p>	3
11	<b>Cardiovascular system</b>	<p><b>- Must know</b></p> <ul style="list-style-type: none"> <li>• Vascular diseases: Atherosclerosis, Monckeberg's medial calcification,</li> <li>• Ischemic heart Disease: Myocardial infarction.</li> <li>• Hypertension and Hypertensive heart disease.</li> </ul> <p><b>- Desirable to know</b></p> <ul style="list-style-type: none"> <li>• Endocarditis.</li> <li>• Rheumatic Heart disease</li> </ul> <p><b>- Nice to know</b></p> <ul style="list-style-type: none"> <li>• Congenital Heart disease: Atrial septal defect, Ventricular septal defect, Fallot's tetralogy, Patent ductus arteriosus</li> <li>• Aneurysm</li> </ul>	4
12	<b>Alimentary tract</b>	<p><b>- Must know</b></p> <ul style="list-style-type: none"> <li>• Stomach: Gastritis, Ulcer &amp; Tumours.</li> <li>• Tumours and tumour like condition of the small and large Intes</li> </ul>	4

		<p>tine:Polyps,carcinoid,carcinoma,Lymphoma.</p> <p><b>-Desirable to know</b></p> <ul style="list-style-type: none"> <li>• Oral Pathology: Ulcers, leukoplakia, Carcinoma oral cavity diseases</li> <li>• Tumours of salivary gland</li> <li>• Esophagus and precancerous lesions: Esophagus inflammatory, functional disorders and tumours.</li> <li>• Pancreatitis &amp; Pancreatic tumours</li> </ul>	
<b>UNIT – III : SYSTEMIC PATHOLOGY</b>			
13	<b>Hepato – biliary pathology</b>	<p><b>- Must know</b></p> <ul style="list-style-type: none"> <li>• Jaundice: Types, aetiopathogenesis and diagnosis.</li> <li>• Hepatitis</li> <li>• Alcoholic liver disease</li> <li>• Cirrhosis</li> </ul> <p><b>-Desirable to know</b></p> <ul style="list-style-type: none"> <li>• Abscesses: Pyogenic, parasitic and Amoebic</li> <li>• Tumours of Liver</li> </ul>	4
14	<b>Lymphatic System</b>	<p><b>- Must know</b></p> <ul style="list-style-type: none"> <li>• Lymphadenitis- Nonspecific and granulomatous</li> <li>• Causes of Lymph Node enlargements.</li> <li>• Causes of Splenic Enlargements.</li> </ul> <p><b>-Nice to know</b></p> <ul style="list-style-type: none"> <li>• Primary Tumours - Hodgkin's and Non-hodgkin's Lymphomas, Metastatic Tumours</li> <li>• Diseases of the gall bladder: Cholecystitis, Cholelithiasis, Carcinoma</li> </ul>	2
15	<b>Musculoskeletal System</b>	<p><b>- Must know</b></p> <ul style="list-style-type: none"> <li>• Osteomyelitis, acute, chronic, tuberculous, mycetoma</li> <li>• Metabolic diseases: 16. Rickets / Osteomalacia, 17. osteoporosis, Hyperparathyroidism, Paget's disease.</li> <li>• Arthritis: Suppurative, Rheum</li> </ul>	4

		<p>atoid.Osteoarthritis, Gout,Tuberculous.</p> <p><b>- Desirable to know</b></p> <ul style="list-style-type: none"> <li>• TumoursClassification:Benign,Malignant,Metastatic</li> </ul>	
1 6 .	<b>Endocrinepat hology</b>	<p><b>-Must know</b></p> <ul style="list-style-type: none"> <li>• DiabetesMellitus:Types,Pathogenesis,Pathology,Laborat orydiagnosis</li> <li>• Non- neoplasticlesionsofThyroid:Iodinedeficiencygoiter,autoi mmuneThyroiditis,Thyrotoxicosis, Myxedema, Hashimoto'sthyroiditis.</li> <li>• Tumours of Thyroid: Adenoma, Carcinoma: Papillary, Follicular, Medullary,Anaplastic.</li> </ul> <p><b>- Desirable to know</b></p> <ul style="list-style-type: none"> <li>• Adrenaldiseases:corticalhyperplasia,atrophytumorsof cortexandmedulla.</li> </ul>	3
1 7 .	<b>Neuropatholo gy</b>	<p><b>- Must know</b></p> <ul style="list-style-type: none"> <li>• Inflammations and Infections : TB Meningitis, Pyogenic Meningitis, Viral meningitis</li> <li>• BrainAbscess</li> <li>• Cysticercosis</li> </ul> <p><b>- Desirable to know</b></p> <ul style="list-style-type: none"> <li>• CNSTumors: names according to age &amp; site, clinical features, diagnosis, prognosis.</li> </ul>	3
1 8 .	<b>Dermatopatho logy</b>	<p><b>- Must know</b></p> <ul style="list-style-type: none"> <li>• Skin tumours: SCC, BCC, MM</li> </ul>	2

**RecommendedTextbooks:**

1. Textbookofpathology: Harshmohan
2. General systemicpathology: Churchill Livingstone
3. Text book ofPathology:Robbins

**YEAR: II YEAR**

**COURSE CODE: 22PT202**

**TITLE OF THE COURSE: MICROBIOLOGY**

**COURSE OBJECTIVES:**

THE COURSE WILL ENABLE STUDENTS TO UNDERSTAND THE CONDITIONS

IN MICROBIOLOGY AND PATHOLOGY AND ITS APPLICATION IN RELATION WITH PHYSIOTHERAPY. STUDENTS WILL LEARN THE PATHOLOGICAL CHANGES IN VARIOUS CONDITIONS, DISEASES AND DISORDERS, WHICH ARE COMMONLY TREATED BY PHYSIOTHERAPY.

**COURSE OUTCOMES:**

THE EXPECTED OUTCOMES OF THIS COURSE IS THAT AFTER THE PRESCRIBED HOURS OF LECTURES AND DEMONSTRATIONS IN ADDITION TO CLINICAL THE STUDENT WILL BE ABLE TO UNDERSTAND THE CAUSES, FINDINGS, INVESTIGATIONS, MANAGEMENT IN RELATION WITH PHYSIOTHERAPY.

COURSE TITLE – Microbiology															
COURSE CODE – 22PT202															
Hours				Hours per week				Evaluation pattern							
Th	Prac	SPT	Total	Th	Prac	SPT	Total	Theory			Th Aggre gate	Practical		Th+Prac c	
								IA	Written exam	VV		IA	Final Exam		Final Exam
60	00	00	60	2	-	-	2	10	40	-	-	-	-	-	50

S.I No.	Topic		Theory hours
<b>UNIT – I : GENERAL MICROBIOLOGY</b>			
1.	<b>Infection</b>	<b>- Desirable know</b> <ul style="list-style-type: none"> <li>• Definition of Infection.</li> <li>• parasites, host, vector, fomite,</li> <li>• contagious disease, infectious disease,</li> <li>• epidemic, endemic, pandemic,</li> <li>• zoonosis, Epizootic,</li> <li>• Attack rate.</li> </ul>	1
2.	<b>Routes of infection and spread</b>	<b>- Must know</b> <ul style="list-style-type: none"> <li>• Explain the various routes of endogenous and exogenous infections</li> <li>• Define the Source at reservoir of infections.</li> </ul>	1
3.	<b>Normal flora of the</b>	<b>-Nice to know</b>	1

	body	<ul style="list-style-type: none"> <li>Describe Normal flora of the human body</li> </ul>	
4.	<b>Bacterial cell: Anatomy</b>	<b>- Must know</b> <ul style="list-style-type: none"> <li>Explain labeled diagram of Morphology of bacterial cell limited to recognizing bacteria in clinical samples.</li> <li>Discuss about the shape, motility and arrangements, which are, virulence associated.</li> </ul>	1
5.	<b>Sterilization and Disinfection and in relation to patient care and disease prevention</b>	<b>- Must know</b> <ul style="list-style-type: none"> <li>Define Asepsis.</li> <li>Classify &amp; describe various methods of sterilization methods.</li> <li>Classify the Disinfectants used in hospital</li> <li>Describe Methods to test efficacy of disinfectants</li> </ul>	2
6.	<b>Hospital acquired infections</b>	<b>- Must know</b> <ul style="list-style-type: none"> <li>Describe Hospital acquired infection – Types, causative agents, mode of transmission and prophylaxis.</li> <li>Explain the standard precautions in relation to the patient care and disease prevention.</li> </ul>	2
7.	<b>Antimicrobials</b>	<b>- Nice to know</b> <ul style="list-style-type: none"> <li>Describe different methods of antimicrobial susceptibility testing and interpretation of susceptibility tests.</li> <li>Explain the mode of action of antimicrobials and resistance spectrum developed.</li> </ul>	1
8.	<b>Immunity</b>	<b>- Must know</b> <ul style="list-style-type: none"> <li>Define Immunity and Mechanism of immunity.</li> <li>Describe in detail humoral immunity</li> <li>Describe in detail cell mediated immunity.</li> <li>Explain the structure and function of immune system – lymphoid organ and tissue.</li> </ul>	2
9.	<b>Antigen</b>	<b>- Desirable to know</b> <ul style="list-style-type: none"> <li>Define &amp; classify Antigen. Describe characteristics of Antigens</li> </ul>	1
10.	<b>Antibody</b>	<b>- Desirable to know</b> <ul style="list-style-type: none"> <li>Define &amp; classify Antibody. Describe characteristics of antibody</li> </ul>	1
11.	<b>Antigen-Antibody reaction</b>	<b>- Must know</b> <ul style="list-style-type: none"> <li>Describe in detail about General Properties and the types of antigen-antibody reactions with relevant to pathogenesis.</li> </ul>	1

