Dr. NTR UNIVERSITY OF HEALTH SCIENCES

ANDHRA PRADESH
VIJAYAWADA- 520 008

BPT DEGREE COURSE 4 ½ YDC

HAND BOOK

2020 – 2021.

REGULATIONS

1. Objectives:

The aim of the undergraduate course in Physiotherapy is to impart in depth knowledge and skills to a student to become competent in the techniques of physiotherapy and develop the proper attitude required for the practice of Physiotherapy.

"To educate and train the student to independently evaluate, assess, diagnose, prescribe, plan and practice physiotherapy in a competent manner towards those who need such services, with autonomy in quality assurance and maintaining the humanitarian approach of service".

By the end of the course, the student should:

a) Acquire adequate knowledge of the basic medical subjects required in the practice of Physiotherapy.
b) Develop skills and techniques of soft tissue mobilization, electrotherapy and exercises for the management of various medical and surgical conditions.
c) Develop proper attitude of compassion and concern for the individuals and for the welfare for the physically handicapped in the community.
d) Demonstrate skills in teaching, management, research guidance and counseling.
e) Imbibe moral and ethical values.

2. Eligibility:

Candidates belonging to all categories for admission to the Bachelor of Physiotherapy Course should have passed the qualifying examination (Academic stream), after a period of 10+2 years of study, with the following subjects: English, Physics, Chemistry and Biology (Botany and Zoology).

Candidates who have passed any qualifying examination other than Intermediate examination conducted by the Board of Intermediate Education, Andhra Pradesh shall obtain an Equivalency Certificate from the Board of Intermediate Education, Andhra Pradesh to be eligible to apply. However the eligibility for the course will be verified by the University for admissions.

Candidates who have completed their vocational physiotherapy at the 10+2 level are also eligible for admission.

3. Age limit for Admission:

A candidate should have completed the age of 17 years on or before 31st December of the year of admission to the degree course.

4. Physical Fitness Certificate:

Every candidate, before admission to the course, shall submit to the Principal of the institution a certificate of medical fitness from an authorized Medical Officer to the effect

that the candidate is physically fit to undergo the academic course and that he / she does not suffer from any disability or contagious disease.

5. Registration:

A candidate admitted to the course of BPT in any of the affiliated colleges shall register with Dr NTR University of Health Sciences, AP., Vijayawada, by remitting the prescribed fee along with the application form for registration duly filled in by the candidate and forwarded to this University by the Head of the Institution within one month of admission.

6. Medium of Instruction:

English shall be the medium of instruction for study and examinations of the Bachelor of Physiotherapy degree Course. The text book language for all the subjects of the BPT course is also English.

7. Duration of the Course:

The duration of certified study for the Bachelor of Physiotherapy Course shall be four academic years followed by six months of Compulsory internship.

8. Promotion:

- Promotion from I Year BPT to II Year BPT and to III Year BPT course is allowed without any break even if the candidate fails in any of the subjects, up to III Year BPT course.
- Promotion to IV Year BPT course, is allowed only if the candidate passes all the previous year subjects pertaining to I Year, II Year, III Year BPT course .
- A student is permitted to join for internship only after successfully passing all the final year papers.

9. Year-wise subjects of study & hours allotted.

Sl. No.	Name of the Subject	No. of Hours	weekly hours	Year of Instruction
1st year: Examination subjects				
1.	English	100	01	I
2.	Sociology (Common paper)	75	01	I
3.	Psychology (Common paper)	90	01	I
4.	Anatomy	215	09	I
5.	Physiology	150	06	I
6.	Biochemistry	80	03	I
Sl. No.	**Name of the Subject**	**No. of Hours**	**weekly hours**	**Year of Instruction**
Non examination subjects				
7.	Orientation and instruction to treatment	50	-	I
8.	Visits & Special Lectures	75	-	I
9.	Administration, Supervision and Ethics	50	-	I
10.	Fundamentals of Physiotherapy practicals	50	-	I
11.	Physical Education	75	-	I
		945	**21**	

2nd year: Examination subjects

12.	Pathology	40	01	II
13.	Microbiology Common paper	40	01	II
14.	Exercise Therapy	330	12	II
15.	Bio-mechanics and Applied Anatomy	80	02	II
16.	Electrotherapy – I (Low Frequency & Medium)	200	09	II
17.	Electrotherapy –II (High Frequency)	160	06	II
18.	Clinicals	380		II

Non examination subjects

19.	Visits & Special Lectures	25	10	II
20.	Physiotherapy in Veterinary Sciences	10	-	II
		885	**41**	

3rd year: Examination subjects

21.	General Medicine Common paper	75	10	III
22.	Pharmacology	30		III
23.	Paediatrics	50		III
24.	General Surgery including Plastic Surgery	50		III
25	Obstetrics & Gynaecology	20		III
26.	Clinical Orthopaedics	125	02	III
27.	Physiotherapy in Orthopaedic Conditions	110	02	III
28.	Clinical Neurology	125	02	III
29.	Physiotherapy in Neurology Conditions	110	02	III
30.	Clinicals	440	18	III

Non examination subjects:

31.	Nursing and First Aid	40	01	III
32.	Diagnostic Imaging for Physiotherapist	15	01	III
32.	Emergency Care & BLS	10	01	III
32.	Project work	40	01	III
		790	**38**	

4th year: Examination subjects

33.	Community Medicine	150	06	IV
34.	Rehabilitation Medicine including Geriatrics	100	05	IV
35.	Clinical Cardio-respiratory condition	125	05	IV
36.	Physiotherapy in Cardiorespiratory conditions	110	05	IV
37.	Biostatistics and Research Methodology	80	02	IV
37.	Project Work (Should commence in 3rd year)	40	01	IV
38.	Clinicals	400	18	IV

Non examination subjects:

39.	Yoga	50	01	IV
40.	Basics of Acupuncture & Acupressure	25	--	IV
		680	**38**	

Internship: **1150** —

10. Examination Eligibility:

a) No candidate shall be permitted to appear in any one of the subjects of Bachelor of Physiotherapy degree course unless he / she has attended the course in the subject for the prescribed period in an affiliated institution recognized by Dr. NTR University of Health Sciences, Vijayawada, Andhra Pradesh, and has produced the necessary certificate of study, attendance, progress and satisfactory conduct from the Principal/ Head of the institution where he/she has studied.

b) A candidate is required to put in a minimum of 75% of attendance in both theory and practical's separately in each subject before appearing for the examination.

c) As per the directives of the University, there will be no consideration for leave on medical grounds. The student will have to adjust the same in the minimum prescribed attendance.

d) A candidate lacking the prescribed attendance and progress in all the subjects of the year shall be detained and shall attend the classes with the next batch.

e) A candidate shall secure at least 50% of marks in the Internal Assessment to become eligible to apply for the University examination.

11. Condonation of lack of attendance:

The power of condonation of shortage of attendance up to a maximum of 10% in the prescribed attendance required for admission to an examination rests with the discretionary powers of the Vice-chancellor. A candidate lacking in attendance should submit an application in the prescribed form and remit the stipulated fee, 15 days prior to the commencement of the theory examination.

12. Qualifying Marks:

A candidate shall be declared to have passed the examination if he/she obtains the following qualifying Marks.

(a) 50% of marks in Theory Internal Assessment

and

(b) 50% of marks in Practical Internal Assessment

and

(c) 40% of marks in theory examination

and

(d) 50% of marks in Practicals / Clinical examination

and

(e) 50% of aggregate in theory, Practical/Clinical and oral marks taken together.

(f) Maximum Five (5) grace marks may be awarded to candidates who failed in different subjects by splitting the five marks in theory / practical / aggregate.

Note: There is no minimum mark prescribed for orals.

13. Classification of results:

1. *Second class* - 50% and above but less than 65% of total marks.
2. *First class* - 65% and above but less than 75% of total marks and having passed the examination in first attempt.
3. *Distinction* - 75% and above of total marks and having passed the examination in first attempt.

Attempt: When a candidate is eligible to appear for the examination, but not applied / registered / absent for the examination, it is considered as an attempt.

14. Revaluation of Answer Papers:

There is no revaluation of answer papers as per the regulations prescribed by Dr. NTR University of Health Sciences, Vijayawada, Andhra Pradesh.
However, the candidates can apply for re-totaling of their answer scripts by paying the requisite fee as prescribed by the University from time to time.

15. Readmission after discontinuation / Break of Study:

As per the new regulations of the Dr.NTR UHS, which come into force from 01-06-2011 onwards, the following are the rules of readmission after break of study.

i. For all practical purposes two types of break of study is allowed.
   a. Less than 90 days – Principal of the College can permit the candidate to rejoin the course.
   b. More than 90 days of break only two spells in a total duration of double the number of years of study (8 years) are allowed.
ii. If the candidate is on a break of study or two spells in an academic year of a particular course, the candidate is deemed to have been discharged from the course. No condonation is allowed.
iii. If the candidate avails 2 spells of break as in clause (i)(b), even if the second spell is less than 90 days, permission must be obtained from the University.
iv. Incase of a single break of study of more than 90 days, the candidates have to apply to the University for permission to rejoin the course.

16. Migration:

Migration of candidates from one recognized institution to another institution of this University or from another University will not be considered.

17. Vacation:

There shall be a vacation of one month only, from 1st to 31st May in an academic year, to the students.

18. Compulsory Internship:

After successful completion of the final year examination every student admitted to the course should undergo 6 months of compulsory rotatory Internship in the following Departments.

Total Internship Hours: 1150 hrs.

1. Physiotherapy Out-patient Department	1 Month.
2. Orthopaedics	1 Month.
3. Neurology & Neuro Surgery	1 Month.
4. Cardiology & Cardiothoracic Surgery	1 Month.
5. General Medicine, General Surgery Gynaecology and Paediatrics	1 Month.
6. Community based Rehabilitation / Geriatrics.	1 Month.

In case, a candidate wants to do internship in any other college (other than his parent college) affiliated to Dr. NTR UHS or any other institute having 4 ½ years full time BPT Course and having atleast the first batch of students in their internship, the candidate should obtain No Objection certificate from the institution where he/she has studied and also the institution where he/ she wants to do internship and submit the same to the Registrar, Dr. NTR University of health Sciences, stating reasons for the same. Upon getting permission from the Registrar, Dr. NTR University of Health Sciences, the candidate will be permitted to do internship in the said college / institute.

The candidates are not permitted to do their Internship program in General and Corporate hospitals which do not run a 4 ½ years full time BPT course.

19. Authority for issue of Internship Certificate:
The heads of institutions of the affiliated colleges shall issue a certificate on successful completion of internship to each candidate, upon satisfaction that the candidate has completed the training programme and has acquired the skills to function independently.

20. Award of the Degree:
The degree shall be awarded by the University only after the issue of certificate of completion of the compulsory internship by the Principal of the institution where the student has completed his 4 years of Physiotherapy course.

21. Scheme of Examination:

	Theory Marks		Practical Marks			
PAPER	University Exam	Internal assessment	University Practical /Clinical	University Orals	Internal assessment	Total
I Year						
English	80	20	--		--	100
Sociology Sec.A & Psychology Sec.B	40+40	10+10	---		---	100
Anatomy	80	20	40	40 (10 marks of the orals is for record book work)	20	200
Physiology	80	20	40	40 (10 marks of the orals is for record book work)	20	200
Biochemistry	80	20	--	--	--	100
II Year						
Microbiology & Pathology	80	20	--	--	--	100
Exercise Therapy	80	20	60	20	20	200
Electrotherapy – I (Low Frequency & Medium frequency)	80	20	60	20	20	200
Electrotherapy – II (High Frequency)	80	20	60	20	20	200
Biomechanics & Applied Anatomy	80	20	--	--	--	100

	Theory Marks		Practical Marks			
PAPER	University Exam	Internal assessment	University Practical /Clinical	University Orals	Internal assessment	Total
III Year						
General Medicine, Pharmacology, Paediatrics as Part A & General Surgery & Obstetrics & Gynaecology as Part B	40 40	10 10	-- --	-- --	-- --	100
Orthopaedics for Physiotherapists/ Clinical	80	20	--	--	--	100
Physiotherapy for Orthopaedic - Conditio Including sports physiotherapy	80	20	60	20	20	200
Neurology for Physiotherapists / Clinical	80	20	--	--	--	100
Physiotherapy for Neurology conditions	80	20	60	20	20	200

IV Year						
Community Medicine	80	20	--	--	--	100
Rehabilitation Medicine including Geriatric Rehabilitation & Women's Health	80	20	60	20	20	200
Cardio-Respiratory disorders for Physiotherapists/ clinical	80	20	--	--	--	100
Physiotherapy for Cardio Respiratory Conditions	80	20	60	20	20	200
Biostatistics and Research Methodology	80	20	--	--	--	100
Project Work	--	--	40	40	20	100

2. Pattern of Theory question papers:

PATTERN OF THEORY QUESTION PAPER FROM OCTOBER, 2019			
SL NO	**SUBJECT**	**UNIVERSITY EXAM MAX. MARKS**	**Question Paper Pattern**
FIRST YEAR			
1	English	80	No change
2	Sociology - Sec A Psychology - Sec B	40 + 40	Sec - A (1) One Essay Question with One Internal Choice 1 x 10 = 10 (2) Four Short Note Questions 4 x 5 = 20 (3) Five very Short Note Questions 5 x 2 = 10 Sec - B (1) One Essay Question with One Internal Choice 1 x 10 = 10 (2) Four Short Note Questions 4 x 5 = 20 (3) Five very Short Note Questions 5 x 2 = 10
3	Anatomy	80	(1) Two Essay Questions with One Internal Choice 2 x 10 = 20 (2) Eight Short Note Questions 8 x 5 = 40 (3) Ten very Short Note Questions 10 x 2 = 20
4	Physiology	80	(1) Two Essay Questions with One Internal Choice 2 x 10 = 20 (2) Eight Short Note Questions 8 x 5 = 40 (3) Ten very Short Note Questions 10 x 2 = 20
5	Biochemistry	80	(1) Two Essay Questions with One Internal Choice 2 x 10 = 20 (2) Eight Short Note Questions 8 x 5 = 40 (3) Ten very Short Note Questions 10 x 2 = 20

Note: - There should be structured questions with marks weightage in split manner for Essay type questions.

PATTERN OF THEORY QUESTION PAPER FROM OCTOBER, 2019

	SUBJECT	UNIVERSITY EXAM MAX. MARKS	Question Paper Pattern
SECOND YEAR			
1	Microbiology - Sec A Pathology - Sec B	40 + 40	Sec - A (1) One Essay Question with One Internal Choice 1 x 10 = 10 (2) Four Short Note Questions 4 x 5 = 20 (3) Five very Short Note Questions 5 x 2 = 10 Sec - B (1) One Essay Question with One Internal Choice 1 x 10 = 10 (2) Four Short Note Questions 4 x 5 = 20 (3) Five very Short Note Questions 5 x 2 = 10
2	Excercise Therapy	80	(1) Two Essay Questions with One Internal Choice 2 x 10 = 20 (2) Eight Short Note Questions 8 x 5 = 40 (3) Ten very Short Note Questions 10 x 2 = 20
3	Electrotherapy - I	80	(1) Two Essay Questions with One Internal Choice 2 x 10 = 20 (2) Eight Short Note Questions 8 x 5 = 40 (3) Ten very Short Note Questions 10 x 2 = 20
4	Electrotherapy - II	80	(1) Two Essay Questions with One Internal Choic 2 x 10 = 20 (2) Eight Short Note Questions 8 x 5 = 40 (3) Ten very Short Note Questions 10 x 2 = 20
5	Biomechanics & Applied Anatomy	80	(1) Two Essay Questions with One Internal Choice 2 x 10 = 20 (2) Eight Short Note Questions 8 x 5 = 40 (3) Ten very Short Note Questions 0 x 2 = 20

Note: - There should be structured questions with marks weightage in split manner for Essay type questions.

PATTERN OF THEORY QUESTION PAPER FROM OCTOBER, 2019			
SUBJECT		**UNIVERSITY EXAM MAX. MARKS**	**Question Paper Pattern**
THIRD YEAR			
1	General Medicine - Sec A General Surgery - Sec B	40 + 40	Sec - A (1) One Essay Question with One Internal Choice 1 x 10 = 10 (2) Four Short Note Questions 4 x 5 = 20 (3) Five very Short Note Questions 5 x 2 = 10 Sec - B (1) One Essay Question with One Internal Choice 1 x 10 = 10 (2) Four Short Note Questions 4 x 5 = 20 (3) Five very Short Note Questions 5 x 2 = 10
2	Orthopaedics for Clinical	80	(1) Two Essay Questions with One Internal Choice 2 x 10 = 20 (2) Eight Short Note Questions 8 x 5 = 40 (3) Ten very Short Note Questions 10 x 2 = 20
3	Physiotherapy for Orthopaedic Conditions	80	(1) Two Essay Questions with One Internal Choice 2 x 10 = 20 (2) Eight Short Note Questions 8 x 5 = 40 (3) Ten very Short Note Questions 10 x 2 = 20
4	Neurology for Clinical	80	(1) Two Essay Questions with One Internal Choice 2 x 10 = 20 (2) Eight Short Note Questions 8 x 5 = 40 (3) Ten very Short Note Questions 10 x 2 = 20
5	Physiotherapy for Neurology Conditions	80	(1) Two Essay Questions with One Internal Choice 2 x 10 = 20 (2) Eight Short Note Questions 8 x 5 = 40 (3) Ten very Short Note Questions 10 x 2 = 20

Note: - There should be structured questions with marks weightage in split manner for Essay type questions.

PATTERN OF THEORY QUESTION PAPER FROM OCTOBER, 2019			
SUBJECT		**UNIVERSITY EXAM MAX. MARKS**	**Question Paper Pattern**
FOURTH YEAR			
1	Community Medicine	80	(1) Two Essay Questions with One Internal Choice 2 x 10 = 20 (2) Eight Short Note Questions 8 x 5 = 40 (3) Ten very Short Note Questions 10 x 2 = 20
2	Rehabilitation Medicine	80	(1) Two Essay Questions with One Internal Choice 2 x 10 = 20 (2) Eight Short Note Questions 8 x 5 = 40 (3) Ten very Short Note Questions 0 x 2 = 20
3	Cardio Respiratory - Clinical	80	(1) Two Essay Questions with One Internal Choice 2 x 10 = 20 (2) Eight Short Note Questions 8 x 5 = 40 (3) Ten very Short Note Questions 10 x 2 = 20
4	Physiotherapy for Cardio Respiratory Conditions	80	(1) Two Essay Questions with One Internal Choice 2 x 10 = 20 (2) Eight Short Note Questions 8 x 5 = 40 (3) Ten very Short Note Questions 0 x 2 = 20
5	Biostatistics and Research Methodology	80	(1) Two Essay Questions with One Internal Choice 2 x 10 = 20 (2) Eight Short Note Questions 8 x 5 = 40 (3) Ten very Short Note Questions 0 x 2 = 20

Note: - There should be structured questions with marks weightage in split manner for Essay type questions.

FIRST YEAR

E N G L I S H

Examination at the end of: 1st Year **Instruction hours: 100**
Theory marks: 80 marks
Internal assessment: 20 marks

COURSE OBJECTIVES:

1. The Objective of the course is to make a student communicate with ease in English with his/her colleagues, teachers, professionals and non-professionals.

2. To develop English speaking, writing and reading abilities.

3. To develop skill to document clearly, concisely and precisely.

SYLLABUS

1) PROSE: *Contemporary English:* An Anthology of Prose, Board of Editors, D.U.P.
The following lessons are prescribed:

i) From Heaven lake- Vikram seth [3 hours]

ii) Indian Cinema: Tradition and Change- Chidananda Das Gupta [3 hours]

iii) Stench of Kerosene - Amrita Pritam [3 hours]

iv) The Relationship of languages - Jawaharlal Nehru [3 hours]

v) My financial career - Stephen Leacock [3 hours]

vi) To Students - M.K.Gandhi [3 hours]

vii) Next Sunday - R.K.Narayan [3 hours]

viii) After twenty years- O.Henry [3 hours]

ix) New York on 17 Dollars a Day - Khuswant Singh [3 hours]

2) POETRY: Magic of the Muse: An Anthology of poems Ed: Prof. L.S.R.Krishna Sastry, Maruthi Publishing House, Hyderabad

The following poems are prescribed:

i) Under the Greenwood tree - William Shakespeare [3 hours]

ii) The Happy Man- Alexander Pope [3 hours]

iii) Simon Lee (The Old Huntsman) - William Wordsworth [3 hours]

iv) The Cloud - Percy Byshe Shelley [3 hours]

v) Ulysses - Alfred Lord Tennyson [3 hours]

vi) From Lover's Gift - Ravindranath Tagore [3 hours]

vii) Unharvested - Robert Frost [3 hours]

viii) The Earthen Goblet - Harindranath Chattopadhyaya [3 hours]

ix) Telephone Conversation - Wole Soyinka [3 hours]

3. GRAMMER: [46 hours]

The following Text books of grammar are recommended for references and study.

1. "Essentials of English grammar and composition by N.K. Aggarwala of Goyal Brother's Prakashan Educational Publishers" [11/1903 Chuna Mandi, Paharganj, New Delhi- 110 055

AND

"Learners English grammar and composition" By N.D.V. Prasada Rao, Reviser of Wren & Martin's High School English Grammar And Composition of S.Chand & Company Ltd Ramnagar, New Delhi – 110055

I. (a) Spellings (Three marks)
(b) Antonyms (Four marks)
(c) Words & Phrases (Three marks)

II. Letter writing (6 marks)
(a) Personal Letter (letters to Father, Mother, Brother, Aunt etc)
(b) Official Letters (All applications)
(c) Academic Matters (eg: To the editor of a Newspaper (or) submission of an Article)

III. General Essay (6 Marks)
(Suggested Topics)
1. Physiotherapy
2. Social Problems – Corruption, Dowry System, Population, Diseases &

Remedies, Scientists and their contribution.

IV. Transformation of Sentences (6 Marks)

(a) Voice, Degrees, Question Tags, Direct & Indirect Speech, Words often confused.

V. Articles, Prepositions, Tenses, Verbs, correct use of nouns (4 Marks)

SOCIOLOGY

Examination at the end of: I Year **Instruction Hours: 75**
Theory: 50 marks (40 + 10 IA)

COURSE DESCRIPTION:

This course introduces the basic sociological concepts, principles and social process. Social institutions (in relation to the individual, family and community) and the various social factors affecting the family in rural and urban communities in India will be studied.

COURSE OBJECTIVES:

After 75 hours of lectures, demonstrations, practicals and clinics, the student shall be able to demonstrate an understanding of the role of sociocultural factors as determinants of health and behaviour in health and sickness. They will be able to relate this to therapeutic situations in the practice of physiotherapy.

A) Understand the role of family and community in the development of human behaviour.

B) Develop a holistic outlook towards the structure of the society and community resources.

C) Identify the subtle influence of culture in the development of human personality, the role of beliefs and values as determinants of individual and group behaviour.

D) Understand the social and economic aspects of community that influence the health of the people.

E) Learn to assess the social problems and participate in social planning.

F) Identify social institutions and resources.

G) Understand the significance of social interaction in the process of rehabilitation.

H) Appreciate the role of therapist as a member of the society and the interdependence of individuals and society.

COURSE OUTLINE:

A) INTRODUCTION: [3 hours]

Definitions of Sociology, Sociology as a science of society, uses of study of Sociology, application of knowledge of Sociology in Physiotherapy.

B) SOCIOLOGY AND HEALTH: [3 hours]

Concepts of health and disease, social factors affecting health status, social consciousness and perception of illness, decision making in treatment.

C) SOCIALIZATION: [3 hours]

Meaning of Socialization, types of Socialization, influence of social factors on personality, socialization in hospital, socialization in the rehabilitation of patients.

D) SOCIAL GROUPS: [3 hours]

Concepts of social groups, classification of social groups, influence of formal and informal groups on health and sickness. The role of primary groups and secondary groups in the hospital and rehabilitation settings.

E) FAMILY: [6 hours]

Meaning and characteristics of family, distinctive features of families, types, basic needs, functions, influence of family on human personality, discussion of changes in the functions of a family, the effects of sickness on family, family and psychosomatic diseases.

F) COMMUNITY: [4 hours]

Definition and elements of community, concepts of community, role of rural and urban communities in public health, role of community in determining beliefs, practices and home remedies in treatment.

G) CULTURE: [3 hours]

Meaning, definition and characteristics, material culture and non-material culture, cultural diffusion, cultural lag, components of culture, impact of culture on human behaviour, culture induced symptoms and diseases, sub-culture of medical workers.

H) CASTE SYSTEM: [3 hours]

Definition and characteristics, features of the modern caste system and its trends.

H) RACE: [3 hours]

A biological human stratification, theories of races, classification of races, racism

I) SOCIAL CHANGE: [4 hours]

Meaning of social change, factors of social change, human adaptation and social change. Social change and stress, social change and health programmes, the role of social planning in the improvement of health and in rehabilitation.

