

**VEER NARMAD
SOUTH GUJARAT UNIVERSITY
UDHANA-MAGDALLA ROAD, SURAT-395007.**



**BACHELOR OF PHYSIOTHERAPY
(BPT)**

Version 3.0

New Syllabus
(Effective from 2011-2012)

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##. BACHELOR OF PHYSIOTHERAPY [BPT]

1 st BPT	2 nd BPT	3 rd BPT	4 th BPT
Exam Papers			
Paper- I: Human Anatomy*	Paper- I: Pathology & Microbiology	Paper- I: General Medicine (including Pediatrics).	Paper- I: Neurology & Neurosurgery
Paper- II: Human Physiology * (Including Exercise Physiology)	Paper- II: Biochemistry & Pharmacology	Paper- II: General Surgery (including O&G and Cardiothoracic Surgery).	Paper- II: Neuromuscular Physiotherapy*
Paper- III: Exercise Therapy - I & Basic Biomechanics*	Paper- III: Exercise Therapy – II*	Paper- III: Orthopedics & Traumatology	Paper- III: Cardio-pulmonary Physiotherapy *
Paper- IV: Psychology & Sociology	Paper- IV: Electrotherapy*	Paper- IV: Musculoskeletal Physiotherapy *	Paper- IV: Physiotherapy in Rehabilitation
Paper- V: Biomedical Physics	Paper- V: Kinesiology	Paper- V: General Medical & Surgical Physiotherapy*	Paper- V: Physical & Functional Diagnosis*
Paper- VI: English	Paper- VI: Biostatistics	Paper- VI: Research Methodology	*****
Non-exam Papers			
Paper- VII: Orientation to Physiotherapy	Paper- VII: ENT & Dermatology	Paper-VII: Radiology	Paper- VI: Administration & Management in Physiotherapy
Paper- VIII: First Aid & CPR	Paper- VIII: Basic Nursing	Paper- VIII: Computer Application	Paper-VII: Evidence Based Physiotherapy & Ethics
****	Paper- IX: Environmental Studies	Paper- IX: Psychiatry	Paper- VIII: Allied Therapeutics
<i>Clinical Observation Posting</i>	<i>Supervised Clinical Practice</i>	<i>Clinical Training - I</i>	<i>Clinical Training -II</i>

Table – II: SY BPT

Paper No.	Papers	Weekly Class Hours	Total	Hours		Marks		Total Marks
				Theory	Practical	Theory (External +Internal)	Practical (External +Internal)	
1.	Pathology & Microbiology	3-4	60+55	45+40	15+15	80+20	*****	100
2.	Biochemistry & Pharmacology	3-4	60+60	60+60	****	80+20	*****	100
3.	Exercise Therapy – II*	5-6	250	100	150	80+20	80+20	200
4.	Electrotherapy*	5-6	200	100	100	80+20	80+20	200
5.	Kinesiology	2-3	100	100	****	80+20	*****	100
6.	Biostatistics	2-3	50	50	****	40+10	*****	50
	Non-Exam Papers							
7.	ENT & Dermatology	1-2	10+20	10+20	****	****	****	****
8.	Basic Nursing	1-2	40	20	20	****	****	****
9.	Environmental Studies	1-2	64	64	****	****	****	****
*	Supervised Clinical Practice	2-3	141	141		****	****	
**	Extra-curricular Activities [Conference, Tours, Seminar, Workshops, Sports and Cultural Activities]	--	150	150		****	****	****
	Total Hours in SY		1260 Hours					



D.

Second Year

***Bachelor of
Physiotherapy***

Paper I - PATHOLOGY & MICROBIOLOGY

SECTION – I: PATHOLOGY

Subject Title:	Pathology
Total hours:	60
Theory:	45
Practical:	15
Total Hours/ Week:	2-3 hours
Method of Assessment:	Written

Course Description:

This subject follows the basic subjects of Anatomy, Physiology and Biochemistry and it forms a vital link between preclinical subjects and clinical subjects. Pathology involves the study of causes and mechanisms of diseases. Microbiology involves the study of common organisms causing diseases including nosocomial infections and precautionary measures to protect one from acquiring infections. The knowledge and understanding of Microbiology & Pathology of diseases is essential to institute appropriate treatment or suggest preventive measures to the patient. Particular effort is made in this course to avoid burdening the student.

THEORY

A. General Pathology

- a) **Introduction to Pathology [1 Hour]:** Subdivisions of Pathology, Key terms used in pathology viz. etiology, morphological changes, lesions, primary & secondary, acute & chronic
- b) **Cellular Injuries [1 Hour]:** Causes & mechanism of cell injury, reversible & irreversible cellular injuries
- c) **Cell Death & Cell Necrosis [1 Hour] :** Different types of cell necrosis, its gross & microscopic appearances, gangrene & its different types; Apoptosis
- d) **Cellular Adaptations [1 Hour] :** Hypertrophy, hyperplasia, atrophy, Metaplasia, cellular dysplasia
- e) **Cellular Changes & Information [1 Hour]:** Cloudy swelling, hydropic change, fatty change, mucoid change, pathological calcification
- f) **Amyloidosis [1 Hour]:** Definition, classification, nature of amyloid, clinical significance
- g) **Pathology of Diabetes Mellitus [1 Hour]:** Definition, classification of diabetes, Pathology of - renal, cardiovascular, ophthalmic & neurological complications.
- h) **Inflammation [3 Hours]:** Acute inflammation - definition, causes, vascular events, exudates formation, chemical mediators of inflammation , Chronic inflammation - general feature, Granulomatous inflammation, examples of Granulomatous inflammation

- i) **Wound Healing [2 Hours]:** Regeneration, repair, healing by primary & secondary union, factors affecting healing, healing of bone fracture.
- j) **Hemodynamic changes [4 Hours] :** Oedema, hyperaemia & congestion, thrombosis, embolism, infarction, shock.
- k) **Tumor Pathology [2 Hours] :** Definition, classification, characteristics of benign & malignant tumors, pathogenesis & spread of tumors. **Systemic Pathology**
 - 1. **Gastrointestinal tract [2 Hours]:** Peptic ulcer, benign & malignant tumors of intestine, infective & inflammatory bowel diseases, typhoid ulcer, intestinal tuberculosis, 'Crohn's disease, ulcerative colitis.
 - 2. **Liver disease [2 Hours]:** Viral hepatitis A, viral hepatitis B, viral hepatitis c, cirrhosis of liver, portal hypertension, pathology of jaundice
 - 3. **Genitourinary tract [2 Hours] :** Acute & chronic renal failure, definition & classification of glomerulonephritis, hydronephrosis, urinary calculi, classification of testicular & ovarian tumors.
 - 4. **Musculoskeletal system [2 Hours]:**
 - a) Osteomyelitis, osteoporosis, osteoarthritis, rheumatoid arthritis, gout, psoriasis **[1 hour]**
 - b) Muscle disease – myopathic and Neurogenic disorders, inflammatory myopathy, muscular dystrophies
 - 5. **Respiratory system [4 hours] :** Bronchitis, pulmonary hypertension, pulmonary tuberculosis, pneumonia, emphysema, Bronchiectasis, neonatal respiratory syndrome, adult respiratory syndrome
 - 6. **Cardiovascular system**
 - a) Blood Vessels: Atherosclerosis, aneurysm, phlebothrombosis, thrombophlebitis **[2 Hours]**
 - b) Heart Disease: Rheumatic heart disease, bacterial endocarditis, hypertensive heart disease, coronary heart disease, congenital heart diseases **[4 Hours]**
 - 7. **Central nervous system [2 Hours]:** Meningitis, encephalitis, hydrocephalus, cerebrovascular disease, poliomyelitis, epidural & subdural hematoma