		<ul style="list-style-type: none"> <li>Brief introduction on Serological tests: Agglutination, Precipitation, ELISA, Immunofluorescence, Immunochromatography.</li> </ul>	
12.	<b>Hypersensitivity</b>	<p><b>- Must know</b></p> <ul style="list-style-type: none"> <li>Define &amp; classify Hypersensitivity reactions</li> <li>Explain the mechanism of Hypersensitivity reactions &amp; outcome measuring immune functions.</li> </ul>	1
<b>UNIT – II : SYSTEMATIC BACTERIOLOGY</b>			
6.	<b>Staphylococcus</b>	<p><b>- Must know</b></p> <ul style="list-style-type: none"> <li>Describe the morphology, mode of transmission and various diseases caused by Staphylococcus and discuss the laboratory diagnosis</li> <li>Methicillin Resistant Staphylococcus aureus.</li> </ul>	2
7.	<b>Streptococcus and Pneumococcus</b>	<p><b>- Must know</b></p> <ul style="list-style-type: none"> <li>Classify Streptococci and describe the mode of transmission and various diseases caused by Streptococcus and add a note on its laboratory diagnosis protocol.</li> <li>Describe the cultural characteristics and diagnosis of S.pyogenes &amp; Streptococcus pneumonia.</li> </ul>	2
8.	<b>Mycobacteria</b>	<p><b>- Must know</b></p> <ul style="list-style-type: none"> <li>Describe the morphology, modes of transmission, clinical presentation and laboratory diagnosis of Mycobacterium tuberculosis</li> <li>Describe the morphology, modes of transmission, clinical presentation laboratory diagnosis of Mycobacterium leprae.</li> <li>Classify and diseases caused by Atypical mycobacteria/Non-Tuberculosis Mycobacteria.</li> </ul>	2
9.	<b>Escherichia coli and Klebsiella sp.</b>	<p><b>- Must know</b></p> <ul style="list-style-type: none"> <li>Classify the Enterobacteriaceae family</li> <li>Discuss the laboratory diagnosis of UTI.</li> <li>Discuss the cultural characteristics and diarrhoeal diseases caused by E.coli</li> <li>Discuss the cultural characteristics and diseases caused by Klebsiella species.</li> </ul>	2
10.	<b>Pseudomonas</b>	<p><b>- Desirable to know</b></p> <ul style="list-style-type: none"> <li>Discuss the clinical presentation &amp; laboratory diagnosis</li> <li>Discuss the role of Pseudomonas in hospital infections.</li> </ul>	1
11.	<b>Vibrio cholera</b>	<p><b>- Desirable to know</b></p>	1

		<ul style="list-style-type: none"> <li>• Discuss the clinical presentation &amp; laboratory diagnosis of cholera</li> <li>• Discuss the diseases caused by halophilic vibrios.</li> </ul>	
12.	<b>Bacillus anthracis Clostridia, Bacteroides and Fusobacterium.</b>	<b>- Desirable to know</b> <ul style="list-style-type: none"> <li>• Discuss clinical presentation &amp; the laboratory diagnosis of anthrax.</li> <li>• Describe the morphology, disease associated and laboratory diagnosis of Clostridium species.</li> <li>• Classify and discuss the laboratory diagnosis of non-sporing anaerobes.</li> </ul>	2
13.	<b>General properties</b>	<b>- Desirable to know</b> <ul style="list-style-type: none"> <li>• Discuss briefly basic structure and broad classification of viruses.</li> <li>• List of medically important viruses' pathogenesis and infections caused by viruses.</li> <li>• Explain the about the immunity and prophylaxis of viral diseases</li> </ul>	1
14.	<b>HIV</b>	<b>- Must know</b> <ul style="list-style-type: none"> <li>• Describe morphology, epidemiology, mode of transmission of HIV</li> <li>• Describe clinical features of AIDS</li> <li>• Describe various methods of laboratory diagnosis of HIV.</li> <li>• Add a note on preventive measures</li> </ul>	2
15.	<b>HBV</b>	<b>- Must know</b> <ul style="list-style-type: none"> <li>• Discuss the morphology ,clinical features, laboratory diagnosis and prophylaxis of - Hepatitis B.</li> </ul>	1
16.	<b>HCV</b>	<b>- Desirable to know</b> <ul style="list-style-type: none"> <li>• Discuss the morphology, mode of transmission , clinical features, laboratory diagnosis of Hepatitis C</li> </ul>	1
17.	<b>HSV</b>	<b>- Must know</b> <ul style="list-style-type: none"> <li>• Discuss the morphology, mode of transmission , clinical features, laboratory diagnosis of HSV</li> </ul>	1
18.	<b>Polio virus</b>	<b>- Desirable to know</b> <ul style="list-style-type: none"> <li>• Discuss the Morphology, clinical features, laboratory diagnosis of Polio virus and immunization.</li> </ul>	1
19.	<b>Rubella</b>	<b>- Nice to know</b>	1

		<ul style="list-style-type: none"> <li>• Discuss the Morphology, clinical features, laboratory diagnosis of Rubella</li> </ul>	
20.	<b>Measles</b>	<b>- Nice to know</b> <ul style="list-style-type: none"> <li>• Discuss the Morphology, clinical features, laboratory diagnosis of Measles</li> </ul>	1
<b>UNIT – III : MYCOLOGY</b>			
21.	<b>Introduction and classification of fungi</b>	<b>-Desirable to know</b> <ul style="list-style-type: none"> <li>• Classify medically important fungi, diseases caused: superficial, subcutaneous, opportunistic infections including mycotoxins, systemic mycoses.</li> <li>• Discuss the recent updates on Laboratory diagnosis of fungal infections.</li> <li>• Discuss the common antifungal agents and mode of action.</li> </ul>	2
22.	<b>Introduction and classification of Parasites</b>	<b>- Must know</b> <ul style="list-style-type: none"> <li>• Classify medically important parasites, diseases caused and the Laboratory diagnosis of parasitic infections including sample collection.</li> <li>• Add a note on Opportunistic parasitic infections.</li> </ul>	1
23.	<b>Malaria</b>	<b>- Must know</b> <ul style="list-style-type: none"> <li>• Explain briefly about the clinical features, laboratory diagnosis of Malaria</li> <li>• Explain briefly about the various methods in prophylaxis for Malaria.</li> </ul>	1
24.	<b>Filariasis</b>	<b>- Must know</b> <ul style="list-style-type: none"> <li>• Classify somatic nematodes.</li> <li>• Describe the life cycle and clinical features and laboratory diagnosis of BrugiaMalayi</li> <li>• Describe the life cycle and clinical features and laboratory diagnosis of WuchereriaBancrofti</li> </ul>	1
25.	<b>Pyrexia of unknown origin(PUO)</b>	<b>- Must know</b> <ul style="list-style-type: none"> <li>• Definition, Classification &amp; their definition</li> <li>• Common Causes &amp; pathogenesis of fever</li> <li>• Clinical presentations</li> <li>• Lab diagnosis</li> </ul>	1
26.	<b>Sexually transmitted diseases(STIs)</b>	<b>- Must know</b> <ul style="list-style-type: none"> <li>• Definition, Classification</li> <li>• Common STIs Clinical presentations &amp; complications</li> </ul>	1

