

SYLLABUS

ON

DIPLOMA COURSE IN PROSTHETICS & ORTHOTICS

REHABILITATION COUNCIL OF INDIA

(A Statutory Body under the Ministry of Social Justice and Empowerment)

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Diploma in Prosthetics & Orthotics

1 Structure of the Course

1.1 (a) General Objective

The principle objectives of the course is the training of men and women as Prosthetists and Orthotists to meet the growing requirement for, well qualified personnel competent to undertake this very specialized type of work in the country. Prosthetist/ Orthotist is the specialist who in the exercise and pursuit of the art of prosthetics / Orthotics designs, fabricates, and fits prostheses (artificial limbs) and orthoses (Braces, supports, accessories and remedial devices for locomotor handicapped) prescribed by a clinical team headed by a Physical Medicine Specialist / Orthopaedic Surgeon.

(b) Instructional Objective

The instructional objectives of the course is that the course contents and training given in theory and practical work in the subjects and clinical practices offered should enable the Prosthetists/ Orthotists qualified to work with Physicians, Therapists and other professionals in the field of Rehabilitation in the clinical environment. The candidates so trained should be bright, intelligent, clean-cut able to think, solve problems and apply basic principles in their work. Aiming at these objectives the course syllabus include lectures, classroom work and practical demonstration, and practical work in Prosthetic and Orthotic laboratories, during which the students are introduced to Prosthetic and Orthotic shop practices and learn the fundamentals of manufacturing, measuring and fitting of appliances. This is followed by more advanced studies in basic subjects and under direction and supervision and the students design, fabricate and fit prosthetic or orthotic appliances, as the case may be, and attend clinical meeting/conferences, demonstrations and seminars. Coaching in shop management and administration is also given to prepare them to hold such responsibilities.

1.2. Entry requirements

- a. A pass in the Higher Secondary Examination (10+2) in science subject, viz Physics, Chemistry, Biology and/or Mathematics. OR
- b. A pass in the 10+2 in the vocational stream in the trade of machinist or 10+2 and I.T.I. Certificate in the trade of Fitter / Turner / Machinist / Tool or Die Maker.
- c. A pass in the final diploma examinations conducted by the Board of Technical Education of the State Govt. in Mechanical, Electrical/ or Electronics Engineering are also eligible.

A minimum of 50% marks in each of the core subject will be required for admission to the course. In the case of reserved category, this may be relaxed to 45%.

1.3. Length of the course

The course duration is Two Years followed by Internship of Six Months in any recognized Rehabilitation / Limb Fitting Centres.

2. Courses Organization

A General

2.1 A. Teachers:

- a. For teachers taking up lectures on medical subjects, a minimum qualification of M.B.B.S. preferably trained in Physical Medicine & Rehabilitation or in Prosthetics and Orthotics (Short Orientation Course) or an Orthopaedic Surgeon with minimum 3 years experience.
- b. For teachers taking up lectures on Bio-mechanics, Prosthetics and Orthotics a minimum qualification of a graduate in the subject and 2 years experience is preferable. In the absence of such personnel, teachers with diploma in prosthetics and orthotics with outstanding practical and or teaching experience for not less than 5 year will be required.
- c. For practical demonstration in prosthetics / orthotics and supervision, Prosthetists / Orthotists with a diploma and not less than 3 years experience in practical will be required.

2.2 Students–Teacher Ratio

- a. For medical subjects, one full-time or part-time lecturer on each subject for a batch of maximum 20 students is considered adequate.
- b. For theory classes in Bio-mechanics and subjects on prosthetic and orthotics, one lecturer in each subject will be required for a batch of 20 students (max.).
- c. For practical demonstration and supervision and guidance of students in laboratory practices in prosthetics and orthotics, a ratio of teacher versus students should be 1:4 for very close attention of the instructor on each student and patients as well.

2.3 Space and other Facilities

- a. Two lecture halls
- b. One room for clinical meeting
- c. Two fitting rooms (one for men & one for women)
- d. Two measurement room (One for men & one for women)
- e. One plaster cast / modification
- f. One plastic lamination room
- g. One prosthetic laboratory
- h. One orthotic laboratory
- i. One leather shop and surgical shoes section
- j. One office room
- k. One faculty room
- l. One students locker room
- m. One doctor's room
- n. One bio-engineer's room
- o. One store room
- p. One waiting hall for patients
- q. One corridor / verandah for walking practice of patients
- r. One drawing hall with drawing boards & drafting machines
- s. One library room

The above space requirements needed for prosthetic/orthotic training only. Space requirements for hospital treatment physio/occupational therapy and allied departments for rehabilitation and exhibits of models are not included.

2.4 Library Facilities

A well equipped library consisting the students textbooks on Prosthetics, Orthotics, Rehabilitation Medicine, Physiotherapy, Occupational Therapy, Bio-mechanics, Bio-engineering, Bio-electric, electrical, mechanical, electronics, plastics, leather and basic subjects like anatomy, physiology, biology, mathematics, pathology, orthopedics, amputation surgery, medical dictionary, etc. is required for the Institutions which teaches Prosthetics and Orthotics.

A collection of anatomical, physiological charts, articular and disarticular skeleton, audio & visual aids like slides, video films etc. are needed. Audio / Video equipments like slide projector, 16 mm sound projector, overhead projector, epaediastroscope T.V. and V.C.R/ etc. are also required for use as teaching aids. a

Periodicals and journals on prosthetics, orthotics, Rehabilitation Medicine, Bio-engineering etc. are to be kept in the library. (A list of books and periodicals and journals are enclosed in **Appendix-1**).