B. Hematology

- 1. **Anaemias:** Definition, classification, Fe deficiency ananemia, B12 deficiency ananemia, hemolytic ananemias, thalassemia, sickle cell ananemia, G6PD deficiency ananemia, aplastic ananemia. **[3 Hours]**
- 2. **Leukemias:** Definition & classification, acute myeloblastic leukemia, acute lymphoblastic leukemia, chronic myeloid leukemia, chronic lymphocytic leukemia **[1 Hour]**
- 3. **Haemorrhagic disorders:** Haemophilia, purpura, prothrombin time **[1 Hour]**

4. **Blood Banking:** Blood groups, cross matching, blood transfusion reaction, selection of blood donor, blood components [2 Hour]

PRACTICAL [15 Hours]

Demonstration of Slides – The students may be demonstrated the common histopathological, hematological and cytological slides, specimens, charts and their interpretations.

Recommended Textbooks

1. Text book of pathology: Harshmohan
2. General Systemic pathology: Churchill Livingstone
3. Text book of Pathology: Robbins
4. Textbook of Pathology. : S. G. Deodhare
5. Pathology. Anderson (reference).

Section – II - MICROBIOLOGY

Subject Title:	Microbiology
Total hours:	55
Theory:	40
Practical:	15
Total Hours/ Week:	2 hours
Method of Assessment:	Written

THEORY

1. General Microbiology [10 Hours]

- a) Definitions: Infections, parasite, host, vector, fomite, contagious disease, infectious disease, epidemic, endemic, pandemic, Zoonosis, Epizootic, Attack rate.
- b) Normal flora of the human body.
- c) Routes of infection and spread; endogenous and exogenous infections; source at reservoir of infections.
- d) Morphology of bacteria – Size, Shape, motility and arrangement. Structures, which are virulence – pili, cell wall, capsule, flagella.
- e) Sterilization, disinfection, aseptic measures and universal precautions in relation to patient care and disease prevention.
- f) Culture media.

2. **Immunology [7 Hours]:** Basic principles of immunity & immunobiology: lymphoid organs and tissues. Antigen, Antibodies, antigen and antibody reactions – agglutination, precipitation, innate immunity, ELISA,RIA, fluroscenceAb techniques.Humoral immunity, Cell mediated immunity , hypersensitivity.

3. Bacteriology [11 Hours]

- a) Morphology, mode of transmission, prevention, pathogenesis, collection and transport of samples for laboratory diagnosis, treatment.
- b) Staphylococci, Streptococci and Pneumococci,
- c) Mycobacteria: M. Tuberculosis, M. leprae,
- d) Salmonella, shigella.
- e) Vibrio cholera.
- f) Sporing and non-sporing anaerobes: Clostridia. Cl. Perfringens, cl. Tetani
- g) Syphilis- treponema pallidum

4. General Virology [6 Hours]: General properties: Basic structure, Pathogenesis and pathology of viral infections. Immunity and prophylaxis of viral diseases. Principles of laboratory diagnosis of viral diseases. List of commonly used antiviral agents. Poliomyelitis, HIV, Hepatitis.

5. Mycology [6 Hours]: General properties of fungi. fungal diagnosis. Rapid diagnosis. Method of collection of samples. Antifungal agents. Pathogenesis. Mycetoma. Aspergillosis. Candidiasis.

PRACTICAL [15 Hours]

1. Demonstration of Microscopes and its uses
2. Principles, uses and demonstration of common sterilization equipment
3. Demonstration of common culture media
4. Demonstration of Gram Stain, ZN Stain
5. Demonstration of Serological test: ELISA
6. Demonstration of Fungus

Recommended Textbooks:

1. Short textbook of Medical Microbiology by Sathish Gupta
2. Microbiology & Parasitology by Rajeshwar Reddy
3. Text book of Microbiology by Anantha Narayanan and Jayaram Panicker
4. Microbiology by Baveja
5. Text book of Microbiology by Chakraborty

Paper II - BIOCHEMISTRY & PHARMACOLOGY

SECTION – I BIOCHEMISTRY

Subject Title:	Biochemistry
Total hours:	60
Theory:	60
Total Hours/ Week:	2 hours
Method of Assessment:	Written

THEORY

1. Nutrition [7 Hours]

- a) Introduction, Importance of nutrition, Calorific values,
- b) Respiratory quotient – Definition, and its significance
- c) Energy requirement of a person -
- d) Basal metabolic rate: Definition, Normal values, factor affecting BMR
- e) Special dynamic action of food
- f) Physical activities - Energy expenditure for various activities.
- g) Calculation of energy requirement of a person
- h) Balanced diet, Recommended dietary allowances
- i) Role of carbohydrates in diet: Digestible carbohydrates and dietary fibers
- j) Role of lipids in diet.
- k) Role of proteins in diet: Quality of proteins - Biological value, net protein utilization, Nutritional aspects of proteins-essential and non essential amino acids. Nitrogen balance
- l) Nutritional disorders

2. Carbohydrate Chemistry [3 Hours]: Definition, general classification with examples, Glycosidic bond Structures, composition, sources, properties and functions of Monosaccharides, Disaccharides, Oligosaccharides and Polysaccharides. Glycosaminoglycans (mucopolysaccharides)

3. Lipid Chemistry [3 Hours]

- a) Definition, general classification
- b) Definition, classification, properties and functions of Fatty acids, Triglycerol, Phospholipids, Cholesterol, Essential fatty acids and their importance
- c) Lipoproteins: Definition, classification, properties, Sources and function, Ketone bodies.

4. Amino-acid Chemistry [3 Hours]: Amino acid chemistry: Definition, Classification, Peptide bonds Peptides: Definition, Biologically important peptides Protein chemistry: Definition, Classification, Functions of proteins,

5. Enzymes [3 Hours]: Definition, Active site, Cofactor (Coenzyme, Activator), Proenzyme. Classification with examples, Factors effecting enzyme activity, Enzyme inhibition and significance, Isoenzymes, Diagnostic enzymology (clinical significance of enzymes).

6. Nucleotide and Nucleic acid Chemistry [2 Hours]: Nucleotide chemistry: Nucleotide composition, functions of free nucleotides in body. Nucleic acid (DNA and RNA) chemistry: Difference between DNA and RNA, Structure of DNA (Watson and Crick model), Functions of DNA. Structure and functions of tRNA, rRNA, mRNA. Replication, Transcription & Translation.