		<ul style="list-style-type: none"> <li>• Etiological agents</li> <li>• Lab diagnosis</li> <li>• Treatment</li> <li>• Prevention &amp; control strategies</li> <li>• National control programs</li> </ul>	
27.	<b>Acute respiratory infections</b>	<ul style="list-style-type: none"> <li>- <b>Must know</b></li> <li>• Definition, Classification</li> <li>• Etiological agents</li> <li>• Clinical presentations &amp; complications</li> <li>• Factors influencing- host, environment <ul style="list-style-type: none"> <li>• Lab diagnosis</li> <li>• Treatment</li> </ul> </li> <li>• Prevention &amp; control strategies</li> </ul>	2
28.	<b>CNS infections</b>	<ul style="list-style-type: none"> <li>- <b>Must know</b></li> <li>• Definition, Classification</li> <li>• Common CNS infections &amp; Etiological agents</li> <li>• Clinical presentations &amp; complications</li> <li>• Lab diagnosis</li> <li>• Treatment</li> <li>• Prevention &amp; control strategies</li> </ul>	2
29.	<b>Urinary tract infections</b>	<ul style="list-style-type: none"> <li>- <b>Must know</b></li> <li>• Definition, Classification</li> <li>• Common terminologies &amp; Etiological agents</li> <li>• Clinical presentations &amp; complications</li> <li>• Lab diagnosis</li> <li>• Treatment</li> <li>• Prevention &amp; control strategies</li> </ul>	1
30.	<b>Pelvic inflammatory diseases</b>	<ul style="list-style-type: none"> <li>- <b>Must know</b></li> <li>• Definition, causes, Risk factors &amp; Etiological agents</li> <li>• Clinical presentations &amp; complications</li> <li>• Lab diagnosis</li> <li>• Treatment</li> <li>• Prevention &amp; control strategies</li> </ul>	1
31.	<b>Wound infections</b>	<ul style="list-style-type: none"> <li>- <b>Must know</b></li> <li>• Definition, causes, Risk factors</li> <li>• Types, mode of infection &amp; Etiological agents</li> <li>• Clinical presentations</li> <li>• Lab diagnosis</li> <li>• Treatment</li> </ul>	1
32.	<b>Opportunistic infections</b>	<ul style="list-style-type: none"> <li>- <b>Must know</b></li> <li>• Definition, Classification</li> <li>• Etiological agents &amp; Risk factors</li> <li>• Clinical presentations</li> <li>• Lab diagnosis</li> <li>• Treatment</li> <li>• Prevention—patient education &amp; control</li> </ul>	1

		strategies	
33.	<b>Zoonotic diseases</b>	<b>- Desirable to know</b> <ul style="list-style-type: none"> <li>• Definition, Classification</li> <li>• Etiological agents &amp; Risk factors</li> <li>• Clinical presentations</li> <li>• Lab diagnosis</li> <li>• Treatment</li> <li>• Prevention—patient education &amp; control strategies</li> </ul>	1
34.	<b>Demonstration of basic techniques</b>	<ul style="list-style-type: none"> <li>• Hand hygiene Techniques</li> <li>• Gloves and Kits – Donning and Doffing</li> <li>• Instrument handling and use</li> </ul>	8

### Reference Books

1. Introduction to medical microbiology- Ananthanarayana- Orient Longman Pvt. Ltd.
2. Robert Cruickshank- Medical Microbiology- The Practice of Medical Microbiology
3. Chatterjee- Parasitology- Interpretation to Clinical Medicine
4. Rippon- Medical Mycology
5. Basic Laboratory methods in Parasitology, J P Bros, New Delhi
6. Basic Laboratory procedures in clinical bacteriology, J P Bros, New Delhi
7. Medical Parasitology- Ajit Damle
8. Ananthanarayana & Panikar Medical Microbiology- University Press

**YEAR: II YEAR**

**COURSE CODE: 22PT203**

**TITLE OF THE COURSE: PHARMACOLOGY**

**COURSE OBJECTIVES:**

THIS COURSE COVERS THE BASIC KNOWLEDGE OF PHARMACOLOGY INCLUDING ADMINISTRATION, PHYSIOLOGIC RESPONSE AND ADVERSE EFFECTS OF DRUGS UNDER NORMAL AND PATHOLOGIC CONDITIONS. TOPICS FOCUS ON THE INFLUENCE OF DRUGS IN REHABILITATION PATIENT/CLIENT MANAGEMENT. DRUGS USED IN IONTOPHORESIS AND PHONOPHORESIS WILL BE DISCUSSED IN DETAIL.

**COURSE OUTCOMES:**

THE EXPECTED OUTCOMES OF THE COURSE IS THAT AFTER THE PRESCRIBED HOURS OF LECTURES AND DEMONSTRATIONS, THE STUDENT WILL BE ABLE TO UNDERSTAND THE EFFECTS AND THE ADVERSE EFFECTS OF VARIOUS DRUGS ON DIFFERENT SYSTEMS OF THE BODY. THIS WOULD HELP THE STUDENT TO UNDERSTAND THE LIMITATIONS IMPOSED BY THE DRUGS ON ANY THERAPY.

COURSE TITLE – Pharmacology														
COURSE CODE – 22PT203														
Hours				Hours per week				Evaluation pattern						
Th	Prac	SPT	Total	Th	Prac	SPT	Total	Theory			Th Aggregate	Practical		Th+Prac
								IA	Written exam	VV		IA	Final Exam	
74	00	00	74	2	-	-	2	20	80	-	-	-	-	100

S.I No.	Topic		Theory hours
<b>UNIT – I</b>			
1.	<b>General Pharmacology</b>	<b>- Must to know</b> <ul style="list-style-type: none"><li>• Introduction to pharmacology</li><li>• Classification of drugs</li><li>• Sources of drugs</li><li>• Routes of administration.</li><li>• Pharmacokinetics - Absorption and distribution of drugs.</li><li>• Pharmacokinetics - Drug Biotransformation &amp; drug Excretion.</li><li>• Pharmacodynamics – Dose response</li></ul>	6

		<p>relationship.</p> <ul style="list-style-type: none"> <li>• Adverse drug reactions.</li> <li>• Factors modifying drug action.</li> </ul> <p><b>-Desirable to know</b></p> <ul style="list-style-type: none"> <li>• Drug development.</li> </ul>	
2.	<b>Drugs acting on Autonomic Nervous System and Peripheral Muscle Relaxants</b>	<p><b>- Must to know</b></p> <ul style="list-style-type: none"> <li>• General considerations – The Sympathetic and Parasympathetic Systems</li> <li>• Receptors</li> <li>• Cholinergic and Anti-Cholinergic drugs</li> <li>• Adrenergic and Adrenergic blocking drugs</li> </ul> <p><b>-Desirable to know</b></p> <ul style="list-style-type: none"> <li>• Somatic Nervous System</li> <li>• Muscle relaxants.</li> </ul> <p><b>-Nice to know</b></p> <ul style="list-style-type: none"> <li>• Glaucoma</li> <li>• Autonomic changes during exercise.</li> </ul>	7
3.	<b>Drugs acting on CVS</b>	<p><b>- Must to know</b></p> <ul style="list-style-type: none"> <li>• Drugs Used in the Treatment of Heart Failure: Digitalis, Diuretics, Vasodilators, ACE inhibitors</li> <li>• Antihypertensive Drugs: Diuretics, Beta Blockers, Calcium Channel Blockers, ACE Inhibitors</li> <li>• Drugs Used in the Treatment of Vascular Disease and Tissue Ischemia</li> <li>• Ischemic Heart Disease – Nitrates, Beta-Blockers, Calcium Channel Blockers</li> </ul> <p><b>-Desirable to know</b></p> <ul style="list-style-type: none"> <li>• Anti-arrhythmic Drugs</li> <li>• Central Acting Alpha Agonists, Peripheral Alpha Antagonists, Direct acting Vasodilators</li> </ul> <p><b>-Nice to know</b></p> <ul style="list-style-type: none"> <li>• Cardiovascular changes during exercise.</li> </ul>	7
4	<b>Drugs acting on blood</b>	<p><b>-Must to know</b></p> <ul style="list-style-type: none"> <li>• Hemostasis Antithrombotics, Anticoagulants and Thrombolytics</li> <li>• Hyperlipidemic drugs</li> <li>• Cerebral Ischemia Peripheral Vascular Disease.</li> </ul> <p><b>- Desirable to know</b></p>	4