2.5 Teaching Methods

- a. Theory lectures should be accompanied by notes / précis given to students wherever possible on the subjects covered. Study manuals are to be prepared on each subject and are to be provided to students. Wherever possible visual aids like slides, epaediastroscope, overheads projector etc. are to be used for the students to understand and grasp the subjects better.
- b. Lectures should include practical demonstration, group discussions. For medical subjects, visits to anatomy department / pathological museum / operation theatres in a medical institution are to be arranged for the students to have visual experience and learning.
- c. Practical work in prosthetics / orthotics and clinical practice must be given to the students under experienced faculty members.
- d. “Basic ideas and principles of Instruction” given on page No. 7 may be followed.
- e. Visits to manufacturing unit of prosthetic / orthotic and major limb fitting centers are to be arranged for the students. Field work in rehabilitation including rural and tribal areas may be arranged for the benefit of students to expose themselves in practical rehabilitation work (during their internship).

3. Examinations

A. Preliminary Assessment

Candidates who possess the minimum entry qualifications and applied for undergoing the course will be interviewed by an Entrance Examination Board consisting of a Physician (Ortho. Surgeon or Psychiatrist), a Bio-engineer (Prosthetist / Orthotist), a psychologist or a vocational guidance expert to assess the aptitude, ability and suitability of the students to continue the course. A maximum of 100 marks will be set apart for this assessment. A minimum of 50% marks is necessary for a candidate to admission in this assessment test (45% for reserved category).

A selection will be made strictly on merit on the following basis: -

- a. Percentage of marks (average) in core subjects at the minimum entry qualifying examinations.
- b. Percentage of marks in assessment test by an Examining board.

$$\text{Average percentage for selection for admission} = \frac{A+B}{2}$$

The assessment for SC / ST candidates will be made separately in the same manner as above, and a separate list in the order of merit will be prepared for them and seats will be allotted as per the reserved quota.

B. Final Evaluation

Examinations in theory / practical will be conducted at the end of each semester. Besides, this internal assessment will be made on the candidate's individual performance in project work, group performance, acquisition of knowledge, skill and aptitude for the rehabilitation, educational and management work. Separate marks will be set apart for this internal assessment and will be taken into account in the final evaluation of the candidate for successful completion of the course. Pass marks: aggregate 50% and minimum of 40% in each subject in the final examination which will be conducted by the Examination Board. First Class: 60% and Second Class: 50%.

4. Courses Evaluation

On completion of the first course under the revised syllabus, feedback from each student and teacher will be obtained. After 3 years, one more feedback from such students and teachers are to be taken. A review committee on the curricula consisting of faculty members from various teaching institutions in the country should review the curricula of the course, using the feedback received, for changing and developing the curricula.

Course Outline

a. Study hours available (Approx.)

There would be total of 250 working days in a year consisting of 6 working hours per day.

1st Year

S.No.	Subject	Theory hrs.	Practical hrs.	Exam. hrs.	Total hrs.	Exam Marks
Paper 1.	Life/Basic Science					
	Anatomy	62	30	3	250	200
	Physiology	50	30			
	Pathology	53	22			
Paper 2.	Workshop Technology & Practice	153	-	4	276	200
	Technical Drawing	119				
Paper 3.	Applied Mechanics & Strength of Material	114	-	3	224	100
	Electronics & Bio-Electricity	107				
Paper 4.	Orthopedics, Amputation Surgery	107	-	3	194	200
	Kinesiology & Bio-Mechanics	84				
Paper 5.	Prosthetics U.E.	70	267	3+6 (P)	346	100 (Th) 100 (P)
Paper 6.	Orthotic U.E.	40	114	3+6 (P)	163	100 (Th) 100 (P)
	Total	959	463	31	1453	1100

Th = Theory

P = Practical

Total teaching hours in a year is = 1453

No. of Theory papers = 6

No. of Practical papers = 2

2nd Year

S. No.	Subject	Theory hours	Practical hours	Exam hours	Total hours	Exam marks
Paper 7.	P.M.R. including Intro. to Rehab. & Psy. & Workshop Admn. & Management	182	-	3	185	100
Paper 8.	Prosthetics L.E.	100	383	3+6 (P)	492	100 (Th) 100 (P)
Paper 9.	Orthotic L.E.	75	268	3+6 (P)	352	100 (Th) 100 (P)
Paper 10.	Spinal Orthotic	50	166	3+6 (P)	225	100 (Th) 100 (P)
Paper 11.	Case conference, Educational tour & Dissertation	-	208	6	214	200
	Total	407	1025	33	1468	900

Th = Theory

P = Practical

Total teaching hours in a year	=	1468
Total No. of Theory papers	=	4
Total No. of Practical papers	=	4
Total teaching hours in the course curriculum	=	1453+1468
	=	2921 hours

Detailed Syllabus

Paper-I Life/Basic Science

(250 Hours)

Anatomy

(92 Hours)

S. No.	Topic Breakdown	Theory (Hrs.)	Lab / Field works (Hrs)
1.	Introduction to human body terminology used.	2 Hrs.	-
2.	The skeleton classification of bones, terms used in describing bones	5 Hrs.	3 Hrs.
3.	The skull	1 Hrs.	1 Hrs.
4.	The Thorax	1 Hrs.	1 Hrs.
5.	The Vertebral Coloumn	2 Hrs.	1 Hrs.
6.	The Pelvic girdle	1 Hrs.	1 Hrs.
7.	The skeleton of upper Limb Scapula, Humerus, Ulna, Radius, Bones of wrist & hands	2 Hrs.	-
8.	The skeleton of Lower Extremity. The innominate bone, femur, Patella, Tibia, Febula Bones of the foot.	4 Hrs.	-
9.	The Joint of the Skeleton classification & Types	2 Hrs.	-
10.	Joints of Upper Extremity	1 Hrs.	1 Hrs.
11.	Joints of Lower Extremity, Knee, Ankle & Joints of the foot.	4 Hrs.	1 Hrs.
12.	Myelogy – the muscle of the skeleton, Name of Muscles & their derivation.	3 Hrs.	1 Hrs.
13.	Muscle of the head & face- Position, attachments, action & nerve supply	3 Hrs.	1 Hrs.
14.	Muscle of the neck, Position, attachments, action & nerve supply.	3 Hrs.	1 Hrs.
15.	Muscle of the Chest- Position, attachments, action & nerve supply	3 Hrs.	1 Hrs.
16.	Muscles of the Back - Position, attachments, action & nerve supply	4 Hrs.	2 Hrs.
17.	Abdominal muscles- Position, attachments, action & nerve supply	3 Hrs.	2 Hrs.
18.	Muscle of the Upper Extremity- Position, attachments, action & nerve supply	7 Hrs.	3 Hrs.
19.	Muscles of the Lower Extremity- Position, attachments, action & nerve supply	7 Hrs.	3 Hrs.
20	Anatomical regions formation & contents of Axilla, anticubital fossa, anterior & posterior triangle of neck, femoral triangle, popliteal space	2 Hrs.	2 Hrs.
21	Living anatomy - recognition of structure in living body by inspection & palpation.	2 Hrs.	2 Hrs.
22.	Ability to replace the surface of the living body, the position of the chief structures	-	3 Hrs.
	Total	62 Hrs.	30 Hrs.