J) SOCIAL CONTROL: [4 hours]

Meaning of Social control, role of norms, folkways, customs, morals, religion, law and other means of social control in the regulation of human behaviour.

K) SOCIAL PROBLEMS OF THE DISABLED: [10 hours]

Consequences of the following social problems in relation to sickness and disability and remedies to prevent these problems.

- Population explosion
- Poverty and unemployment
- Beggary
- Juvenile delinquency
- Prostitution
- Alcoholism
- Problems of employed women

M) GERIATRIC CARE: A SOCIOLOGICAL APPROACH: [4 hours]

Post retirement difficulties faced by the geriatric group, problem mitigation, services by governmental agencies, services by NGOs like (a) Age care India (b) Help age India (c) Homes for senior citizens

N) TYPES OF DISABILITIES VIDE PERSONS WITH DISABILITIES ACT -1995, with special reference to : - [5 hours]

- Autism spectrum disorders
- Cerebral Palsy
- Four levels of mental retardation
- Multiple disabilities

O) SOCIAL SECURITY: [4 hours]

Retirement as social and economic event, Social security for civil servants, for general public through insurance schemes, for industrial workers (ESI Act) including Workmen Compensation Act and social legislation in relation to the disabled.

P) SOCIAL ADJUSTMENT AND SOCIAL GERONTOLOGY: [5 hours]

Social adjustment, Gerontology: ageing, social aspects of ageing, sexual adjustment, economic aspects of ageing, the ageing process, health and medical care.

Q) SOCIAL WORKER: [3 hours]

The role of a medical social worker.

R) MERITS AND DEMERITS OF SOCIAL LEGISLATION. [2 hours]

S) EVALUATION. [3 hours]

References: -

1) Sachdeva, D.R. and Bhushan V, An introduction to Sociology - Allahabad; Kitab Mahal Limited, 1974
2) Madan G.R.Indian Social Problems, Vol.I Madras, Allied publications - 1973.
3) Social & Preventive Medicine - J.E.Park.
4) Text Book of Sociology for Physiotherapy students - K P Neeraja.
5) General and Medical Sociology - Dr. P. Ramasamy.

6) Psychology and Sociology for GNM and BPT students - Jacob Anthikad.
7) Sociology for Nurses - C M Abraham.
8) Sociology for Physiotherapy - Subba Rao.

PSYCHOLOGY

Examination at the end of: I Year **Instruction Hours: 90**
Theory: 50 marks (40 + 10 IA)

COURSE OUTLINES:

The course is divided into part A and B. Part A is devoted to the elementary principles of behaviour and will be examined for 50 marks, and part B will be taught as an applied subject where only the internal evaluation will be conducted for 25 marks at the end of the first year.

COURSE DESCRIPTION:

This course will enable the student to understand all the psychological factors that influence health and illness, and as to how people stay healthy, why they become ill and how they respond when they do get ill. By learning how the mind and body work together to produce physical and mental health they can deal effectively with the patients during their admission, treatment, rehabilitation, recovery and discharge.

COURSE OBJECTIVES:

After getting exposed to this course the student will be able to understand and manage the psychological aspects involved in pain, disability, disfigurement, unconsciousness, chronic illness, death bereavement, and surgical conditions. They should also understand the basic principles of behaviour so that they can apply them in the therapeutic environment.

Thus, the objectives of the course are:

1. Psychosocial assessment of patients in various developmental stages.
2. Awareness of the patient's needs during admission, treatment, rehabilitation and discharge
3. Explain the concepts of stress and its relationship to health, sickness and one's profession.
4. Understand the barriers in communication and improve the communication with the patients.
5. Identify ego defense mechanisms and learn counseling techniques to help those in need.
6. Help them to understand the reasons of non-compliance among patients and improve complying behaviour.

GENERAL PSYCHOLOGY

A. INTRODUCTION TO PSYCHOLOGY: [5 hours]

1. Definition of Psychology, nature of psychology, basic information in relation to the methods and branches.
   a. Methods of Psychology: Introspection, observation, interview, case study and experimental method.
   b. Branches of Psychology: General, social abnormal, child, applied psychology educational, industrial, counseling, clinical, para psychology and gerontology.

B. HEREDITY AND ENVIRONMENT: [10 hours]

Twins, relative importance of heredity and environment, their role in relation to physical characteristics, intelligence and personality, nature - nurture controversy.

C. GROWTH AND DEVELOPMENT BEHAVIOUR: [8 hours]

Infancy, childhood, adolescence, adulthood, middle age & old age.

D. MOTIVATION: [8 hours]

Definition, drive, incentive, reinforcement, types of motivation, basic information about physiological and psychological needs, Theories of motivation (Need theory, Maslow's hierarchial Theory).

E. EMOTION: [6 hours]

Definition, differentiate from feelings, physiological changes of emotions, role of RAS, hypothalamus, cerebral cortex, sympathetic nervous system, adrenal glands. Theories of emotion (James Lange and Cannon Burd theories).

F. INTELLIGENCE: [8 hours]

Definition, Nature of Intelligence, Mental Age concept (MA), Intelligence Quotient (IQ), assessment of intelligence (or) Intelligence tests. Weschler scales, WISC & WAIS, Bhatia performance test, Raven's Progressive Matrices (RPM).

G. PERSONALITY: [8 hours]

1) Definition, list of components, physical characteristics, character, abilities, temperament, interest, attitudes.
2) Role of heredity, nervous system, physical characteristics, abilities, family and culture on personality development.
3) Approaches: Type approach – Sheldon, Trait approach-Cattell and Allport Psychoanalytic approach – Freud, psychosocial approach – Eric Erikson and Neo-Freudian approach – Adlar and Jung.
4) Personality Assessment - interview, rating scales, questionnaires and inventories like MMPI, CPI, BAI and 16 PF.
5) Projective tests: Rorschach ink blot test, Thamatic Apperception test (TAT), Children's Apperception Test (CAT) Rotter in complete Sentence Blank (RISB).

H. LEARNING: [8 hours]

1) Definition, Nature of learning.
2) Types of learning: classical conditioning, operant conditioning, trial and error, Insightful and observation learning.

3) List the effective ways to learn: Massed vs spaced, whole vs part, reading vs recitation, rote vs meaningful, incidental vs intentional, knowledge of results and SQ3R method.
4) Reinforcement – meaning and types of schedules.
5) Memory – short term and long term memory and forgetting.

I. THINKING: [8 hours]

Definition, types of thinking, process of thinking and creative thinking.

J. FRUSTRATION: [4 hours]

Definition, sources and measurement of frustration
Conflicts – types, methods to resolve conflicts – adaptive and defensive.

K. SENSATION, ATTENTION AND PERCEPTION: [8 hours]

1) List the senses: Vision, hearing, olfactory, gustatory, and cutaneons, sensations, movement, equilibrium and visceral sense.

2) Define attention and list factors that determine attention: Nature of stimulus, intensity, colour, change, extensity, repetition, movement, size, curiosity, primary motives.

3) Define perception and test the principle of perception, Figure and Ground, constancy, similarity, proximity, closure continuity, values and interests, past experience, context, needs, moods, religion, sex, age and socio economic status.

Define illusion and hallucination, type of illusion and hallucinations. visual, auditory and cutaneous.

L. ATTITUDES; [4 hour]

Definition - factors involved in attitude change and attitude measurement.

M. DEFENCE MECHANISMS: [5 hour]

Regression, compensation, projection, identification, repression, rationalization, sublimation, day dreams, withdrawal and denial.

Not for University Examination
HEALTH PSYCHOLOGY

A. PSYCHOLOGICAL REACTIONS OF A PATIENT:

Psychological reactions of a patient during admission and treatment: Anxiety, shock, denial, suspicion, questioning, loneliness, regression, egocentricity, concern about small matters, narrowed interests, emotional over relations, perceptual change, disorientation, hallucinations, delusions, illusions, anger, hostility, loss of hope.

B. REACTION OF LOSS:

Reaction to loss, death and bereavement: Shock and disbelief, development of awareness, restitution, stages of acceptance as proposed by Kubler - Ross.

C. STRESS:

Definition, Physiological and Psychological changes, relation to health and sickness: Psychosomatic, professional stress, burn out.

D.COMMUNICATIONS:

1. Definition, Types - Verbal, non-verbal, elements in communication, barrier to good communication, developing effective communication, specific communication techniques.

2. Counseling - Definition, aim, principles in counseling, techniques in counseling, Qualities of counselors.

E. COMPLIANCES:

Nature, factors contributing to non-compliance, improving compliance.

F. EMOTIONAL NEEDS:

Emotional needs and psychological factors in relation to unconscious patients, handicapped patients, bed ridden patients, chronic pain, spinal cord injury, paralysis, cerebral palsy, burns, amputations, disfigurement, head injury, degenerative disorders, parkinsonism, leprosy, incontinence and mental illness.

G. GERIATRIC PSYCHOLOGY:

Specific psychological reactions and needs of geriatric patients, handicapped patients.

H. PAEDIATRIC PSYCHOLOGY:

Specific psychological reactions and needs of paediatric Psychology.

I. BEHAVIOUR MODIFICATION:

Application of various conditioning and learning principles to modify patient behaviour.

J. SUBSTANCE ABUSE:

Psychological aspects of substance abuse: Smoking, alcoholism, drug-addiction.

References: -

1) Invitation to Psychology - Beena and Paremeshwaran.
2) General Psychology - S.K.Mangal.
3) Introduction to Health Psychology - Shelly E.Taylor.
4) Introduction to Psychology - Atkinson and Hilgard.
5) Introduction to Psychology - Morgan and king.
6) Psychology applied to modern life - Wayne Weiten Margareta L. Lord.
7) Psychology and Sociology for GNM and BPT student - Jacob Anthikad.

ANATOMY

Duration : One year **Total Hours of Instruction: 215 Hours**
Examination: At the end of I year **Seminars / Tutorials: 1 Hour / Week**
Theory : 145 Hrs
Practical : 70 Hrs
Total Hours / Week : 8 Hrs
Lecture : 4 Hours / Week
Practicals: 4 Hours / Week
Method of Assessment: Written, Oral, Practical
THEORY: 100 Marks (80 + 20 IA)
PRACTICALS: 100 Marks (40 Practicals + 30 Viva + 10 Record +20 IA)

GOALS:

To provide the student with the necessary anatomical knowledge & skills for identification of all gross anatomical structures. Particular emphasis will be placed on description of musculoskeletal anatomy which includes bones, joints and muscles. In addition anatomical knowledge of nervous system, cardiovascular system and respiratory system related to the application of physiotherapy in patients as expected of a qualified Physiotherapist for practising the profession.

COURSE DESCRIPTION**:**

The course is designed to provide students with the working knowledge of those structures of the human body that form essential foundation for understanding their clinical studies. Studies are concerned with the topographical and functional anatomy of the limbs, thorax and brain. Particular attention is paid to the muscles, bones and joints of the regions. The abdomen, pelvis, perineum, head and neck and are to be studied with particular reference to topics of importance to physiotherapists.

INSTRUCTIONAL METHOD AND PEDAGOGY:

1. Interactive class room sessions using black-board and audio-visual aids.
2. Using the available technology and resources for e-learning.
3. Students will be focused on self-learning, practical learning and clinical exposure facilitated by the faculty.
4. Students will be enabled for continuous evaluation.
5. Case study, group discussions, role-plays and simulation exercises.

STUDENT LEARNING OUTCOMES/OBJECTIVES:

GENERAL OBJECTIVES**:** At the end of the one year course the student will be able to understand:

1. Levels of organization of the human body.
2. Topographical and functional anatomy of the limbs, thorax,head and neck, abdomen and pelvis.
3. The muscles, bones and joints of the various regions.
4. Application of basic knowledge of anatomy in practice of physiotherapy.

SPECIFIC OBJECTIVES:

1. MUSCULO- SKELETAL: The student should be able to

i] Identify & describe anatomical aspects of muscles, bones & joints

ii] Understand and analyze movements at various joints

iii] Understand the anatomical basis of various clinical conditions e.g. trauma, deformities pertaining to limbs & spine.

iv] Understand & describe the mechanism of posture, gait, various movements like walking, running, standing, writing, carrying weights, lifting weights etc. Anatomical basis for abnormal postures, gait and abnormal movements.

2. NEURO: Anatomy **-** The student should be able to

i] Identify & describe various parts of C.N.S.-Forebrain, midbrain, hind-brain, brain-stem.

ii] Understand the course, functional components, distribution and anatomical basis of clinical lesions of cranial nerves.

iii] Ventricular system and CSF circulation.

iv] Describe the source, course and termination of various spinal tracts and anatomical basis of injuries to these tracts at various levels.

v] Describe the blood supply of brain and spinal cord with its clinical importance.

vi] To describe blood circulation of C.N.S. & spine

3. THORAX: The student should be able to

i] Understand the arrangements of structures of thoracic cage and the anatomical basis of movements of thoracic cage in respiration.

ii] Understand attachments, innervations, structures passing through and movements of diaphragm and its clinical application.

iii] Identify & describe various components of the contents of the thorax - with special emphasis to cardio- vascular & respiratory systems.

4. CIRCULATORY: The student should be able to

i] Identify & describe the source & course of major arterial, venous & lymphatic system, with special emphasis to limbs, spine & thorax. Applied importance of arterial, venous and lymphatic obstructions.

ANATOMY

DISTRIBUTION OF THEORY AND PRACTICAL HOURS – REGION-WISE

TOPIC	THEORY	PRACTICALS
General Anatomy	8hrs	__
Histology	10 hrs	06 hrs
Genetics	05 hrs	02hrs
Embryology	10 hrs	__
Regional Anatomy		
1. Upper Limb	20 hrs	16 hrs
2. Lower Limb	20 hrs	16 hrs
3. Thorax	15 hrs	04 hrs
4. Abdomen and Pelvis	10 hrs	04 hrs
5. Back	10 hrs	02 hrs
6. Head, Face & Neck	15 hrs	06Hrs
7. Brain	15 hrs	10Hrs
8. Endocrine glands	2 Hrs	__
Internal Assessment exam (Theory) 3 * 3hrs	= 9hrs	__
Internal Assessment exam (Practicals)	__	2 * 2 hrs = 4hrs
Internal Assessment exam (Viva)	1 hr	__
TOTAL	145 hrs	70hrs

Syllabus:

General Anatomy: Theory - 8hrs

a) Introduction to Anatomy – definition, anatomical position, anatomical planes, common anatomical terms, various methods of study of anatomy-gross, systemic, radiological etc.. and subdivisions of anatomy- muscular, skeletal, cardio-vascular etc.

b) Introduction to Osteology – Definition of bone, classification of bones, parts of a long bone, blood supply of a long bone, laws of ossification, epiphysis and types. Clinical application.

c) Introduction to Myology – Definition, types of muscles, classification of skeletal muscles –based on shape, location, function etc., Swing, shunt and spin muscles, and innervations of a muscle – motor unit, neuro-muscular junction.

d) Introduction to Arthrology – Definition, classification of joints with examples, lever systems of body, description of a synovial joint, synovial fluid, bursa, menisci with clinical application.

e) Introduction to Neuroanatomy – classification of nervous system, parts of a neuron with function, types of neurons, afferent and efferent nerves, components of a reflex arc, spinal segments, formation of a plexus, peripheral nerve – motor, sensory, mixed and effects of injury.

f) Introduction to Cardio-vascular system- Arteries and their classification, end arteries, collateral circulation, veins, sinusoids, arterio-venous anastomoses, components of a lymphatic system –lymph capillaries, lymphnode, circulation of lymph.

HISTOLOGY: Theory - 10 hrs Practicals – 06 hrs

General Histology:

1. Microscope – parts and different types with their uses for understanding the various levels of structural details
2. Cell-components, functions including ultrastructural details.
3. Tissue –classification of basic tissues and their function –epithelial, connective, muscular, nervous
4. Epithelial tissue including glandular epithelia –definition, classification with examples and function
5. Connective tissue- components, classification with examples, deep fascia,tendons, ligaments, aponeuroses. Cartilage- types, structure, location and functions in detail. Bone – primary/secondary, lamellar/compact, growth and development, factors influencing growth and development, types of ossification with clinical importance in detail.
6. Muscular tissue – classification and structure of cardiac and skeletal muscles in detail-sarcomere, intercalated discs etc...
7. Nervous tissue – types of neurons – unipolar,bipolar,multipolar, peripheral nerve LS – axon, myelin sheath, nodes of Ranvier, - peripheral nerve TS with its coverings – epineurium, perineurium, endoneurium.
8. Circulatory system – TS of large sized artery, medium sized artery and large sized vein.
9. Lymphoid tissue – Lymph node, Tonsil, Thymus, Spleen.
10. Skin and its appendages.- flexion creases, Langer’s lines.

Systemic Histology:

1. Respiratory system – Trachea, lung.
2. Nervous system: a. Spinal cord – cervical, thoracic and lumbar levels,
   b. cerebrum & c. cerebellum.

GENETICS Theory - 05 hrs Practicals – 02hrs

I. Introduction to human genetics – mitosis, meiosis, Mendel's laws,
II. Cytogenetics - karyotype, karyotyping, Barr-body.
III. Modes of Inheritance – Autosomal dominant and recessive, Y- linked inheritance, X linked dominant and recessive, pedigree charting
IV. Medical Genetics: Chromosomal aberrations, - Structural: deletion, duplication, translocation etc., numerical: Down, Turner, Klinefelter syndromes
V. Clinical Genetics: Prenatal diagnosis, Genetic counselling.
VI. Recent advances – Gene-therapy, stem cell therapy

EMBRYOLOGY Theory - 10 hrs

a) Ovum, Spermatozoa, fertilization and formation of the Germ layers and their derivations.
b) Development of skin, fascia, blood vessels, lymphatics.
c) Development of pharyngeal arches and their derivatives.
d) Development of heart and major vessels – aorta, superior vena cava, inferior vena cava, axillary, femoral, carotid etc..
e) Development of respiratory system.
f) Development of bones, axial and appendicular skeleton and muscles.
g) Development of nervous system - neural tube, brain vesicles and spinal cord, formation of grey matter, white matter, tracts, myelination and neural tube defects.

REGIONAL ANATOMY:

1. Upper Limb Theory- 20 hrs Practicals – 16 hrs

a. Osteology: Clavicle, Scapula, humerus, radius, ulna, articulated hand.

b. Soft parts: Breast, pectoral region, axilla, front of arm, back of arm, cubital fossa, front of fore arm, back of fore arm, palm, dorsum of hand, muscles, nerves, blood vessels and lymphatic drainage of upper extremity.

c. Joints: Shoulder girdle, shoulder joint, elbow joints, radio ulnar joint, wrist joint and joints of the hand.

d. Applied Anatomy - Erb's and Klumpke's paralysis, wrist drop, carpal tunnel, claw hand, winging of scapula.

e. Surface anatomy and X-rays

2. Lower Limb: Theory - 20 hrs Practicals – 16 hrs

a. Osteology: Hip bone, femur, tibia, fibula, patella, articulated foot

b. Soft parts: Gluteal region, front and back of the thigh (femoral triangle, femoral canal and inguinal canal), medial side of the thigh, adductor canal, popliteal fossa, anterior and posterior compartment of leg, sole and dorsum of the foot, lymphatic drainage of lower limb, venous drainage of the lower limb, blood supply of the lower limb, arches of foot.

c. Joints: hip joint, knee joint, ankle joint, joints of the foot.

d. Applied anatomy of - femoral sheath, femoral canal, sciatic nerve and its branches, obturator nerve, foot drop, varicose veins and various joints.

e. Surface anatomy and X-rays.

3. Thorax: Theory- 15 hrs Practicals – 04 hrs

Osteology: thoracic vertebrae,sternum, ribs and joints

a. Soft parts - Intercostal muscles and accessory muscles of respiration: origin, insertion, nerve supply and action. Diaphragm: origin, insertion, nerve supply and action, openings in the diaphragm. Intercostal space-boundaries, intercostal nerves and vessels. Movements of respiration.
b. Cardio – vascular system- mediastinum: divisions and contents - pericardium: thoracic wall: position, shape and parts of the heart; conducting system; blood Supply and nerve supply of the heart

c. Respiratory system- Outline of respiratory passages - pleura and lungs: position, parts, relations, blood supply and nerve supply; lungs –emphasize on broncho-pulmonary segments
d. Azygos vein, oesophagus, trachea and thoracic duct.
e. Surface anatomy and X-rays

4. Abdomen and Pelvis: Theory - 10 hrs Practicals – 04 hrs

a. Osteology: lumbar vertebrae, pelvis (male & female), sacrum, joints

b. Soft parts: Anterior abdominal wall, Rectus sheath, external genitalia, inguinal canal.

c. Organs- stomach, small intestine, large intestine, liver, pancreas, spleen, urinary system, supra renal glands, reproductive system male and female – supports of uterus.

d. Perineum: male, female – superficial and deep perineal pouches, ischio-rectal fossa, pelvic diaphragm.

e. Applied anatomy of reproductive system and perineum in parturition and family planning.

5. Back: Theory - 10 hrs Practicals – 02 hrs

a. Osteology: vertebral column, curvatures, intervertebral discs, movements.

b. Soft parts: muscles of back, thoracolumbar fascia.

c. Spinal cord & Meninges – tracts, blood supply

d. Applied anatomy of posture & gait, line of gravity, centre of gravity. abnormal curvatures, prolapsed of intervertebral disc, lumbar puncture.

e. Surface anatomy and X-rays

6. Head, Face & Neck: Theory- 15 hrs Practicals – 06Hrs

a. Osteology: Articulated skull & mandible, cervical vertebrae, foetal skull, joints

b. Soft parts: Scalp, face, fascia of neck, triangles of neck, muscles of neck, cranial cavity, dural venous sinuses, meninges, cranial nerves, extra ocular muscles of eye ball, muscles of mastication.

c. Thyroid, parotid, submandibular gland

d. Oral cavity, tongue, teeth, tonsil

e. Nasal cavity, paranasal sinuses

F. Ear, larynx, pharynx, palate, trachea, oesophagus, surface anatomy and X-rays.

7. Brain: Theory- 15 hrs Practicals – 10Hrs

a. Meninges, surfaces and parts of cerebrum, cerebellum, brainstem

b. Medulla – gross and sectional anatomy with special attention to motor and sensory tracts , cardiac, respiratory centres

c. Pons – Gross and sectional anatomy
d. Midbrain – Gross and sectional anatomy
e. Cerebellum- lobes, fissures, cerebellar peduncles
f. Cerebrum – sulci, gyri and functional areas
g. Thalamus, hypothalamus, basal ganglia, limbic system,reticular formation
h. Tracts – Pyramidal, extra pyramidal,optic pathway, auditory path way, gustatory path way
i. Blood supply.Ventricular system of brain and CSF.
j. Cranial nerves – location of nuclei, course, termination and effects of injuries at various levels
k. Applied anatomy of – Hemiplegia, Internal capsule, medial and lateral medullary syndromes etc.

8. Endocrine glands**:** Theory - 2 Hrs

Position, shape, size, function, blood supply and nerve supply of the hypothalamus and pituitary gland, thyroid glands, parathyroid glands, adrenal glands, pancreatic islets, ovaries and testes, pineal glands, thymus.

Textbooks:

Gross Anatomy (Any One):
1. Human anatomy by I.B. Singh - Volumes.
2. Human Anatomy B.D. Chaurasia Volumes

General Anatomy (Any One):
1. Handbook of General Anatomy by B.D. Chaurasia
2. Principles of General Anatomy by A.K. Datta

Microanatomy (Any One):
1. Text book of Human Histology with colour Atlas.Inderbir Singh
2. Atlas of Histology by Di Fiore

Neuroanatomy:
1. Text book of Human Neuroanatomy by Inderbir Singh.
2. Clinical Neuroanatomy for medical students by Vishram Singh

Genetics (Any One):
1. Essentials of Human Embryology by Bhatnagar, Kothari,Mehta.
2. Human Genetics by S.D. Gangane

References: -

1. Principles of anatomy and physiology by Tortora
2. Cunningham's Manual of Practical Anatomy
3. Clinical Anatomy for Medical Students by Richard Snell
4. MOORE [Kieth L], Clinically Oriented Anatomy
5. Anatomy & Physiology by Ross & Wilson's, 8th edition, Churchill Livingston.
6. Gray's Anatomy.
7. Grant's atlas of anatomy, Anne MR; 10th edition.