		<ul style="list-style-type: none"> <li>● Haematinics and Erythropoietin</li> <li>● Treatment of shock</li> </ul>	
<b>UNIT- II</b>			
5.	<b>Drugs used in Psychiatric conditions</b>	<p><b>- Must to know</b></p> <ul style="list-style-type: none"> <li>● Sedative-Hypnotic Drugs: Barbiturates, Benzodiazepines</li> <li>● Antianxiety Drugs: Benzodiazepines, Other Anxiolytics</li> <li>● Drugs Used in Treatment of Mood Disorders: Monoamine Oxidase Inhibitors, Tricyclic Antidepressants, Atypical Antidepressants, Lithium</li> <li>● Antipsychotic drugs</li> <li>● Antiepileptic Drugs</li> <li>● Drugs used to treat alcoholism</li> </ul> <p><b>-Desirable to know</b></p> <ul style="list-style-type: none"> <li>●</li> </ul>	6
6.	<b>Chemotherapy</b>	<p><b>- Must to know</b></p> <ul style="list-style-type: none"> <li>● General principles of chemotherapy.</li> <li>● Anti-Tuberculosis drugs</li> <li>● Anti -Leprosy drugs</li> <li>● Beta - Lactam antibiotics - I (Penicillins)</li> <li>● Beta - Lactam antibiotics - II (Cephalosporins)</li> </ul> <p><b>-Desirable to know</b></p> <ul style="list-style-type: none"> <li>● Sulfonamides&amp;Fluoroquinolones.</li> <li>● Macrolides &amp;aminoglycides</li> <li>● Tetracyclines&amp; chloramphenicol (Broad spectrum antibiotics)</li> <li>● Immunosuppressants</li> </ul> <p><b>-Nice to know</b></p> <ul style="list-style-type: none"> <li>● Anti- fungal drugs</li> <li>● Anti- malarial drugs</li> <li>● Anti- protozoal drugs</li> <li>● Anti- viral drugs</li> <li>● Anti- cancerous drugs</li> </ul>	8
7.	<b>Endocrinology</b>	<p><b>- Must to know</b></p> <ul style="list-style-type: none"> <li>● Introduction to Endocrinology,</li> <li>● Thyroid hormones and Anti-thyroid drugs.</li> <li>● Treatments of diabetes mellitus.</li> <li>● Corticosteroids</li> <li>● Glucocorticoids: Pharmacological Uses</li> </ul>	6

		<p>of Glucocorticoids, adverse effects, Physiologic Use of Glucocorticoids</p> <p><b>-Desirable to know</b></p> <ul style="list-style-type: none"> <li>• Oestrogen and Progesterone (effects on CNS, coagulation)</li> <li>• Vitamins and Calcium Metabolism, Phosphorous and Magnesium, Selenium, Zinc</li> </ul> <p><b>-Nice to know</b></p>	
8.	<b>Drugs used in Respiratory Conditions</b>	<p><b>- Must to know</b></p> <ul style="list-style-type: none"> <li>• Drugs used in Treatment of Obstructive Airway Diseases – COPD, Bronchial Asthma</li> <li>• Drugs to treat COVID- 19</li> <li>• Drugs used in Upper Respiratory Tract Infections - Allergic Rhinitis, Sinusitis, cough, laryngitis, Pharyngitis.</li> </ul>	4
<b>UNIT- III</b>			
9.	<b>Inflammatory/Immune Diseases</b>	<p><b>- Must to know</b></p> <ul style="list-style-type: none"> <li>• Antipyretics</li> <li>• Nonsteroidal Anti-Inflammatory Drugs: Acetaminophen, NSAIDs, Aspirin, Nonaspirin NSAIDs, Drug Interactions with NSAIDs</li> <li>• Drugs Used in Treatment of Arthritic Diseases: Rheumatoid Arthritis, Osteoarthritis, Gout</li> <li>• Drugs Used in the Treatment of Neuromuscular Immune/Inflammatory Diseases: Myasthenia gravis, Idiopathic Inflammatory Myopathies, systemic lupus Erythmatosus, Scleroderma, Demyelinating Disease, Neuropathies</li> </ul> <p><b>-Desirable to know</b></p> <p><b>-Nice to know</b></p> <ul style="list-style-type: none"> <li>• Neuromuscular changes during exercise.</li> </ul>	7
10.	<b>Geriatrics</b>	<p><b>- Must to know</b></p> <ul style="list-style-type: none"> <li>• Drugs used in Treatment of Parkinson’s Disease</li> <li>• Dementia</li> <li>• Postural hypotension</li> </ul> <p><b>-Desirable to know</b></p> <ul style="list-style-type: none"> <li>• Adverse effects of special concern in</li> </ul>	4

		the Elderly	
11.	<b>Drugs acting in Gastrointestinal Disorders and Metabolism</b>	<b>- Must to know</b> <ul style="list-style-type: none"> <li>● Peptic Ulcer</li> <li>● Constipation</li> <li>● Laxatives</li> <li>● Anti-diarrhoeal drugs</li> </ul> <b>-Desirable to know</b> <ul style="list-style-type: none"> <li>● Anti-emetics</li> <li>● Intestinal Bowel Disorder drugs</li> </ul>	5
12.	<b>Drugs used in Pain Management</b>	<b>- Must to know</b> <ul style="list-style-type: none"> <li>● Anaesthesia –All types</li> <li>● Analgesics – all types</li> <li>● Opioids</li> </ul>	3
13.	<b>Miscellaneous topic</b>	<b>- Must to know</b> <ul style="list-style-type: none"> <li>● Drugs used in hyperhidrosis (Botox, Zinc)</li> <li>● Bone health: Vitamin D, Calcium homeostasis, Bisphosphonates, Calcitonin, Parathyroid hormone.</li> <li>● Drug Abuse and recreation of drugs: Steroids, Diuretics, Marijuana, Cocaine, Cannabinoids and others.</li> </ul> <b>-Desirable to know</b> <ul style="list-style-type: none"> <li>● Vaccines and Sera</li> <li>● Drugs used in Organo-Phosphate Poisoning and Nicotine Poisoning</li> <li>● Drugs used in dermatological conditions: Psoriasis, Scabies</li> </ul> <b>-Nice to know</b> <ul style="list-style-type: none"> <li>● Vertigo</li> <li>● Migraine</li> </ul>	7

#### **Recommended Textbooks**

1. Lippicott's Pharmacology.
2. Essential of Medical Pharmacology by Tripathi
3. Textbook of Medical Pharmacology by Padmajaydaykumar
4. Pharmacology by N. Muruges
5. Pharmacology & Pharmacotherapeutics by Sadoskar.

**YEAR: II YEAR**

**COURSE CODE: 22PT204**

**22PT271**

**TITLE OF THE COURSE: EXERCISE THERAPY**

**EXERCISE THERAPY PRACTICALS**

**COURSE OBJECTIVES:**

IN THIS COURSE THE STUDENT WILL LEARN THE PRINCIPLES, TECHNIQUES AND EFFECTS OF EXERCISE AS A THERAPEUTIC MODALITY IN THE RESTORATION OF PHYSICAL FUNCTION.

**COURSE OUTCOMES:**

THE EXPECTED OUTCOMES OF THIS COURSE IS THAT AFTER THE PRESCRIBED HOURS OF LECTURES AND DEMONSTRATIONS IN ADDITION TO PRACTICAL AND CLINIC THE STUDENT WILL BE ABLE TO LIST THE INDICATIONS AND CONTRAINDICATIONS OF VARIOUS TYPES OF EXERCISE, DEMONSTRATE THE DIFFERENT TECHNIQUE, AND DESCRIBE THE EFFECTS.

<b>COURSE TITLE – Exercise Therapy</b> Exercise Therapy Practicals <b>COURSE CODE – 22PT204</b> 22PT271														
Hours				Hours per week				Evaluation pattern						
Th	Prac	SPT	Total	Th	Prac	SPT	Total	Theory			Th Aggre gate	Practical		Th+Prac
								IA	Written exam	VV		IA	Final Exam	
100	120	30	250	4	5	1	10	20	100	30	150	-	50	200

Sr.No.	Topic /Course Content	Hours of teaching/learning	
		Theory	Practical
<b>UNIT I</b>			
1	<b>Basics of Movement science</b>	8	8
	<b>Must know</b>		
	The aims of Exercise Therapy, The techniques of Exercise Therapy, Approach to patient's problems	2	
	Define the following terms and describe the principles involved with suitable examples: force, gravity, equilibrium, lever, springs, tension, elasticity, axes, planes,	4	