Reference Books

1. Gray's Anatomy
2. Gate's Primary Anatomy
3. Anatomy & Physiology for Nurses By V.E. Pearce

Notes

1. Each topic should be taught with Articular skeleton and disarticulated bones- charts also can be used.
2. Manuals for study to be prepared and given to students.
3. For field work, the students are to be taken to Anatomy Department of a Medical College for visit and demonstration to be given.

Physiology

(80 Hours)

S.No	Topic Breakdown	Theory (Hrs.)	Lab / Field work (Hrs)
1.	Introduction to physiology & different systems of the body	1 Hrs.	-
2.	Body fluids, tissue cells, cytoplasm, nucleus, irritability, conductivity, reproduction.	5 Hrs.	1 Hrs.
3.	Elementary tissue of the body & their functions development & growth of bones	6 Hrs.	1 Hrs.
4.	The circulatory system - Heart, Blood vessels attached to it & nerve supply of the heart, cardiac cycle of the heart, cardiac cycle, the heart sounds, the pulse, blood pressure, the cardiac output, circulation of blood throughout body, Principal blood vessels, arteries & veins.	10 Hrs.	5 Hrs.
5.	The blood composition of blood & functions – the coagulation of blood.	4 Hrs.	4 Hrs.
6.	The spleen & the Reticula Endothelial system	1 Hrs.	1 Hrs.
7.	The classification of food	2 Hrs.	2 Hrs.
8.	The digestive system	4 Hrs.	2 Hrs.
9.	The liver & pancreas	2 Hrs.	2 Hrs.
10.	The respiratory system and respiration	3 Hrs.	1 Hrs.
11.	Metabolism	1 Hrs.	1 Hrs.
12.	Endocrine glands.	1 Hrs.	1 Hrs.
13.	Urinary system	2 Hrs.	1 Hrs.
14.	Reproductive system	1 Hrs.	1 Hrs.
15.	The nervous system - sympathetic, parasympathetic	5 Hrs.	6 Hrs.
16.	Organs of special senses and skin	2 Hrs.	1 Hrs.
	Total	50 Hrs.	30 Hrs.

Reference Books: -

Anatomy & Physiology for Users by Evlyn Pearch.

S.No	Topic Breakdown	Theory (Hrs.)	Lab / Field works (Hrs)
1.	Introduction to pathology, General pathology	3 Hrs.	-
2.	Inflammation – signs and symptoms – types of inflammation, Acute & Chronic inflammation	10 Hrs.	4 Hrs.
3.	Infections – Bacteria and viruses, immunity, types, classification, control of infection, cross infection & prevention. Asopsis and sterilization, pyogenic infection – boils, abscess setticamla, Tuberculous infection of bones & joints & management. Fungle infection – actiriomycosis, filariasis, leprosy, veneral disease syphilis, gonorrohea, virus infection – poliomyelitis influence.	10 Hrs.	6 Hrs.
4.	Wounds – types of healing process.		
5.	Tumours – connected to bones		
6.	Vascular disorders- Thrombosis, Embolism, Thrombo angites, Obliterands. Arthrosclerosis, hyper lesions.	10 Hrs.	4 Hrs.
7.	Gangrene – types, causes, signs & symptoms and management.		
8.	Metabolic disorders – Diabetes, Rickets, Hyper & Hypo-para throidesm & parathyroidism, metabolic disorders – Osteoporosis	10 Hrs.	4 Hrs.
9.	Inflammation of joints – Arthritis – classification and pathology	10 Hrs.	4 Hrs.
	Total	53 Hrs.	22 Hrs.

Reference Books

Text book of the Practice & Medicine

Paper II**Workshop Technology & Practice & Technical Drawing****(272 Hrs.)****Workshop Technology****(153 Hrs.)**