Pattern of Distribution of Marks

1. General Anatomy ,General Embryology + Histology + Genetics – 5 Marks
2. Regional Anatomy

Upper limb	15 Marks
Lower limb	15 Marks
Thorax	10 marks
Head and Neck	10 Marks
Abdomen and Pelvis	05 Marks
Brain and endocrines	15 Marks
Back	05Marks

Distribution of Practical Marks **40 Marks**

1. Spotters 15 x 2 = 30 marks
   - Upper limb – 2 nos
   - Lower limb – 2 nos
   - Abdomen – 2 nos
   - Thorax – 2nos
   - Head and neck – 2nos
   - Brain - 2nos
   - Osteology - 3nos
2. Discussion -
   Limbs – identification of all the structures as questioned by the examiner

   2 x 5 = 10 marks

VIVA **30 Marks**

1. Soft parts 10 Marks
2. Radiology 10 Marks
3. Osteology 10 Marks

Record **10 Marks**

General Anatomy, Histology, Genetics	10 diagrams
Regional Anatomy	20 diagrams

PHYSIOLOGY

Examination at the end: I Year **Instruction hours: 150**
i) Theory marks 80+ Internal Assessment 20
ii) Practicals 40 + orals 30 + Record 10 + IA 20
Note: ES= Essay question, S= Short question & VS= Very short question.

COURSE DESCRIPTION:

This course which runs concurrently with the anatomy course helps the students to understand the basis of normal human physiology with special emphasis on the functioning of the cardiovascular, respiratory, musculoskeletal and nervous system.

COURSE OBJECTIVES:

The objective of this course is that after 150 hours of lectures, demonstrations, practicals and clinics the student will be able to demonstrate an understanding of elementary human physiology.

LECTURE OUTLINES

A. CELL VS [2 hours]
Outline of basic concepts of cell structure, functions of components transport across membranes.

B. SKIN S/ VS [2 hours]
Structure; functions; blood flow; temperature regulation.

C. BLOOD E/S/VS [10 hours]
i. Outline of components and their functions – RBC, WBC, Platelets
ii. Blood groups.
iii. Significance of RBC & WBC counts, ESR and other related tests.
iv. Clotting mechanisms
v. Blood volume and its regulation.

D. Nerve Muscle Physiology. E/S/VS [15 hours]
i. Structure of muscle tissue: Gross structure and microscopic structure. Arrangement of myofibrils. Myoneural junction.
ii. Chemical processes involved in muscle contraction.
iii. Physiology of muscle contraction, simple muscle twitch, quantal summation, wave summation, treppe, tetany, effects of temperature changes. All or none law. Fatigue, isotonic, isometric and isokinetic contractions.

E. CIRCULATION E/S/VS [20 hours]
Structure & Properties of cardiac muscle, cardiac cycle.
i. ECG, Heart sounds, cardiac output.
ii. Factors regulating the action of the heart.
iii. Blood pressure – its maintenance and regulation.
iv. Cerebral circulation, renal circulation, pulmonary circulation.
v. Effects of exercise, effects of postural changes.

vi. Lymph, factors affecting flow of lymph.

F. RESPIRATION E/S/VS [15 hours]

i. Defense mechanisms in the respiratory tract, mucociliary transport, mechanics of respiration.
ii. Transport of blood gases. Acid-base balance.
iii. Lung function tests (including lung volumes), Artificial ventilation.
iv. Nervous and chemical regulation of respiration
v. Hypoxia-types and causes
vi. Effects of exercise on respiration.

G. EXERCISE PHYSIOLOGY E/S/VS [15 hours]

i. Exercise metabolism. Oxygen debt, Respiratory quotient
ii. Development of endurance, factors affecting endurance and muscle strength. Factors affecting general and cardiorespiratory endurance. Aerobic and anaerobic work. Efficiency of muscular activity, aerobic versus anaerobic (eg.speed, work, load, fatigue, diet, obesity)
iii. Age and exercise, age changes in muscle function, age changes in CVS, age changes in pulmonary function, age and physical work capacity, age and nervous system.
iv. Environment and exercise, adaptation to heat and cold, exercise in heat and in cold. Human limitation in heat, acclimatization to heat, exercise at high altitudes.

H. DIGESTION S/VS [5 hours]

i. Digestion in the mouth, stomach and intestine
ii. Gastric juice, bile, pancreatic juice, intestinal juice
iii. Mechanics of control of secretions and motility
iv. Diet, nutrition.

I. EXCRETION S/VS [8 hours]

i. Structure of nephron
ii. Formation of urine
iii. Micturition

J. ENDOCRINES S/VS [10 hours]

Outline of the various hormones and their actions with special emphasis on thyroid and parathyroid hormones

K. REPRODUCTION S/VS [5 hours]

i. Male reproductive system.
ii. Female reproductive system
iii. Outline of pregnancy, functions of placenta, parturition, lactation and contraceptive measures.
iv. Physiology of foetus, factors that affect foetal growth

L. NERVOUS SYSTEM E/S/VS [20 hours]

i. Introduction to nervous system.
ii. Neural tissue –
    a. Neuron

b. Neuroglia

iii. Classification of nerve fibers.
iv. Properties of nerve fibers
v. Degeneration and regeneration of nerve fibers.
vi. Receptors
vii. Synapse
viii. Neurotransmitters
ix. Reflex activity
x. Spinal cord
xi. Pathways in spinal cord – ascending and descending tracts
xii. Physiology of pain
xiii. Brain stem
xiv. Thalamus
xv. Internal capsule
xvi. Hypothalamus.
xvii. Basal ganglia
xviii. Cerebral cortex
xix. Limbic system
xx. Reticular formation
xxi. Proprioceptors
xxii. Muscle tone, posture and equilibrium
xxiii. Vestibular apparatus
xxiv. CSF
xxv. Autonomic nervous system

M. SPECIAL SENSES VS [8 hours]

Vision, audition, olfaction, gustation, vestibular apparatus

Note: **E: Essay S: Short note question VS: Very short note questions**

PRACTICAL DEMONSTRATIONS: - [15 hours]

a. HAEMATOLOGY:

1) Demonstration of packed cell volume
2) Estimation of Haemoglobin by Sahli's method
3) Determination of total RBC count
4) Determination of total WBC count
5) Determination of differential leucocyte count
6) Determination of Blood groups
7) Determination of Bleeding time and clotting time
8) Determination of E.S.R

b. HUMAN EXPERIMENTS

1. Recording of systemic arterial blood pressure and effect of exercise on BP
2. Demonstration of vital capacity measurement and peak expiratory flow rate.
3. Clinical examination of cardio vascular system including arterial pulse
4. Clinical examination of sensory nervous system
5. Clinical examination of motor nervous system and reflexes

6. Examination of light reflexes and hearing tests.
7. Clinical examination of cranial nerves.
8. Clinical examination of colour vision and acuity of vision.

PRACTICAL & VIVA:

Major practical – 15 Marks
Minor practical – 5 Marks
Spotters – 20 Marks
Viva – 30 Marks
Record – 10 Marks
Practical Internal Assessment: 20 marks.

LIST OF PRACTICALS TO BE KEPT FOR PRACTICAL EXAMINATION AND DISTRIBUTION OF MARKS:

MAJOR PRACTICAL MARKS:15

1. RBC Count
2. WBC Count
3. Recording of arterial blood pressure and effect of exercise.
4. Clinical examination of sensory nervous system..
5. Clinical examination of motor nervous system.

MINOR PRACTICAL MARKS:05

1) Clinical examination of reflexes (either 2 superficial or 2 deep reflexes)
2) Hearing tests.
3) Pupillary reflexes

SPOTTERS10 x 2 = 20

1) Focussing one WBC and identification
2) Identification of photographs of endocrine disturbances.
3) P.C.V
4) E.S.R.
5) Ischiara's charts
6) Sneller's Chart
7) Neubauer's counting chamber
8) Knee hammer
9) P.E.Flow meter
10) Theory charts.

References: -

1. Text Book of Human Physiology by Chatterji
2. Human Physiology by Chaudary.
3. Human Physiology by Guyton.
4. Concise Physiology for Under Graduates - Prof. A.K. JAIN.
5. R. Chandra Mouli - Text Book of Physiology.

BIO-CHEMISTRY

Examination at the end of the: I Year **Instruction hours: 80**
Theory marks 80+ Internal Assessment 20

Objectives:-

At the end of the course the student should be able to understand

1. Biochemical and functional organization of the cell and sub cellular organelles.
2. Basic structural, biochemical and functional aspects of bio molecules and their interrelations.
3. Basic and clinical aspects of enzymology.
4. Basic and nutritional aspects of vitamins
5. Basic principles of biological oxidation and bioenergetics.
6. Outlines of digestion and absorption of bio molecules
7. Basic principles of metabolism and overview of important bio molecules, their regulation and integration.
8. Biochemical principles of signal transduction and its role in metabolic integration.
9. Basic principles of fluid, electrolyte and acid – base balance
10. Basic principles of nutrition including minerals.
11. Biochemistry of muscle, connective tissue and muscle contraction.
12. Basic molecular concepts of body defense and homeostasis.
13. Basic biochemistry of diseases involving Neuro musculo skeletal system.
14. Basics of clinical chemistry.

Student need not know the details of structures, formulas, individual chemical reactions and their mechanisms.

1. NUTRITION: E/S/VS [5 hours]

a) Importance of nutrition
b) Calorimetry - energy values, calorimeters, respiratory quotient and its significance, specific dynamic action of food.
c) Basal metabolic rate - definition, normal values, factors affecting B.M.R. food, energy expenditure for various activities.
d) Nutritional aspects of carbohydrates, fat and fibers
e) Nutritional aspects of proteins - essential and non essential amino acids, chemical score, digestibility coefficient, biological value, net protein utilization, nutritional classification of proteins (complete and incomplete), nitrogen balance and its significance.
f) Composition of food, balanced diet, dietary recommendations, nutritional supplementation.
g) Protein - energy malnutrition, Kwashiorkor and Marasmus

2. CARBOHYDRATES: E/S/VS [10 hours]

a) Definition, chemistry, classification, common carbohydrates, their sources and composition.
b) Digestion and absorption of carbohydrates.
c) Glycolysis - aerobic, anaerobic, energetics, regulation, Cori's cycle, Gluconeogenesis.

d) Citric acid cycle and its energetics
e) Glycogenesis, glycogenolysis and their regulation, role of liver and muscle glycogen.
f) Hormonal regulation of blood sugar level.
g) Metabolic disorders of glycogen, lactose intolerance, diabetes mellitus.

3. LIPIDS: E/S/VS [10 hours]
a) Definition, classification of lipids, classification of fatty acids, examples and functions of common lipids, essential fatty acids and their importance.
b) Classification, sources and functions of lipoproteins
c) Digestion and absorption of lipids
d) Beta-oxidation and its energetics, regulation
e) Fatty acid biosynthesis, energetics, regulation
f) Fat metabolism in adipose tissue, lipoprotein lipase, hormone sensitive lipase.
g) Ketone body formation and utilisation
h) Cholesterol and its importance, common hyperlipoproteinemias.

4. PROTEINS: E/S/VS [9 hours]
a) Definitions of proteins and amino acids, classification of amino acids and proteins, essential amino acids, functions of amino acids and proteins
b) Enzymes - definition, coenzymes, factors affecting enzyme activity, regulation of enzyme activity, enzyme inhibition, isoenzymes and clinical significance of enzymes.
c) Digestion and absorption of proteins.
d) Transamination, deamination and urea cycle.
e) Specialised products produced from amino acids – Phenylalanine, Tyrosine, Tryptophan, Arginine, Glycine, Methionine

5. GENETICS: S/VS [6 hours]
Nucleic acids – Functions of DNA and RNA, differences between DNA and RNA Genetic code.

6. VITAMINS: E/S/VS [6 hours]
i. Definition, classification according to solubility
ii. Individual vitamins - sources, coenzyme forms, functions, RDA. Digestion, absorption and transport, deficiency and toxicity.

7. TRACE MINERALS: S/VS [6 hours]
i. Individual minerals – Calcium, Phosphate, Iron, Magnesium, Fluoride, Selenium, Molybdenum, Copper, Zinc, Sources, RDA, Digestion, Absorption, Transport, Excretion, Functions, Disorders.
ii. Phosphate, calcium and iron in detail.

8. MUSCLE CONTRACTION: S/VS [3 hours]
Contractile elements in muscle, process of muscle contraction.

9. CONNECTIVE TISSUE: S/VS [3 hours]
Biochemistry of connective tissue, collagen, glycoproteins, proteoglycans.

10. CELL BIOLOGY: S/VS [5 hours]
Cell membrane structure, mechanism of transport across cell membrane, intracelluar organelles and their functions, briefly cytoskeleton.

11. HORMONE ACTION:S/VS [6 hours]

Classification of hormones and mechanism of hormone action

i. Receptors, signal transduction, second messengers (Ca, cAMP, Inositol Phosphates) and their role in cell function.
ii. Neurotransmitters.

12. ACID - BASE BALANCE, WATER AND ELECTROLYTES:S/VS [7 hours]

i. Body water, osmolarity, extra and intracellular sodium and potassium, regulation of water & electrolyte balance, buffers, pH., buffer systems in the blood.
ii. Role of lungs and kidneys in acid-base balance.

13. CLINICAL BIOCHEMISTRY S/VS [4 hours]

i. Relevance of blood levels of glucose, urea, calcium, phosphates, pH, bicarbonate, enzymes, lipids and lipoproteins.
ii. Urine levels of sugar, creatinine, proteins
iii. Competitive inhibitors, clinically important enzymes.
iv. Liver function tests.
v. Renal function tests.

Note: **E: Essay S: Short note question VS: Very short note questions**

References: -

1. Text Book of Bio-chemistry - Ranganatha Rao
2. Text Book of Medical Bio-chemistry - Chatterjee & Schinde
3. Essentials of Biochemistry – U.Satyanarayana

Non University Exam subjects

	Subject	Instructional hours	Year
1.	Orientation and instruction to treatment	50	I
2.	Visits & Special Lectures	75	I
3.	Administration, Supervision and Ethics	50	I
4.	Fundamentals of Physiotherapy practicals	50	I
5.	Physical Education	75	I

ORIENTATION & INSTRUCTION TO TREATMENT

COURSE DESCRIPTION**:**

This course will introduce the basic pattern of health care delivery, resources, history of medical therapeutics and an overview of physiotherapy profession to the students.

COURSE OBJECTIVE**:**

The objective of this course is that after 50 hours of lecture, the student will be able to understand the pattern of health care delivery, various trends and resources, history & foundation of the physiotherapy profession.

1. Pattern of Health Care Delivery

   - National trends and resources
   - Local trends and resources
   - Overview of physiotherapy profession (Paramedicals)

2. Components of Physiotherapy Profession

   - History of medical therapeutics
   - History of physiotherapy : International, National and Local
   - Professional and governmental licensing, accreditation, and . education standards

3. Role of Physiotherapy in meeting health care needs in India

   - Needs versus demands
   - Physiotherapist as “Educator”
   - Typical job settings
   - Common problems and solutions

VISITS AND SPECIAL LECTURES

COURSE OBJECTIVE**:**

The course will introduce the students to various departments of medical & surgical specialties by periodic visits and special lectures taken by various health care professionals concerned.

COURSE OBJECTIVE:

The course will enable the students to learn the working of various departments, understand the scope & limitations of different medical branches and develop interaction with various health care professionals.

ADMINISTRATION AND SUPERVISION:

COURSE OBJECTIVE:

The course is designed to provide basic management knowledge and skills essential for effective functioning, and to be conversant with planning, organization, work scheduling cost, control of quality in relation to Physiotherapy care and service and also practice moral and ethical values in the profession.

COURSE CONTENTS:

1 Introduction, branches of management, nature and scope of management process.
2. General Principles of Management – Theories of management, principles of health sector management; its application to Physiotherapy.
3. Personal Management – Policies, procedures, basic concepts including performance appraisal.
4. Planning & Organization: Planning cycle, principles of organizational charts, resource and quality management, planning change.
5. Financial issues including budget and income generation
6. Hospital Management: Hospital organization, staffing, information, communication and coordination with other services of hospital, cost services, monitoring and evaluation.
7. Self Management
    - Preparing for first job
    - Time management
    - Career development
8. National Health policy and health care system in India
9. Organization of Physiotherapy department: Planning, space, manpower and other basic resources.

References: -

1. Kulkarni, G.K: Hospital, management, Accounting, Planning and Control
2. FRANCIS C.M: Hospital Administration.

ETHICS

1. History of physiotherapy
2. Ethical principles in health care
3. Ethical principles related to physiotherapy
4. Scope of professional conduct
5. Rules of professional conduct
    a) Physiotherapy as a profession
    b) Relationship with patients
    c) Relationship at health care institution i.e., hospital, clinics, etc.
    d) Relationship with colleagues and peers
    e) Relationship with medical and other professionals
6. Confidentiality and responsibility
7. Malpractice and negligence
8. Provision of services and advertising
9. Sale of Goods: personal and professional standards
10. Legal aspects
    a) Legal responsibility of Physiotherapist for their action in the professional context, understanding liability and obligations in case of medico legal cases.
    b) Consumer Protection Act.

References: -

1. C.M.Francis, Medical Ethics by Jaypee Publications, Bangalore, 1994.
2. George.V.Lobo, Current Problems in Medical Ethics.
3. Consumer Protection Act-1986, Govt. of India, New Delhi.

FUNDAMENTALS OF PHYSIOTHERAPY PRACTICALS

COURSE DESCRITION:

The course will enable the students to know the basic principles and fundamentals to be practiced in the following years of the course.

SYLLABUS:

1. Axes, planes, types of muscle work, angle of pull.
2. Mechanics of forces: Newton's - Laws - Levels - Mechanical advantage of applicances used for exercise therapeutics (including therapeutic gymnasium).
3. Starting positions - stability - base of support.
4. Goniometry
5. Limb length and girth measurements.
6. Reflex testing.
7. Assessment of sensations
8. Chest expansion and respiratory rate measurements.

References: -

1. Joint structure & Functions - Cynthia Norkin.
2. Measurement of Joint Motion - A Guide to Goniometry by – Norkin.
3. Manual Muscle Testing by - Kendal.

PHYSICAL EDUCATION

COURSE DESCRIPTION**:**

The course will teach the students various sports, games & physical fitness.

COURSE OBJECTIVE**:**

The course will encourage the students to participate and to learn the technique of various indoor/outdoor sporting activity and maintenance of physical fitness in his/her personal & professional career.

COURSE DESCRIPTION**:**

The course will enable the students to know the founding principles of the Physiotherapy profession and the administration and the management in the modern age.

SECOND YEAR

PATHOLOGY AND MICROBIOLOGY

Examination at the end of: II year

Instruction Hours: 80 (40+40)

i) Theory 80 marks

(ii) Internal Assessment 20 marks

COURSE DESCRIPTION:

This course follows the basic courses in anatomy and physiology and compliments the course in general medicine & surgery being taught concurrently. Particular effort is made in this course to avoid burdening the student with any detail pertaining to diagnosis which will not contribute to their understanding of the limitations imposed by pathology on the functioning of the individual.

COURSE OBJECTIVES:

The objective of this course is that after 80 hours of lectures, demonstrations, practicals and clinics the student will be able to demonstrate an understanding of the pathology and microbiology of common diseases that therapists would encounter in their daily practice. The course will also help therapists understand how to protect themselves and their patients from nosocomial infections during their interactions.

PATHOLOGY

Instruction Hours: 40

COURSE OUTLINE:

1. Introduction: Concepts of disease, classification. [1 hour]
2. Bacterial, viral and parasitic infections - a general outline. [3 hours]
3. Inflammation and repair; Degeneration, necrosis and gangrene. [3 hours]
4. Haemorrhage, shock, embolism, thrombosis [3 hours]
5. Tuberculosis, Leprosy, Typhoid [4 hours]
6. Deficiency diseases. [1 hour]
7. Tumours: Aetiology & spread. Common tumours. [2 hours]
8. Blood: Anaemia, Heart and blood vessels, common congenital anomalies, Rheumatic & coronary heart diseases. [4 hours]
9. Respiratory system: Pneumonias, Bronchiectasis, Emphysema, Chronic bronchitis, Asthma. [2 hours]
10. Bone and joints: Autoimmune diseases, septic arthritis, Osteomyelitis. [4 hours]
11. Skin: Leprosy [2 hours]

12. Urinary system [2 hours]

13. Central nervous system: CNS infections, vascular disorders. [3 hours]

14. Rheumatoid Arthritis. [1 hour]

15. Scleroderma and Psoriasis [1 hour]

16. Diseases of muscle including Poliomyelitis, Myopathies [3 hours]

17. Volkmann's Ischaemia [1 hour]

MICROBIOLOGY

Instruction Hours: 40

I. General Microbiology: [9 hours]

a. History

b. Classification of Micro Organisms, morphology of Bacteria, Viruses and Fungi.

c. Important virulence factors of Bacteria

d. Sterilization and Disinfection

e. Anti bacterial, antifungal and antiviral agents.

f. Infection types, Source, transmission, spread.

II. Fundamentals of immunology : [5 hours]

a. Innate and Acquired Immunity

b. Antigen, Antibody

c. Immune Response

d. Hypersensitivity Reactions

III. Pathogenesis, Disease spectrum, management and prevention of : (Emphasis on Bacterial and Viral infections) [26 hours]

a. Respiratory tract infections:

b. CNS infections: Meningitis, Encephalitis, Poliomyelitis

c. GIT infections: (with additional emphasis on important parasitic diseases, Hepatitis viruses)

d. Genitourinary infections: Urinary tract infections, Sexually transmitted infections

e. Tuberculosis and Leprosy

f. Wound infections and anaerobic infections

g. Blood stream infections

h. Hospital acquired infections: Types, causes and prevention

References: -

1. Text Book of Microbiology - Anantanarayan

2. Text Book of Pathology - Robbins.

3. Text Book of Pathology - William Boyd.

4. Essentials of Medical Microbiology - Rajesh Bhatia - Rattan Lal Icchpujani.

5. Text Book of Microbiology - Baweja

EXERCISE THERAPY

Examination at the end of : II year **Instruction hours: 330**
i) Theory 80 marks + IA 20 marks
ii) Practical 60 marks
iii) Oral 20 marks + Practical IA 20 marks

COURSE DESCRIPTION**:**

In this course the student will learn the principles, technique and effect of exercise as a therapeutic modality in the restroration of physical function.

COURSE OBJECTIVES:

The objective of this course is that after 330 hours of lectures, demonstrations, practicals and clinics the student will be able to list the indications and contraindications of various types of exercise therapy, demonstrate the different techniques and describe their effects.

COURSE OUTLINE:

I. MECHANICS: [15 hours]

Define the following terms and describe the principles involved with suitable examples.

i. Force: Composition of force, Parallelogram of forces.

ii. Equilibrium: Stable, unstable, neutral.

iii. Gravity: Centre of gravity, Line of gravity.

iv. Levers: 1st , 2nd and 3rd order. Their examples in the human body and their practical application in physiotherapy, Forces applied to the body levers.

v. Pulleys: Fixed, Movable

vi. Springs ; Series, Parallel.

vii. Tension.

viii. Elasticity : Hook's law.

ix. Axis: Sagittal, Frontal, Horizontal.

x. Planes: Sagittal, Frontal, Horizontal

xi. Definitions of: Speed, Velocity, Work, Energy, Power, Acceleration, Momentum, Friction and Inertia.

II. MUSCLE ACTION: [9 hours]

i. Muscle work: Isotonic (concentric, eccentric), isometric (static)

ii. Group actions: Agonists (prime movers), antagonists, synergists, fixators

iii. Angle of muscle pull, mechanical efficiency of the muscles.

III. PELVIC TILT: [6 hours]

Describe the following:

i. Normal pelvic tilts, alterations from normal: anterior tilt (forward), posterior tilt (backward) lateral tilt.

ii. Muscles responsible for alterations and pelvic rotation.

iii. Identification of normal pelvic tilts, pelvic rotation and altered tilts and their corrective measures.

IV. STARTING POSITIONS: [18 hours]

Describe the following starting positions, their muscle work effects and uses. Specify the importance and derived positions for each one.
Standing, kneeling, sitting, lying, hanging.

V. MOVEMENTS: [13 hours]

Explain the following terms with suitable examples:

i. Anatomic movements: Flexion, Extension, Abduction, Inversion, Eversion, Supination, Pronation, Internal rotation, External rotation, Gross flexion, Gross extension, Trunk side flexion.

ii. Surface anatomy of the individual joints.

iii. Rhythm of movement.

iv. Timing of movement.

v. Duration of movement

vi. Classification of movement : Active, Passive.

vii. Effects of exercise : Physiological effects, Therapeutic effects.

viii. List the indications and contraindications of the following and demonstrate the technique for each:

a. *Active movements :* Voluntary (free, active assisted, assisted resisted, resisted), Involuntary (associated, reflex, peristaltic / visceral, cardiac).

b. *Passive movements:* Relaxed passive, mobilizing passive (forced P.M. manipulations, serial manipulations), passive stretching.

VI. RELAXATION: **[12 hours]**

i. Describe: Relaxation, Muscle fatigue, Muscle spasm.

ii. Describe: General causes, signs and symptoms of tension (mental and physical)

iii. Factors contributing to fatigue, types of relaxation (local and general), indications of relaxation, techniques of relaxation.

iv. Breathing exercises - different types

v. Demonstrate the techniques of relaxation (local and general).