	Speed, Velocity, Work, Energy, Power, Acceleration, Momentum, Friction and Inertia.		
	Starting Positions – Fundamental positions & derived Positions, Planning of Treatment	2	6
	<b>Desirable to know</b>		
	Assessment of patient’s condition – Measurements of Vital parameters		2
2	<b>Physiology of muscle contraction</b>	3	
	<b>Must know</b>		
	Structure of skeletal muscle, chemical & mechanical events during contraction & relaxation, muscle fibre type, motor unit, force gradation. Causes of decreased muscle performance Physiologic adaptation to training: Strength & Power, Endurance.	2	
	Type of contraction – Isometric, Isotonic, Isokinetic, Eccentric.	1	
3	<b>Assessment of muscle strength</b>	7	24
	<b>Must know</b>		
	Goniometry (Revision): ROM-Definition, Normal ROM for all peripheral joints & spine, Goniometer-parts, types, principles, uses, Limitations of goniometry, Techniques for measurement of ROM for all peripheral joints .	2	10
	Manual Muscle Testing: Introduction to MMT, Principles & Aims, Indications & Limitations, Techniques of MMT for group & individual muscles : Techniques of MMT for upper limb / Techniques of MMT for lower limb / Techniques of MMT for spine Anthropometric Measurements: Muscle girth – biceps, triceps, forearm, quadriceps, calf Static power Test Dynamic power Test Endurance test Speed test	5	12
	<b>Desirable to know</b>		
	Measurement of Limb Length: true limb length, apparent limb length, segmental limb length. Pelvic tilt: Measurement of the angle of Pelvic Inclination.		2
4	<b>Classification of movements</b>	10	18
	<b>Must know</b>		
	Active Movements	4	6
	Free exercise: Classification, principles, techniques, indications, contraindications, effects and uses Active Assisted Exercise: principles, techniques, indications, contraindications, effects and uses Assisted-Resisted Exercise: principles, techniques, indications, contraindications, effects and uses Resisted Exercise: Definition, principles, indications, contraindications, precautions & techniques, effects and uses Types of resisted exercises: Manual and Mechanical resistance exercise, Isometric exercise, Dynamic exercise: Concentric and Eccentric, Dynamic exercise: Constant versus variable resistance, Isokinetic exercise, Open-Chain and Closed-		

	Chain exercise.		
5	<b>Specific exercise regimens Isotonic:</b>	2	6
	<b>Must know</b>		
	de Lormes, Oxford, MacQueen, Circuit weight training Isometric: BRIME (Brief Resisted Isometric Exercise), Multiple Angle Isometrics Isokinetic regimens		
6	<b>Passive Movements</b>	4	4
	<b>Must know</b>		
	Causes of immobility, Classification of Passive movements, Specific definitions related to passive movements, Principles of giving passive movements, Indications, contraindications, effects of uses, Techniques of giving passive movements.		
<b>Unit II</b>			
7	<b>Proprioceptive Neuromuscular Facilitation</b>	5	5
	<b>Must know</b>		
	: Definitions & goals Basic neurophysiologic principles of PNF: Muscular activity, Diagonals patterns of movement: upper limb, lower limb Procedure: components of PNF Techniques of facilitation Mobility: Contract relax, Hold relax, Rhythmic initiation Strengthening: Slow reversals, repeated contractions, timing for emphasis, rhythmic stabilization Stability: Alternating isometric, rhythmic stabilization Skill: timing for emphasis, resisted progression Endurance: slow reversals, agonist reversal		
8	<b>Suspension Therapy</b>	4	5
	<b>Must know</b>		
	Definition, principles, equipment's & accessories, Indications & contraindications, Benefits of suspension therapy Types of suspension therapy: axial, vertical, pendular Techniques of suspension therapy for upper limb Techniques of suspension therapy for lower limb		
9	<b>Functional Re-education</b>	4	6
	<b>Must know</b>		
	Lying to sitting: Activities on the Mat/Bed, Movement and stability at floor level; Sitting activities and gait; Lowerlimb and Upperlimb activities.		
10	<b>Relaxation :</b>	4	3
	<b>Must know</b>		
	Definitions: Muscle Tone, Postural tone, Voluntary Movement, Degrees of relaxation, Pathological tension in muscle, Stress mechanics, types of stresses, Effects of stress on the body mechanism, Indications of relaxation, Methods & techniques of relaxation-Principles & uses: General, Local, Jacobson's, Mitchel's, additional methods.	3	
	<b>Nice to know</b>	1	
	Muscle fatigue, muscle spasm and tension (mental and		
11	<b>Aerobic Exercise</b>	4	2

	<b>Must know</b>		
	Definition and key terms; Physiological response to aerobic exercise, Examination and evaluation of aerobic capacity – Exercise Testing, Determinants of an Exercise Program, The Exercise Program, Normal and abnormal response to acute aerobic exercise, Physiological changes that occur with training, Application of Principles of an Aerobic conditioning program for patients – types and phases of aerobic training.		
12	<b>Manual Therapy &amp; Peripheral Joint Mobilization</b>	<b>5</b>	<b>6</b>
	<b>Must know</b>		
	Schools of Manual Therapy, Principles, Grades, Indications and Contraindications, Effects and Uses – Maitland, Kaltenborn, Mulligan Biomechanical basis for mobilization, Effects of joint mobilisation, Indications and contraindications, Grades of mobilization, Principles of mobilization, Techniques of mobilization for upper limb, lower limb, Precautions.		
13	<b>Stretching</b>	<b>3</b>	<b>6</b>
	<b>Must know</b>		
	Definition of terms related to stretching; Tissue response towards immobilization and elongation, Determinants of stretching exercise, Effects of stretching, Inhibition and relaxation procedures, Precautions and contraindications of stretching, Techniques of stretching.		
14	<b>Hydrotherapy</b>	<b>3</b>	<b>4</b>
	<b>Must know</b>		
	Definitions, Goals and Indications, Precautions and Contraindications, Properties of water, Use of special equipments, techniques, Effects and uses, merits and demerits		
<b>UNIT III</b>			
15	<b>Posture</b>	<b>4</b>	<b>4</b>
	Definition, Active and Inactive Postures, Postural Mechanism, Patterns of Posture, Principles of re-education: corrective methods and techniques, Patient education		
16	<b>Balance</b>	<b>3</b>	<b>4</b>
	<b>Must know</b>		
	Physiology of balance: contributions of sensory systems, processing sensory information, generating motor output Components of balance (sensory, musculoskeletal, biomechanical) Causes of impaired balance, Examination & evaluation of impaired balance, Activities for treating impaired balance: mode, posture, movement, Precautions & contraindications, Types Balance retraining		
16	<b>Co-ordination Exercise</b>	<b>3</b>	<b>4</b>
	<b>Must know</b>		

	Anatomy & Physiology of cerebellum with its pathways Definitions: Co-ordination, Inco-ordination Causes for Inco-ordination, Test for co-ordination: equilibrium test, non-equilibrium test Principles of co-ordination exercise Frenkel's Exercise: uses of Frenkel's exercise, technique of Frenkel's exercise, progression, home exercise.		
17	<b>Walking Aids</b>	<b>3</b>	<b>4</b>
	<b>Must know</b>		
	Walking aids Revision. Application: Pre crutch Training and crutch gaits.		
18	<b>Massage</b>	<b>4</b>	<b>6</b>
	<b>Must know</b>		
	Classification of Massage Technique Principles, Indications and Contraindications Technique of Massage Manipulations Physiological and Therapeutic Uses of Specific Manipulations	<b>3</b>	
	<b>Nice to know</b>		
	History, various types of soft tissue manipulations techniques.	<b>1</b>	
19	<b>Breathing exercises</b>	<b>4</b>	<b>6</b>
	<b>Must know</b>		
	Goals, Types of breathing exercises- Inspiratory, Expiratory, Segmental, Forced Expiratory- coughing & huffing, Modified Inspiratory, Active cycle of breathing. • Physiology of the above mentioned technique • Indication, contraindication & its importance for patient		
20	<b>Individual and Group Exercises</b>	<b>3</b>	<b>4</b>
	<b>Must know</b>		
	Advantages and Disadvantages, Organisation of Group exercises, Recreational Activities and Sports		
21	<b>Human dignity and Human Rights</b>	<b>2</b>	
	<b>Must know</b>		
	Human dignity as an intrinsic value • Respect , care and Equality in dignity of all human beings • human dignity in different cultural and moral traditions • Ethical aspects of physiotherapists in patients relation in regard to human dignity in handling children, women, elderly, mental & Physically challenged		
22	<b>Elements of Yoga</b>	<b>4</b>	<b>3</b>
	<b>Must know</b>		
	Asanas – Principles and elements; Pranayamas – 3Principles, Methods and Techniques		
23	<b>SPT</b>	<b>-</b>	<b>30</b>

**Recommended Textbooks:**

1. Therapeutic exercise by Barbara Bandy
2. Therapeutic exercise by Carolyn Kisner
3. Principles of exercise therapy by M. Dena Gardiner
4. Practical Exercise therapy by Hollis Margaret
5. Therapeutic exercise by Sydney Litch
6. Therapeutic exercise by Hall & Brody
7. Therapeutic exercise by Basmajian
8. Physical Rehabilitation by O'Sullivan.
9. Therapeutic massage by Sinha
10. Principles of muscle testing by Hislop.