S. No.	Topic Breakdown	Theory (Hrs.)	Lab / Field work (Hrs)
1.	Introduction to workshop technology	1 Hrs.	-
2.	Bench work-bench vice, leg vice, hand vice, hammers of different types, Files of various types, Chisels, Scrappers & their uses. Hack saws, wrenches, surface plate, angle plate, V-block Centre Punches, dividers & trammels, feeler & surface gauges, etc.	6 Hrs.	5 Hrs.
3.	Measuring Tools – scales & tapes, calipers, Micrometer, Vernier calipers, gauges, plug gauges, dial gauges, vernier protractors sine bars, indicators.	6 Hrs.	4 Hrs.
4.	Fundamentals of rivetting soldering, brazing and welding.	4 Hrs.	2 Hrs.
5.	Forging (blacksmithy) -the forge & tools used in smithy & forging processes.	2 Hrs.	1Hrs.
6.	Drilling-Machine operation, tools holding devices, types of drill, reamers and uses, cutting internal- external threads, by using taps and dies, counter sinking, counter boring.	7 Hrs.	2 Hrs.
7.	Lathe work-parts of centre lathe and their uses, turning of centre, taper turning screw cutting in lathe, cutting tools used in lathe, tools speed, feed and depth of cut.	6 Hrs.	6 Hrs.
8.	Milling types of milling machines, Milling cutter, Up-cut & cone cut milling dividing head, set-up and operation on milling machine	7 Hrs.	6 Hrs.
9.	Shaping – Shaping machine and their use.	2 Hrs.	2 Hrs.
10.	Grinding – The grinding wheels, abrasives, wheel bonds, grit & grade, wheel structure, shape, selection, hand grinders, speed & feed, types of grinding & different types of grinding machines.	7 Hrs.	6 Hrs.
11.	Finishing process polishing, buffing, electroplating, copper, nickel and chromium.	6 Hrs.	6 Hrs.
12.	Material & Tools used in Prosthetics & Orthotics; -		
	a. Rubber different types uses, density, resilience, utility in prosthetic & orthotic	5 Hrs.	-
	b. Plastics-types, strength impregnation, lamination colouring & utility:	8 Hrs.	8 Hrs.
	c. Ferrous metals – Steel variety & uses	4 Hrs.	-
	d. Non-ferrous metals and alloys, aluminum, various suitability.	6 Hrs.	-
	e. Fabrics	2 Hrs.	1 Hrs.
	f. Leather	4 Hrs.	1 Hrs.
	g. Plaster of Paris	3 Hrs.	2 Hrs.
	h. Adhesive & Fasteners	3 Hrs.	2 Hrs.
	i. Special tools & equipments used in prosthetic & orthotic work	8 Hrs.	3 Hrs.
	Total	96 Hrs.	57 Hrs.

Notes: - 1. Lecture should follow by demonstration of use of tools and equipments.

- Students should be taken to an I.T.I / Polytechnic / Engineering College to see the different machinery, equipments and their actual uses in engineering workshop practice.

Reference Books: -

- Tools & Materials for Prosthetists
 - Tools & Materials for Orthotists
- } N.Y.U. Publication
- Workshop Technology & Practice – By Chapman.

Technical Drawing

(119 Hours)

S.No.	Topic Breakdown	Theory (Hrs)	Practical / Field work (Hrs.)
1.	Introduction to Engineering Drawing	1 Hrs.	-
2.	Definition, terms & uses	2 Hrs.	4 Hrs.
3.	Printing letters		
4.	Lines, angles, triangles and quadrilaterals.	1 Hrs.	4 Hrs.
5.	Circles and Tangents	1 Hrs.	2 Hrs.
6.	Regular polygone	1 Hrs.	6 Hrs.
7.	Ellipse, Cycloid involute of circles	2 Hrs.	4 Hrs.
8.	Orthographic projections, Plan, Elevation, Side view.	3 Hrs.	10 Hrs.
9.	Projections of points, lines & solids (Prisms, Pyramid, Cylinders & Cones), including simple case of projections on oblique planes.	2 Hrs.	6 Hrs.
10.	Projections in oblique planes, auxiliary planes & views.	2 Hrs.	4 Hrs.
11.	First & third angle method	1 Hrs.	5 Hrs.
12.	Full & sectional view of machine parts.	1 Hrs.	3 Hrs.
13.	Dimensioning the views, conventions used in view.	1 Hrs.	3 Hrs.
14.	Drawing of principle components, parts like bolts, nuts, rivets, keys, locking pins, washers etc.	2 Hrs.	7 Hrs.
15.	Joints & coupling, rivetted, bolted, keyed, knuckle joints.	3 Hrs.	8 Hrs.
16.	Conventions in technical drawing.	2 Hrs.	5 Hrs.
17.	Isometric view of simple objects.	1 Hrs.	9 Hrs.
18.	Practice in hand sketches, line drawing, various prostheses, orthoses & the Rehab. aids	1 Hrs.	12 Hrs.
19.	Total	27 Hrs.	92 Hrs.

Note: - Teachings aids, models & samples of components, etc. are to be demonstrated at each stage and explained to students.

Reference Books: -

- A Text book of Engineering Drawing by R.B. Gupta
- A Text book of Geometrical Drawing by R.K. Gupta
(Katsan Publishing Co.)

Paper III

Applied Mechanics & Strength of Material & Electronics & Bio-Electricity

(221 Hours)

Applied Mechanics & Strength of Material

(114 Hours)

S.No	Topic Breakdown	Theory (Hrs.)	Lab / Field work (Hrs)
1.	Simple stress & strains Definition of stress and strains, factor of safety, safe stress, modulus of elasticity, longitudinal strain and lateral strains, Poission's ratio, etc. – stress strain curve, statement of formulae relating between different moduli-simple problems to understand the above principles of composite bars – formula relating to loads & strains in individual members – simple problems to understand the above relations.	15 Hrs.	3 Hrs.
2.	Geometric properties of sections Definition of moment inertia & radius of gyration of a solid body. Definition of centroid, moment of inertia of sections, determining of centroid of 'L' section, trapezoidal section. Determination of common centroid for a combination of two circles – simple statement of formulas for regular section namely Rectangle, Triangle & Circle, parallel axis & perpendicular axis theorem	6 Hrs.	1 Hrs.
3.	Shear Force & Bending moments Classification of beams, types of loads, definition of shear force & bending moment of a loaded beam, shear force & bending moment diagrams for cantilevers and simply supported beams with concentrated UDL loads - simple problems to determine SF and BM at various points and drawn SF and BM diagrams.	13 Hrs.	2 Hrs.
4.	Theory of simple bending Definition of bending stress, neutral axis, moment of resistance fiber stress etc. assumption to be absorbed in the simple bending theory. Derivation of the equation of simple bending. Simple problem of cantilever and simply supported beams with central concentrated load & full load.	10 Hrs.	2 Hrs.
5.	Torsion Definition of torsion, angle of twist, polar moment of inertia etc. assumption made in torsion, statement of torsion equation, simple problems to determine transmitted in solids & shafts only.	6 Hrs.	1 Hrs.
6.	Springs Types of springs, uses of various springs, development of formulae for stiffness & deflection of closely coiled helical springs – simple problems.	6 Hrs.	1 Hrs.
7.	Riveted Joints Types of riveted joints, strength of joints, Howin's formula – simple problems in single riveted & double riveted lap & butt joints, to determine pitch & efficiency of the joints.	10 Hrs.	2 Hrs.
8.	Thin cylinders Failure of thin cylinders, longitudinal & hoop stresses assumptions, derivation of formulae, simple problem.	6 Hrs.	1 Hrs.
9.	Friction Principles of friction – coefficient of, definition of static &	8 Hrs.	1 Hrs.