VII. PASSIVE MOVEMENTS: [22 hours]

i. Describe the types, techniques, indications and contraindications, physiological effects and passive movements of joints.

ii. Demonstrate passive stretching of following muscles / muscle groups of each upper limit and describe the indications, contraindications, physiological effects, advantages and disadvantages: pectoralis major, biceps brachii, triceps brachii, long flexors of the fingers.

iii. Lower limb: rectus femoris, iliotibial band (tensor fascia lata) gastrocnemius, soleus, hamstrings, hip adductors, iliopsoas.

iv. Neck: Sternocleidomastoid.

VIII. ACTIVE MOVEMENTS: [15 hours]

i. Describe the types, techniques, indications and contra indications, physiological effects, advantages and disadvantages of active movements for the following muscle groups: Shoulder abductors, shoulder forward flexors, Triceps brachii, hip abductors, hip flexors, quadriceps femoris, abdominal muscles, back extensors.

ii. Describe the home programme for strengthening neck muscles and back extensors.

IX. PROGRESSIVE RESISTANCE EXERCISE [15 hours]

i. Describe the following exercises, their advantages and disadvantages and demonstrate the techniques of the following types of PRE's : Fractional System, Macqueen's set system, Mcqueen's power system.

ii. Demonstrate practically each system using : Delorme's boot, dumbells, sand bags in pulleys, powder board and suspension therapy.

X. MUSCLE GRADING: [25 hours]

i. Describe the types of muscle grading, key to muscle grading, techniques of muscle testing.

ii. Demonstrate the skill to grade the individual and group muscles of upper and lower limb, neck and trunk muscles.

XI. GONIOMETRY: **[25 hours]**

i. Describe the normal range of various joints. Describe goniometer, range of measuring systems (180), foot, trunk and head, techniques of goniometer.

ii. Demonstrate measuring of individual joint range using goniometer.

iii. Demonstrate measurement of limb girth (using measuring tape) : arm, forearm, thigh, calf.

XII. RE-EDUCATION OF MUSCLES: **[18 hours]**

i. Describe the term 're-education of muscles' and the techniques, 'spatial summation' and 'temporal summation'.

ii. Demonstrate the various re-education techniques and facilitating methods for various groups of muscles.

iii. Demonstrate the progressive exercises in strengthening by using various applications: (according to their muscle power) Grade-I to Grade-IV.

iv. Functional re-education – Mat exercises.

XIII. SUSPENSION THERAPY: **[15 hours]**

i. Describe the basic principle of simple pendulum and pendular movement.

ii. Describe the type of suspension: Pendular, axial, eccentric fixation (anterior, posterior, medial & lateral).

iii. Explain the indications and technique for each type of suspension.

iv. Demonstrate axial and eccentric fixation for mobilizing, strengthening and re-education of various muscles and joints.

XIV. HYDROTHERAPY: **[12 hours]**

i. Describe Hydrostatic pressure, upward thrust of water buoyancy.

ii. List the indications and contra-indications for hydro therapy.

iii. Describe the dress of patients and the therapist and necessary hydrotherapy equipment.

iv. Types of hydro therapy: Sterile pool contrast bath, whirlpool bath, hubbard tank.

v. Construction of hydrotherapy tank : Design of construction, safety features, cleaning the pool, water heating systems, hygiene of patient and pool.

XV. JOINT MOBILITY: **[20 Hours]**

Describe the following:

i. Joint ranges (outer range, middle range, inner range), individual joint structures, joint movements (anatomic, accessory), causes of joint range limitations, prevention of joint stiffness, positioning (physiological resting position).

ii. Passive range of movement, methods of relaxation, active exercises, manual mobilization techniques.

iii. Forced passive movements : small amplitudes, large amplitudes.

iv. Muscle strengthening techniques (PNF): Hold-relax, slow reversal, rhythmic stabilization, repeated contractions.

v. Accesory movements : Posterior, anterior, superior and inferior glide, traction and approximation.

vi. Indications and contra-indications for mobilisation of individual joints; demonstrate practically the various mobilisation techniques for individual joints and teaching home programme.

XVI. <u>CRUTCH WALKING</u>: [10 hours]

i. Describe the following: Components of a crutch, types of classification of crutches, characters of good crutch, preparing a patient for crutch walking, crutch walking muscles, measurement of crutches (axillary piece, hand piece), crutch stance, crutch palsy, types of crutch walking (4 point, 3 point, 3 point (non-weight bearing and partial weight bearing), modified 3 point (paraplegic and shuffling gait, swing to and swing through)

ii. Demonstrate crutch measurement (sitting, standing and lying positions) and various types of crutch walking (even ground, stairs and ramps).

XVII. <u>POSTURE:</u> [11 hours]

i. Describe the following : Posture (static and dynamic), Definition of good posture, Muscles responsible for good posture. Postural mechanisms, Definition of abnormal posture (Kyphosis, Scoliosis, Lordosis, Kypho-scoliosis, Kypholordosis), Assessment of posture (inspection, Scoliosis, Lordosis, Kypho-scoliosis, Kypholordosis), Assessment of posture (inspection, measurement – length of legs, width of pelvis, plumb line – R.O.M. of trunk in flexion, extension, side flexion and rotation.

ii. Describe and demonstrate postural correction by : Strengthening of muscles, Mobilisation of trunk, Relaxation. Active correction of the deformities, passive correction (traction), postural awareness, abdominals and back extensors.

iii. Outline principles in bracing of the trunk and surgical correction.

iv. Demonstrate practically : Identification of abnormal posture, and postural corrective measures.

XVIII. <u>GAIT:</u> [18 hours]

i. Define gait and center of gravity of the human body.

ii. Describe muscles responsible for normal gait, six determinants of gait (pelvic rotation, pelvic tilt, hip flexion, lateral displacement of pelvis, knee flexion, in stance phase, normal foot pattern during walking).

iii. Describe the walking cycle : Stance (heel strike, foot flat, mid stance, and foot off), Swing (acceleration, mid swing and deacceleration).

iv. Describe the following pathological gaits : Gluteus medius Gait, Gluteus maximus gait, Hip flexor weakness gait, Quardriceps weakness gait, Foot drop gait,

hemiplegic gait, Ataxic waddling gait, Equinus gait, Calcaneus gait, Equinovarus gait.

v. Demonstrate skill in identifying pathological gait and proper gait training.

XIX. COORDINATION: [12 hours]

i. Define balance (static and dynamic)

ii. Explain the mechanism of neuromuscular co-ordination.

iii. Describe the incoordination due to : Lower motor neuron lesions (flaccidity) Upper motor neuron lesions (spasticity) Cerebellar lesions, Loss of kinaesthetic sense (tabes dorsalis, syringomyelia, leprosy), Imbalance due to muscular disease.

iv. Describe re-education of balance.

v. Describe re-education of co-ordination: Frenkels exercises, proprioceptive neuromuscular facilitation (PNF) techniques.

vi. Demonstrate the re-education techniques of balance and coordination.

XX. COMPLICATION OF BED REST: [9 hours]

i. Describe the complications of patients on prolonged bed rest.

ii. Burger's exercises

iii. Demonstrate maintenance exercises for patients on prolonged bed rest.

XXI. Describe briefly: [30 hours]

A. Soft Tissue Manipulation:

i. History of massage.

ii. Mechanical points to be considered

iii. Points to be considered while giving massage

a. Manipulations.

b. The time of the day for treatment.

c. The comfort and support of the patient (draping and positioning)

d. Position of operator (therapist's stance)

e. Using body weight

f. Contact and continuity

g. Techniques, indications and contra – indications.

iv. Physiological effects of massage on various systems of body. Effects on: Excretory system, Circulatory system, Muscular system, Nervous system & Metabolic system.

B. Define and describe the various manipulation techniques used in massage.

1. Stroking manipulation: Effleurage, stroking
2. Pressure manipulations: Kneading, squeezing, stationary, circular ironing (reinforced kneading), finger kneading, petrissage (picking up, wringing, rolling), frictions.
3. Percussion manipulation: tapotement, hacking, clapping, beating & pounding.
4. Shaking manipulations: vibration, shaking.

C. Define and describe the technique, effects, uses and contra-indications of the following manipulations:

1. Stroking manipulations.
2. Pressure manipulations.
3. Percussion manipulations.
4. Shaking manipulations.

D. Demonstrate the following techniques on patients / models:

i. Massage for upper limb:

a. Scapular region

b. Shoulder joint

c. Upper arm

d. Elbow joint

e. Forearm

f. Wrist joint

g. Hand.

ii. Massage for lower limb:

a. Thigh

b. Knee joint

c. Leg

d. Foot (including ankle joints and toes)

iii. Massage for back:

a. Neck and upper back

b. Middle and lower back

c. Gluteal region, arm & leg.

iv. Massage for the face

References: -

1. Principles of Exercise Therapy – Dena Gardener.
2. Practical Exercise Therapy – Hollis.
3. Therapeutic Exercise foundation & techniques – Kisner.
4. Muscle testing and function - F.Kendal.
5. Muscle testing - Danial & Worthinghams.
6. Measurement of joint motion – a guide to Goniometry - Cynthia Norkin.
7. Therapeutic Exercise foundation and techniques - Carolyn Kisner.
8. Text Book of Therapeutic Exercise - S. Lakshmi Narayana.
9. Fundamentals of Physiotherapy - Kumar
10. Principle of Exercise Testing and Interpretation - Kalrlman Wasswerman.
11. Exercise Therapy - Prevention and Treatment of disease - John Gormly.
12. Manual of massage and measurement – Edith. M.Prosser.
13. Massage for therapists – Margaret Hollis.
14. Principal and practice of Therapeutic Massage - Akhoury Gourang Sinha.
15. Hand book of Clinical Massage - Mario - Paul – Cassar.

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BIOMECHANICS & APPLIED ANATOMY

Examination at the end of: II year **Instruction hours: 80**
i) Theory 80 marks
ii) Internal Assessment 20 marks.

COURSE DESCRIPTION:

This course supplements the knowledge of anatomy and enables the student to have a better understanding of the principles of biomechanics and their application in musculoskeletal function and dysfunction.

COURSE OBJECTIVES:

The objectives of this course are that after 80 hours of lectures, demonstrations and practicals the student will be able to demonstrate an understanding of the principles of Biomechanics and Kinesiology and their application in health and disease.

COURSE OUTLINE:

A. MECHANICS: [6 hours]

1. Describe the types of motion, planes of motion, direction of motion and quantity of motion.
2. Define forces, force vectors, components of forces.
3. Describe gravity, segmental centers of gravity, center of gravity of the human body, stability and center of gravity, relocation of the center of gravity.
4. Describe Reaction forces, Newton's law of reaction.
5. Describe equilibrium – Law of inertia and establishing equilibrium of an object.
6. Describe objects in motion: Law of acceleration, joint distraction in a linear force system and force of friction.
7. Describe concurrent force system: Composition of forces, Muscle action lines, total muscle force vector, divergent muscle pulls, anatomic pulleys.
8. Describe parallel force systems: - First class levers, second class levers, third class levers, torque, mechanical advantage.
9. Define moment arm: Moment arm of a muscle force, moment arm of gravity and anatomic pulleys.
10. Describe equilibrium of lever.

Describe the following:

1. Three types of motion.
2. The plane in which a given joint motion occurs and the axis around which the motion occurs.
3. The location of the center of gravity of a solid object, the location of the center of gravity of a segmental object and the location of the center of the gravity of the human body.

4. The action line of a single muscle.
5. The name, point of application, direction and magnitude of any interforce given its reaction force.
6. A linear force system, a concurrent force system, a parallel force system.
7. The relationship between torque, moment arm and rotatory force component.
8. The methods of determining torque for the same given set of forces.
9. How anatomic pulleys may change action line, moment arm and torque of muscles passing through them.
10. In general terms, the point in the joint range of motion at which the muscle acting over that joint is biomechanically most efficient.
11. How external forces can be manipulated to maximize torque.
12. Friction and its relationship to contacting surfaces and to the applied forces.

Determine the following:

1. The identity (name) of diagrammed forces on an object.
2. The new center of gravity of an object when segments are rearranged, given the original centers of gravity
3. The resultant vector in a linear force system, a concurrent force system and a parallel force system, if a given object is in linear or rotational equilibrium.
4. The magnitude and direction of acceleration of an object not in equilibrium.
5. Which forces are joint distraction forces and which are joint compression forces. What are the equilibrium forces for each?
6. The magnitude and direction of friction in a given problem.
7. The class of term in a given problem.

Compare the following:

1. Mechanical advantage in a second and third class lever.
2. Work done by muscles in a second and third class lever.
3. Stability of an object in two given situations in which location of the center of gravity and the base of support of the object.

Learn the following:

1. The action line of a muscle.
2. The rotary force component, the translatory force component and the moment arm for a given force on a lever.

B. JOINT STRUCTURE AND FUNCTION: [3 hours]

1. Describe the basic principles of joint design and a human joint.
2. Describe the tissues present in human joints including dense fibrous tissue, bone, cartilage and connective tissue.

3. Classify joints, synarthrosis, amphiarthrosis, diarthrosis, subclassification of synovial joints.
4. Describe joint function, kinermatic chains, range of motion.
5. Describe the general effects of injury and disease.

Recall the following:

1. The elementary principles of joint design.
2. The three main classifications of joints.
3. The five features common to all diarthrodial joints.
4. Types of materials used in human joint construction.
5. Properties of connective tissue.

Identify the following:

1. The axis of motion for any given motion at a specific joint (knee, hip, metacarpophalangeal).
2. The plane of motion for any given motion at a specific joint (shoulder, interphalangeal, wrist).
3. The degree of freedom at any given joint.
4. The distinguishing features of a diarthrodial joint.
5. The structures that contribute to joint stability.

Compare the following:

1. A synarthrosis with an amphiarthrosis on the basis of methods, materials and function.
2. A synarthrosis with a diarthrosis on the basis of methods, material and function.
3. Closed kinematic chain with an open kinematic chain.
4. Dense fibrous tissue with bone.
5. Hyaline cartilage with fibrocartilage.

C. MUSCLE STRUCTURE AND FUNCTION: [3 hours]

1. Describe mobility and stability functions of muscles.
2. Describe elements of muscle structure, compositions of muscle fibre, the motor unit, types of muscle fibres, muscle fibre size, arrangement and number, muscle tension, length- tension relationship.
3. Describe types of muscle contraction, speed and angular velocity, applied load, voluntary control, torque & isokinetic exercise.
4. Summarise factors affecting muscle tension.
5. Classify muscles: spurt and shunt muscles, tonic and phasic muscles.
6. Factors affecting muscle function: Type of joint and location of muscle attachment, number of joints, passive insufficiency, sensory receptors.

Describe the following:

1. Ordering of the myofibrils in a sarcomere.
2. An alpha motor neuron.
3. The connective tissue in a muscle.
4. How tension develops in a muscle.
5. Isokinetic exercise.

Define the following:

1. Active and passive insufficiency.
2. Active and passive tension.
3. Concentric, eccentric and isometric contractions.
4. Reverse action.
5. Agonists, antagonists and synergists.

Recall the following:

1. Factors affecting muscle tension.
2. Characteristics of different fibre types.
3. Characteristics of motor units.
4. Factors affecting angular velocity.

Differentiate the following:

1. A spurt from a shunt muscle.
2. A phase from a tonic muscle.
3. Agonist from an antagonist.
4. Active from passive insufficiency.
5. Concentric from eccentric contractions.

Compare the following:

1. Tension development in eccentric versus concentric tractions.
2. The angular velocity of isometric versus concentric & isokinetic contractions.
3. Isokinetic exercise with concentric exercise.

D. TEMPORO MANDIBULAR JOINT: (TMJ) [2 hours]

1. Introduction
2. General features
3. Structure & articulation
4. Function / dysfunction

E. THE VERTEBRAL COLUMN: [8 hours]

1. Articulations, ligaments and muscles, typical vertebra, intervertebral disc.

2. Describe factors affecting stability and motility
3. Regional structure and functions of cervical, dorsal, lumbar and sacral vertebrae.
4. Describe the muscles of the vertebral column – flexors, extensors, rotators and lateral flexors.
5. Describe the effects of injury and developmental deficits.

Describe the following:

1. The curves of the vertebral column using appropriate terminology.
2. The articulations of the vertebral column.
3. The major ligaments of the vertebral column.
4. The structural components of typical and atypical vertebra.
5. The intervertebral disc.
6. Regional characteristics of vertebral structure.
7. Motions of the vertebral column.
8. Lumbar pelvic rhythm.
9. Rotation of the vertebrae in each region.
10. Movements of the ribs during rotation.

Identify the following:

1. Structures that provide stability for the vertebral column.
2. Muscles of the vertebral column and the specific functions of each.
3. Ligaments that limit specific motions (i.e, flexion, extension, lateral flexion, rotation).
4. Forces acting on the vertebral column during specific motion.

Explain the following:

1. The relationship between the intervertebral and facet joints during motions of the vertebral column.
2. The role of the intervertebral disc in stability and mobility.
3. The effects of forces acting on the structural components during motion and at rest.

Analyse the following:

1. The effects of disease process, injury, or other defects in the vertebrae.
2. The effects of an increased lumbosacral angle on the pelvis and lumbar vertebral column.

F. MECHANICS OF RESPIRATION: [3 hours]

1. Describe the work of breathing.
2. Movements of breathing.
3. Respiratory muscles.
4. Compliance of lungs & chest wall.

G. THE SHOULDER COMPLEX: [9 hours]

1. Describe the structural components of the shoulder complex including the articulating surfaces, capsular attachments and ligaments and movements of the following joints:

   i) Sternoclavicular

   ii) Acromioclavicular

   iii) Scapulothoracic

   iv) Glenohumeral.

2. Describe the function of the shoulder complex including dynamic stability of the glenohumeral joint, musculohumeral rhythm, scapulothoracic and glenohumeral contributions.

3. Describe the muscles of elevation (Deltoid, Supraspinatus, Infraspinatus, Teres minor, Subscapularis, Upper Trapezius, lower Trapezius, Serratus anterior, Middle Trapezius & Rhomboids).

4. Describe the muscles of depression, Latissimus dorsi, Pectoralis, Teres Major, Rhomboids).

Describe the following:

1. The articular surface of the joints of the complex.
2. The function of the ligaments of each joint.
3. Accessory joint structures and the function of each.
4. Motions and ranges available at each joint and movement of articular surfaces within the joint.
5. The normal mechanism of dynamic stability of the glenohumeral joint, utilising principles of biomechanics.
6. The normal mechanism of glenohumeral stability in the dependent arm.
7. Scapulohumeral rhythm including contributions of each joint.
8. The extent of dependent or independent function of each joint in scapulohumeral rhythm.
9. How restriction in the range of elevation of the arm may occur.
10. One muscular force couple at a given joint and its function.
11. The effect of a given muscular deficit may have on the function of shoulder complex.

Compare the following:

1. The advantages and disadvantages of coracoacromial arch.
2. The structural stability of the three joints, including the tendency towards degenerative changes and derangement.
3. Draw the action lines of muscles of the shoulder complex and the moment arm for each, and resolve each into components.

H. THE ELBOW COMPLEX: [4 hours]

1. Describe the structure of the Humeroulnar and Humeroradial joints including articulating surfaces, joint capsule, ligaments & muscles.
2. Describe the function of the Humeroulnar and Humeroradial joints including the Axis of motion, Range of motion, Muscle action.
3. Describe the structure of the superior and inferior radioulnar joints.
4. Describe the function of the superior and inferior radioulnar joints.
5. Describe the mobility and stability of the elbow complex and its relationship to hand and wrist.
6. Describe the effects of injury and the resistance to longitudinal compression forces, to distraction forces and to medial-lateral forces.

Describe the following:

1. All of the articulating surfaces associated with each of the following joints: humero-ulnar, humeroradial, superior and inferior radioulnar.
2. The ligaments associated with all the joints of the elbow complex.

Identify the following:

1. Axes of motion for supination and pronation and flexion and extension.
2. The degrees of freedom associated with each of the joints of the elbow complex.
3. Factors limiting the range of motion in flexion and extension.
4. Factors that create the carrying angle.
5. Factors limiting motion in supination and pronation.

Compare the following:

1. The translatory and rotatory components of the brachioradialis and brachialis at all points in the range of motion.
2. The moment arms of the flexors at any point in the range of motion.
3. Muscle activity of the extensors in a closed kinematic chain with activity in an open kinematic chain.
4. The role of pronator teres with role of pronator quadratus.
5. The role of biceps with that of brachialis.
6. The resistance of elbow joint to longitudinal tensile forces with its resistance to compressive forces.

7. The features of a classic tennis elbow with the features of cubital tunnel syndrome.
8. The role of and structure of the annular ligament with the role and structure of the articular disc.

I. THE WRIST AND HAND COMPLEX: [9 hours]

1. Describe the wrist complex including radiocarpal joint, midcarpal joint and the ligaments of the wrist complex.
2. Describe the function of the radiocarpal and midcarpal joints including the movements and muscles involved.
3. Describe the hand complex including: structure of (Carpometacarpal, Metacarpophalangeal and Interphalangeal joints of fingers, ligaments, range of motion.
4. Describe the finger musculature including extrinsic, MCP and intrinsic muscles.
5. Describe the structure of the Carpometacarpal, MCP and IP joints of thumb.
6. Describe the structure of the extrinsic & instrinsic muscles of thumb.
7. Describe prehension, power, cylindrical, spherical & hook grips.
8. Describe precision handling, pad to pad, tip to tip and pad to side prehension and functional position of wrist and hand.

Describe the following:

1. The articular surfaces of the joints of the wrist and hand complexes.
2. The ligaments of the joints of the wrist and hand, including the function of each.
3. Accessory joint structures found in the wrist and hand complex, including the function of each.
4. Types of movements and types of motion of the radiocarpal joint, the midcarpal joint and the total wrist complex.
5. The sequence of joint activity occurring from full wrist flexion to extension including the role of the scaphoid, the sequence of joint activity in radial and ulnar deviation from neutral.
6. The role of the wrist musculature in producing wrist motion.
7. Motions and ranges available to joints of the hand complex.
8. The gliding mechanisms of the extrinsic finger flexors.
9. The structure of the extensor mechanism, including the muscles and ligaments that compose it.
10. How M.C.P. extension occurs, including the muscles that produce and control it.
11. Explain how flexion and extension of the PIP occur, including the muscular and ligamentous forces that produce and control these motions.
12. The role of the wrist in optimizing length tension in the extrinsic hand muscles.
13. The activity of reposition, including the muscles that perform it.
14. The functional position of the wrist and hand.

Differentiate between:

1. The role of the interosseous and lumbrical muscles at the MCP and IP joints.
2. The muscles used in cylindrical grip to those active in spherical grip, hook grip, and lateral prehension.
3. The muscles that are active in pad to pad, tip to tip and pad to side prehension.

Compare:

1. The activity of muscles of the thumb in opposition of the thumb to the index finger with the activity of those active in opposition to the little finger.
2. The characteristics of power grip with those of precision grip.
3. The most easily disrupted form of precision handling caused in some one without any active hand musculature; pre-requisites for each.

J. HIP COMPLEX: [7 hours]

1. Describe the general features of the hip joint including articulating surface of the pelvis & the femur; angulations; angle of torsion; internal architecture of hip and pelvis; joint capsule. Ligaments & muscles (flexors, extensors, one joint extensors, two joint extensors, adductors, rotators and lateral rotators).
2. Describe the function of hip – rotation between pelvis, spine and hip; pelvic motion – anterior and posterior pelvic, lumbar pelvic rhythm, lateral pelvic tilting, pelvic rhythm.
3. Summarize the pelvic motions in the static erect posture.
4. Describe femoral motion.
5. Describe hip stability in erect bilateral stance, sagittal equilibrium and unilateral stance.
6. Describe reduction of forces and abnormalities with weight shifting and cane and deviations from normal in muscular weakness.

Describe the following:

1. The articulating surfaces of the pelvis and femur.
2. The structure and function of the trabecular systems of pelvis and femur.
3. The structure and function of the ligaments of the hip.
4. The angle of inclination and the angle of torsion.
5. The planes and axes of the following pelvic motions and the accompanying motions at the lumbar spine and hip joints, pelvic rotation, and anterior, posterior and lateral tilting of the pelvis.

6. The muscle activity that produces tilting and rotation of the pelvis.
7. Motions of the femur on the pelvis including planes and axes of motion.
8. The structure and function of all the muscles associated with the hip joint.
9. The forces that act on the head of femur.
10. The position of greatest stability at the hip.

Explain the following:

1. How sagittal and frontal plane equilibrium are maintained in erect bilateral stance.
2. How frontal plane equilibrium is achieved in unilateral stance.
3. How force acting on the femoral head may be reduced.
4. How the function of the two joint muscles at the hip are affected by changes in the position of the knee and hip.
5. The functional and structural relationship among the hip, knee, pelvis and lumbar spine.