7. Digestion and Absorption [3 Hours]: General characteristics of digestion and absorption, Digestion and absorption of carbohydrates, proteins and lipids. Disorders of digestion and absorption – Lactose intolerance,

8. Carbohydrate Metabolism [in brief only] [5 Hours]

- a) Introduction, Glycolysis – Aerobic, Anaerobic Citric acid cycle, Substrate level phosphorylation
- b) Glycogen metabolism – Glycogenesis, Glycogenolysis, Metabolic disorders glycogen, Gluconeogenesis, Cori cycle
- c) Hormonal regulation of glucose, Glycosuria, Diabetes mellitus,

9. Lipid Metabolism [in brief only] [5 Hours]

- a) Introduction to lipid metabolism, Lipolysis, Oxidation of fatty acids β -oxidation of fatty acids, Lipogenesis - Denovo synthesis of fatty acids, chain elongation, desaturation, triacylglycerol synthesis, fat metabolism in adipose tissues Ketone body metabolism: Ketone body formation (ketogenesis), utilization (ketolysis), ketosis, Rothera's test
- b) Cholesterol metabolism: synthesis, degradation, cholesterol transport
- c) Hypercholesterolemia and its effects (atherosclerosis and coronary heart diseases) Hypocholesterolemic agents, Common hyperlipoproteinemia, Fatty liver

10. Amino acid and Protein Metabolism [in brief only][3 Hours]

- a) Catabolism of amino acids - Introduction, transamination, deamination, Fate of ammonia, transport of ammonia, Urea cycle
- b) Specialized products formed from amino acids - from glycine, arginine, methionine, phenylalanine and tyrosine.

11. Vitamins [7 Hours]

- a) Definition, classification according to solubility,
- b) Individual vitamins - Sources, Coenzyme forms, functions, RDA, digestion, absorption and transport, deficiency and toxicity

12. Mineral Metabolism [in brief only] [2 Hours]: Definition, Sources, RDA, functions, disorder of Individual minerals - Calcium, phosphate, iron, Magnesium, fluoride, selenium, molybdenum, copper. Phosphate, calcium and iron in detail

- 13. Hormone [4 Hours]:** Definition, classification, Mechanism of hormone action. Receptors, signal transduction, second messengers and cell function, Hormones of Pituitary gland, Hypothalamus, Thyroid gland, Adrenal gland, Ovary & Testes.
- 14. Acid-Base balance [2 Hours]:** Acids, bases and buffers, pH. Buffer systems of the body, bicarbonate buffer system, Role of lungs and kidneys in acid base balance, Acid base imbalance
- 15. Water balance [1 Hour]:** Water distribution in the body, Body water, water turnover, Regulation of water balance: role of ADH and thirst centre
- 16. Electrolyte balance[1 Hour]**
- a) Osmolarity. Distribution of electrolytes
 - b) Electrolyte balance: Role of aldosterone, rennin angiotensin system and ANF
- 17. Clinical Biochemistry [4 Hours]:** Normal levels of blood and urine constituents, Relevance of blood and urine levels of Glucose, Urea, Uric acid, Creatinine, Calcium, Phosphates, pH and Bicarbonate. Liver function tests, Renal function tests **Instrumentation**, Spectrophotometry, Electrophoresis, Elisa and RIA
- 18. Biochemistry of cancer & tumour markers [1 Hour]**
- 19. Advance molecular biological technique PCR [1 Hour]**

Recommended Textbooks:

1. Fundamentals of Biochemistry by U. Satyanarayana, U Chakrapani.
2. Manipal manual of Clinical Biochemistry.

Reference Books:-

1. Fundamentals of Biochemistry by A.C. Deb Publisher : New central book agency
2. T.B. of Medical Biochemistry by MN Chatterjee, Rana Shinde.
3. T.B. of Biochemistry by DM Vasudevan, shreekumari S.
4. MURRAY [ROBERT KK], Harper's Bio Chemistry Ed 24, Prentice Hall. 1996
5. RAMAKRISHNA [S], PRASANNA [KG], RAJAN [R], Text Book of Medical Biochemistry.
6. VASUDEVAN [DM] and SREE KUMARI [S], Text Book of BioChemistry for Medical students.
7. DAS [Debajyothi], Biochemistry.
8. LEHNINGER [Albert] et. al., Principles of Biochemistry.
9. ORTEN [James M] and NEUHAUS [OHO.W]. Human Biochemistry.
10. Strayer [LUBERT], Biochemistry.
11. DEVLIN [Thomas M], Biochemistry with Clinical Correlation.

SECTION – II PHARMACOLOGY

Subject Title:	Pharmacology
Total hours:	60
Theory:	60
Total Hours/ Week:	2 hours/Week
Method of Assessment:	Written

Course Description:

This course introduces the student to basic pharmacology of common drugs used, their importance in the overall treatment including Physiotherapy. The student after completing the course will be able to understand the general principles of drug action and the handling of drugs by the body. The student will be aware of the contribution of both drug and physiotherapy factors in the outcome of treatment.

THEORY

- 1. General Pharmacology [5 Hours]:** Introduction, Definitions, Classification of drugs, Sources of drugs, Routes of drug administration, Distribution of drugs, Metabolism and Excretion of drugs Pharmacokinetics, Pharmacodynamics, Factors modifying drug response, Adverse effects.
- 2. Autonomic Nervous system [5 hours]:** General considerations – The Sympathetic and Parasympathetic Systems, Receptors, Somatic Nervous System, Cholinergic and Anti-Cholinergic drugs, Adrenergic and Adrenergic blocking drugs, Peripheral muscle relaxants.
- 3. Cardiovascular Pharmacology [10 Hours]**
 - a) Drugs Used in the Treatment of Heart Failure: Digitalis, Diuretics, Vasodilators, ACE inhibitors
 - b) Antihypertensive Drugs: Diuretics, Beta Blockers, Calcium Channel Blockers, ACE Inhibitors, Central Acting Alpha Agonists, Peripheral Alpha Antagonists, Direct acting Vasodilators, Antiarrhythmic Drugs
 - c) Drugs Used in the Treatment of Vascular Disease and Tissue Ischemia : Vascular Disease, Hemostasis Lipid-Lowering agents, Antithrombotics, Anticoagulants and Thrombolytics Ischemic Heart Disease – Nitrates, Beta-Blockers, Calcium Channel Blockers
 - d) Cerebral Ischemia
 - e) Peripheral Vascular Disease
- 4. Neuropharmacology [8 Hours]:** Introduction, Alcohols, Sedatives and Hypnotics, Anti-convulsants, Analgesics and Antipyretics, General anesthetic, Local anesthetic, Antianxiety Drugs: Benzodiazepines, Other Anxiolytics, Very brief introduction of Psycho Therapeutics: Treatment of Mood Disorders (Monoamine Oxidase Inhibitors, Tricyclic Antidepressants, Atypical Antidepressants, Lithium, Antipsychotic drugs).
- 5. Disorders of Movement [4 Hours]:** Drugs used in Treatment of Parkinson's Disease Antiepileptic Drugs, Spasticity and Skeletal Muscle Relaxants