	dynamic friction, laws of static friction, least force required to drag a body on horizontal plane, angle of repose frictional force on inclined plane simple problems.		
10.	Graphic Station Vector representation drawing of space diagram, Bow's notations, drawing of Vector diagrams, Farnicular polygen for parallel forces, determination of strength of members in simple contilever, beams & king post roof stress, drawing of SF & BM diagrams.	18 Hrs.	2 Hrs.
	Total	98 Hrs.	16 Hrs.

Electronics & Bio-Electricity

(107 Hours)

S.No	Topic Breakdown	Theory (Hrs.)	Lab / Field work (Hrs)
1.	Fundamental of Electricity Ohm's Law. Resistance in Parallel & series AC + DC resistance capacitance, impedance-power, power factor, transformers, meters	24 Hrs.	10 Hrs.
2.	Elements of Electronics Vacuum tubes, Diode, Electrode, Tetrode, Pentode, Electrification, valve as rectifier valve as amplifier semi-conductors, integrated circuit, computers.	21 Hrs.	14 Hrs.
3.	Bio-Electricity Biological potentials, muscle action potentials, electromyography, myoelectricity control of artificial arms, Bio-cybernetics.	24 Hrs.	14 Hrs.
	Total	69 Hrs.	38 Hrs.

Reference Books: -

1. Biological & Medical Electronics by Ralph. W. Stach, Ph.D. London.
2. Bio-electricity by E.E. Svek / Ling D.E.E.

Notes: - The students should be made to do the following & experiments each of 6 hours approx.

1. Calibration of liner & long type potentiometers.
2. Rigging up and calibration of electrogeniometers.
3. Rigging up and calibration of wire strain gauge transdecers.
4. Study and use of low-level preamplifiers with oscilloscope to record muscles potential.
5. Study and use of electro-myographic equipment to record muscle potential.
6. Study and use of stimulators.
7. Study and use of myoelectric arms.
8. Study and use of EEG equipments for Kinesiological studies.

Paper- IV**Orthopaedics, Amputation Surgery & Kinesiology & Bio-mechanics (191 Hours)****Orthopaedics****(69 Hours)**

S.No	Topic Breakdown	Theory (Hrs.)	Lab / Field work (Hrs)
1.	Introduction to Orthopaedics	1 Hrs.	-
2.	Principles of Orthopaedics	1 Hrs.	-
3.	Congenital deformities	3 Hrs	-
4.	Diseases of Nervous System	4 Hrs.	-
5.	Poliomyelitis	3 Hrs.	-
6.	Obstetrical paralysis	1 Hrs.	-
7.	Spastic paralysis	2 Hrs.	-
8.	Hemiplegia	2 Hrs.	-
9.	Paraplegia	3 Hrs.	-
10.	Pyoemic infection	2 Hrs.	-
11.	Tuberculosis	2 Hrs.	-
12.	Leprosy	3 Hrs.	-
13.	Chronic arthritis	2 Hrs.	-
14.	Rheumatoid arthritis	3 Hrs.	-
15.	Osteoarthritis	3 Hrs.	-
16.	Neuropathic arthritis	3 Hrs.	-
17.	Metabolic diseases	3 Hrs.	-
18.	Rickets	3 Hrs.	-
19.	Avitaminosis	2 Hrs.	-
20.	Renal osteo-dystrophy	2 Hrs.	-
21.	Bone tumours	3 hrs.	-
22.	Trauma	3 Hrs.	-
23.	Fractures upper extremity	3 Hrs.	-
24.	Fracture lower extremity	3 Hrs.	-
25.	Spine dislocation	3 Hrs.	-
26.	Management of fracture	3 Hrs,	3 Hrs.
	Total	66 hrs.	3 Hrs.

Reference Book: - Outline of Orthopaedic by Adams

Note: - Demonstration should be made with case as far as possible. Visual aids should be shown with each lecture.

Amputation**(38 Hours)**

S.No	Topic Breakdown	Theory (Hrs.)	Lab / Field works (Hrs)
1.	Introduction to amputation surgery – indications	1 Hrs.	-
2.	Principles of amputation, types, techniques.	4 Hrs.	-
3.	Amputation in children (Upper & Lower Extremity)	3 Hrs.	-
4.	Amputation in adults (Upper extremity) and its complications (various levels)	3 Hrs.	-
5.	Amputation in lower extremity & its complications (various levels)	3 Hrs.	-
6.	Postoperative care of the stump properties of good stump.	4 Hrs.	-
7.	Examination & prescription	1 Hrs.	-
8.	Stump dermatology	2 Hrs.	-
9.	Common skin diseases and their management	2 Hrs.	-
10.	Stump hygiene	1 Hrs.	-
11.	Latest techniques of amputation Myodesis – Myoplasty	4 Hrs.	-
12.	Immediate post-operative fitting or prosthesis for lower extremity amputation	4 hrs.	6 Hrs.
	Total	32 Hrs.	6 hrs.

Notes: -

1. Topics should be covered in a simple manner to the required extent of knowledge required by a Prosthetist.
2. Presentation of cases, charts, slides and other mode of teaching aids are required for demonstration to students.
3. Student may be taken to an operation theatre for observation of performance of any one amputation surgery.