Compare the following:

1. Forces acting on the femoral head in erect bilateral stance with the forces acting on the head in erect unilateral stance.
2. Coxa valga with coxa vara on the basis of hip stability and mobility.
3. The motions that occur at the hip, pelvis and lumbar spine during forward trunk bending with the motions that occur during anterior and posterior tilting of the pelvis in the erect standing position.
4. Anteroversion with retroversion on the basis of hip stability and mobility.
5. The structure and function of the following muscles : Flexors and extensors, abductors and adductors, lateral and medial rotators.

K. THE KNEE COMPLEX: [9 hours]

1. Describe the structures of the tibiofemoral joint, articulating surfaces on femur and tibia, the menisci, joint capsule and bursae, ligaments and other supporting structures, anterior, posterior, medial and lateral stability muscles involved; knee flexors & extensors : axes of knee complex : mechanical axis, anatomic axis and axis of motion.
2. Describe the functions of the tibiofemoral joint : range of motion: flexion, extension, rotation, abduction, adduction, locking and unlocking; function of menisci and muscle function.
3. Describe the structure of the patellofemoral joint.
4. Describe the function of the patellofemoral joint.
5. Describe the effects of injury and disease of the tibiofemoral and patellofemoral joints.

Describe the following:-

1. The articulating surfaces of tibiofemoral and patellofemoral joints.
2. The joint capsule.
3. The anatomic and mechanical axes of knee.
4. Motion of the femoral condyles during flexion and extension in a closed kinematic chain.
5. Motion of the tibia in flexion and extension in an open kinematic chain.

DRAW:

1. The Q angle when given an illustration of the lower extremity.
2. Moment arm of quadriceps at the following degrees of knee flexion : 90, 130, 30 and 10.
3. The action lines of vastus lateralis and the vastus medialis oblique.

Locate:

1. The origins and insertions of the muscles at the knee.
2. The bursae surrounding the knee.
3. The attachments of the ligaments of the medial and lateral compartments.

Identify:

1. Structures that contribute to the medial stability of the knee including dynamic and static stabilizers.
2. Structures that contribute to the lateral stability of the knee including dynamic and static stabilizers.
3. Structure that contribute to the posterior stability of the knee including dynamic and static stabilizers.
4. Structures that contribute to the anterior stability of the knee including dynamic and static stabilizers.
5. Structures that contribute to the rotatory stability of knee.
6. The normal forces acting on the knee.

Compare:

1. The similarities and dissimilarities in structure and function of knee and elbow joints.
2. The lateral with the medial meniscus on the basis of structure and function.
3. The forces on the patellofemoral joint in full flexion with full extension.
4. The action of quadriceps in an open kinematic chain with that in a close kinematic chain.

5. The effectiveness of the hamstrings as knee flexors in each of the following hip positions:- hyperextension, ten degrees of flexion and full flexion (open kinematic chain)
6. The effectiveness of the rectus femoris as a knee extensor at sixty degrees of knee flexion with its effectiveness at ten degrees of knee flexion.

Explain:

1. The functions of the menisci.
2. How a tear of the medial collateral ligament may affect joint function.
3. The functions of the suprapatellar, gastrocnemius, infrapatellar and prepatellor bursae.
4. Why the semiflexed position of the knee is the least painful position.
5. Why the knee may be more susceptible to injury than the hip joint.

L. THE ANKLE FOOT COMPLEX: [9 hours]

1. Describe the structure, ligaments, axis and function of the following : ankle joint, tibiofibular joints, subtalar joints, Talocalcaneonavicular joints, transverse tarsal joint. Tarsometatarsal joint, Plantar arches, metatarsophalangeal joints, Interphalangeal joints.

2. Describe the terminology unique to the ankle foot complex, including inversion, eversion, pronation, supination, dorsiflexion, plantar flexion, flexion, extension, adduction and abduction.

Describe:

1. The compound articulations of the ankle, subtalar, talocalcaneonavicular, transverse tarsal and tarsometatarsal joint.
2. The role of the tibiofibular joints and supporting ligaments.
3. The degrees of freedom and range of motion available at the joints of the ankle and the foot.
4. The significant ligaments that support the ankle, subtalar and transverse tarsal joints.
5. The triplanar nature of ankle joint motion.
6. The articular movements that occur in the weight-bearing subtalar joint during inversion-eversion.
7. The relationship between tibial rotation and subtalar / talo calcaneonavicular inversion-eversion.
8. The relationship between hind foot inversion – eversion and motility-stability of the transverse tarsal joint.
9. The functions of the tarsometatarsal joints, including when, motion at these joints is called upon.
10. Supination – pronation of the forefoot at the tarsometatarsal joints.

11. Distribution of weight within the foot.
12. The structure and function of the plantar arches including the primary supporting structure.
13. Muscles supplementing plantar arch.
14. The effects of toe extension on the plantar arch.
15. The general function of the extrinsic muscles of ankle & foot.
16. The general function of the intrinsic muscles of foot.

M. POSTURE: [4 hours]

1. Describe the effects of gravity and indicate the location of the gravity line in the sagittal plane in optimal posture.
2. Analyse the posture with respect to the optimal alignment of joints in the antero-posterior and lateral views.

Describe:

1. The position of the hip, knee and ankle joints in optimal erect posture.
2. The position of body's gravity line in optimal erect posture using appropriate points of reference.
3. The effects of gravitational movements on body segments in optimal erect posture.
4. The gravitational movements acting around the vertebral column, pelvis, hip, knee and ankle in optimal erect posture.
5. Muscles and ligamentous structures that counterbalance gravitational movements in optimal erect posture.
6. The following postural deviations: Pes planus, hallux valgus, pes cavus, idiopathic scoliosis, kyphosis and lordosis.
7. The effects of above postural deviations on the body structures i.e., ligaments, joints and muscles.

Determine :

1. How changes in the location of the body's gravity line will effect gravitational movements acting around specified joint axes.
2. How changes in the alignment of body segments will affect either the magnitude or the deviation of the gravitational movement.
3. How changes in alignment will affect supporting structures such as ligaments, joint capsules, muscles, and joint surfaces.

N. GAIT: [4 hours]

Define :

1. The stance, swing and double support phases of gait.
2. The time and distance parameters of gait.

Describe:

1. Joint motion at the hip, knee and ankle for one extremity during a gait cycle.
2. The location of line of gravity in relation to the hip, knee and ankle during the stance phases of gait.
3. The gravitational movements of force acting at the hip, knee and ankle during the stance phase.

Explain :

1. Muscle activity at the hip, knee and ankle throughout the gait cycle, including why and when a particular muscle is active and the type of contraction required.
2. The role of each of the determinants of gait.
3. The muscle activity that occurs in the upper extremity and trunk.

Compare :

1. Motion of upper extremities and trunk with motion of pelvis and lower extremities.
2. The traditional gait terminology with the new terminology.
3. Normal gait with a gait in which there is a weakness of the hip extensors and abductors.
4. Normal gait with a gait in which there is unequal length of leg.

References: -

1. Text Book of Biomechanics – Cynthia Norkin.
2. The Physiology of the joints (Volume I, II, III) - I A Kapandji.
3. Clinical Kinesiology and Anatomy - Lynn. S. Lippert.

ELECTROTHERAPY
(LOW AND MEDIUM FREQUENCY)

Examination at the end of 2nd Year ***Instruction hours: - 200***

I 1. Theory internal – 20 Marks
2. Theory examination – 80 marks

II. 1. Practical internal - 20 Marks
2. Practical examination – 60 Marks
3. Orals - 20 Marks

PART – I
BASIC PHYSICS

A. STATIC ELECTRICITY [8 hours]

1. Structure of matter
2. Structure of atom
3. Theories of electricity
4. Production of electrical charge
5. Characters of charged body
6. Potential and capacity

B. CURRENT ELECTRICITY [8 hours]

1. Electric current
2. Resistances: series and parallel
3. Regulation of intensity
4. Electrical energy and power
5. Thermal effect and electric current

C. CHEMICAL EFFECTS OF CURRENTS [8 hours]

1. Ions and compounds
2. Behavior of metals in solution
3. Production of EMF
4. Cells in series and parallel

D. MAGNETISM AND METERS [8 hours]

1. Nature of magnets
2. Magnetic effect of an electric current
3. Moving coil milliammeter
4. Volt meter

E. ELECTROMAGNETIC INDUCTION [8 hours]

1. Principles
2. Static transformers

F. CONDENSER [8 hours]

1. Potential and capacity
2. Capacitor and construction
3. Electric field

G. MAIN SUPPLY [8 hours]

1. Production
2. Wiring of houses

PART – II
LOW FREQUENCY

A. DC FOR TREATMENT [8 hours]

1. Cell battery
2. Rectification of AC
3. DC for treatment
4. Care of apparatus
5. Surging

B. FARADIC AND SINUSOIDAL APPARATUS [4 hours]

1. Faradic current and coils
2. Sinusoidal currents

C. ELECTRIC SHOCK [6 hours]

1. Causes
2. Earth shock
3. Burns- electrical, chemical
4. Preventions and management.

D. ELECTRICAL STIMULATION OF NERVE AND MUSCLE [10 hours]

1. Muscle contraction
2. Duration of stimulus
3. Frequency

E. FARADIC AND SINUSOIDAL CURRENTS [12 hours]

1. Physiological and therapeutic effects
2. Technique
3. Methods of application

F. MODIFIED DC [12 hours]

1. Modification of DC
2. Therapeutic effects
3. Methods and techniques

G. ELECTRICAL REACTIONS [12 hours]

1. Changes in electrical reactions
2. FG test
3. SD curve
4. EMG, NCV

H. CONSTANT DC [8 hours]

1. Therapeutic effects
2. Cathodal and anodal galvanism
3. Technique

I. IONISATION [8 hours]

1. Theories

2. Effects
3. Techniques
4. Surgical ionization.

J. ELECTRO ANALGESIA [20 hours]

1. Pain – definition
2. Acute / chronic pain
3. Theories of pain: specificity, summation, pattern theories.
4. Pain gate mechanism
5. Descending pain suppression mechanism
6. TENS
7. Types of TENS
8. Parameters
9. Dosage
10. Indications
11. Contraindications
12. Dangers

PART – III
MEDIUM FREQUENCY

A. Types of Medium frequency currents and characteristics of different medium frequency currents (amplitude, duration and frequency) [20 hours]

B. Interferential Therapy [24 hours]

1. Introduction
2. Principles
3. Physiological effects
4. Indications
5. Contraindications
6. Dosage
7. Methods of applications
8. Dangers

References: -

1. Electrotherapy Explained – Joseph Kahn.
2. Clayton's Electrotherapy.
3. Eletrotherapy Explained - Low and Reed
4. Basics of Electrotherapy - Subhash Khatri
5. Electrotherapy - S. Kitchen.

ELECTROTHERAPY – HIGH FREQUENCY

Examinations at the end of 2nd Year **** Instruction hours: - 200***

I. 1. Theory internal – 20 Marks
2. Theory examination – 80 marks
II. 1. Practical internal - 20 Marks
2. Practical examination – 60 Marks
3. Orals - 20 Marks

PART – I

BASIC PHYSICS: [1 hour]

A. Define electricity : Discuss its properties briefly.

1. Describe the 2 types of electricity – static, current.
2. Cell battery, electrical energy and power

B. Magnetism; Discuss briefly : [2 hours]

1. Nature-molecular theory
2. Magnetic effect of an electric current
3. Properties

C. Define electromagnetic induction. Discuss: [2 hours]

1. EMF
2. Principles of Dynamo
3. Principles, construction & types of transformers
4. Choke coil.

D. Condensers. Define and discuss: [2 hours]

1. Principles
2. Measurement
3. Factors determining capacity
4. Construction
5. Field between condensers
6. Charging and discharging
7. Discharge through inductance & capacitive resistance.

E. Rectifiers [2 hours]

1. Types of rectifiers
   - Valve rectifiers - diode valve, triode valve – construction, function
   - Metal rectifiers – construction & function of rectifiers
2. Types of rectification – half wave & full wave rectification
3. Smoothening circuit

F. Explain with diagram the working and use of the fuse and grid, switch and reversal switch [2 hours]

G. Discuss the various devices used in regulating intensity of current. – rheostat and potential divider [1 hour]

H. Define oscillation. What is "capacitance" and "inductance" ? [1 hour]

Give an example of an oscillating system:

1. What is the frequency of oscillation and how is it calculated in brief?
2. What do you mean by damping of oscillation?
3. How does transfer of energy between 2 circuits take place?

I. Physics of heat & Radiation [2 hours]

1. Heat & temperature
2. Physical effects of heat
3. Transmission of heat
4. Radiant energy
5. Electromagnetic spectrum
6. Laws governing radiations
7. Reflectors
8. Inverse square law

PART – II

HIGH FREQUENCY:

I. SHORT WAVE DIATHERMY: [30 hours]

A. PROPERTIES OF H.F. CURRENTS

1. Sustained and unsustained.
2. Damped and undamped
3. Impedance
4. Define Nodes and Antinodes. Explain, with examples, the fields set up etc.
5. Define wavelength.

B. TYPES OF HIGH FREQUENCY CURRENTS (IN BRIEF)

C. PRODUCTION OF H.F. CURRENTS ;

1. Principles
2. Construction of apparatus with diagram.
3. Tuning of machine.
4. Regulation of current.

D. METHODS:

1. Condenser field
2. Cable method.
3. Effects of 2 fields.

E. PHYSIOLOGICAL AND THERAPEUTIC EFFECTS OF S.W.D.

F.TECHNIQUE OF APPLICATION :

1. Testing machine.
2. Preparation of patient.
3. Types of electrodes
4. Position and size of electrodes
5. Selection of electrode - electro static field & electro magnetic field
6. Electro static field – spacing need & types

   Apposition

   Size of electrode

   Application
7. Electro magnetic field – Cable method of applications
8. Dosage

G. PULSED ELECTROMAGNETIC ENERGY [1 hour]

H. DANGERS AND PRECAUTIONS.

I. INDICATIONS AND CONTRA-INDICATIONS.

II. MICROWAVE DIATHERAMY (M.W.): [10 hours]

A. 1. PRODUCTION – EXPLAIN WITH DIAGRAM

2. Explain how the magnetron works within.

3. Application of M.W.

4. Physiological effects

5. Therapeutic effects.

B. TECHNIQUE OF APPLICATION – DOSAGE (IN DETAIL)

C. INDICATIONS & CONTRA – INDICATIONS.

D. DANGERS.

PART – III

ACTINOTHERAPY

I. INFRA RED RAYS: [15 hours]

A. 1. I.R. WAVE LENGTH AND FREQUENCY.

2. Types of generators and their working.
3. Physiological effects.
4. Therapeutic effects and uses.

B. TECHNIQUE OF IRRADIATION.

1. Choice of apparatus
2. Preparation of patient
3. Arrangement of lamp
4. Application of treatment
5. Duration and frequency.

C. BRIEFLY DISCUSS DANGERS

D. INDICATIONS & CONTRA – INDICATIONS.

E. THERAPEUTIC USES – ITS PHYSIOLOGICAL EFFECTS.

II. ULTRA VIOLET RADIATION: [30 hours]

A. PHYSICS

1. Electric arc
2. Process of ionization.
3. Transmission of current through gases.
4. Types of lamps

B CONSTRUCTION OF LAMPS

1. High pressure mercury vapour lamps
2. Kromayer lamp
3. Tridymite formation.
4. Cooling
5. Spectrum – mercury vapour lamp (in brief)
6. Fluorescent tube for U.V. Production.
7. PUVA apparatus
8. Care of lamp

C. PHYSIOLOGICAL AND THERAPEUTIC EFFECTS – IN DETAIL; PHOTO-SENSITIZATION – IN BRIEF

D INDICATION, CONTRA INDICATION AND DANGERS.

E. TECHNIQUE OF APPLICATION ;

1. Test dose
2. Local treatment
3. General irradiation
4. Treatment

F. CONDITIONS (COMMON) IN WHICH ABOVE TREATMENT IS GIVEN

G. SENSITISERS (IN BRIEF)

H. FILTERS

I. COMPARISON BETWEEN I.R. & U.V.

III. LASER: [10 hours]

1. Introduction
2. Characters
3. Production
4. Types
5. Classification
6. Physiological effects
7. Therapeutic effects
8. Principles and techniques of applications
9. Dosage
10. Indications
11. Contraindications

PART – IV

HEAT & COLD THERAPY [20 hours]

A) THERAPEUTIC CONDUCTION HEATING

1. General principles
2. Thermal regulatory mechanism
3. Physiological regulation
4. Physiological effects of local tissue heating
5. Sites of tissue heating
6. Burns
7. Paraffin wax bath
8. Hydrocollator packs
9. Hydrotherapy
10. Heated air treatment
11. Fluido therapy
12. Electric heating pads
13. Physiological & therapeutic effects of superficial heating
14. Indications / contra indications

B) CRYOTHERAPY [20 hours]

1. Physiological changes due to cooling of the skin
2. Therapeutic uses of cold
3. Methods of application
4. Contrasting heat & cold treatment
5. Vapocoolant sprays – cryokinetics & cryostretch
6. Dangers & contra indications

PART – V

ULTRASONIC THERAPY [40 hours]

A. What is U.S. Therapy

B. Explain with the aid of diagram the production of U.S.Waves and Piezo Electric Effect.

C. Three Properties of U.S.Waves in detail

1) Reflection

2) Transmission and

3) Absorption

D. Properties of ultrasonic field / depth of penetration in relation to (a) intensity and (b) frequency.

E. Effects on tissues:

1 Thermal

2 Mechanical

3 Chemical and biological

4 Effects of ultra sound on inflammation & repair process

F Coupling Media

G. Mode of U.S – pulsed and continuous mode.

H. Therapeutic uses of U.S

I. Techniques of application:

1 Method

i. Direct contact

ii Water bath

iii Water bag

2.Dosage in acute and chronic conditions

3. Testing of apparatus.

J. Dangers

K. Indications & contra – indications.

L. Phonophoresis, drugs used in phonophoresis & its application

PART – VI

TRACTION [10 hours]

1. Effects of spinal traction
2. Types
3. Application techniques
4. Indications
5. Adverse effects of spinal traction
6. Contraindications
7. Precautions

References: -

1. Electrotherapy Explained – Joseph Kahn.
2. Clayton's Electrotherapy.
3. Eletrotherapy Explained - Low and Reed.
4. Basics of Electrotherapy - Subhash Khatri.
5. Electrotherapy - S. Kitchen.
6. Physical Agents in Rehabilitation - Michelle Cameroon.

THIRD YEAR

GENERAL MEDICINE, PHARMACOLOGY & PEDIATRICS

PART – A

Examination at the end of: III year **Instruction Hours: 75 + 30 + 50 hours**

Marks: Theory – 40, IA – 10.

GENERAL MEDICINE:

A. INFECTIONS:

Outline the etiology, mode of spread, clinical features, diagnosis, management and prevention of the following infections:

a. Viral – Japanese encephalitis, chikungunya and related viral arthritis, herpes simplex, varicella, Measles, Rubella, hepatitis B, hepatitis C and HIV infections.
b. Bacterial – Hansen's disease and tetanus.
c. Parasitic – Filariasis.

B. HEMATOLOGY:

Outline the etiology, clinical features, diagnosis and management of the following disorders:

a. Iron, folic acid and B12 deficiency anemia.
b. Bleeding and clotting disorders with a special stress on hemophilia.

C. CARDIOVASCULAR DISEASES:

Outline the etiology, clinical features, diagnosis and management of the following disorders:

a. Heart failure.
b. Rheumatic fever.
c. Infective endocarditis.
d. Ischemic heart disease.
e. Hypertension.
f. Congenital heart diseases: ASD, VSD, Fallot's Tetralogy, PDA
g. Pulmonary embolism, deep vein thrombosis, pulmonary infarction.
h. Peripheral vascular diseases.

D. RESPIRATORY DISEASES:

Outline the etiology, clinical features, diagnosis and management of the following disorders:

a. Common conditions like bronchitis, pneumonia, tuberculosis, bronchiectasis, emphysema and lung abscess.
b. Pleural diseases like pleural effusion, empyema, pneumothorax and hydro- pneumothorax.
c. Obstructive airway diseases like bronchial asthma, COPD and cystic fibrosis.
d. Interstitial lung diseases.
e. Occupational lung diseases.
f. Chest wall deformities: funnel chest, pigeon chest, barrel chest, kyphoscoliosis of thoracic spine.

g. Introduction to intensive respiratory care.

E. DISORDERS OF BONE, JOINT AND CONNECTIVE TISSUES:

1. Brief introduction to concepts of autoimmune disease.
2. Define systemic lupus erythematosus, polymyositis, dermatomyositis, polyarteritisnodosa, and scleroderma.
3. Rheumatoid arthritis – Describe etiology, clinical features and complications, drug therapy and non pharmacological therapy.
4. Osteoarthritis – Describe etiology, clinical features and complications and review nonsteroidal anti – inflammatory drugs and steroids.

F. RENAL DISEASES:

1. Define and briefly outline acute and chronic renal failure.
2. Urinary tract infection: pathogenesis. Outline common clinical complications produced by UTI.

G. METABOLIC DISEASES:

Outline the etiology, clinical features, diagnosis and management of the following disorders: Diabetes mellitus, obesity and disorders of calcium metabolism.

H. GERIATRICS:

List diseases commonly encountered in the elderly population and their role in causing disability: hypertension, ischemic heart disease, cerebrovascular accidents, benign prostatic hyperplasia, cataracts, other causes of falling vision, Alzheimer's disease.

References:-

1. Principles and Practice of Medicine – Davidson.
2. Medicine for students and Practitioners – K.Chaudhury.

PHARMACOLOGY

Instruction hours: 30

Introduce the students to basic pharmacology of various common medications used and their effects on patients at rest and during physical activity.

I. General Pharmacology:

a. Terminology (definitions)
b. Routes of drug administration
c. Pharmacokinetics. (brief)
d. Pharmacodynamics
e. Adverse drug effects. (reaction)
f. Treatment of drug poisoning

II. Drug acting on ANS:

a. Cholinergic drugs
b. Anti-cholinergic drugs
c. Adrenergic drugs
d. Anti-adrenergic drugs

III. Drugs acting on peripheral nervous system:

a. Skeletal muscle relaxants
b. Local anesthetics

IV. Drugs acting on CNS:

a. Anesthetics
b. Anti-epileptics
c. Anti-parkinsonism drugs
d. Anti psychotics

V. Drugs acting on respiratory system:

a. Drugs used for cough and asthma

VI. Drugs acting on CVS:

a. Anti hypertensive drugs
b. Anti-anginal and myocardial infarction drugs
c. Drugs used to treat CHF (congestive heart failure)

VII. Drug effects of endocrine system:

a. Growth hormone
b. Thyroid hormone
c. Insulin

d. Corticosteroids

VIII. Chemotherapy:

a. Penicillin
b. Quinolones
c. Anti T.B. drugs
d. Anti leprotics
e. Anti malarial drugs

IX. Others

a. Diuretics
b. Anti emetics

References :

1. Pharmacology for Physiotherapist - K.AshokShenoy& K V Ramesh
2. Text Book Pharmacology for Physiotherapist - PadmajaUday Kumar.
3. Text book of Pharmacology – Tripati.
4. Illustrated Pharmacology – Lippincott.

PAEDIATRICS

Instruction hours: 50

1. Describe the growth and development of a child from birth to 12 years, including physical, social, adaptive development.
2. List the maternal and neonatal factors contributing to high risk pregnancy and the neonate; inherited diseases; maternal infection - viral and bacterial; maternal diseases incidental to pregnancy, such as gestational diabetes, pregnancy-induced hypertension; chronic maternal diseases such as heart disease, renal failure, tuberculosis, diabetes, epilepsy, bleeding in the mother at any trimester.

Appropriate management of high risk pregnancies, prevention of neonatal and postnatal infections, metabolic problems, outline prevention.

3. Briefly describe community programmes: International (WHO), national and local for prevention of poliomyelitis, blindness, deafness, mental retardation and hypothyroidism. Outline the immunization schedule for children.
4. Cerebral Palsy: Define and briefly outline prenatal, perinatal and postnatal etiology, briefly mention pathogenesis, types of cerebral palsy (classification), findings on examination: general examination, examination of C.N.S., musculoskeletal system, respiratory system, gastro intestinal tract and nutritional status.

Briefly outline associated defects: Mental retardation, microcephaly, blindness, hearing and speech impairments, squint and convulsions. Briefly outline treatment and prevention.