6. Inflammatory/Immune Diseases [14 Hours]

- a) Non-narcotic Analgesics and Nonsteroidal Anti-Inflammatory Drugs: Acetaminophen, NSAIDs, Aspirin, Nonaspirin NSAIDs, drug Interactins with NSAIDs
- b) Glucocorticoids: Pharmacological Uses of Glucocorticoids, adverse effects, Physiologic Use of Glucocorticoids
- c) Drugs Used in Treatment of Arthritic Diseases: Rheumatoid Arthritis, Osteoarthritis, Gout
- d) Drugs Used in the Treatment of Neuromuscular Immune/Inflmmatory Diseases: Myasthena gravis, Haematinics, Vitamin B, Iron.
- e) Very brief introduction of: idiopathic Inflammatory Myopathies, systemic lupus Erythmatosus, Scleroderma, Demyelinating Disease. Haematinics, Vitamin B, Iron.
- f) Respiratory Pharmacology : Upper Respiratory Tract infections-sinusitis, Laryngitis, Pharyngitis, Bronchial Asthma, COPD- effects of prolonged drug administration, Cough suppressant

7. Digestion and Metabolism [8 Hours]

- a) Gastrointestinal Pharmacology: Vomiting, Peptic Ulcer Disease, Constipation, Diarrhea
- b) Drugs Used in Treatment of Diabetes Mellitus: Insulin, Oral Hypoglycemics
- c) Disorder of thyroid hormone: drugs for hypo and hyperthyroid
- d) Very brief introduction of sex hormone and hormonal contraceptive

8. Geriatrics [3 Hours]: Pharmacology and the geriatric Population: Adverse effects of special concern in the Elderly, Dementia, Postural hypotension

9. Antibiotics [3 hours]: Definition, choice of agents, resistance, prophylactic groups, Very brief introduction of drugs name, mechanism, uses and specific toxicity

Recommended Textbooks

- 1. Essential of Medical Pharmacology by K. D. Tripathi
- 2. Text book of Medical Pharmacology by Padmaja Udaykumar
- 3. Pharmacology by N. Murugesh
- 4. Pharmacology & Pharmacotherapeutics by Satoskar.

Reference Books:

- 1. Clinical Pharmacology – D.R Laurence, Pn Ben net, MJ Brown
- 2. Goodman’s & Gilman’s the Pharmacological basis of therapeutics

Paper III - EXERCISE THERAPY – II

Total hours:	250
Theory:	100
Practical:	150
Total Hours/ Week:	6 hours
Lecture:	3 hours /week
Practicals:	2 hours/ week
Seminars/ Tutorials:	1 Hour/ week
Method of Assessment:	Written, Oral, Practical

Course Description:

In this course, the students will learn the principles and effects of exercise as a therapeutic modality and will learn the techniques in the restoration of physical functions.

THEORY

SECTION - I

1. **Introduction to Exercise Therapy [5 Hours]:** The aims of Exercise Therapy, The techniques of Exercise Therapy, Approach to patient's problems, Assessment of patient's condition – Measurements of Vital parameters, Planning of Treatment.
2. **Methods of Testing [15 Hours]**
 - a) Functional tests
 - b) Tests for neuromuscular efficiency
 - **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
 - c) Measurement of Limb Length: true limb length, apparent limb length, segmental limb length
 - d) Measurement of the angle of Pelvic Inclination
3. **Relaxation [4 Hours]:** 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, Mitchell's, additional methods.

4. **Aerobic Exercise [7 Hours]:** 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.
5. **Balance [7 Hours]:** Definition, Physiology of balance: contributions of sensory systems, processing sensory information, generating motor output Components of balance (sensory, musculoskeletal and biomechanical) Causes of impaired balance, Examination & evaluation of impaired balance, Activities for treating impaired balance: mode, posture, movement, Precautions & contraindications, Types Balance retraining
6. **Co-ordination Exercise [6 Hours]:** Anatomy & Physiology of cerebellum with its pathways Definitions: Co-ordination, Inco-ordination, Causes for Inco-ordination, And 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.
7. **Proprioceptive Neuromuscular Facilitation [10 Hours]:** 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, Stability: Alternating isometric, rhythmic stabilization , Skill: timing for emphasis, resisted progression, Endurance: slow reversals, agonist reversal.
8. **Functional Re-education [7 hours]:** Lying to sitting: Activities on the Mat/Bed, Movement and stability at floor level; Sitting activities and gait; Lower limb and Upper limb activities.

SECTION – II

1. **Passive Movements [4 Hours]:** 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.
2. **Manual Therapy: Spinal & Peripheral Joint Mobilization [15 Hours]:** 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.
3. **Resisted Movements [9 hours]:** Definition of strength, power & work, endurance, muscle actions. Physiology of muscle performance: structure of skeletal muscle, chemical & mechanical events during contraction & relaxation, muscle fiber type, motor unit, force gradation. Causes of decreased muscle performance. Physiologic adaptation to training: Strength & Power, Endurance. 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. Specific exercise regimens, Isotonic: de Lorme's, Oxford, Mac Queen, Circuit weight training, Isometric: BRIME (Brief Resisted Isometric Exercise), Multiple Angle Isometrics Isokinetic regimens, Plyometrics.

4. **Stretching [6 Hours]:** 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.
5. **Posture [5 Hours]:** Definition, Active and Inactive Postures, Postural Mechanism, Patterns of Posture, Principles of re-education: corrective methods and techniques, Patient education.

PRACTICAL [150 Hours]

The students of exercise therapy are to be trained in Practical Laboratory work for all the topics discussed in theory. The student must be able to evaluate and apply judiciously the different methods of exercise therapy techniques on the patients. They must be able to:

1. Demonstrate muscle strength using the principles and technique of MMT
2. Demonstrate the techniques for muscle strengthening based on MMT grading
3. Demonstrate the PNF techniques
4. Demonstrate exercises for training co-ordination – Frenkel’s exercise
5. Demonstrate techniques for functional re-education
6. Demonstrate mobilization of individual joint regions
7. Demonstrate the techniques for muscle stretching
8. Assess and evaluate posture and gait
9. Demonstrate to apply the technique of passive movements
10. Demonstrate various techniques of Active movements
11. Demonstrate techniques of strengthening muscles using resisted exercises
12. Demonstrate techniques for measuring limb length and body circumference.

Practical Exam Format

PRACTICAL-80 marks + INT. ASSESSMENT-20 marks: TOTAL-100 MARKS

A] Long case-based on techniques of application of MMT/ Mobilization/ Stretching/ PNF/ Posture & Gait [35 marks]

- a) Principles, Indications, Contra-indications, Documentation of findings etc [20 marks]
- b) Psychomotor & affective-skills [15 marks]

B] Short Case – Any one of the following [20 marks]

- a) Passive movements /Strengthening/ Relaxation / Functional Reeducation/ Mat Exercises/ General Fitness / Group Exercises / Balance/ Coordination etc.
- b) Spots-Based on Therapeutic Gymnasium [Four] [5x4= 20 marks]
- c) Journal [5 marks]

Recommended Textbooks:

1. Therapeutic Exercise: Foundations and Techniques : Carolyn Kisner, Lynn Allen Colby
2. Principles of exercise therapy: M. Dena Gardiner
3. Practical Exercise therapy by Hollis Margaret
4. PNF in Practice: An Illustrated Guide: Susan S. Adler , Dominiek Beckers, Math Buck

Reference Books:

1. Principles of muscle testing by Hislop.
2. Proprioceptive Neuromuscular Facilitation: Patterns and Techniques Voss , Ionta & Myers
3. Facilitated Stretching -Robert McAtee , Jeff Charland
4. Relaxation Techniques: A Practical Handbook for the Health Care Professional , Marie Donaghy , Rosemary A. Payne & Keith Bellamy
5. Water Exercise : 78 Safe and Effective Exercises for Fitness and Therapy Martha White
6. Yoga as Therapeutic Exercise: A Practical Guide for Manual Therapists Luise Worle , Erik Pfeiff
7. Proven Therapeutic Exercise Techniques: Best Practices for Therapists and Trainers
R. Eric Oestmann
8. Therapeutic Exercise in Developmental Disabilities Barbara H. Connolly, Patricia Montgomery
9. Therapeutic Exercise: Moving Toward Function - Lori Thein Brody, Carrie M. Hall
10. Therapeutic Exercises Using the Swiss Ball: Caroline Corning Creager , Caryl Riedel , Mike Berry
11. Ultimate Core Ball Workout: Strengthening and Sculpting Exercises Jeanine Detz
12. Therapeutic Exercises Using Foam Rollers[Paperback] Caroline Corning Creager
13. Therapeutic Exercises Using Resistive Bands[Paperback] Caroline Corning Creager
14. Therapeutic Exercise: Techniques for Intervention : William D. Bandy, Barbara Sanders
15. Advanced Fitness Assessment and Exercise Prescription : Vivian H. Heyward
16. Progressive Exercise Therapy in Rehabilitation and Physical Education: John H. Colson
17. New Directions in Progressive Relaxation Training: A Guidebook for Helping Professionals:
Douglas A. Bernstein , Thomas D. Borkovec

Paper IV - ELECTROTHERAPY

Total hours:	200
Theory:	100
Practical:	100
Total Hours/ Week:	6 hours
Lecture:	2 hours /week
Practicals:	3 hours/ week
Seminars/ Tutorials:	1 Hour/ week
Method of Assessment:	Written, Oral, Practical

Course Description:

In this course the student will learn the Principles, Techniques, Effects, Indication, Contra- Indication. and the dosage parameter for various indications of electro therapeutic modalities in the restoration of physical function. The objective of this course is that after 240hrs. of lectures, demonstration, practical and clinics the student will be able to list the indications, contra indications, dosages of electro therapy modalities, demonstrates the different techniques, and describe their effects on various conditions.

THEORY

Introductory Physics [Not for Exam]

- 1. Electricity definition, types [1 Hour]:**
- 2. Static electricity [2 Hour]:**
 - a) Production of electrical charges.
 - b) Characteristics of charged body.
 - c) Characteristics of lines of forces.
 - d) Potential difference and EMG.
- 3. Current Electricity [5 Hour]:**
 - a) Units of Electricity, faraday, volt, ampere, coulomb, watt.
 - b) Resistance in series and parallel.
 - c) Ohms law and its application to DC/AC.
 - d) Fuse.
 - e) Shock: Micro/ Macro shocks, safety precaution and management, earthing techniques & Precautions.
 - f) Burns: electrical & chemical burns, prevention and management.
 - g) Condensers: definition, principles, types construction, working and uses.
- 4. Magnetism [1Hour]:** Definition, properties, electro-magnetic induction, electro- magnetic spectrum.
- 5. Valves, transformers, types, principles, construction and working. [1 Hour]**

6. **Ionization [1 Hour]:** Principles, effects of various technique of medical ionization.
7. **Nerve Muscle Physiology [4 Hours] :** Action Potential, Resting membrane potential, Propagation of Action Potential, Motor unit, synapse, Accommodation, Stimulation of Healthy Muscle, Stimulation of Denervated Muscle, Stimulation for Tissue Repair.
8. **Pain [3 Hours]:** Define Pain, Theories of Pain (Outline only), Pain Gate Control theory in detail.

SECTION- I

A - Low frequency Currents:

1. Basic types of current [1 Hour]

- a) Direct Current: types, physiological & therapeutic effects.
- b) Alternating Current

2. Types of Current used in Therapeutics [2 Hour]

- a) Modified D.C
 - Faradic Current
 - Galvanic Current
- b) Modified A.C
 - Sinusoidal Current
 - Diadynamic Current.

3. **Faradic Current. [3 Hours]:** Definition, Modifications, Techniques of Application of Individual, Muscle and Group Muscle stimulation, Physiological & Therapeutic effects of Faradic Current, Precautions, Indications & Contra-Indications, Dangers.

4. **Galvanic Current [3 Hours]:** Definition, Modifications, Physiological & Therapeutic effects of Galvanic Current, Indications & Contra-Indications, Dangers, Effect of interrupted galvanic current on normally innervated and denervated muscles and partially denervated muscles.

5. Sinusoidal Current & Diadynamic Current in Brief. [1 Hour]

6. **HVPGS [1 Hour]:** Parameters & its uses

7. **Ionization / Iontophoresis [1 Hour]:** Techniques of Application of Iontophoresis, Indications, Selection of Current, Commonly used Ions (Drugs) for pain, hyperhydrosis, wound healing.

8. Cathodal / Anodal galvanism. [1 Hour]

9. Micro Current & Macro Current [1 Hour]

10. Types of Electrical Stimulators [1 Hour]

- a) NMES- Construction component.
- b) Neuro muscular diagnostic stimulator- construction component.
- c) Components and working Principles

11. Principles of Application [2 Hours]: Electrode tissue interface, Tissue Impedance, Types of Electrode, Size & Placement of Electrode – Waterbath, Unipolar, Bi-polar, Electrode coupling, Current flow in tissues, Lowering of Skin Resistance.

12. TENS [5 Hours]: Define TENS, Types of TENS, Conventional TENS, Acupuncture TENS, Burst TENS, Brief & Intense TENS, Modulated TENS. Types of Electrodes & Placement of Electrodes, Dosage parameters, Physiological & Therapeutic effects, Indications & Contraindications.

B - Electro-diagnosis:

1. FG Test [1 Hour]

2. SD Curve [2 Hours]: Methods of Plotting SD Curve, Apparatus selection, Characters of Normally innervated Muscle, Characters of Partially Denervated Muscle, Characters of Completely denervated Muscle, Chronaxie & Rheobase.

3. Nerve conduction velocity studies [2 Hour]

4. EMG: Construction of EMG equipment. [1 Hour]

5. Bio-feed back. [2 Hour]

C - Medium Frequency:

1. Interferential Therapy [3 Hour]: Define IFT, Principle of Production of IFT, Static Interference System, Dynamic Interference system, Dosage Parameters for IFT, Electrode placement in IFT, Physiological & Therapeutic effects, Indications & Contraindications. Russian Current.