Kinesiology & Bio- mechanics**(84 Hours)**

S.No	Topic Breakdown	Theory (Hrs.)	Lab / Field work (Hrs)
1.	Definition of Kinesiology & Bio-mechanics	1 Hrs.	-
2.	Diagram & Bio-mechanics	4 Hrs.	1 Hr.
3.	Origin & Development of Kinesiology	1 Hrs.	-
4.	Definition of Kinetics & Kinematics	4 Hrs.	1 Hr.
5.	Centre of gravity of human body.	2 Hrs.	1 Hrs.
6.	Segment masses & the density of parts.	3 Hrs.	1 Hrs.
7.	The whole body centres of gravity.	2 Hrs.	1 Hrs.
8.	Segment of centres of gravity	3 Hrs.	1 Hrs.
9.	Origin of human movements & its significance	2 Hrs.	1 Hrs.
10.	Forms of human movement their characteristics & factors affecting them.	3 Hrs.	1 Hrs.
11.	Analysis of movement.	3 Hrs.	1 Hrs.
12.	Body links and motion of parts.	2 Hrs.	1 Hrs.
13.	Closed chain systems.	1 Hrs.	-
14.	Open chain system.	1 Hrs.	-

15.	Four bar mechanism.	1 Hrs.	-
16.	Measurement of joint motion.	2 Hrs.	1 Hrs.
17.	Electrogenio-metric method	3 Hrs.	1 Hrs.
18.	Mechanics of the spine	3 Hrs.	1 Hrs.
19.	Lumbar discometry	2 Hrs.	1 Hrs.
20.	Locomotor studies	7 Hrs.	2 Hrs.
21.	Bio-mechanics of lower extremity	4 Hrs.	1 Hr.
22.	Bio-mechanics of upper extremity	4 Hrs.	1 Hr.
23.	Gait analysis	4 Hrs.	2 Hrs.
24.	Bio-mechanics of squatting	2 Hrs.	-
	Total	64 Hrs.	20 Hrs.

Note: -The Bio-mechanics of various types of prosthesis and orthosis are included in the syllabus of the respective subjects in subsequent semesters.

Paper V**Prosthetics (Upper Extremity)****(337 Hours)**

S.No	Topic Breakdown	Theory (Hrs.)	Lab / Field work (Hrs)
1.	Medical		
	(i) Classification by level of amputation.	2 Hrs.	-
	(ii) Medical consideration applied anatomy and pathological consideration	3 Hrs.	-
	(iii) Classification of congenital skeletal limb deficiencies	3 Hrs.	-
	(iv) Prosthetic prescription	2 Hrs.	1Hrs.
	(v) Amputee trainee	2 Hrs.	2 Hrs.
2.	Technical		
	(i) Components of upper extremity prostheses, control & harness systems.	6 Hrs.	8 Hrs.
	(ii) Fabrication principle & procedures for upper extremity prostheses.	6 Hrs.	72 Hrs.
	(iii) Measurement fitting & alignment	6 Hrs.	36 Hrs.
	(iv) Check-out & care of B.E. prostheses.	4 Hrs.	22 Hrs.
	(v) Bio-mechanics of U.E. prostheses.	6 Hrs.	10 Hrs.
	(vi) Harness & control systems Below Elbow harnessing & this causes, shoulder amputee harnessing.	10 Hrs.	28 Hrs.
	(vii) Clinical aspects of U.E. prosthesis	4 Hrs.	24 Hrs.
	(viii) Training in the use of U.E. prosthesis	4 Hrs.	24 Hrs.
	(ix) Electro-mechanical myoelectric and other externally powered prostheses	8 Hrs.	28 Hrs.
	(x) Study of publication sources for updating information on upper limb prostheses	4 Hrs.	12 Hrs.
	Total	70 Hrs.	267 Hrs.

Paper VI**Orthotic (Upper Extremity)****(154 Hours)**

S.No	Topic Breakdown	Theory (Hrs.)	Lab / Field work(Hrs)
1.	a. Medical		
	(i) Functional anatomy of the hand	4 Hrs.	2 Hrs.
	(ii) How to train the patients to use functional splint & arms braces.	2 Hrs.	4 Hrs.
2.	b. Technical		
	Measurement, selection of materials & components, fabrication & fitting of the following: (i) Static fingers hand splints. (ii) Functional hand splints (iii) Functional arm braces (iv) Feeders (v) Special assistive devices (vi) Myoelectric & other externally powered upper extremity orthoses	22 Hrs.	98 Hrs.
3.	Biomechanics of functional hand splints and arm Orthosis	12 Hrs.	10 Hrs.
	Total	40 Hrs.	114 Hrs.

Reference Books: -

1. Upper Extremity Orthosis – Miles. H. Anderson.
2. Manuals of U.E. Orthosis- N.Y. University
3. Orthotics Atlas, Vol. I - American Academy of Orthopaedic Surgeons.

**2nd Year
Paper VII**

P.M.R. & Introduction to Rehabilitation & Psychology & Workshop Administration & Management

(182 Hours)

P.M.R.

(83 Hours)

S.No	Topic Breakdown	Theory (Hrs.)	Lab / Field work (Hrs)
1.	Introduction to Physical Medicine & Rehabilitation.	1Hrs.	-
2.	Muscle charting	10 Hrs.	8 Hrs.
3.	Electro-therapy	7 Hrs.	6 Hrs.
4.	Hydro-therapy	2 Hrs.	1 Hrs.
5.	Application of the above topics in the management of amputees	2 Hrs.	2 Hrs.
6.	Neuro muscular diseases type and management	7 Hrs.	2 Hrs.
7.	Arthritis, types and management	4 Hrs.	2 Hrs.
8.	Crutches & uses, different crutches-gait	4 Hrs.	2 Hrs.
9.	Bandaging of stumps, BK/AK etc. Knees, Elbows, Hands, Wrists and Ankles.	2 Hrs.	4 Hrs.
10.	Gait training & analysis of patients fitted with orthoses & prostheses	10 Hrs	6 Hrs.
11.	Prescription of appliances.	1 Hrs.	-
	Total	50 Hrs.	33 Hrs.