5. Muscular dystrophy: outline various forms, modes of inheritance and clinical manifestation; physical findings in relation to disabilities, progression of various forms and prognosis. Describe treatment goals in fatal and nonfatal forms.
6. Spina bifida, meningomyelocele: Outline development; clinical features-lower limbs, bladder and bowel control; complications - U.T.I. & hydrocephalus; medical treatment and surgical treatment.
7. Still's disease: Classification, pathology in brief, physical findings, course & prognosis. Outline treatment, prevention and correction of deformity.
8. Acute C.N.S. infections: Classify (bacterial and viral) and outline the acute illness, C.N.S. sequelae leading to mental retardation, blindness, deafness, speech defect, motor paralysis, bladder and bowel problems, seizure disorder and specific problems such as subdural effusion, hydrocephalus, pressure sores, feeding difficulties.
9. Normal diet of newborn and child: List dietary calories, fat, protein, mineral and vitamin requirement in a normal child and in a child with malnutrition. Classify and outline etiology, findings and treatment of Rickets: Vitamin D deficiency and Vit.D resistant rickets.

10. Lung infections: Outline the clinical finding, complications and medical treatment of bronchiectasis, lung abscess and bronchial asthma.

Reference:

1. Essentials of Pediatrics - O.P.Ghai.
2. Physiotherapy in Pediatrics: Shepherd.

GENERAL SURGERY & OBSTETRICS & GYNECOLOGY

PART – B

Examination at the end of: III year **Instruction Hours: 50 + 20 hours**

Theory Marks: 40 + 10 IA.

COURSE DESCRIPTION:

This course covers relevant aspects of General Surgery, and Gynecology & Obstetrics.

COURSE OBJECTIVES:

The objective of this course is that after 70 hours of lectures & demonstrations, in addition to clinics, the student will be able to demonstrate a general understanding of the diseases that therapists would encounter in their practice. They should have a brief idea of the etiology and pathology, patient's symptoms and resultant functional disability. This would help the candidates to understand the limitations imposed by the diseases on any therapy that may be prescribed.

Particular effort is to be made to avoid over-burdening the student with clinical signs and diagnostic methods except in certain specific diseases such as rheumatoid arthritis, other diseases of bones and joints, diseases of respiratory, cardiovascular and nervous systems requiring specific attention of physiotherapist.

Broad outline of goals of pharmacological and surgical therapy should be given in those diseases in which physical therapy will be an important component of overall treatment.

GENERAL SURGERY & PLASTIC SURGERY

Examination at the end of: III year **Instruction Hours: 50**

1. Describe abdominal surgical incisions.
2. Outline the post operative complications in: Nephrectomy, Appendicectomy, Herniorrhaphy, mastectomy, Thyroidectomy, Colostomy, Adrenalectomy, Cystectomy, Hysterectomy, prostatectomy, Cholecystectomy, Ileostomy.
3. Classify burns by depth and surface area; outline the causes, medical management and precautions in the acute stage.
4. List the potential deformities due to burns, methods of prevention and precautions. Mention cosmetic and functional treatment measures.
5. Outline the plastic surgery procedures and management in rehabilitation of burns, including splinting methods for common deformities and prevention of burns contractures.

References: -

1. Essentials of Surgery - S.B.Agarwal.
2. Burn Care - David N Hemdon.
3. Text book of general surgical conditions: Cash.

OBSTETRICS & GYNAECOLOGY

Examination at the end of: III year **Instruction Hours: 20**

1. Review the anatomy of the female pelvis and embryonic and fetal development.
2. Outline the physiological skeletal changes during pregnancy, delivery and postpartum period.
3. Describe an antenatal programme in preparation for labour.
4. Outline the mechanism of labour and postnatal management after normal delivery, forceps delivery and caesarian sections.
5. Complications of child birth – outline.
6. Outline the pre-disposing factors of stress incontinence and prolapse uterus.

References:-

1. Physiotherapy in Obstetrics & Gynecology - Polden
2. Text Book of Physiotherapy for Obsteric and Gynecological conditions - G.B. Madhuri
3. Physiotherapy in Obstetric and Gynecology - Jill Mantle.

CLINICAL ORTHOPEDICS

Examination at the end of: III year **Instruction Hours: 125**

Theory: 100 marks (80 + 20 IA)

COURSE DESCRIPTION:

Following the basic science and clinical science courses this course introduces the students to the orthopedic conditions which commonly cause disability. Particular efforts is to be made to avoid burdening the student with any detail pertaining to diagnosis which will not contribute to their understanding of the limitations imposed by orthopedic pathology on the functioning of the individual.

COURSE OBJECTIVES:

The objective of this course is that after 125 hours of lectures & demonstrations in addition to clinics, the student will be able to demonstrate an understanding of orthopedic conditions causing disability and their management.

Course outline

A. INTRODUCTION TO ORTHOPEDICS:

Introduction to orthopedic terminology, common orthopedic diseases dealt with, clinical examination, common investigations.Radiological and imaging technics in orthopedics.

B. PRINCIPLES OF TREATMENT PROCEDURES IN ORTHOPEDICS:

1. Non operative procedures:
    - Splints
    - Tractions

Their indications, usage, limitations.

2. Operative procedures: List indications, contraindications, and briefly Outline the principles of
    - Soft tissue release operations
    - Tendon transfers
    - Osteotomy
    - Arthrodesis
    - Arthroplasty (shoulder, hip and kne specially)
    - Outlines of arthroscopic procedures

C. BASIC KNOWLEDGE OF IMPLANTS:

Wires, pins, nails, rods, plate and screws, external fixators and Illizarov fixator.

D. FRACTURES & DISLOCATIONS:

General Principles.

1. Fractures, dislocations and subluxation – classifications of fractures with respect to etiological fractures, geometry, communication to the environment.
2. General & local signs & symptoms of fractures & dislocations.
3. Outlines of management principles of fractures & dislocations: Reduction procedures – immobilization procedures – plaster of paris application and complications – functional cast bracing – various internal fixations.
4. Outline of prevention & treatment of complications of fractures including fracture disease, Volkmann's ischaemic contracture, Sudeck'sosteodystrophy, avascular necrosis, stiffness of the joints Carpal Tunnel syndrome, myositis ossificans, and shoulder hand syndrome.
5. Fracture healing – Factors influencing fracture healing

E. UPPER LIMB FRACTURES & DISLOCATIONS:

1. Enumerate all major long bond fractures and joint injuries of upper limb.
2. Brief description of the clinical features, principles of management and complications should be limited to the following fractures: Shoulder dislocations, surgical neck of humerus fracture, fracture greater tuberosity, fracture shaft of humerus, supracondylar fracture humerus, elbow dislocations, monteggia fracture, forearm bone fractures, Colles' fracture, scaphoid fractures.

F. LOWER LIMB FRACTURES & DISLOCATIONS:

1. Enumerate all major long bone fractures and joint injuries of lower limb.
2. Brief description of the clinical features, principles of management and complications should be limited to the following fractures. Dislocations of the hip, intracapsular fracture neck of femur, extra capsular fracture neck of femur, fracture shaft of femur, supracondylar fracture femur, fracture patella, condylar fractures of lower end of femur and upper end of tibia, fracture shaft of tibia, ankle fractures, fracture of the calcaneum and fracture of the 5^{th} metatarsal bone.

G. SPINAL FRACTURES AND DISLOCATIONS:

Outline the mechanism, clinical features, principles of management and complications of spinal injuries.

H. HAND INJURIES:

Outline the clinical features, management and complications of: skin and soft tissue injury, tendon injury, bone and joint injury – Bennet's fracture – mallet finger.

I. RECURRENT DISLOCATIONS:

Outline the mechanism, clinical features, principles of management and complications of recurrent dislocation of the shoulder and patella.

J. PERIPHERAL NERVE INJURIES:

Outline the clinical features and management, including reconstructive surgery on:

1. Radial, median and ulnar nerve lesions.
2. Sciatic and lateral popliteal nerve lesions.
3. Brachial plexus injuries including Erb's, Klumpke's crutch palsy.

K. AMPUTATIONS:

1. Classify amputations, list indications for surgery.
2. Outline pre-operative, operative and prosthetic management.
3. Outline prevention and treatment or complications.

L. BONE & JOINT INFECTIONS:

Outline the etiology, clinical features, management and complications of:

- Acute osteomyelitis
- Chronic osteomyelitis
- Septic arthritis
- Tuberculosis of hip, knee and spine

M. BONE & JOINT TUMORS:

General account of classification, clinical features and management of benign and malignant bone tumours. Only general principles are to be gives; study of specific individual bone tumours is not essential.

N. CHRONIC ARTHRITIS:

Outline the pathology, clinical features, mechanism of deformities, management and complications of: Rheumatoid arthritis, Osteoarthritis of major joints and spine, Ankylosingtspondylitis.

O. SPINAL DEFORMITIES:

Classify spinal deformities and outline the salient clinical features, management and complications.

P. POLIOMYELITIS:

Outline the management of residual paralysis including use of orthosis, and principles of muscle transfers.

Q. CONGENITAL DEFORMITIES:

Outline the clinical features and management of CTEV, CDH flat foot, vertical talus, limb deficiency, spina bifida, meningomyelocele and wry neck.

R. EVALUATION OF LOW BACK ACHE:

Aetiological factors of LBA – prolapsed intervertebral dise, spondylitis, spondylolisthesis, lumbar canal stenosis.

S. MISCELLANEOUS CONDITIONS:

Clinical features and management of

Painful are syndrome

Tennis elbow

Plantar fasciitis

T. LEPROSY:

Orthopaedic affections of leprosy which include outlines of clinical features and management of claw hand, foot drop, trophic ulcers.

U. SPORTS INJURIES AND MANAGEMENT:

1. Sprains and Muscle Strains: List common sites of sprains and muscle strains and describe the clinical manifestations and treatment with special reference to ankle, knee and shoulder.
2. Internal derangements of knee Joint: Meniscal injuries and injuries of the cruciate ligaments.

References:-

1. Text book of Orthopedics by Dr.M.Natarajam
2. System of orthopedics by Graham Apley
3. Clinical Orthopedics by Richardson
4. Outline of Orthopedics – Adams
5. Outline of Fractures – Adams.
6. Text book of Orthopedics – John Ebnezar.
7. Orthopedics and fractures – Ronald MC Rae.

PHYSIOTHERAPY IN ORTHOPEDIC CONDITIONS

Examination at the end of: III year **Instruction Hours: 110**

Theory: 100 marks (80 + 20IA)

Practical and viva: 100 marks (Practical 60 + viva 20 + IA 20)

COURSE DESCRIPTION:

This course serves to integrate the knowledge gained by the students in clinical orthopedics with skills gained in exercise therapy, electrotherapy and massage, thus enabling them to apply these in clinical situations of dysfunction due to musculoskeletal pathology.

COURSE OBJECTIVES:

The objectives of this course are that after 110 hours of lectures demonstration, practical's and clinics the student will be able to identify disability due to musculoskeletal dysfunction, assess, evaluate, diagnose, set treatment goals and apply their skills in exercise therapy, electrotherapy and massage in clinical situations to restore musculoskeletal function.

(A) Physiotherapy Assessment of Patient with Orthopedic conditions (Peripheral & vertebral) with relevant special tests.

Describe briefly the general and PT assessment of the vertebral column: Subjective examination history:- occupation, symptoms, major problems;

Objective Examination

1. Observation of body type, musculature, deformity & gait.
2. Palpation – Temperature, swelling, bony prominences, local tenderness.
3. Postural evaluation using a plumb line.
4. Active movements of the vertebral column – flexion, extension, lateral flexion and rotation.

Specific tests: straight leg raising, prone knee bend, passive neck flexion, Kernig's sign.

5. Proximal joints of pelvic and shoulder girdles.
6. Neurological tests for muscle strength, sensation and reflexes.

(B) Principles of interpretation of Physiotherapy orthopedic Examination finding & selection of appropriate physiotherapy techniques.

(C) Principles of Physiotherapy Management in Fractures.

Guidelines of treatment of fracture during immobilization period and mobilization period. Review the mechanism of injury, clinical features, treatment and complications and describe the PT management and home programme for the following injuries:

1. Fracture clavicle, upper 1/3 of humerus, shaft of humerus, supra and inter condylar fractures of the humerus.
2. Fracture head of radius, olecranon process, shafts of radius and ulna, Coll's.

3. Fracture scaphoid, Bennett's and metacarpal, neck
4. Fracture pelvis, neck, trochanter and shaft of femur, supracondylar fracture and injuries of the knee joint & patella.
5. Fracture proximal tibia, both bones of leg, Potts' and Dupuytren's, calcaneum and metatarsal.
6. Dislocation of (a) Hip: congenital, traumatic, posterior & central (b) \ Shoulder: anterior & recurrent (c) Patella.

(D) Specific fractures and dislocations

Physiotherapy assessment & management of upper limb fractures and dislocations, lower limb fractures and dislocations including pelvis and spinal fractures.

(E) Deformities

Review of clinical presentation, investigations, medical & surgical management, Physiotherapy assessment & management for the following conditions.

(1) CTEV
(2) CDH
(3) Torticollis
(4) Scoliosis
(5) Kyphosis
(6) Lordosis
(7) Coxavara
(8) Genu varum
(9) Genu valgum
(10) Genu recurvatum
(11) Pesplanus
(12) Pescavus

(F) Degenerative and inflammatory conditions

Review of clinical presentation, investigations, medical & surgical management, Physiotherapy assessment & management of the following.

(1) Osteoarthritis of knee
(2) Osteoarthritis of hip
(3) Osteoarthritis of hand
(4) Rheumatoid arthritis
(5) Ankylosing spondylitis
(6) Gout
(7) Perthe's disease
(8) Osteoporosis
(9) Hemophilia

(G) Infective conditions –

Review of clinical presentation, investigations, medical & surgical management, Physiotherapy assessment & management for the following.

(1) Osteomyelitis – acute & chronic
(2) Septic arthritis
(3) Pyogenic arthritis
(4) TB spine
(5) TB knee
(6) TB hip

(H) Spinal conditions

Review of clinical presentation, investigations, medical & surgical management, Physiotherapy assessment & management and home program for the following

(1) Cervical spondylosis
(2) Lumbar spondylosis
(3) Spondylolisthesis
(4) Spinal canal stenosis
(5) Spondylosis
(6) IVDP
(7) Coccydynia
(8) Sacro-iliac joint dysfunction
(9) Sacralisation
(10) Lumbarisation

(I) Introduction to Bioengineering –

a. Classification of orthotics & prosthetics.
b. Biomechanical principles of orthotics & prosthetic appliances.
c. Designing of upper extremity & lower extremity prosthesis
d. Indications & contraindications
e. Advantages & disadvantages of orthosis& prosthesis.
f. Checkout of orthosis& prosthesis.
g. Footwear prescription & modifications.

(J) Amputations-

(1) Definition
(2) Types
(3) Levels
(4) Indications
(5) Physiotherapy assessment
(6) Aims

(7) Management: pre &post operative

(8) Physiotherapy with emphasis on stump care & bandaging

(9) Ideal stump

(10) Pre & post prosthetic training

(11) Prosthetic checkout

(12) Pylon

(13) Complications of amputation & their management

(K) Cerebral palsy

Review of clinical presentation, investigations, medical & surgical management, physiotherapy orthopaedic assessment & management for surgically and conservatively managed cases.

(L) Poliomyelitis

Review of clinical presentation, investigations, medical & surgical management, physiotherapy orthopaedic assessment & management prior to and after surgical interventions, reconstructive surgeries with emphasis on tendon transfers. Role of orthotics, floor reaction orthosis (FRO), post polio syndrome.

(M) Leprosy

Review of clinical presentation, investigations, medical & surgical management, physiotherapy orthopaedic assessment & management prior to and after surgical interventions (tendon transfers). Risks of anaesthetic limb and outline its care to prevent complications.

(N) Orthopaedic surgeries

Brief overview of surgical procedure and technique of the following common orthopaedic surgeries such as – open reduction and internal fixation (ORIF), arthroplasty-types, osteotomy, reconstructive surgeries, tendon transplants with emphasis on hand injures, soft tissue release-types, soft tissue repair, arthrodesis, arthoscopy, synovectomy, spinal decompression, spinal stabilization, reattachment of limbs, external fixators. Pre and postoperative PT assessment, goals, precautions and PT management of above mentioned surgeries. Pre and postoperative PT management of common surgeries of shoulder, elbow, forearm, wrist, hand, hip, knee, ankle and foot with emphasis on TKR, THR, and ACL reconstruction surgery protocols.

(O) Sports physiotherapy and soft tissue conditions

Types of injuries to soft tissue (ligaments, muscles, tendons, nerves, capsule, meniscus, bursa etc;), stages of soft tissue healing, treatment guidelines for soft tissue injuries in acute, sub acute and chronic stages. Prevention and rehabilitation of soft tissue injuries.Peri arthritis of shoulder, supraspinatus tendinitis, rotator cuff tendinitis and tear, biceps tendonitis, sub acromion bursitis, lateral epicondylitis, medial epicondylitis, olecranon bursitis, carpal tunnel syndrome, Dupuytren's contracture, de quervains disease, trigger finger, wry neck, piriformis syndrome, iliotibial tract syndrome, knee- ligament and meniscal injuries, quadriceps, hamstring and calf strain,

chondromalacia patella, patellar tendinitis, pre patellar bursitis, ankle sprain, tendo Achilles tendinitis, plantar fasciitis, metatarsalgia, Mortons neuralgia.

Role of physiotherapy in prevention and treatment of sports injuries.

Applied yoga in orthopaedic conditions.Brief outline about epiphyseal injuries.

Practicals

Practicals shall be conducted for all the relevant topics discussed in theory in the following forms.

1. Lab sessions consisting of demonstration and practice of components of orthopaedic physiotherapy assessment and special tests on student models.
2. Lab sessions consisting of demonstration and practice of orthopaedic physiotherapy treatment techniques.
3. Bed side case presentations and case discussions.

References:-

(1) Cash Text book of orthopedics and rheumatology
(2) Tidy's physiotherapy
(3) Text book of orthopedics for physiotherapist – Jayant Joshi.
(4) Sports Medicine – C.S.Jayaprakash.
(5) Text Book of Sports Medicine – Das.
(6) Therapeutic exercise – Kisner
(7) Orthopaedic physical assessment – Magee.
(8) Clinical Orthopedic Rehabilitation – Brent &Brotzman.

CLINICAL NEUROLOGY

Examination at the end of: III year **Instruction Hours: 125**

Theory: 100 marks (80 + 20 IA)

COURSE DESCRIPTION:

Following the basic science and clinical science course, this course introduces the students to the neurological conditions which commonly cause disability. Particular effort is to be made to avoid burdening the student with any detail pertaining to diagnosis which will not contribute to their understanding of the limitations imposed by neurological pathology on the functioning of the individual.

COURSE OBJECTIVES:

The objectives of this course is that after 125 hours of lectures & demonstrations in addition to clinics, the student will be able to demonstrate an understanding of neurological conditions causing disability and their management.

COURSE OUTLINE:

A. NEURO ANATOMY:

Review the basic anatomy of the brain and spinal cord including: blood supply of the brain and spinal cord, anatomy of the visual pathway, connections of the cerebellum and extrapyramidal system, relationship of the spinal nerves to the spinal cord segments. Long tracts of the spinal cord, the brachial and lumbar plexuses, and cranial nerves.

B. NEUROPHYSIOLOGY:

Review in brief the neurophysiological basis of learning, motor control, motor learning: tone and disorders of tone and posture, bladder control, muscle contraction and movement and pain.

C. ASSESSMENT:

Clinical assessment of neurological function to be taught through bedside demonstration of clinics.

1. Basic history taking to determine whether the brain, spinal cord or peripheral nerve is involved.
2. Assessment of higher mental function such as orientation, memory, attention, speech and language.
3. Assessment of cranial nerves.
4. Assessment of motor power.
5. Assessment of sensory function: touch, pain and position.
6. Assessment of tone: spasticity, rigidity and hypotonia.
7. Assessment of cerebellar function.
8. Assessment of higher cortical function – apraxia etc.
9. Assessment of gait abnormalities.
10. Assessment of ADL activity

11. Functional status of individual with neurological dysfunction

D. CLINICAL FEATURES & MANAGEMENT:

Briefly outline the clinical features and management of the following neurological Disorders:

1. Vestibular disorders
2. Congenital and childhood disorders.
    a. Cerebral palsy
    b. Hydrocephalus
    c. Spina bifida.
3. Cerebrovascular accidents.
    a. General classification, thrombotic, embolic, haemorrhagic& inflammatory strokes.
    b. Gross localization and sequelae.
    c. Detailed rehabilitative programme.
4. Trauma – broad localization, first aid and management of sequelae of head injury and spinal cord injury.
5. Diseases of the spinal cord.
    a. Craniovertebral junction anomalies.
    b. Syingomyelia
    c. Cervical and lumbar disc disease.
    d. Tumours
    e. Spinal arachnoiditis
6. Demyelinating diseases (central and peripheral)
    a. Guillian – Barre syndrome
    b. Acute disseminated encephalomyelitis.
    c. Transverse myelitis.
    d. Multiple sclerosis.
7. Degenerative disorders.
    a. Parkinson's disease.
    b. Dementia
8. Infections
    a. Pyogenic meningitis sequelae.
    b. Tuberculous infection of central nervous system.
    c. Poliomyelitis.
9. Diseases of the muscle: classification, signs, symptoms, progression and management.
10. Peripheral nerve disorders.
    a. Peripheral nerve injuries: localization and management
    b. Entrapment neuropathies.
    c. Peripheral neuropathies.

11. Miscellaneous.
    a. Epilepsy; definition, classification and management
    b. Myasthenia Gravis: definition, course and management
    c. Intracranial tumours: broad classification, signs and symptoms.
    d. Motor neuron disease.
    e. Management of unconscious patient
    f. Management of Japanese encephalitis.
    g. Cerebellar lesions – ataxia, friedreich;s hereditary, cerebellar ataxia &tabesdorsalis.
    h. Movement disorders – dystonia, chorea, ballismus, athetosis, tics, myoclonus and wilson's disease.

References:

1. Davidson's principles and practice of medicine.
2. Neuro Anatomy – Inderbir Singh.
3. Clinical Neuro Anatomy – Vishram Singh.
4. Clinical Neuro Physiology – U.K. Misra.
5. Neurological Examination – Robert J. Schwartzman.
6. Neurological Differential Diagnosis – John Patten.
7. ABC of Spinal Cord Injury – David Grundy.

PHYSIOTHERAPY IN NEUROLOGICAL CONDITIONS

Examination at the end of: III year **Instruction Hours: 110**

Theory: 100 marks (80 + 20 IA)

Practical &Viva 100 marks (60 - Practical + 20 - Viva + 20 - IA)

COURSE DESCRIPTION:

This course serves to integrate the knowledge gained by the students in clinical neurology with the skills gained in exercise therapy, electrotherapy and massage, thus enabling them to apply these in clinical situations of dysfunction due to pathology in the nervous system.

COURSE OBJECTIVES:

The objectives of this course is that after 110 hours of lectures, demonstrations practicals and clinics the student will be able to identify disability due to neurological dysfunction, set treatment goals and apply their skills in exercise therapy, electrotherapy and massage in clinical situation to restore neurological function.

COURSE OUTLINE:

A. REVIEW OF NEUROANATOMY AND PHYSIOLOGY:

Review the structure and function of :- a) neuron b) synapse c) supporting tissue; Review the organization and function of : a) cerebral hemispheres b) cerebellum c) spinal cord d) peripheral nerves e) pyramidal system f) extra pyramidal system. Review the factors influencing alpha motor neuron activity. Review the neurological basis of muscle tone and movement and demonstrate the following: a) hypotonia b) hypertonia – spasticity and rigidity c) ataxia d) athetosis e) chorea.

B. PRINCIPLES OF ASSESSMENT:

Review a) skills in history taking b) assessment of higher functions, cortical sensations, cranial nerves, dorsal column sensation and pain and temperature sensations c) assessment of motor function : grading of muscle poer, assessment of range of movement, balance and coordination d) assessment of superficial and deep reflexes e) assessment of reflex maturation in terms of stimulus, position, negative / positive reactions and their significance f) assessment of gait – both normal and abnormal (spastic, ataxic and paralytic patterns). Emphasis should be placed on teaching accurate assessment techniques and various recording methods eg. colourcoding on body charts, graphs etc

C. PRINCIPLES OF TREATMENT:

Review the treatment principles as follows:-

a. Sensory re-education: hypersensitivity, hyposensitivity and anesthesia.
b. Treatment of altered tone: hypertonicity and hypotonicity
c. Motor re-education: strengthening exercises, coordination exercises, joint mobilization exercises, uses of equilibrium and labrynthine system, use of PNF patterns, controlled

sensory stimulation to bias the spindle cell eg. vibration, tactile, ice etc., use of stretch to elicit movement (facilitation), light joint compression (inhibition), use of reflex activity to improve motor function, physiogenic sequence of motor behavior.

d. Treatment to improve functions: free exercises, gait training with and without aids, activities of daily living, mat exercises and exercises and recreation.
e. Review the use of ambulatory aids in neurological conditions: in spastic upper motor neuron lesions, in lower motor neuron lesions, in dorsal column dysfunction and cerebellar dysfunction.
f. Review the use of splints and braces in spastic upper motor neuron and flaccid lower motor neuron lesions in both upper and lower limb.
g. Review the management of chronic pain in neurological conditions with respect to the pain, treatment modalities available, selection criteria for each modality and possible complications.
h. Vestibular rehabilitation
i. General principles and selection of orthoses and assistive devices, training of patients with orthoses in various neurological conditions.