2. Rebox type Current [1 Hour]

SECTION - II

A - High Frequency Currents [Thermo & Actinotherapy]:

1. Electro Magnetic Spectrum. [1 Hour]

2. SWD: Define short wave, Frequency & Wavelength of SWD, Principle of Production of SWD, Circuit diagram & Production of SWD, Methods of Heat Production by SWD treatment, Types of SWD Electrode, Placement & Spacing of Electrodes, Tuning, Testing of SWD Apparatus, Physiological & Therapeutic effects, Indications & Contraindications, Dangers, Dosage parameters [7 Hours]

3. Pulsed Electro Magnetic Energy [1 Hour]: Principles, Production & Parameters of PEME, Uses of PEME.

4. **Micro Wave Diathermy [3 Hours]:** Define Microwave, Wave length & Frequency, Production of MW, Applicators, Dosage Parameters, Physiological & Therapeutic effects, Indications & Contraindications, Dangers of MWD.
5. **Ultrasound [8 Hours]:** Define Ultrasound, Frequency, Piezo Electric effects: Direct, Reverse, Production of US, Treatment Dosage parameters: Continuous & Pulsed mode, Intensity, US Fields: Near field, Far field, Half value distance, Attenuation, Coupling Media, Thermal effects, Non- thermal effects, Principles & Application of US: Direct contact, Water bag, Water bath, Solid sterile gel pack method for wound. Uses of US, Indications & Contraindications, Dangers of Ultrasound. Phonophoresis: Define Phonophoresis, Methods of application, commonly used drugs, Uses. Dosages of US.
6. **IRR [2 Hours]:** Define IRR, wavelength & parameters, Types of IR generators, Production of IR, Physiological & Therapeutic effects, Duration & frequency of treatment, Indication & Contraindication.
7. **UVR [7 Hours]:** Define UVR, Types of UVR, UVR generators: High pressure mercury vapour lamp, Water cooled mercury vapour lamp, Kromayer lamp, Fluorescent tube, Theraktin tunnel, PUVA apparatus. Physiological & Therapeutic effects. Sensitizers & Filters. Test dosage calculation. Calculation of E1, E2, E3, E4 doses. Indications, contraindications. Dangers. Dosages for different therapeutic effects, Distance in UVR lamp.
8. **LASER [7 Hours]:** Classification, Methods of application of LASER. Dosage of LASER. Physiological & Therapeutic effects of LASER. Safety precautions of LASER. . Energy density & power density

B – Superficial heating Modalities:

1. **Heat and Cold –** Physiological and therapeutic effects, indications/contraindications. **[2 Hours]**
2. **Wax Therapy:** Principle of Wax Therapy application – latent Heat, Composition of Wax Bath Therapy unit, Methods of application of Wax, Physiological & Therapeutic effects, Indications & Contraindication, Dangers. **[3 Hours]**
3. **Contrast Bath:** Methods of application, Therapeutic uses, Indications & Contraindications.**[1 Hour]**
4. **Moist Heat Therapy:** Hydro collator packs – in brief, Methods of applications, Therapeutic uses, Indications & Contraindications.**[1 Hour]**
5. **Hydrotherapy:** Whirl Pool Bath and Hubbard tank -Construction, Method of Application, Therapeutic Uses, Indications & Contraindications. **[2 Hours]**
6. **Cryotherapy:** Define- Cryotherapy, Principle - Latent heat of fusion, Physiological & Therapeutics effects, Techniques of Applications, Indications & Contraindications, Dangers, Methods of application with dosages. **[3 Hours]**

PRACTICAL: [100 Hours]

The student of Electrotherapy must be able to demonstrate the use of electrotherapy modalities applying the principles of electrotherapy with proper techniques, choice of dosage parameters and safety precautions.

1. Demonstrate the technique for patient evaluation – receiving the patient and positioning the patient for treatment using electrotherapy.
2. Collection of materials required for treatment using electrotherapy modalities and testing of the apparatus.
3. Demonstrate placement of electrodes for various electrotherapy modalities
4. Electrical stimulation for the muscles supplied by the peripheral nerves
5. Faradism under Pressure for UL and LL
6. Plotting of SD curve with Chronaxie and Rheobase
7. Demonstrate FG test
8. Application of Ultrasound for different regions-various methods of application
9. Demonstrate treatment techniques using SWD, IRR and Microwave diathermy
10. Demonstrate the technique of UVR exposure for various conditions – calculation of test dose
11. Demonstrate treatment method using IFT for various regions
12. Calculation of dosage and technique of application of LASER
13. Technique of treatment and application of Hydrocollator packs, cryotherapy, contrast bath, wax therapy
14. Demonstrate the treatment method using whirl pool bath
15. Winding up procedure after any electrotherapy treatment method

Practical Exam Format

PRACTICAL-80 MARKS + I.A.-20 MARKS: TOTAL = 100 MARKS

- A. Long case** - based on Techniques of application of Electrical Modalities/ superficial thermal agents/ Cryotherapy – **[35 marks]**: [Cognitive–Medical electronics, Physiological /Biophysical principles, Therapeutic effects, Indications & Contraindications] [20 marks] + [Psychomotor + Affective- skills] [15 marks]
- B. Spots and equipment testing [40 marks]**
 - a] Spots [Six] –5 Minutes per Spot-Identification of Electronic Equipment / Component & Panel Diagram of any Two Equipments [5 x 6] [30 marks]
 - b] Testing of Equipment — SWD / Ultra Sonic / IFT / Stimulator, TENS Machine [10 minutes] [10 marks]
- C. Journal [5 marks]**

Recommended Textbooks:

1. Claytons Electrotherapy by Forster & Plastanga
2. Electrotherapy Explained by Low & Reed
3. Clinical Electrotherapy by Nelson
4. Principles and Practice of Electrotherapy: Joseph Kahn

Reference Books:

1. Electrotherapy: Clinical Procedures Manual: Theresa Nalty, Mohammed A. Sabbahi
2. Electrotherapy in Rehabilitation : Meryl Roth Gersh
3. Electrotherapy and light therapy : Richard Kovács
4. Handbook of Electrotherapy for Practitioners and Students : Burton Baker Grover
5. Physical Agents in Rehabilitation: From Research to Practice: Michelle H. Cameron
6. Physical Agents: Theory And Practice: Barbara J. Behrens, Susan L. Michlovitz
7. Ultrasound and Laser Light Handbook Package: From Research to Practice: Michelle H. Cameron
8. Laboratory Manual for Physical Agents Theory and Practice PT, Barbara J. Behrens MS
9. Manual for Physical Agents : Karen W. Hayes, Roger M. Nelson
10. Evidence-Based Guide to Therapeutic Physical Agents : Alain Yvan Belanger
11. Therapeutic Electrophysical Agents: Evidence Behind Practice Alain Yvan Belanger
12. Therapeutic Modalities in Rehabilitation. William Prentice
13. Electrotherapy Evidence based practice by Sheila Kitchen

Paper V - KINESIOLOGY

Total hours:	100
Theory:	100
Lecture:	3 hours/ week
Method of assessment:	Written

Course Description:

Kinesiology involves the study of basic concepts of human movement, and application of various biomechanical principles in the evaluation and treatment of disorders of musculoskeletal system. Students are taught to understand the various quantitative methods of movement. Mechanical principles of various treatment methods are studied. Study of posture and gait are also included.