Introduction to the Course, Rehabilitation & Psychological Aspects

(29 Hours)

S. No.	Topic breakdown	Lecture theory (hrs.)	Lab. Practical field work
1.	Introduction to the subject	3 hrs.	
2.	Visit to various department, of the institution.		
3.	General idea & definition of prosthetics / orthotics		
4.	Function of different sections / departments of the institute		
5.	Rehabilitation a. Concept of Rehabilitation b. Total Rehabilitation c. Rehabilitation team and role of each member of the team.	4 hrs.	
6.	Psychology of disabled a. Goals & methods of scientific psychology	1 hrs	
	b. Normal personality, normal growth & development c. Heredity d. Maturation	2 hrs	
	e. Environment & Learning factors in intellectual & Social Development.	2 Hrs.	
	f. Psychometry g. Testing & motivation	1 Hrs.	
	h. Emotional life of the disabled & psychological assessment	2 Hrs.	2 Hrs.

	i. Counselling	3 Hrs.	
7.	Social & Vocational Aspects		
	a. Disability & social effects	2 hrs	
	b. Home environment of disabled		
	c. Attitude of the society	2 hrs.	
	d. Vocational problems		
	e. Vocational assessment	1 hrs.	2 hrs.
	f. Vocational counselling and guidance	1 hrs.	
	g. Follow up	1 hrs.	
	Total	25hrs.	4 hrs.

- Notes: -
1. Lectures should be given along with teaching aids, like slides, charts etc.
 2. Notes / Précis on the subject is to be given.
 3. Demonstration on patients should be shown first and students should independently do the assessment later on patients.

Reference Books

1. Psychology by Munn N.L.
2. Development Psychology - by Hurlock E.B.
3. Child Development - do -
4. Rehabilitation Medicine - by Howard A.Rusk
5. Rehabilitation Medicine - by PJR. Nicholas
6. Workshop for the disabled - by Chownard E.L. & Gay
7. Psychology Testing - by Anastasi A.
8. Abnormal Psychology - by Brown
9. Educational Psychology - by Grow & Grow.

Journal: -

1. Journal of Rehabilitation in Asia } Published by Indian Society for
Rehabilitation of Handicapped.

S.No	Topic Breakdown	Theory (Hrs.)	Lab / Field work (Hrs)
1.	Planning of Prosthetic / Orthotic Workshop Workshop layout organization of department / sections, location of various departments, types of construction & ventilation & lighting provision for further extension, sanitary convenience, plant layout & main objects of scientific layout.	5 Hrs.	-
2.	Administrative & Management structure	2 Hrs.	-
3.	Industrial Management Definition of organisation, Administration & Management Principles of good organization, type of organization charts.	10 Hrs.	-
4.	Selection & Training	3 Hrs.	-
5.	Foremanship & Duties of forman & qualities of forman	2 Hrs.	-
6.	Store & Store Organisation Purpose of store keeping, store location, layout of stores, systems of location of materials, methods of storing Biocard, Indent of stores material returned, Accounting of stores, registers, advantages of good stores keeping.	8 Hrs.	-
7.	Purchase Organisation Functions of purchase department, methods of purchasing, purchase procedures.	4 Hrs.	-
8.	Cost Accounting Closing of job cards and work orders	6 Hrs.	-
9.	Accident Hazards and Industrial Safety Introduction to safety and management function, basic principles of accident prevention, Physical and Psychological factors in safety, occupational hygiene and health, safety in engineering & industry safety in prosthetic & orthotic workshop	4 Hrs.	2 Hrs.
10.	First Aid Wounds, antiseptics, bandages, splints, and their practical uses, care of injured cares	8 Hrs.	3 Hrs.
	Practical demonstration of handling the casualties of various types.	-	5 Hrs.
	Artificial respiration, practical demonstration	2 Hrs.	2 Hrs.
	Practical demonstration or external cardiac message.	-	2 Hrs.
	Treatment of shoe	1 Hrs.	1 Hrs.
	Total	55 Hrs.	15 Hrs.

Paper VIII

Prosthetics (Lower Extremity)

(483 Hours)

S.No	Topic Breakdown	Theory (Hrs.)	Lab / Field work (Hrs)
1.	Medical Subjects		
	(i) Levels of amputation & limiting factor (lower extremity)	3 Hrs.	-
	(ii) Psychological aspects of amputation	2 Hrs.	-
	(iii) Classification of congenital skeletal limb deficiencies.	2 Hrs.	-
	(iv) Prosthetic / Orthotic clinic procedures	2 Hrs.	2 Hrs.
	(v) Prosthetic prescription	1 Hrs.	1 Hrs
	(vi) Immediate & early Prosthetic management	3 Hrs.	3 Hrs.
2.	Technical		
	(i) Prosthetic components below knee & above knee	6 Hrs.	10 Hrs.
	(ii) Examination of stump, measurement, cast taking POP modification, fabrication, alignment & fitting procedures for below knee & above knee amputations (this include prosthesis for partial foot, choparts, syme's below knee, through knee above knee amputations.	35 Hrs.	240 Hrs.
	(iii) Gait analysis of BK/ AK amputees fitted with prostheses.	3 Hrs.	6 Hrs.
	(iv) Check out of below knee & above knee prosthesis	3 Hrs.	8 Hrs.
	(v) Maintenance & care of prosthesis	2 Hrs.	1 Hrs
	(vi) Hip disarticulation & Hemipelvectomy prosthesis	6 Hrs.	70 Hrs.
	(vii) Bio-mechanics of below knee, above knee & hip disarticulation prosthesis	16 Hrs.	
	(viii) Fluid controlled prosthesis	2 Hrs.	2 Hrs.
	(ix) Modular & other modern types of prosthesis	8 Hrs.	10 Hrs.
	(x) Development of squatting type prosthesis – Madras & Jaipur port, etc,	2 Hrs.	14 Hrs.
	(xi) Study of publication of sources for updating information on L.E. Prosthesis Examination	4 Hrs.	4 Hrs.
	Total	100 Hrs.	383 Hrs.