**YEAR: II YEAR**

**COURSE CODE: 22PT205**

**22PT272**

**TITLE OF THE COURSE: ELECTROTHERAPY**

**ELECTROTHERAPY PRACTICALS**

**COURSE OBJECTIVES:**

IN THIS COURSE THE STUDENT WILL LEARN THE PRINCIPLES, TECHNIQUE AND EFFECTS OF ELECTROTHERAPY AS A THERAPEUTIC MODALITY IN THE RESTORATION OF PHYSICAL FUNCTION.

**COURSE OUTCOMES:**

THE EXPECTED OUTCOMES OF THIS COURSE IS THAT AFTER THE PRESCRIBED HOURS OF LECTURES, DEMONSTRATIONS, PRACTICALS AND CLINICS THE STUDENT WILL BE ABLE TO LIST THE INDICATIONS AND CONTRAINDICATIONS OF VARIOUS TYPES OF ELECTROTHERAPY DEMONSTRATE THE DIFFERENT TECHNIQUE AND DESCRIBE THEIR EFFECTS.

<b>COURSE TITLE – Electrotherapy</b> Electrotherapy Practicals <b>COURSE CODE – 22PT205</b> 22PT272														
Hours				Hours per week				Evaluation pattern						
Th	Prac	SPT	Total	Th	Prac	SPT	Total	Theory			Th Aggre gate	Practical		Th+Prac
								IA	Written exam	VV		IA	Final Exam	
100	120	30	250	4	5	1	10	20	100	30	150	-	50	200

Sr. No.	Topic / Course Contents	Hours of teaching learning	
		Theory	Practical
<b>UNIT – I</b>			
1	<b>Section I - Introductory Physics</b>	<b>20</b>	<b>12</b>
	Must Know <b>Electricity definition, types</b> <b>Static electricity</b> a. Production of electrical charges. b. Characteristics of charged body. c. Characteristics of lines of forces. d. Potential difference and EMG. <b>Current Electricity</b>		

	<p>a. Units of Electricity, faraday, volt, ampere, coulomb, watt.</p> <p>b. Resistance in series and parallel.</p> <p>c. Ohms law and its application to DC/AC.</p> <p>d. Fuse.</p> <p>e. Shock: Micro/ Macro shocks, safety precaution and management, earthing techniques &amp; precautions.</p> <p>f. Burns: electrical &amp; chemical burns, prevention and management.</p> <p>g. Condensers: definition, principles, types, construction, working and uses.</p> <p><b>Magnetism:</b> Definition, properties, electro-magnetic induction, electro- magnetic spectrum.</p> <p><b>Valves,</b> transformers, types, principles, construction and working.</p> <p><b>Ionization:</b> Principles, effects of various technique of medical ionization.</p>		
2	<b>Section II – Therapeutic Electricity :Low Frequency currents</b>	55	40
	<p>Must Know</p> <p>Physiological effects, therapeutic uses, indications and contraindications and dangers of faradic type current, intermittent galvanic current and galvanic current</p> <ul style="list-style-type: none"> <li>➤ Cathodal &amp; Anodal Galvanism, Iontophoresis with various ions &amp; Pharmaco therapeutic drugs.</li> <li>➤ Faradic current under pressure /elevation, Faradic Foot Bath</li> <li>➤ Electrical stimulation for re-education–short /long pulse motor points</li> </ul> <p><b>Electrical Reactions and Electro-diagnostic tests:</b></p> <ul style="list-style-type: none"> <li>➤ Electrical Stimuli &amp; normal behavior of Nerve &amp; muscle</li> <li>➤ Types of lesion &amp; development of reaction of degeneration.</li> <li>➤ Faradic – Intermittent direct current test.</li> <li>➤ S.D. Curve and its application and characteristics</li> <li>➤ Chronaxie, Rheobase &amp; Pulse ratio</li> <li>➤ High voltage pulsed galvanic current</li> </ul> <p><b>TENS:</b> Define, Principles of production, types, dosage, electrode placement, Physiological and therapeutic effects, indication &amp; contraindications.</p>		
	<p>Desirable to know</p> <p>Micro –currents</p> <p>Didynamic currents</p>		
	<p>Nice to know-</p> <ul style="list-style-type: none"> <li>➤ Functional electrical stimulation</li> <li>➤ Long wave diathermy</li> <li>➤ NEMS, Matrix Rhythm Therapy</li> </ul>		

	<b>UNIT -II</b>		
3	<b>Section – III - Therapeutic Electricity: Medium frequency currents</b>	18	28
	<p>Must Know</p> <p><b>Interferential therapy:</b> Define, Principles of production, static Interferential system, dynamic interference system, dosage, electrode placement, Physiological and therapeutic effects, indication and contraindications</p>		
	<p>Desirable to Know</p> <ul style="list-style-type: none"> <li>➤ Russian currents</li> <li>➤ Rebox type currents</li> </ul> <p><b>Biofeedback method:</b></p> <ul style="list-style-type: none"> <li>➤ Instrumentation, principles, therapeutic effects,</li> <li>➤ Indications, contraindications, limitations, precautions,</li> <li>➤ Operational skills and patient preparation</li> </ul>		
	<p><b>Must Know</b></p> <p><b>Ultraviolet rays (UVR):</b></p> <ul style="list-style-type: none"> <li>➤ Wavelength, frequency, types &amp; sources of UVR generation,</li> <li>➤ Techniques of irradiation, physiological &amp; therapeutic effects</li> <li>➤ Indications, Contraindications, precautions, operational skills of equipment&amp; patient preparation.</li> <li>➤ Dosimetry of UVR.</li> </ul> <p><b>Light Amplification of stimulated Emission of Radiation (LASER)</b></p> <ul style="list-style-type: none"> <li>➤ Definition, historical background, physical principles, biophysical effects, types, production, therapeutic effects</li> <li>➤ Techniques of application, indications, contraindications, precautions</li> <li>➤ Operational skills and patient preparation.</li> </ul> <p><b>Care of wound</b> –application of Therapeutic currents, Ultrasound, U.V.R.&amp; LASER</p>		
	<b>Nice to know- Combination Therapy</b>		
	<p>Desirable to Know</p> <p><b>Intermittent Therapy</b> unit, its operation and different methods of application region wise.</p> <p><b>Interferential Pneumatic Therapy</b> unit, its operation and different methods of application – region wise.</p>		
	<b>Nice to know</b>		

	<b>Respect for human vulnerability and personal integrity</b> <ul style="list-style-type: none"> <li>➤ Different aspects of vulnerability - biological , social , cultural</li> <li>➤ Success and failures in physiotherapy treatments</li> <li>➤ Problems with the basic assumption that vulnerability should be eliminated</li> <li>➤ Care ethics- New approaches in bioethics, Solidarity, duty to care</li> <li>➤ Relation between vulnerability and personal integrity</li> </ul>		
4	<b>Section IV- HIGH FREQUENCY CURRENTS AND WAVES</b>	<b>25</b>	<b>14</b>
	<p>Must know</p> <p><b>High frequency currents (S.W.D.)</b></p> <ul style="list-style-type: none"> <li>➤ Production, biophysical effects, types</li> <li>➤ Therapeutic effects, techniques of application</li> <li>➤ Indications, contraindications, precautions</li> <li>➤ Operational skills and patient preparation</li> </ul> <p><b>High frequency sound waves (Ultrasound)</b></p> <ul style="list-style-type: none"> <li>➤ Physics of sound including characteristics and propagation</li> <li>➤ Production, biophysical effects, types</li> <li>➤ Therapeutic effects, techniques of application</li> <li>➤ Indications, contraindications, precautions</li> <li>➤ Operational skills and patient preparation</li> </ul>		
<b>UNIT -III</b>			
5	<b>Section V Superficial heating Modalities</b>	<b>33</b>	<b>22</b>
	<p>Must Know</p> <p>Wax Therapy: Principle of Wax Therapy application – latent Heat, Composition of Wax Bath Therapy unit, Methods of application of Wax, Physiological &amp; Therapeutic effects, Indications &amp; Contraindication, Dangers</p>	4	2
	<p>Must know</p> <p>Contrast Bath: Methods of application, Therapeutic uses, Indications &amp; Contraindications</p>	3	2
	<p>Must know</p> <p>Moist Heat Therapy: Hydro collator packs – in brief, Methods of applications, Therapeutic uses, Indications &amp; Contraindications.</p>	4	2
	<p>Must know</p> <p>Cyclotherm: Principles of production, Therapeutic uses, Indications &amp; Contraindications</p>	3	2
	<p>Must know</p> <p>Fluidotherapy: Construction, Method of application, Therapeutic uses, Indications &amp; Contraindications.</p>	3	2
	<p>Must know</p> <p>Whirl Pool Bath: Construction, Method of Application, Therapeutic Uses, Indications &amp; Contraindications</p>	3	2