THEORY

SECTION -I

1. Basic Concepts in Biomechanics: Kinematics and Kinetics [5 Hours]:

- a) Types of Motion
- b) Location of Motion
- c) Direction of Motion
- d) Magnitude of Motion
- e) Definition of Forces
- f) Force of Gravity
- g) Reaction forces
- h) Equilibrium
- i) Objects in Motion
- j) Force of friction
- k) Concurrent force systems
- l) Parallel force systems
- m) Work
- n) Moment arm of force
- o) Force components
- p) Equilibrium of levers

2. Joint structure and Function [4 Hours]:

- a) Joint design
- b) Materials used in human joints
- c) General properties of connective tissues
- d) Human joint design
- e) Joint function
- f) Joint motion

3. Muscle structure and function [3 Hours]:

- a) Mobility and stability functions of muscles
- b) Elements of muscle structure
- c) Muscle function
- d) Effects of immobilization, and aging

4. Biomechanics of the Thorax and Chest wall [5 Hours]:

- a) General structure and function
- b) Rib cage and the muscles associated with the rib cage
- c) Ventilatory motions: its coordination and integration
- d) Developmental aspects of structure and function
- e) Changes in normal structure and function in relation to pregnancy, scoliosis and COPD

5. The Temporomandibular Joint [4 Hours]:

General features, structure, function and dysfunction

6. Biomechanics of the vertebral column [10 Hours]:

- a) General structure and function
- b) Regional structure and function – Cervical region, thoracic region, lumbar region, sacral region
- c) Muscles of the vertebral column
- d) General effects of injury and aging

SECTION - II

1. Biomechanics of the peripheral joints [54 Hours]:

- a) The shoulder complex: Structure and components of the shoulder complex and their integrated function.
- b) The elbow complex: Structure and function of the elbow joint – humeroulnar and humeroradial articulations, superior and inferior radioulnar joints; mobility and stability of the elbow complex; the effects of immobilization and injury.
- c) The wrist and hand complex: Structural components and functions of the wrist complex; structure of the hand complex; prehension; functional position of the wrist and hand.
- d) The hip complex: Structure and function of the hip joint; hip joint pathology - arthrosis, fracture, bony abnormalities of the femur.
- e) The knee complex: Structure and function of the knee joint – tibiofemoral joint and patellofemoral joint; effects of injury and disease.

- f) The ankle and foot complex.: structure and function of the ankle joint, subtalar joint, talocalcaneonavicular joint, transverse tarsal joint, tarsometatarsal joints, metatarsophalangeal joints, interphalangeal joints, structure and function of the plantar arches, muscles of the ankle and foot, deviations from normal structure and function – Pes Planus and Pes Cavus
- 2. Analysis of Posture and Gait [15 Hours] :** Static and dynamic posture, postural control, kinetics and kinematics of posture, ideal posture analysis of posture, effects of posture on age, pregnancy, occupation and recreation; general features of gait, gait initiation, kinematics and kinetics of gait, energy requirements, kinematics and kinetics of the trunk and upper extremities in relation to gait, stair case climbing and running, effects of age, gender, muscle weakness, paralysis, asymmetries of the lower extremities, injuries and malalignments in gait; Movement Analysis; ADL activities like sitting – to standing, lifting, various grips , pinches.

Recommended Text Books:

1. Joint Structure and Function – A comprehensive Analysis by Cynthia Norikin.
2. Brunnstrom's Clinical Kinesiology by Laura Smith, Elizabeth Beth Weiss, and Don Lehmkuhl.

Recommended Reference Books:

1. Clinical Kinesiology for Physical Therapist Assistants by Lippert
2. Applied Kinesiology: A Training Manual and Reference Book of Basic Principles and Practices by Robert Frost (Mar 28, 2002)
3. Kinesiology: The Mechanics and Pathomechanics of Human Movement by Carol A. Oatis
4. Kinesiology by K. Wells; Sauder's Publications.
5. Basic Biomechanics of the Musculoskeletal System by Margareta Nordin and Victor H. Frankel

Paper VI - BIOSTATISTICS

Subject Title:	Biostatistics
Total hours:	50
Theory:	50
Lecture:	2-3 hours/ week
Method of assessment:	Written

Course Description:

This course will introduce to the student to understand and apply basic statistics in research.

THEORY

- 1. Introduction [5 Hours]:** Meaning, definition, characteristics of statistics., Importance of the study of statistics, Branches of statistics, Statistics and health science including physiotherapy, Parameters and Estimates, Descriptive and inferential statistics, Variables and their types, Measurement scales.
- 2. Tabulation of Data [5 Hours]:** Basic principles of graphical representation, Types of diagrams – histograms, frequency polygons, smooth frequency polygon, cumulative frequency curve,. Normal probability curve.
- 3. Measure of Central Tendency [10 Hours]:** Need for measures of central Tendency, Definition and calculation of mean – ungrouped and grouped, Meaning, interpretation and calculation of median ungrouped and grouped., Meaning and calculation of mode, Comparison of the mean, median and mode, Guidelines for the use of various measures of central tendency.
- 4. Measures of Dispersion [5 Hours]:** Meaning, requisites, various methods of dispersion – range, inter quartile range, quartile deviation, mean deviation, standard deviation, coefficient deviation.
- 5. Correlation [5 Hours] :** Correlation – meaning, types of correlation, Scatter diagram, Karl Pearson's coefficient of correlation (ungrouped data only), Spearman's rank correlation, Coefficient (ungrouped data only).
- 6. Regression [5 Hours]:** Logistic Regression – Linear regression – lines of regression – estimation using limes of regression (using deviation for mean) (ungrouped data only).
- 7. Sampling techniques [5 Hours]:** Need for sampling - Criteria for good samples, Application of sampling in community, Procedures of sampling and sampling designs errors, Sampling variation and tests of significance.
- 8. Concept of Z and t – tests [5 Hours].**
- 9. Analysis of variance & covariance [5 Hours] :** Analysis of variance (ANOVA), Basic principle of ANOVA, ANOVA technique; Analysis of Covariance (ANACOVA)

Recommended Textbooks:

1. Elements of Health Statistics: Rao.N.S.N
2. An introduction of Biostatistics: Sunder Rao. P.S.S.
3. Methods in Bio-Statistics 6th Edn. 1997: B.K. Mahajan
4. Biostatistics: A manual of Statistics Methods: K. Visweswara Rao
5. Elementary Statistics 1st Edn, 1990. in Medical Workers: Inderbir Singh
6. Statistics in Psychology and education: Great and Henry
7. Biostatistics: Ramakrishnan

Paper VII - ENT & DERMATOLOGY**E.N.T.**

Total hours:	10
Theory:	10
Lecture:	1 hour / week

Course Description:

This course will introduce to the student to acquire knowledge to describe pathophysiology, signs & symptoms, clinical features, examination & management of diseases of ENT & skin conditions.