D. CEREBRAL PALSY:

Define cerebral palsy and describe the topographical classification – monoplegia, diplegia, paraplegia, hemiplegia & tetraplegia. Describe types of cerebral palsy; spastic, athetotic, mixed. Identify common associated problems: visual, hearing, speech and intelligence. Assess reflex activity at different levels: cortical, mid brain, brain stem, spinal. Assess developmental milestones from birth to five years. Assess functional ability: Prone to supine (rolling), crawling to sitting quadripod, crawling, kneeling kneel – stand, stand with support and walking. Examine for contractures as follows: hip: flexion, adduction, internal rotation; knee: flexion; ankle: plantar flexion, inversion / eversion; flexion contractures of elbow, wrist & fingers and spinal deformities.

Treatment – Describe and demonstrate the treatment of motor disabilities: passive movement, stretching of soft tissue to tightness, use of ice to reduce spasticity, positioning the child to prevent soft tissue contractures, to inhibit abnormal reflexes and to facilitate rotational movement. Describe and demonstrate techniques of carrying of different types of CP children, encouraging bimanual activities in different starting positions like prone, sitting and standing and activities across the midline. Describe appropriate home programmes for positioning the child, handling them and assisting improvement of function, introduction to treatment techniques: Bobath, Rood.

E. PERIPHERAL NERVE LESIONS:

Identify types of peripheral nerve lesions. Assess the motor system: specific muscles, range of motion, active and passive ranges, muscle girth. Assess sensory system: touch, pain, temperature, parasthesia, nerve regeneration. Assess autonomic function: sweating, skin condition, soft tissue atrophy. Treatment: describe muscle re-education techniques: electrical stimulation (selection of

current); active, assisted, resisted movements; passive education and pain relief by various modalities. Describe the common splints used in peripheral nerve lesions; static, dynamic and functional, muscle transfers: preparation for transfer assessment of muscle power, stretching of soft tissue tightness, Post-operative management: pressure bandaging & muscle re-education after transfer. Describe a home programme.

F. MUSCULAR DYSTROPHY:

Describe stages of the disease: ambulatory, wheel chair and bed stages. Describe significance of exercises - resistive, active and free. Identify and assess common contractures and deformities. Assess range of motion and muscle power. Assess functional ability.

Demonstrate treatment programme for strengthening weak muscles; active movements and hydrotherapy. Increase range of motion by suspension therapy, poder board, passive stretching. Positioning etc. demonstrate gait training with appropriate orthoses. Describe management of chest complications: breathing exercises, chest percussion, drainage of secretions, and assisted coughing.

G. Parkinsonism:

Review the natural history, course and prognosis. Identify and assess problems in posture, sitting, kneeling and standing balance, voluntary and automatic movements, rigidity, tremor and gait. Assess also hearing, speech, fingers, dexterity. Describe disability grading according to Yalu.

Demonstrate treatment: postural awareness and relaxation training, gait training, techniques; associated reactions, heel-toe gait. Overcoming obstacles, start and stop on command, turning and walking backwards, forwards and sidewards. Describe an appropriate home exercise programme.

H. SPINAL CORD LESIONS:

Describe types of spinal cord lesions. Describe signs of tract and root interruptions. Describe positioning of the patient in acute spinal cord injury. Describe assessment of the motor system: tone, power of specific muscles, range of motion and limb girth. Describe the assessment of sensory system and reflexes. Describe assessment of functional ability and balance reactions in appropriate cases. Describe assessment of respiratory function: muscles of respiration, coughing ability and vital capacity. Describe how the level of lesion is ascertained.

Treatment: Describe the stages of immobilization & stage when loading of the spine is allowed. Describe spinal orthosis. Demonstrate motor re-education programs and a program for respiratory care in high level paraplegics and quadriplegics. Demonstrate progressive ambulation, mat exercises, various strengthening programmes, methods of decreasing spasticity and improving sitting balance. Demonstrate various types of paraplegic gaits and re-education in functional activities; transfers and protective falling. Describe common ambulatory aids used in paraplegics and common splints used in tetraplegics. Describe the use of hydrotherapy in paraplegics. Describe the concept of team approach in rehabilitation of these patients.

I. C.V.A. (CEREBRO VASCULAR ACCIDENTS):

Define hemiplegia and identify the following: Sensory disturbance, alteration in tone, loss of selective movement, loss of balance reactions and communication problems.

Treatment: Describe the unilateral and bilateral approaches to treatment. Describe positioning in the supine position, on the affected and on the unaffected side. Demonstrate activities in the recumbent position : arm mobilization, trunk elongation, scapular movement, arm elevation, activities for a recovering arm : activities for the lower limb i.e., hip and knee flexion over the side of the bed, knee extension with dorsiflexion, hip control, isolated knee extension. Mat activities: demonstrate rolling on to affected and unaffected sides, sitting and kneeling. Describe the technique of making a patient sit passively and active assisted sitting. Demonstrate transfer techniques. Describe activities in siting : equal weight transference on both buttocks, shuffling on buttocks, weight transfer through arms balance, reactions of trunk – head. Demonstrate activities in the standing position : standing from plinth, from chair (assisted and independent), weight bearing on affected leg, knee control in standing, weight transfers forwards, backward and side wards, gait training and stair climbing. Describe tilt board activities in the lying and sitting positions. Describe additional methods of stimulation using verbal cues, ice, pressure & tapping. Describe management of shoulder pain and shoulder hand syndrome. Identify and describe a hemiplegic gait, identify synergy components and abnormal reflex activities. Demonstrate re-education of gait: motor re-learning techniques, functional approach and use of orthoses.

J. CEREBELLAR LESIONS:

Identify and assess abnormal tone, decomposition of movement, rapid alternate movements, pleurothotonus, proprioception, dysmetria, posture and gait.

Treatment: Demonstrate exercise for incoordination – Frenkel's and weighted exercise. Demonstrate techniques for re-education of balance and equilibrium reactions by visual compensation. Describe use of appropriate aids for ambulation depending on the severity of affectation – walker, elbow crutches, quadripod walking sticks etc.,

K. POLIOMYELITIS:

Define poliomyelitis and review the stages in the disease, acute recovery and residual paralysis. Describe treatment in the acute state: heat, chest care, positioning. Describe the assessment of a patient in the recovery stage: active and passive range of motion, soft tissue tightness, muscle power & spinal deformities. Demonstrate treatment in the recovery stage: muscle strengthening, progressive resistive exercise: active – assisted, active - resistive exercise. Describe the role of suspension and hydrotherapy. Describe the treatment of soft tissue tightness by passive stretching, auto stretching and positioning. Demonstrate treatment in the stage of residual paralysis, pre-operative assessment of contractures: hip flexion, TEL contracture, knee flexion and foot deformities. Describe also assessment of limb length discrepancy and spinal deformities. Review orthotic aids commonly used in

the management of polio. Describe tendon transfer operations commonly performed. Describe functional retraining for self care, gait training and posture correction.

L. POLYNEUROPATHIES, MULTIPLE SCLEROSIS AND GUILLINA – BARRE SYNDROME.

Evaluation and management of the above condition, history, observation, palpation, motor & sensory examination, reflex testing, differential diagnosis, balance and co-ordination examination, gait analysis, functions analysis.

List of problems and complications, short and long term goals and management of systemic complications and physiotherapy intervention.

M. PT Management in Head injuries and motor neuron diseases.

References:-

1. Cash Text Book of Neurology for Physiotherapy
2. Key issues in Neurological physiotherapy – Ada / canning.
3. Physical Rehabilitation – Assessment and Treatment by Susan B.O's Sullivan Thomas J.Schemitz.
4. Neurological Examination in clinical practice – John Spillane, Bicker staff's
5. Neurological Physiotherapy – Susan Edwards.
6. Steps to follow: The comprehensive treatment of patients with Hemiplegia – Patricia M Davies.
7. Adult hemiplegia – Bobath.
8. Physiotherapy in Neuro conditions – Glady Samuel Raj.
9. Neuromusculo skeletal examination – Nicola J. Petty.
10. Stroke – Hanley.
11. Clinical Evaluation and Management of Spasticity – David A Gelber.
12. Neurological rehabilitation – DancyUmphred.

Non University- exam subjects

Subject	Instructional hours	year
1. Nursing and First Aid	40	III
2. Diagnostic Imaging for Physiotherapist	15	III
3. Emergency Care & BLS	10	III
4. Project work	40	III

1) NURSING AND FIRST AID – 40 HOURS

NURSING

1. What is nursing ? Nursing principles, Inter-Personnel relationships.
2. Vital signs : Observation, reporting and recording temperature, respiration and pulse, simple aseptic technique, sterilization and disinfection.
3. Nursing positions : Supine, Prone, Lateral, dorsal, dorsal recumbent, Flower's positions, comfort measures, rest and sleep.
4. Safety environment : Types of beds, bed making.
5. Lifting and transporting patients : Lifting patients up in the bed. Transferring from bed to wheel chair. "Tranferring from bed to stretcher".
6. Methods of giving nourishment : Feeding, tube feeding, drips, transfusion.
7. Bed side management : Giving and taking bed pan, Urinal, Observation of stools, urine, observation of sputum, understand use and care of catheters, enema giving.
8. Surgical dressing : Observation of dressing procedures.

FIRST AID

1. Importance of first aid in physiotherapy.
2. Examination of vital signs.
3. First aid in cardiac arrest.
4. First aid in respiratory failure.
5. First aid in burns.
6. First aid in electric shock.
7. First aid in drowning.

8. First aid in spinal cord injuries.
9. First aid in hypovolemic shock.
10. First aid in poisioning.
11. Instrumentation used in first aid (First aid kit).
12. First aid in RTA.
13. Indication of CPR .
14. Assessment and technique of CPR.
15. Artificial ventilation.

Recommended Textbooks

1. First aid in emergency – St.John. Ambulance Association.
2. Physiotherapy for burns and reconstruction – Glassey.
3. Surgical and Medical procedures for nurses & paramedical staff – Nathan.
4. First aid & management of general injuries & common ailments – Gupta & Gupta.

2) DIAGNOSTIC IMAGING FOR PHYSIOTHERAPIST – 15 HOURS

SUBJECT DESCRIPTION- This course covers the study of common diagnostic and therapeutic imaging tests. At the end of the course students will be aware of the indications and implications of commonly used diagnostic imaging tests as they pertain to patient's management. The course will cover that how X-Ray, CT, MRI, Ultrasound and Other Medical Images are created and how they help the health professionals to save lives.

1. IMAGE INTERPRETATION
a. History
b. A New Kind of Ray
c. How a Medical Image Helps
d. What Imaging Studies Reveal
e. Radiography (x-rays)
f. Fluoroscopy
g. Computed Tomography (CT)
h. Magnetic Resonance Imaging (MRI)
i. Ultrasound
j. Endoscopy.

2. RADIOGRAPHY AND MAMMOGRAPHY

a. Equipment components
b. Procedures for Radiography & Mammography
c. Benefits versus Risks and Costs
d. Indications and contraindications.

3. FLUOROSCOPY

a. What is Fluoroscopy?
b. Equipment used for fluoroscopy
c. Indications and Contra indications
d. How it helps in diagnosis
e. The Findings in Fluoroscopy
f. Benefits versus Risks and Costs.

4. COMPUTED TOMOGRAPHY (CT)

a. What is Computed Tomography?
b. Equipment used for Computed Tomography
c. Indications and Contra indications
d. How it helps in diagnosis
e. The Findings in Computed Tomography
f. Benefits versus Risks and Costs.

5. MAGNETIC RESONANCE IMAGING (MRI)

a. What is MRI?
b. Equipment used for MRI
c. Indications and Contra indications
d. How it helps in diagnosis
e. The Findings in MRI
f. Benefits versus Risks and Costs
g. Functional MRI.

6. ULTRASOUND

a. What is Ultrasound?
b. Equipment used for Ultrasound
c. Indications and Contra indications d. How it helps in diagnosis
e. The Findings in Ultrasound
f. Benefits versus Risks and Costs.

7. ENDOSCOPY

a. What is Endoscopy?

b. Equipment used for Endoscopy

c. Indications and Contra indications d. How it helps in diagnosis

e. The Findings in Endoscopy

f. Benefits versus Risks and Costs.

8. NUCLEAR MEDICINE

a. What is Nuclear Medicine?

b. Equipment used for Nuclear Medicine

c. Indications and Contra indications d. How it helps in diagnosis.

e. Benefits versus Risks and Costs

3) Emergency Care & BLS: - 10 hours

Basics of emergency care and life support skills - Basic life support (BLS) is the foundation for saving lives following cardiac arrest. Fundamental aspects of BLS include immediate recognition of sudden cardiac arrest (SCA) and activation of the emergency response system, early cardiopulmonary resuscitation (CPR), and rapid defibrillation with an automated external defibrillator (AED). Initial recognition and response to heart attack and stroke are also considered part of BLS. The student is also expected to learn about basic emergency care including first aid and triage. Topics to be covered under the subject are as follows:

a. Vital signs and primary assessment

b. Basic emergency care – first aid and triage

c. Ventilations including use of bag-valve-masks (BVMs)

d. Choking, rescue breathing methods

e. One- and Two-rescuer CPR

f. Using an AED (Automated external defibrillator).

g. Managing an emergency including moving a patient

At the end of this topic, focus should be to teach the students to perform the maneuvers in simulation lab and to test their skills with focus on airways management and chest compressions. At the end of the foundation course, each student should be able to perform and execute/operate on the above mentioned modalities.

FOURTH YEAR

COMMUNITY MEDICINE

Examination at the end of: IV Year

Instruction hours: 150

i) Theory: 80 marks
ii) Internal Assessment 20 marks

COURSE DESCRIPTION:

This course will enable students to understand the effects of the environment and the community dynamics on the health of the individual.

COURSE OBJECTIVES:

The objective of this course is that after 150 hours of lectures, demonstrations, practicals and clinics, the student will be able to demonstrate an understanding of the influence of social and environmental factors on the health of the individual and society.

A. Outline the natural history of diseases and the influence of social, economic and cultural aspects of health and diseases. [8 hours]

B. Outline the various measures of prevention and methods of intervention especially for diseases with disability. [10 hours]

C. Outline the national care delivery system and the public health administration system at central and state level. [9 hours]

D. Outline selected national health programmes. [10 hours]

E. Define occupational health and list methods of prevention of occupational diseases and hazards. [10 hours]

F. Outline the employees state insurance scheme and its benefits. [5 hours]

G. Describe the social security measures for protection from occupational hazards, accidents, diseases, and the workman's compensation Act. [5 hours]

H. Outline the objectives and strategies of the National Family Welfare Programme.

[9 hours]

I. Define community based and institution based rehabilitation. Describe the advantages and disadvantages of institution and community based rehabilitation. [5 hours]

J. Describe the following communicable diseases with reference to reservoir, mode of transmission, route of entry and levels of prevention: a) Poliomyelitis b)Meningitis c) Encephalitis d) Tuberculosis, e) Filariasis, f) Leprosy g) Tetanus & h)Measles.

[18 hours]

K. Describe the epidemiology of rheumatic heart disease, cancer, chronic degenerative disease and cerebrovascular accidents. [8 hours]

L. Outline the influence of nutritional factors such as protein energy malnutrition, anemia, vitamin deficiency and minerals on disability. [7 hours]

M. List the principles of health education, methods of communication and role of health education in rehabilitation services. [7 hours]

N. Define the role of community leaders and health professionals in health education. [7 hours]

O. Outline the role of international health agencies in rehabilitation of the disabled. [7 hours]

P. Hospital waste management: Sources of hospital waste, health hazards, waste management. [7 Hours]

Q. Disaster Management : Natural and man made disasters, disaster impact and response, relief phase, epidemiologic surveillance and disease control, nutrition, rehabilitation, disaster preparedness. [10 hours]

R. Mental Health: Characteristics of a mentally healthy person, types of mental illness, causes of mental ill health, prevention, mental health services, alcohol and drug dependence. emphasis on community aspects of mental health. Role of physiotherapist in mental health problems such as mental retardation. [8 hours]

- **Introduction to Community Medicine:**

History of medicine - evolution of community medicine - medicine in the olden days – different systems of medicine in different parts of world – origin of modern medicine – sanitary awakening – discovery of bacteria, viruses – origin of public health, social & preventive medicine & community medicine – health for all – millennium development goals.

- **Basic Concepts of Health & Disease** : [5 hours]

Definitions – dimensions – determinants - indicators - measurement of health – concepts of well being – standards & levels of living – natural history of diseases – concepts of control & prevention - modes of interventions- health policy & goals.

- **Application of Social and Behavioural Sciences in Community Medicine:**

Humanities in community medicine – medical sociology – social factors in health & disease – families – types of families – role of family in health & disease - acculturation – social health problems - social organizations - organizational behaviour - leadership – delegation – motivation – emotions – group dynamics – group discussions – behaviour change communication – skills of communication – counseling in health & disease – health economics.

- **Demography & Family Welfare Planning**: [3 hours]

Definition – demographic cycle – population explosion - population trends in india and world – census india 2011 – family welfare planning – contraceptives - national family welfare programme – national population policy – gender issues and women's health.

- **Applied Nutrition: [4 hours]**

Nutrients and their requirements – malnutrition among infants & under fives – growth monitoring and nutritional surveillance – nutritional anaemia – vitamin A deficiency – iodine deficiency disorders – food consumption surveys – other nutritional health problems- national nutrition policy – nutrition intervention programmes – prevention of food adulteration - food fortification – food toxins.

- **Environmental Health: [3 hours]**

Concepts of basic sanitation - potable water – water purification standards – endemic fluorosis – disposal of solid and liquid wastes - pollution of air, water, soil etc, - global warming.

- **General Epidemiology & its applications: [7 hours]**

Concepts in epidemiology – epidemiology of communicable and non-communicable diseases – methods of epidemiology – causation & association – epidemiological surveillance of diseases - outbreak investigation.

- **Biostatistics:**

Basic concepts – Gaussian curve - measurement of central tendency and variability – sampling – probability – hypothesis formulation & testing – tests of siginificance – parametric & non-parametric tests – correlation & regression – computers in medicine - life table.

- **Epidemiology of Communicable Diseases: [4 hours]**

Vaccine preventable diseases: measles, pertussis, diphtheria, tuberculosis, tetanus, hepatitis B, poliomyelitis – water-borne diseases: cholera, typhoid, viral hepatites, food poisoning, amoebiasis, ancylostomiasis – vector-borne diseases: malaria, filariasis, dengue, Japanese encephalitis, KFD, chikungunya fever, plague – acute respiratory infections – HIV/AIDS – STD's – tuberculosis – leprosy – SARS- influenza – swine flu – avian flu – zoonotic diseases – rabies – ARBO viral diseases – rickettsial diseases, etc.

- **Epidemiology of Non-Communicable diseases: [3 hours]**

Diabestes – obesity – hypertension – cardiovascular diseases – accidents – blindness – cancers.

- **Maternal & Child Health: [6 hours]**

Preventive obstetrics & paediatrics – antenatal care – intra natal care - post natal care – neo-natal care – post neo-natal care – feeding of children – breast feeding –supplementary feeding – weaning of children - growth monitoring – prevention of child health problems – low birth weight - delivery of MCH services – under fives clinics – MCH clinics - indicators of MCH care – neo-natal mortality – post-neo-natal mortality - perinatal mortality - infant mortality – under five mortality – maternal mortality – juvenile delinquency – congenital malformations.

- **National Health Programmes: [4 hours]**

Revised National TB Control Programme – leprosy eradication programme – anti malaria programme – national filariasis control programme – national vector-borne diseases control programme - reproductive & child health programme – MCH services – integrated child development programme – immunization programme - school health programme – integrated management of neo-natal & childhood illnesses programme – national AIDS control programme – national rural & urban health mission – national mental health programme – national cancer control programme – national programme for prevention of diabetes, cardiovascular diseases and stroke, - national programme for control of

occupational diseases – integrated diseases surveillance project – national water supply and sanitation programme – minimum needs programme – 20 point programme.

- **Occupational Health: [4 hours]**

Introduction – occupational hazards – occupational diseases – pneumoconioses – lead poisoning – occupational cancers – radiation hazards – accidents in industries – sickness absenteeism – health problems due to industrialization – health protection of industrial workers – prevention & control of occupational diseases – legislations: factories act – mines act - ESI act.

- **Health Management and Administration: [4 hours]**

Concepts of health care, medical care, health planning – planning cycle – management methods & techniques - reports of important health & development committees: Bhore, Mudaliar, Jungalwala, Kartar Singh, Srivastava & others – health care delivery in India – primary health centers, sub centers, community health centers, etc.

- **Miscellaneous: [9 hours]**

Rehabilitation – community –based rehabilitation - hospital wastes management - disaster management – geriatric health problems – medical entomology – vector control - medical genetics – research methodology – medical ethics – international Health Regulations – ICD - NGO's – WHO – UNCF – ILO – FAO – WB –CARE – DFID - SIDA , etc.

Practicals/Demonstrations & Field visits:

- Exercises in epidemiology & statistics,
- Models and specimens of communicable diseases,
- Models & specimens of family planning,
- Models & specimens of environmental health,
- Vaccines
- Visit to immunization clinic,
- Visit to ante-natal clinic,
- Visit to DMC of RNTCP,
- Visit to primary health center & sub center,
- Family health studies & diet surveys,
- Visit to water works,
- Visit to milk diary,
- Visit to a factory,
- Visit to ICTC,
- Community-based rehabilitation

- Clinicosocial case studies of TB, malaria, leprosy, acute gastroenteritis, antenatal, postnatal, PEM child, hypertension, diabetes, coronary heart disease, etc.

References: -

1. Prevention & Social Medicine - Park & Park.
2. Review in community medicine - Seshubabu.
3. Hand Book of Preventive and Social Medicine - Vidya Ratan.
4. Essential of community medicine - A Practical Approach. - D A Hiremath.
5. Text Book of community Medicine and community Rehabilitation - Dr. T. Bhaskara Rao.

CLINICAL CARDIO-RESPIRATORY CONDITIONS

Examination at the end of: IV Year

Instruction hours: 125

Marks: Theory 80 + 20 IA.

COURSE DESCRIPTION:

This course introduces the student to the cardio - thoracic conditions which commonly cause disability. Particular effort is to be made to avoid burdening the student with any detail pertaining to diagnosis which will not contribute to their understanding of the limitations imposed by cardio - thoracic pathology on the functioning of the individual**.**

COURSE OBJECTIVES:

The objective of this course is after 125 hours of lectures & demonstrations, in addition to clinics, the student will be able to demonstrate an understanding of cardio - thoracic conditions causing disability and their management.

COURSE OUTLINE:

A. ANATOMY AND PHYSIOLOGY: [25 hours]

1. **Describe in detail the anatomy of the thoracic cage.**
2. **Describe in detail the anatomy of the lungs, bronchi and bronchopulmonary segments.**
3. **Relationship of the bony thorax and the lungs to each other and to the abdominal contents.**
4. **Briefly describe the variations in the bony cage in the following conditions:**
   a. **Cervical ribs: thoracic outlet syndrome**
   b. **Rickets - rickety rosary**
   c. **Depression deformities: pectus excavatum**

d. Protrusion deformities: pectus carinatum (pigeon chest)

e. Scoliosis

f. Kyphosis

g. Rare deformities: sternal clefts, absent sternum, Poland syndrome, fused ribs, absent ribs, Jenune's disease.

5. Describe the movements of the thorax: Bucket handle, pump handle.

6. List the muscles of respirations involved in inspiration and expiration (including accessory muscles of respiration).

7. List the mechanical factors involved in breathing. Describe briefly factors affecting lung compliance and airway resistance.

8. Describe in detail the cough reflex.

9. List the factors affecting diffusion of oxygen and carbon-dioxide in the lungs. Explain ventilation, perfusion and their inter relationship.

10. Describe the physiological control of respiration and highlight the function of the medullary and pontine respiratory centres and central and peripheral chemoreceptors.

11. Pulmonary function assessment: Briefly describe the pulmonary function tests and their use; briefly outline the basis and value of blood gas analysis.

12. Describe in brief the anatomy of the heart and its blood supply and briefly outline the electrical activity or the myocardium and normal ECG.