	Magnetic Stimulation, Principles, Therapeutic uses, Indications & contraindication.	2	2
	Must know Cryotherapy: Define- Cryotherapy, Principle- Latent heat of fusion, Physiological & Therapeutics effects, Techniques of Applications, Indications & Contraindications, Dangers, Methods of application with dosages.	6	2
6	<b>Section-VI TRACTION</b>	<b>5</b>	<b>4</b>
	Must know <ul style="list-style-type: none"> <li>➤ Principles of traction, classification, types</li> <li>➤ Physiological &amp; therapeutic effects</li> <li>➤ Indications, contraindications</li> <li>➤ Techniques of application</li> <li>➤ Operational skills &amp; precautions</li> </ul>		
7	<b>SPT</b>	-	30

**Recommended textbooks:**

1. Claytons Electrotherapy by Forster & Plastangs
2. Electrotherapy Explained by Low & Reed
3. Clinical Electrotherapy by Nelson
4. Electrotherapy Evidence based practice by Sheila Kitchen
5. Physical agents by Michèle Cameroon
6. Principles of Electrotherapy by Michèle Cameroon
7. Thermal agents by Susan Michlovitz.

YEAR: II YEAR

COURSE CODE: 22PT206

TITLE OF THE COURSE: RESEARCH METHODOLOGY

COURSE OBJECTIVES:

COURSE OUTCOMES:

COURSE TITLE – Research Methodology														
COURSE CODE – 22PT206														
Hours				Hours per week				Evaluation pattern						
Th	Prac	SPT	Total	Th	Prac	SPT	Total	Theory			Th Aggre gate	Practical		Th+Prac c
								IA	Written exam	VV		IA	Final Exam	
40	00	00	40	1	-	-	1	10	40	-	-	-	-	50

S.I No.	Topic		Theory hours
<b>UNIT – I</b>			
1.	Introduction to Research Methodology	<b>- Must to know</b> <ul style="list-style-type: none"><li>➤ Definition of research</li><li>➤ Objectives of research</li><li>➤ Types of methods and design in research</li><li>➤ Qualities of good research</li><li>➤ Issues in research.</li></ul>	6
2.	Statement of research problem	<b>- Must to know</b> <ul style="list-style-type: none"><li>• Selection of research question</li><li>• Hypothesis</li><li>• Defining the aims and objectives</li><li>• Defining research problem.</li></ul>	4
3.	Selection of research design	<b>- Must to know</b> <ul style="list-style-type: none"><li>• Types of research designs</li><li>• Principles of research design</li></ul>	4
<b>UNIT- II</b>			
4.	Sampling [methods and designs]	<b>- Must to know</b> <ul style="list-style-type: none"><li>• Types of sampling method</li><li>• Calculation of sample size</li><li>• Characteristics of good sample method</li></ul>	4
5.	Measurement and scaling techniques	<b>- Must to know</b> <ul style="list-style-type: none"><li>• Measurement in research – measurement scales</li></ul>	6

		<ul style="list-style-type: none"> <li>• Sources of error in measurement</li> <li>• Technique of developing measurement tools</li> <li>• Meaning of scaling, its classification</li> <li>• Important scaling techniques</li> </ul>	
6.	Methods of data collection	<b>- Must to know</b> <ul style="list-style-type: none"> <li>• Types</li> <li>• Collection</li> <li>• Selection of data tool</li> </ul>	4
<b>UNIT- III</b>			
7.	Processing and analysis of data	<b>- Must to know</b> <ul style="list-style-type: none"> <li>• Processing operations</li> <li>• Problems in processing</li> <li>• Types of analysis</li> <li>• Testing of hypothesis</li> <li>• Statistics in research</li> <li>• Measures of central tendency</li> <li>• Dispersion</li> <li>• Asymmetry</li> </ul>	6
8.	Ethics in research	<b>- Must to know</b> <ul style="list-style-type: none"> <li>• Misconduct</li> <li>• Plagiarism</li> <li>• How to prepare and publish a research paper</li> </ul>	4
9.	Computer technology	<b>- Must to know</b> <ul style="list-style-type: none"> <li>• Introduction to computers</li> <li>• Computer application in research</li> <li>• Computers and researchers</li> </ul>	2

**Recommended Textbooks:**

1. Research Principles and Methods: L Denise F. Poli & Hungler
2. Fundamentals of Research, 4 thEdn.: David J. fox
3. Introduction to research for Physiotherapists by Hicks

**YEAR: II YEAR**

**COURSE CODE: 22PT207**

**TITLE OF THE COURSE: BIOENGINEERING (PROGRAM ELECTIVE)**

**COURSE OBJECTIVES:**

The objectives are to develop an understanding of basic orthotic and prosthetic devices, their uses, prescriptions, check outs and training for various musculoskeletal, neuromuscular disorders.

**COURSE OUTCOMES:**

At the completion of the course, students will be able to:

- 1.1 Understand the historical aspects, materials and instrumentation of common prostheses and orthoses
- 1.2 Understand the classification and basic principles of working of common prosthetic and orthotic devices
- 1.3 Understand the role of a Physiotherapist in the process of prescribing and designing of prosthesis, orthosis & assistive devices
- 1.4 Understand the uses, assessment and prescription of common prosthesis, orthotics and assistive devices.
- 1.5 Demonstrate various methods of training a patient with prosthesis, orthosis or assistive devices to achieve functional independence

**Note:** Long questions should be asked only from “Must Know” and Short Essay and Short Answers from “Must Know” and “Good to Know”. 80% of Questions in the university exam will be included from must know content 15% from desirable to know and 5% from nice to know.

COURSE TITLE – BIOENGINEERING (Program Elective)														
COURSE CODE – 22PT207														
Hours				Hours per week				Evaluation pattern						
Th	Prac	SPT	Total	Th	Prac	SPT	Total	Theory			Th Aggre gate	Practical		Th+Prac c
								IA	Written exam	VV		IA	Final Exam	
40	00	00	40	1	-	-	1	10	40	-	-	-	-	50

S.I No.	Topic		Theory hours
<b>UNIT – I</b>			
1.	<b>Introduction to Bioengineering</b>	<b>- Must to know</b> <ul style="list-style-type: none"><li>• Uses of orthotics and prosthetics</li><li>• Equipements</li><li>• Materials</li><li>• Classification of orthotics</li></ul>	10

		<ul style="list-style-type: none"> <li>• Classification of prosthetics</li> <li>• Classification of adaptive devices</li>   <li>• Biomechanical principles</li>   <li>• Internal force system</li> <li>• External force system</li> <li>• Biomechanical analysis</li> <li>• Pathomechanical analysis</li> <li>Biomechanics of orthosis and prosthesis</li> </ul> <p><b>- Nice to know</b></p> <ul style="list-style-type: none"> <li>• Historical aspects</li> </ul>	
2.	<b>Role of physiotherapist</b>	<p><b>- Must to know</b></p> <ul style="list-style-type: none"> <li>• Prescription of orthotic and prosthetic devices</li> <li>• Check outs of orthotic and prosthetic devices</li> <li>• Training with orthotic and prosthetic devices</li> <li>• Ergonomic modifications</li> </ul>	6
3.	<b>Adaptive devices</b>	<p><b>- Must to know</b></p> <ul style="list-style-type: none"> <li>• Overview</li> <li>• Adaptive devices for ADL</li> <li>• Sitting devices for multiple disabled</li> <li>• Adaptive devices for recreational activities</li> <li>• Adaptive devices for sports.</li> </ul>	4
<b>UNIT- II</b>			
4.	<b>Footwear modifications</b>	<p><b>- Must to know</b></p> <ul style="list-style-type: none"> <li>• Types of footwear and their parts</li> <li>• Functions of footwear</li> <li>• Footwear modification for deformities</li> <li>• Footwear modification for foot ulcers</li> <li>• Role of footwear in enhancement of sports performance</li> <li>• Prevention of sports injuries by footwear modifications</li> </ul>	6
5.	<b>Orthotics</b>	<p><b>- Must to know</b></p> <ul style="list-style-type: none"> <li>• Overview</li> <li>• Upper limb</li> <li>• Lower limb</li> <li>• Spinal</li> <li>• Orthotics for neurological disorders</li> <li>• Orthotics for musculoskeletal disorders</li> <li>• Fitting and alignment techniques</li> <li>• Clinical applications</li> </ul>	6