THEORY

1. Anatomy and physiology of hearing and the use of audiometer in assessment of hearing - outline only. **[2 Hours]**
2. General introduction to diseases of E.N.T., emphasis on otitis media, facial palsy classification, medical and surgical management of lower motor neuron type of facial palsy, sinusitis, rhinitis. **[3 Hours]**
3. Mastoid surgery.**[1 Hour]:**
4. Larynx and associated functional paralysis with tracheostomy and care of tracheostomy.**[2 Hours]**
5. Causes of hearing loss, Conservative and surgery intervention including types and availability of hearing aids. **[2 Hours]**

DERMATOLOGY

Total hours:	20
Theory:	20
Lecture:	1 hour / week

THEORY

1. Structure and functions of normal skin, primary and secondary skin lesions. [**2 Hours**]
2. Scabies and pediculosis. [**1 Hour**]
3. Fungal infections of skin: Dermatophytosis; Tinea versicolor. & Candidiasis.[**2 Hours**]
4. Bacterial infections of skin- Impetigo / Boil. [**2 Hours**]
5. Viral infections of skin- Herpes zoster. [**2 Hours**]
6. Eczema / Dermatitis / Allergies. [**3 Hours**]
7. Psoriasis / Acne / Alopecia / Vitiligo and Leucoderma. [**3 Hours**]
8. Leprosy / Lepra-reaction / Physiotherapy in leprosy. [**3 Hours**]
9. Sexually transmitted diseases.- Syphilis - primary & secondary.; Gonorrhoea.; AIDS. [**2 Hours**]

Recommended Books:

1. Maqbool: TB of Nose Throat & Ear: 11/e 2007
2. Tuli: TB of Nose Throat & Ear: 2005
3. Pasricha: Illustrated TB of Dermatology 4/e 2006.
4. Sehgal: TB of Clinical dermatology 4/e, 2004.

Paper VIII - BASIC NURSING

Subject Title:	BASIC NURSING
Total hours:	40 Hours
Theory:	20 Hours
Practical:	20 Hours
Lecture + Practical:	1-2 hour / week

Course Description:

At the end of the course student will be able to know the role and importance of nursing in patient care, position of patient, transfer of patient, basic knowledge of handling emergencies and hygiene.

THEORY

1. What is Nursing ? Nursing principles. Inter-Personnel relationships. Bandaging : Basic turns; Bandaging extremities; Triangular Bandages and their application. **[2 hours]**
2. Nursing Position: Environment safety; Bed making, prone, lateral, dorsal, dorsal recumbent, Flower's positions, comfort measures, Aids and rest and sleep. **[2 hours]**
3. Lifting and Transporting Patients : Lifting Patients up in the bed. Transferring from bed to wheel chair. "Transferring from bed to stretcher". **[3 hours]**
4. Bed side Management : Giving and taking Bed pan, Urinal : Observation of stools, urine. Observation of sputum, Understand use and care of catheters, enema giving. **[3 hours]**
5. Methods of Giving Nourishment: Feeding, Tube feeding, drips, transfusion **[3 hours]**
6. Care of Rubber Goods: Observation, Reporting and Recording Temperature, Respiration and Pulse, Simple aseptic Technique, Sterilization and Disinfection. **[3 hours]**
7. Surgical Dressing : Observation of dressing procedures **[4 hours]**

PRACTICAL [20 Hours]:

For all the topics discuss in theory.

Recommended Books:

1. Basavanthappa: Fundamentals of Nursing; 2004.
2. Sharma: Principles and Practice of Nursing 1/e.
3. Thresyamma: Fundamentals of Nursing, 2002.

Paper IX - ENVIRONMENTAL STUDIES

Subject Title:	ENVIRONMENTAL STUDIES
Total hours:	64 Hours
Theory:	64 Hours
Lecture :	1-2 hour / week

Course Description:

This course follows the basic principles of environmental sciences and makes the students ready for the upcoming problems the planet earth is facing and going to face in future i.e. waste disposal, deforestation, global warming, ozone depletion and biodiversity. At the end of the course the student will have basic knowledge on natural resources, pollution, ecosystem, biodiversity.

THEORY

1. The Multidisciplinary nature of environmental studies [5 hours]

- a) Definition, scope and importance
- b) Need for public awareness.

2. Renewable and non-renewable resources: [10 hours]

- a) Natural resources and associated problems.
- b) Forest resources: Use and over- exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
- c) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams- benefits and problems.
- d) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- e) Food resources: World food problems, change caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- f) Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources. Case studies.
- g) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- h) Role of an individual in conservation of natural resources.
- i) Equitable use of resources for sustainable lifestyles.

3. Ecosystems[9 hours]

- a) Concept of an ecosystem
- b) Structure and function of an ecosystem
- c) Procedures, consumers and decomposers
- d) Energy flow in the ecosystem
- e) Ecological succession
- f) Food chains, food webs and ecological pyramids.

- g) Introduction, types, characteristic features, structure and function of the following ecosystem:-
- Forest ecosystem
 - Grassland ecosystem
 - Desert ecosystem
 - Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)

4. Biodiversity and its conservation [8 hours]

- a) Introduction- Definition: genetic, species and ecosystem diversity.
- b) Biogeographical classification of India.
- c) Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- d) Biodiversity at global, national and local levels.
- e) India as a mega-diversity nation.
- f) Hot-spots of biodiversity.
- g) Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts.
- h) Endangered and endemic species of India.
- i) Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

5. Environmental Pollution [8 hours]

Definition, Causes, effects and control measures of :-

- a) Air pollution;
- b) Water pollution
- c) Soil pollution
- d) Marine pollution
- e) Noise pollution
- f) Thermal pollution
- g) Nuclear hazards
- h) Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- i) Role of an individual in prevention of pollution.
- j) Pollution case studies.
- k) Disaster management: floods, earthquake, cyclone and landslides.

6. Social Issues and the Environment [8 hours]

- a) From unsustainable to sustainable development
- b) Urban problems related to energy
- c) Water conservation, rain water harvesting, watershed management.
- d) Resettlement and rehabilitation of people: its problems and concerns. Case studies.
- e) Environmental ethics; Issues and possible solutions.
- f) Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- g) Wasteland reclamation
- h) Consumerism and waste products.
- i) Environment Protection Act.
- j) Air (Prevention and Control of Pollution) Act.

- k) Water (Prevention and control of Pollution) Act.
- l) Wildlife Protection Act.
- m) Forest Conservation Act.
- n) Issues involved in enforcement of environmental legislation, Public awareness.

7. Human Population and the Environment [8 hours]

- a) Population growth, variation among nations.
- b) Population explosion- Family Welfare Programme.
- c) Environment and human health.
- d) Human rights.
- e) Value Education.
- f) HIV/AIDS
- g) Women and Child welfare.
- h) Role of information technology in environment and human health.
- i) Case studies.

8. Field Work [8 hours]

- a) Visit to a local to document environmental assets river/forest/grassland/hill/mountain.
- b) Visit to a local polluted site- Urban/Rural/Industrial/Agricultural
- c) Study of common plants, insects, birds.
- d) Study of simple ecosystems-pond, river, hill slopes,etc.

Recommended Books:

1. Agarwal, K.C.2001 Environmental Biology, Nidhi Publications Ltd. Bikaner
2. Clark R.S.Marine Pollution, Clarendon Press Oxford
3. Miller T G.Jr Environmental Science, Wadsworth Publishing Co
4. Odum, EP.1971 Fundamentals of Ecology. W B Saunders Co.
5. Townsend C, Harper J and Michael Begon, Essentials of ecology , Blackwell Science.

SUPERVISED CLINICAL PRACTICE

Total Hours: **141**

Method of Assessment: Oral, Practical

Students will be posted in rotation in the following areas/wards. The students will be assisting physiotherapists to provide physiotherapy care for the patients.

1. Physiotherapy OPD
2. Orthopedic Physiotherapy OPD
3. Neuro-Physiotherapy OPD