13. Describe the mechanism for maintenance of blood pressure.

14. Fundamentals of ECG recording and basic interpretation.

15. Briefly describe the principles of Echocardiography: M-mode, Doppler (trans thoracic and trans oesophageal echocardiography)

16. Briefly outline the principles of cardio vascular stress testing.

17. Basics of arrhythmias, syncope and its management.

18. **Principles, indication and methodology of temporary and permanent pacemarker implantation**

19. **Fundamentals of cardiac catheterization: angioplasty, percutaneous balloon mitral valvotomy, pulmonary valvotomy, aortic valvotomy, device closure of patent ductus arteriosus, atrial septal defects, ventricular septal defects.**

20. **Outline the energy expenditure of various common daily activities.**

B. CARDIAC SURGERY: [20 hours]

1. **Introduction to cardiac surgery: define extra cardiac operations, closed intra-cardiac operations and open cardiac operations.**

2. **Principles of cardiopulmonary bypass and its complications. Define hypothermia and deep circulatory arrest.**

3. **Myocardial preservation techniques during cardiopulmonary bypass.**

4. **Principles of left heart bypass (left aorta femoral bypass), femoral bypass, Gotts shunt, minimally access surgery, port access surgery**

5. **Cardiac conditions requiring closed heart surgery:**

   a. Congenital diseases: Patent ductus arteriosus, coarctation of aorta.

   b. Acquired heart diseases: mitral stenosis

6. **Cardiac conditions requiring open heart surgery: briefly describe the pathophysiology, clinical presentations and management of the following conditions:**

   a. **Congenital diseases: atrial septal defect, ventricular septal defects, pulmonary stenosis, tetralogy of Fallot, double outlet right ventricle. transposition of great vessels, AV canal defect.**
   b. **Acquired diseases: mitral stenosis, mitral regurgitation, aortic stenosis, aortic regurgitation, and mixed valvular lesions.**

Coronary artery disease: clinical presentation, pathophysiology and management: PTCA and stenting, off pump coronary artery bypass surgery (OPCAB), on pump coronary artery bypass grafting, minimally invasive direct coronary artery bypass (MIDCAB).

7. **Intra aortic balloon pump: principles, indications, advantages and disadvantages**
8. **Fundamental principles of ventricular assist devices**
9. **Cardiac transplantation**
10. **Principles of robotic surgery in cardiac surgery**

C. THORACIC SURGERY: [30 hours]

1. **Pathophysiology of various forms of chest trauma. Cardiac tamponade.**

2. **Describe very briefly the clinical features and management of the following: simple and multiple rib fractures, flail chest, stove in chest, pneumothorax, hemothorax, hemopneumothorax. Lung contusion, laceration, injury to heart, great vessels and injury to the tracheo-bronchial tree.**

3. **Empyema thoracis: definition, causes, management. Briefly describe intercostals drainage, rib resection, decortication and window operation.**

4. **Pulmonary Tuberculosis: clinical presentation, pathology, and management. List the manifestations of pulmonary tuberculosis and briefly describe tuberculoma, bronchiectasis sicca, bronchostenosis. Clinical presentation of destroyed lung and management. Management of hemoptysis. Define massive hemoptysis and the strategies involved in the management of patients with massive hemoptysis including bronchial artery embolization, cryoablation.**

5. **Outline briefly the clinical features and management of the following suppurative lesions of the lung; bronchiectasis, lung abscess, bronchopneumonia & aspergillosis.**

6. **Outline briefly the clinical features and management of carcinoma lung.**

7. **Outline the extent, use and complications of the following surgical incisions: anterolateral thoracotomy, posterolateral thoracotomy and median sternotomy.**

8. **Describe and define the following and the post-operative management of patients who have undergone wedge resection, segmentectomy, lobectomy, bilobeotomy, pneumonectomy, pleuropneumonectomy & tracheostomy.**

9. **Describe in detail the preopertive assessment and management of a patient posted for thoracotomy.**

10. **One lung anaesthesia: principle, indications and contraindications.**

11. **Video – assisted thoracoscopy surgery: principle, indications, contraindications and advantages.**

12. **Describe the principles of cardio-pulmonary resuscitation, cardiac massage, artifical respiration, defibrillators and their uses.**

13. **Advanced life support system**

D. INTENSIVE CARE: [25 hours]

1. **Outline briefly the principles of various ventilators and their use.**

2. **Tracheostomy: definition, indications, procedure, complications and advantages.**

3. **Describe in detail the following post-operative procedures: management of endotracheal / endonasal tube, tracheal suction.**

4. **Weaning the patient from the ventilator, extubation technique, post extubation care.**

E. MISCELLANEOUS: [20 hours]

1. **Briefly outline the management of a patient after a myocardial infarction.**

2. **Briefly outline the management of a patient with chronic obstructive airway disease.**

F. RECENT ADVANCES: [5 hours]

1. **Transcatheter aortic and mitral valve implantation.**

References: -

1. **Cardiac Rehabilitation by Piyush Jain.**
2. **Davidson's principles & practice of medicine.**
3. **Text book of Heart, Chest & Vascular diseases for Physiotherapist - Patrica Adowine.**

PHYSIOTHERAPY IN

CARDIORESPIRATORY CONDITIONS

Examination at the end of: IV Year

Instruction hours : 110

i) Theory 80 marks

ii) Practical 60 marks

iii) Oral 20 marks.

iv) Internal – Theory : 20

Practical: 20

COURSE DESCRIPTION:

This course serves to integrate the knowledge gained by the students in clinical cardiorespiratory conditions with skills gained in exercise therapy, electrotherapy and massage, thus enabling them to apply these in clinical situations of dysfunction due to cardiorespiratory pathology.

COURSE OBJECTIVES:

The objective of this course is that after 110 hours of lectures, demonstrations, practicals and clinicals the student will be able to identify cardiorespiratory dysfunction, set treatment goals and apply their skills in exercise therapy, electrotherapy and massage in clinical situations to restore cardiorespiratory function.

COURSE OUTLINE:

A. ANATOMY: [5 hours]

1. Cardio vascular system:
   - Mediastinum: divisions and contents

- Pericardium: thoracic wall: position, shape and parts of the heart, conducting system, blood supply and nerve supply of the heart, names of the blood vessels and their distribution in the body, region wise.

2. Respiratory system:
   - Outline of the respiratory passages.
   - Pleura and lungs: position, parts, relations, blood supply and nerve supply.
   - Lungs – emphasis on bronchopulmonary segments and their applied aspects.
   - Diaphragm: origin, insertion, nerve supply and action
   - Intercostal muscles and accessory muscles of respiration: origin, insertion, nerve supply and action.

3. Thorax
   - List the main bones and joints of thoracic cage. Mention the boundaries and contents of thoracic cavity.
   - Analyse pump handle and bucket handle movement of ribs.
   - Surface anatomy of heart and lungs.

B. PHYSIOLOGY: [5 hours]

1. Cardiovascular system:
   - Properties of cardiac muscle, cardiac cycle.
   - ECG, heart sounds, cardiac output.
   - Factors regulating the action of the heart.
   - Blood pressure, its maintenance and regulation.
   - Renal circulation, pulmonary circulation
   - Vascular mechanics
   - Lymph factors affecting its flow.

2. Respiratory system:
   - Defence mechanism in the respiratory tract, mucociliary transport, mechanics of respiration.
   - Transport of blood gases, acid base balance.
   - Neural and chemical regulation of respiration.

C. GENERAL OVERVIEW: ASSESSMENT [10 hours]

– Describe physical assessment in cardio respiratory dysfunction.

1. Inspection: posture (recumbent, erect orthopneic): breathing pattern (rate, rhythm and pattern, use of accessory muscles), chest movement (symmetry, intercostals and diaphragmatic components), chest deformity (barrel chest, pigeon chest); spinal deformity (scoliosis, kyphosis, kyphoscoliosis); sputum (colour, type, volume, consistency); cough (types, productive / non-productive, presence of a normal cough reflex).
2. Palpation: Tactile and vocal fremitus, mobility of cervical and thoracic spine, shoulder girdle, rib cage.
3. Percussion: dullness and hyperresonance.
4. Auscultation: Normal and abnormal breath sounds.
5. Measurement: Chest expansion at different levels (axiliary, nipple, xiphoid); exercise tolerance (six minute walking test).
6. Cardiac dysfunction: evaluation of risk factors, respiratory system evaluation, heart rate rhythm.
7. Physical assessment in post-operative lung and cardiac conditions: surgery details, date, duration, events, types and extent, incision, vitals, drains, pain, ROM, thoracic cavity, neck, shoulder girdle, thoracic spine, chest excursion, air entry, sputum, posture, neurological complications, exercise tolerance.

D. GENERAL OVERVIEW: PHYSICAL TREATMENT: [15 hours]

1. Describe indications, goals and procedure of breathing exercise. Describe diaphragmatic breathing, localized basal expansion, apical expansion, specific segmental exercise raising the resting respiratory level.
2. Describe chest mobilization exercises.

3. Describe relaxation positions for the breathless patient: high side, lying, sitting, relaxed sitting, forward lean, standing, relaxed standing.
4. Describe controlled breathing during walking and during functional activity.
5. Describe exercise for the breathless patient: exercise tolerance testing and exercise programme.
6. Describe the technique of huffing and coughing, forced expiratory technique, vibratory chest shaking and percussion, autogenic drainage, active cycle of breathing, inspiratory muscle training and flutter.
7. Describe techniques of postural drainage, including indications, general precautions and contra indications, preparation of drainage of individual bronchopulmonary segments, modified postural drainage and continuing postural drainage as a home programme.
8. Outline the history of mechanical respiration. Define the following terms a) respirator b) lung ventilator c) resuscitators d) body ventilator e) electrosimulator f) IPPB g) PEEP h) CPAP i) SIMV j) NEEP. Classify ventilators by their cycling control (volume cycling, pressure cycling, time cycling and mixed cycling). Describe the principles of operation of commonly used ventilators and outline the use of the following types: I) bear II) Bennett III) Emerson IV) Bird.

   Outline the principles of aerosol therapy. Describe the physical properties of aerosols and their deposition in the alveoli. Describe the principles of operation of nebulisers.
9. Outline the principles of humidification therapy and methods of correcting humidity deficits. Describe the principles of operation of pass – over humidifiers and bubble – diffusion aerosol therapy. Describe the physical properties of aerosols and their deposition in the alveoli. Describe the principles of operation of nebulisers.
10. Outline the principles of humidification therapy and methods of correcting humidity deficits. Describe the principles of operation of pass – over humidifiers and bubble – diffusion humidifiers.
11. Describe techniques of sterile nasopharyngeal and endotracheal suctioning.

E. PHYSIOTHERAPY IN OBSTRUCTIVE LUNG DISEASES: [10 hours]

1. Assess: Effort of breathing, extent of wheeze, pattern of breathing, sputum production, chest deformity, exercise tolerance (patient's effort tolerance).

2. Identify problems: Decreased outflow due to bronchospasm, anxiety due to difficulty in ventilation, exhaustion due to increased work of disturbed breathing. Increased secretions which are difficult to remove, decreased exercise tolerance.

3. Demonstrate treatment techniques: Relaxation postures and techniques, reassurance and education about disease, controlled breathing, breathing exercise, postural drainage, vibratory shaking, huffing and coughing, graduated exercise programme and posture correction.

F. PHYSIOTHERAPY IN CHEST INFECTIONS: [7 hours]

1. **Assess: Sputum, cough, fever and dysponea.**

2. **Identify problems: Productive cough with risk of hemoptysis, exhaustion due to increased work of breathing, chest deformity, decreased exercise tolerance.**

3. **Demonstrate treatment techniques: Postural drainage with use of adjuncts, percussion, vibration, huffing and coughing to expectorate, mobilizing exercises to thorax and graduated exercise.**

G. PHYSIOTHERAPY IN RESTRICTIVE LUNG DISORDERS: [10 hours]

1. **Assess: Chest expansion at different levels, mobility of thorax and spine, posture (kyphosis or scoliosis) and tests for exercise tolerance (six minute walking test).**

2. **Identify problems: Decreased expansion of lung due to restriction of chest wall movement causing decreased ventilation, defective posture and decreased exercise tolerance.**

3. **Demonstrate treatment techniques: Vigorous mobilizing exercises to thorax and spine, breathing exercise to increase ventilation and drain secretions, exercises for posture correction, graduated exercises to increase tolerance.**

H. PRINCIPLES OF INTENSIVE CARE PHYSIOTHERAPY: [10 hours]

Describe the principles of intensive care therapy.

1. **Demonstrate knowledge of the following equipment: endotracheal tubes, tracheostomy tubes, humidifier, ventilators, high frequency ventilators, differential ventilators, CPAP masks, Suction pump, electrocardiogram, pressure monitors – arterial, central venous, pulmonary artery and pulmonary wedge: intracranial and temperature monitors.**

2. **Assess : Special instructions pertaining to any operation performed, respiration, level of consciousness, colour, blood pressure, pulse, temperature, sputum expectorated (colour and quantity), drugs (time of last dose of analgesic given), drains, presence of pacemaker or intraaortic balloon pump. ECG and blood gas results. Describe chest radiograph with respect to expansion of lungs, size of heart, presence of secretions and placement of chest tubes.**

I. PHYSIOTHERAPY AFTER PULMONARY SURGERY: [10 hours]

Pre operative:

1. **Assess : special instructions pertaining to operative procedure performed, breath sounds, cyanosis, respiratory rate, temperature and pulse, blood pressure, drainage from pleural drain (bubbling or winging), sputum expectorated, analgesia, movements of chest wall (symmetry) position of patient and effort of breathing, chest radiograph and blood gases.**

2. **Identify problems: Pain due to intercostal drain in situ, decreased air entry, retained secretions, decreased movements of the shoulder of affected side, decreased mobility and poor posture.**

3. **Demonstrate treatment techniques: deep breathing and segmental breathing exercises, vibrations, percussions, huffing and coughing, full range active assisted arm exercises, ankle foot exercises, trunk exercises, posture correction, positioning of patient, IPPB inhalations.**

J. PHYSIOTHERAPY AFTER CARDIAC SURGERY: [11 hours]

Pre operative:

1. **Assess patient's medical history, normal breathing pattern of patient, pulse, respiratory rate, BP. Thoracic mobility, posture and patient's exercise tolerance.**

2. **Identify problems: Excess secretions, decreased mobility of thorax, defective posture, decreased exercise tolerance. Demonstrate treatment techniques: Explain to the patients about their operation and about the incision. ICU. Endotracheal tube, central lines, nasogastric tube, catheter, ECG, leads, drains, peripheral lines, temperature probe etc. Teach breathing exercises, slanting of incision, huffing and coughing, correct posture, range of motion, exercises to trunk and shoulder, active exercises to ankle and foot. Post operative: Assess special instructions pertaining to operative procedure performed, type of incision, blood pressure, pulse rate, respiration, colour, time of last analgesic dose, drains, temperature, ECG. chest x-ray and blood gases.**

Post operative:

1. **Identify problems: Pain, decreased air entry, retained secretions, reduced arm and leg movements. Decreased mobility.**

2. **Demonstrate treatment techniques: Deep breathing exercises, suctioning, active / assisted exercises to arm and leg, graduated exercise programme.**

K. PHYSIOTHERAPY IN GENERAL SURGERY: [7 hours]

1. **Assess the patient's medical history, past treatment, breathing pattern, ability to cough and pain.**

2. **Identify problems: Pain, increased secretions. Defective posture and correction and graduated exercise programme.**

3. **Demonstrate treatment techniques: Breathing exercise, huffing and coughing, mobilizing exercise, posture correction and graduated exercise programme.**

K. PHYSIOTHERAPY IN REHABILITATION AFTER MYOCARDIAL INFARCTION: [6 hours]

1. **Describe the role of the physiotherapist in a coronary care unit during the first 48 hours.**

2. **Describe the principles of formulation of an exercise programme, bed exercises, walking, stair climbing.**

3. **Describe a home exercise programme and advise leisure activities.**

4. **Describe physiotherapy for complications after myocardial infarction: chest infection, cerebral embolism and shoulder hand syndrome.**

M. PERIPHERAL VASCULAR DISEASES: [4 hours]

1. **Outline the pathology, distribution and symptoms of atherosclerosis, intermittent claudication, Buerger's disease, Raynaud's disease and arterial embolus.**

2. **Assessment of the above conditions.**

3. **Management of the above conditions.**

References: -

1. **Cash Text for Chest, Heart & Vascular disorders.**
2. **The Brompton guide to chest physiotherapy by D.U.Gasket.**
3. **Text book of Cardiopulmonary rehabilitation - Scott Irwin.**
4. **Cardiopulmonary Physical therapy – Dona frownfelter**
5. **Clinical Physical therapy – Webber & Prayer.**

REHABILITATION MEDICINE

Examination at the end of: IV Year

Instruction hours: 100

Marks: Theory 80 + IA 20

Practicals 60 + Viva 20 + IA 20

COURSE DESCRIPTION:

Following the basic sciences and clinical sciences course, this course will enable the students to understand their role in the management of disability.

COURSE OBJECTIVES:

The objectives of this course are that after 100 hours of lectures & demonstrations, in addition to clinics, the student will be able to demonstrate an understanding of:

A. The concept of team approach in rehabilitation (practical demonstration, with contributions from all members of the team).
B. Diagnostic features in physical conditions (practised through clinical demonstration).
C. Medical and surgical aspects of disabling conditions (explained in relation to rehabilitation).
D. Residual potentials in patients with partial or total disability (temporary or permanent)
E. Appropriate goals (long and short term) in treatment & rehabilitation.

COURSE OUTLINE:

A. INTRODUCTION: [4 hours]

Define the term rehabilitation. Explain its aims and principles.

Discuss team work involved in rehabilitation. Explain briefly the role of each team member.

B. THERAPEUTIC TECHNIQUES: [7 hours]

Explain the theory and mechanism of therapeutic techniques and relevant precautions, for the following:-

1. **Joint mobilization and manipulation**
2. **Reducing spasm.**
3. **Assisting weak muscles.**
4. **Increasing endurance**
5. **Muscle re-education following muscle transfer surgery.**
6. **Strengthening muscles.**
7. **Increasing co-ordination.**
8. **Improving balance.**
9. **Gait training with various assistive aids**

C. COMMUNICATION PROBLEMS: [6 hours]

Identify communication problems, classify these and outline principles of treatment and training.

D. BEHAVIOURAL PROBLEMS: [6 hours]

Identify behavioural problems in the disabled and outline principles of management.

E. PAIN: [4 hours]

Describe the theories of pain and discuss therapeutic management of pain using various modalities.

Describe the common myo-fascial pain syndromes and outline their management.

F. EVALUATION OF PHYSICAL DYSFUNCTION: [8 hours]

Demonstrate methods of evaluation for physical dysfunction & management of disabilities with particular reference to: Spinal cord injury (paraplegia and tetraplegia), poliomyelitis, brain injury, (including stroke and cerebral palsy) arthritic conditions, muscular dystrophy, Hansen's disease, peripheral nerve lesions. Fracture disease & chronic cardio – respiratory dysfunction.

G. ORTHOTIC DEVICES: [5 hours]

Explain the principles involved in prescribing orthotic devices and fabrication for different parts of the body. Outline the purpose of each type and list major indications & contra indications and demonstrate methods of training in their use.

H. PROSTHETIC DEVICES: [6 hours]

Describe types of artificial limb and their functions. Demonstrate methods of pre and post training and their use.

I. MOBILITY AIDS: [7 hours]

Demonstrate knowledge of the indications for different types of mobility aids, and their functions eg. wheelchairs, walkers, crutches.

J. PRE-VOCATIONAL EVALUATION: [4 hours]

Discuss methods and team involvement in pre-vocational evaluation and training.

K. ARCHITECTURAL BARRIERS: [8 hours]

Describe architectural barriers and possible modifications, with reference to rheumatoid arthritis, cerebrovascular accident, spinal cord injury, and other disabling conditions. Parkinson's disease, amputation, muscular dystrophy, cerebral palsy, poliomyelitis, peripheral nerve lesions, Hansen's disease, multiple sclerosis.

L. DISABILITY EVALUATION: [5 hours]

Outline the principles of disability evaluation and discuss its use.

M. LEGAL ASPECTS: [4 hours]

Outline legal aspects of disability, terms of compensation for disability and benefits available to the disabled.

N. SOCIAL IMPLICATIONS: [4 hours]

Outline the social implications of disability for the individual and for the community.

O. COMMUNITY BASED REHABILITATION MODULE: [3 hours]

Describe a CBR module and compare this with an institution based rehabilitation system.

P. GERIATRIC REHABILITATION: [6 hours]

- **Life history**
- **Sociological & technological aspects**
- **The ageing body**
- Theories of ageing : physiological : environmental
- Locomotor system
- Cardio-respiratory system
- Neurological function
- Autonomic function
- Metabolic function
- Approach to the treatment

- Interview
- Examination
- Aims of intervention
- Role of the Physiotherapist.

Q. WOMEN'S HEALTH: **[7 hours]**

Define the role of Physiotherapy in

a. Antenal education
b. Postnatal care
c. Pre & Post operative care in various abdominal and gynecological surgeries.
d. Post menopausal management.

Explain various mechanisms and therapeutic techniques and precautions used in pelvic floor rehabilitation.

1. Electrotherapy
2. Bio feedback
3. Mobilization & manipulation
4. Ergonomic advice

R. PALLIATIVE CARE: **[6 hours]**

1. Define the term palliative care
2. Role of team members in palliative care
3. Explain briefly the role of each team member
4. Palliative care in terminal illness.

References: -

1. Text book of rehabilitation medicine by Sunder.
2. Text Book of rehabilitation medicine by Delisa.
3. Geriatrics Rehabilitation - Tidy's physiotherapy
4. Cash Text Book of General Surgery.
5. Physical Rehabilitation Assessment and treatment - Susan O Sullivan.
6. Physiological basics of Rehabilitation Medicine - Downy and Darlings.
7. Hand Book of Physical Medicine and Rehabilitation - Randall and Broddom.
8. Manual of Physical Medicine and Rehabilitation - Christopher M Brammer.
9. Joan E. Edelstein - Jan Bruckner - Orthotics A comprehensive clinical approach.
10. Physiotherapy in Obstetrics & Gynaecology – Polden.

RESEARCH METHADOLOGY AND BIOSTATISTICS

Examination at the end of: IV Year

Instruction hours: 80

Marks: Theory 80 + IA 20

1. **Introduction to research methodology : meaning of research ,objectives of research ,motivation in research, Types of researches & research approaches, criteria for good research ,problems encountered by researchers in India**

2. **Research problem : statement of research problem ,statement of purpose and objectives of research problem , necessity of defining problem**

3. **Research design : Meaning of research design , Need for research design , features of good research design**

4. **Sampling design: criteria for selecting procedure , Implications for sampling design , stepsin sampling design , different types of sampling designs.**

5. **Measurement & scaling techniques: measurement in research, scales in research sources of error in measurement , technique of developing measurement tools, meaning of scaling & its classification important scaling techniques**

6. **Methods of data collection : collection of primary data , collection of data through questionnaires & schedules , Differences between questionnaires & schedules**

7. **Sampling fundamentals : need for sampling ,& some fundamental definitions , important sampling distributions**

8. **Processing & analysis of data : processing operations , problems in processing , types of analysis , statistics in research , Measures of central tendency , Dispersion , Asymmetry relationship**

9. **Testing of Hypothesis : what is Hypothesis , basic concepts concerning testing of hypothesis ,limitations of testing of hypothesis**

10. **Computer technology: Introduction to computers , computer application in research , computers & researcher**

BIOSTATISTICS:

1. **Introduction : Meaning , definition , characteristics of statistics , importance of 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 : Basic principles of graphical representations , types of diagrams – histograms , frequency polygons , smooth frequency polygon , cumulative frequency curve , non probability curve**

3. **Measure of central tendency : Need for measure of central tendency , definition and calculation of mean - ungrouped & grouped , Meaning of calculation of Mode , comparison of mean , median and mode**

4. **Probability and standard deviation : Meaning of probability of standard distribution , THE BINOMIAL DISTRIBUTION , the normal distribution , divergence from normality – skewness, kurtosis**

BOOKS FOR REFERENCE:

1. **Carolin Hicks Research for Physiotherapy.**
2. **Text book of Biostatistics by SundarRao.**
3. **Text book of Biostatistics and Research methodology by U.Satyanarayana.**

PROJECT WORK

The Project Work is to be taken up by the student in the beginning of the III Year and submitted at the end of IV Year, under the guidance of the Tutor / Assistant Professor concerned.

The objective of the project work is to introduce the students to the concepts of research methodology and literature review and references. The project work also aids the students to gain an in-depth knowledge of the area they have chosen.

The area of the project work taken up by the students should be relevant and should involve appropriate applications to the practice of Physiotherapy.

INTERNSHIP

After successful completion of the final examination every student admitted to Bachelor of Physiotherapy Degree course should undergo 6 months of compulsory rotatatory internship in the following Departments.

Total Internship Hours: 1150 hrs.

1. **Physiotherapy Out-patient Department 1 Month.**
2. **Orthopaedics: 1 Month.**
3. **Neurology & Neuro Surgery 1 Month.**
4. **Cardiology & Cardiothoracic Surgery 1 Month.**
5. **General Medicine & General Surgery 1 Month.**
6. **Community based Rehabilitation / Geriatrics. 1 Month.**

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