		<ul style="list-style-type: none"> <li>• Maintenance of orthoses</li> </ul>	
6.	<b>Prosthetics</b>	<b>- Must to know</b> <ul style="list-style-type: none"> <li>• Upper limb</li> <li>• Lower limb</li> <li>• Aesthetic</li> <li>• Clinical applications</li> <li>• Fitting and alignment techniques</li> <li>• Complications of prosthetics</li> </ul>	4
<b>UNIT- III</b>			
7.	<b>Recent advances</b>	<b>- Nice to know</b> <ul style="list-style-type: none"> <li>• Bionic arm</li> <li>• Bionic foot</li> <li>• 3d printed prosthetics &amp; orthotics</li> </ul>	4

### Reference-

1. Bella J M: Amputation and Prosthetics: A case study Approach, Jaypee Brothers, New Delhi, 2 Ed, 2002.
2. Kent K Wu Foot: Orthoses Principles and clinical application, Williams and Wilkins, London, 1990.
3. Ron Seymour: Prosthetics and Orthotics Lower limb and spinal, Lippincott Williams and Wilkins, New York, 2002.
4. Lunsardi MM, Nielsen CC: Orthotics and prosthetics in rehabilitation, Butterworth Heinemann, New Delhi, Oxford, 2000.
5. Edelstein J E and Bruckner J: Orthotics A comprehensive clinical approach Jaypee brothers, New Delhi, 2004.
6. Shurr D G, Michael J W, Cook TM: Prosthetics and Orthotics Prentice hall, Michigan, 2 Ed, 2001.
7. Bowker JH, Michael JW: Atlas of limb prosthetics: surgical, prosthetics, and rehabilitation principles, Mosby, Michigan, 2 Ed, 1992.
8. Gerhardt JJ, Philip SK, Zetti JH: Immediate and early prosthetics management: Rehabilitation aspects. Huber Michigan, 2 Ed, 1986.
9. Bussell MH: New advances in prosthetics and orthotics, an issue of Physical Medicine and Rehabilitation clinics, Elsevier Health Sciences Division, 2006.
10. Janardhanam K: Topics on prosthetics and Orthotics, Educom System, Chennai, 2003.

**YEAR: II YEAR**

**COURSE CODE: 22PT208**

**TITLE OF THE COURSE: DIET & NUTRITION (PROGRAM ELECTIVE)**

**COURSE OBJECTIVES:**

The objectives are to develop an understanding of nutrition, balanced diet, their importance, assessment methods and relation with different disorders like musculoskeletal, neurological, paediatric disorders.

**COURSE OUTCOMES:**

At the completion of the course, students will be able to:

- 1.1 Understand the science of nutrition in daily life and in patient care.
- 1.2 Describe the Recommendation of Daily Allowances in India and by WHO.
- 1.3 Understand the role of a nutrition in overall healing in different disorders.
- 1.4 Describe different assessment techniques with advances related to food and nutrition.

**Note:** Long questions should be asked only from “Must Know” and Short Essay and Short Answers from “Must Know” and “Good to Know”. 80% of Questions in the university exam will be included from must know content 15% from desirable to know and 5% from nice to know.

COURSE TITLE – DIET & NUTRITION (Program Elective)														
COURSE CODE – 22PT208														
Hours				Hours per week				Evaluation pattern						
Th	Prac	SPT	Total	Th	Prac	SPT	Total	Theory			Th Aggre gate	Practical		Th+Prac
								IA	Written exam	VV		IA	Final Exam	
40	00	00	40	1	-	-	1	10	40	-	-	-	-	50

S.I No.	Topic		Theory hours
<b>UNIT – I</b>			
1.	<b>Introduction to Nutrition</b>	<b>- Must know</b> <ul style="list-style-type: none"><li>• Introduction to Food Science</li><li>• Optimum nutrition, balanced diet, reference man, reference woman</li><li>• Water &amp; electrolyte balance</li></ul> <b>- Desirable to know</b> <ul style="list-style-type: none"><li>• Structure, Physical &amp; Chemical properties of different types of foods constituents - Cereals &amp; grains, Pulses &amp; legumes, Vegetables &amp; fruits, Nuts &amp; oilseeds, Milk &amp; milk products,</li></ul>	5

		Meat & poultry, Sugar & fat.	
2.	<b>Importance of nutrition in different disorders</b>	<b>- Must know</b> <ul style="list-style-type: none"> <li>• Role of Nutrients and Energy Expenditure</li> <li>• Musculoskeletal Physiotherapy disorders and related Nutrition Guidelines</li> <li>• Neurological Physiotherapy disorders and related Nutrition Guidelines</li> <li>• Sports Injuries disorders and related Nutrition Guidelines</li> <li>• Cardio-Respiratory Physiotherapy disorders and related Nutrition Guidelines</li> <li>• Paediatrics Physiotherapy disorders and related Nutrition Guidelines</li> <li>• Obstetrics and Gynaecological Physiotherapy disorders and related Nutrition Guidelines</li> </ul>	8
<b>UNIT- II</b>			
3.	<b>Human Nutritional Requirements</b>	<b>- Must know</b> <ul style="list-style-type: none"> <li>• Energy – Introduction, basal metabolic rate, calculating energy requirements, energy expenditure using bomb calorimeter, indirect calorimeter etc, specific dynamic action of food, deriving nutritional requirements &amp; recommended dietary allowances for energy for different age groups, specific dynamic action of food</li> <li>• Minerals &amp; Vitamins - Deriving nutritional requirements and recommended dietary allowances for entire life span (infancy to old age) for vitamins &amp; minerals</li> <li>• Critical evaluation of International recommended dietary allowances – WHO Recommended dietary allowances &amp; Guidelines for Indians.</li> </ul>	8
4.	<b>Nutritional Disorders</b>	<b>- Must know</b> <ul style="list-style-type: none"> <li>• Major Nutritional problems: <ul style="list-style-type: none"> <li>- Protein energy malnutrition</li> <li>- Kwashiorkor</li> <li>- Marasmus</li> <li>- Anemia</li> <li>- vitamin A deficiency</li> </ul> </li> </ul>	8

		<ul style="list-style-type: none"> <li>- Iodine deficiency disorder.</li> <li>• Minor Nutritional Problems</li> <li>- Scurvy</li> <li>- beri- beri</li> <li>- pellagra</li> <li>- rickets</li> <li>- osteomalacia</li> <li>- osteoporosis</li> <li>- zinc deficiency &amp; fluorosis</li> <li>- <b>Nice to know</b> <ul style="list-style-type: none"> <li>- Their prevalence, etiology, biochemical &amp; clinical manifestations, diagnostic techniques, preventive &amp; therapeutic measures.</li> </ul> </li> </ul>	
<b>UNIT- III</b>			
5.	<b>Assessment of Nutritional Status</b>	<ul style="list-style-type: none"> <li>- <b>Must know</b></li> <li>Various techniques for assessment of nutritional status: <ul style="list-style-type: none"> <li>- Anthropometric measurements</li> <li>- Clinical examination</li> <li>- Biochemical estimations</li> <li>- Dietary survey</li> </ul> </li> </ul>	8
6.	<b>Recent advances</b>	<ul style="list-style-type: none"> <li>- <b>Nice to know</b> <ul style="list-style-type: none"> <li>• Super foods and its effect on human body</li> <li>• Food science and Technology</li> </ul> </li> </ul>	3

**REFERENCE BOOKS:**

1. Nutrition care & therapeutic nutrition. Krause.
2. Clinical dietetics & nutrition, Antia F.P. Oxford University Press (III edition) 1989
3. Therapeutic nutrition. B.Srilakshmi
4. Food Science- B. Srilakshmi.
5. Clinical Dietetics Manual – Indian Dietetics Association.
6. Nutritional problems of India – P.K. Shukla BSc Clinical Nutrition & Dietetics 20/29
7. Human Nutrition & dietetics, (Davidson & Passmore) Passmore Rand Eastwood M.A. (1986) 8th Ed. English language book society/ Churchill Livingstone.
8. Text book of Human Nutrition. Bamji MS, Rao R.N. & Reddy V. Oxford & IBH Pub Co. PVT LTD, New Delhi
9. Nutrient requirement & Recommended Dietary Allowances for Indians, ICMR 1990.
10. Indian Food Composition Table, NIN, ICMR
11. Nutritive Value of Indian Foods – NIN, ICMR
12. <https://pubmed.ncbi.nlm.nih.gov/31940634>