Paper IX**Orthotic (Lower Extremity)****(343 Hours)**

S.No	Topic Breakdown	Theory (Hrs.)	Lab / Field work (Hrs)
1.	Foot Orthoses		
	a. Medical		
	(i) Anatomy of Foot	3 Hrs.	-
	(ii) Orthotic - Prescription for different pathological condition, pathomechanics of foot & ankles.	4 Hrs.	8 Hrs.
	b. Technical		
	(i) Shoes, boots & their components	7 Hrs.	6 Hrs.
	(ii) Shoe modifications, principles & procedures in clinical application	6 Hrs.	26 Hrs.
	(iii) Biomechanics of the foot	4 Hrs.	2 Hrs.
2.	Ankle Foot Orthoses K.O. KAFO, EKAFO, GIL, HKAFO		
	a. Medical		
	(i) Pathomechanics Lower extremity (including foot, ankle, knee and hip.)	6 Hrs.	-
	(ii) Introduction to Orthotic management	2 Hrs.	2 Hrs.
	(iii) Orthotic prescription	2 Hrs.	4 Hrs.
	(iv) The influence of error in bracing upon deformity of lower extremity	3 Hrs.	6 Hrs.
	(v) Gait training	2 Hrs.	-
	b. Technical		
	(i) Lower extremity orthotic components & functions.	10 Hrs.	18 Hrs.
	(ii) Principles of taking measurements, selection of components, fabrication, alignment fitting and check-out of orthoses.	15 Hrs.	168 Hrs.
	(iii) Analysis of Pathological & orthotic gait	8 Hrs.	20 Hrs.
	(iv) Study of publications sources for up-to-date information on lower extremity Orthoses.	3 Hrs.	8 Hrs.
	Total	75 Hrs.	268 Hrs.

Reference Books

1. Atlas of Orthoses published By A.A.O.S.
2. Manual of L.E. Orthoses by N.Y. University.
3. Orthosis etcetera by N.Y. University.

Paper X**Spinal Orthotic****(216 Hours)**

S.No	Topic Breakdown	Theory (Hrs.)	Lab / Field work (Hrs)
1.	(a) Medical		
	(i) Surface of anatomy of trunk	2 Hrs.	-
	(ii) The Physiological basis of Orthotic methods	3 Hrs.	-
	(iii) Orthotic treatment of lumbar & thoracic conditions	12 Hrs.	50 Hrs.
	(iv) Orthotic treatment of cervical condition	10 Hrs.	42 Hrs.
	(v) Spinal Orthotic prescription	2 Hrs.	2 Hrs.
	(vi) The M.W. brace, exercises for users of M.W. Braces, Boston brace.	11 Hrs.	54 Hrs.
2	(b) Technical		
	(i) Components of spinal braces.	4 Hrs.	8 Hrs.
	(ii) Bio-mechanics of the spine	4 Hrs.	-
3.	Study of publications for up to date information on orthotics (Spine)	2 Hrs.	10 Hrs.
	Total	50 Hrs.	166 Hrs.

Reference Books: -

1. Fundamental principles and treatment of scoliosis - American Academy of Ortho. Surgeon.
2. Spinal Orthotics - N.Y. University
3. Non-operative treatment of scoliosis with M.W. Brace - by Walter P. Blount M. D. and JoH. Moe, M.D.
4. Manual of Upper Extremity Prosthesis - by William R. Santchi Dept of Engg, VCLA

Topic- XI

Clinical Meeting / Case Conference, Educational Tour & Dissertation (208 Hours)

Clinical Meeting / Case Conference (70 Hours)

S.No	Topic Breakdown	Theory (Hrs.)	Lab / Field works (Hrs)
1.	Clinical observation	2 Hrs.	-
2.	Presentation of orthotic fitment cases (lower Ext)	2 Hrs.	16 Hrs.
3.	Presentation of Orthotic fitment cases (upper and spinal)	2 Hrs.	16 Hrs.
4.	Presentation of Lower Extremity Prosthetic cases	2 Hrs.	14 Hrs.
5.	Presentation of Upper Extremity. Prosthetic cases	2 Hrs.	14 Hrs.
	Total	10 Hrs.	60 Hrs.

Visit to Manufacturing Units & Other Rehabilitation Centres (96 Hours)

S.No	Topic Breakdown
	Visits to ALMICO, Kanpur, Visit to Bombay Pune, Madras, Cuttack and New Delhi, Major limb fitting centres.

Dissertation (42 Hours)

S.No	Topic Breakdown	Theory (Hrs.)	Lab / Field work (Hrs)
1.	Choosing of topic for dissertation, preparation of paper & presentation	4 Hrs.	38 Hrs.

Appendix- I

List of Books in Prosthetics & Orthotic

I. Lower Extremity Prosthetics

S.No.	Title	Author / Publisher
1.	Lower Extremity Prosthetics (1973)	New York University
2.	The immediate post – operative Prosthesis in L.E. Amputation	Andrew C. Ruoff & Others.
3.	Contribution of L.E. Prosthetics Programme	Edmund M.
4.	Aircushion Socket for Petellar-Tendon Bearing B.K. Prosthesis	L.A. Willson, E. Iyquist and C. Radcliffe.
5.	B.K. Soft socket plastic leg	
6.	Fitting alignment & fabrication of a B.K. Prosthesis	L.F. Iulicucci
7.	Direct Forming of B.K., P.T. B. Socket with tools & materials.	Antony Stros & H.R. Gardner
8.	Bio-mechanics of B.K. Prosthesis	New York University PG Medical Schools
9.	Education programme on fluid	Willam M. Bennstock

	Controlling Mechanism for AK Prosthesis	
10.	The snirg phase of Walking with A.K. Prosthesis	V.A. Prosthetic Centre
11.	A.K. Prosthetic: Impression duplication of the Socket	E.F. Murphy (BPR Spring 1964)
12.	A New German Method of aligning A.K. Prosthesis	A.P. Gruman
13.	Adjustable Brim Fitting of above knee (AK) Amputees	J.Froot
14.	A felxible casting Brim Technique for A.K. Socket	Sidney Fishman & others
15.	Elements of training with much SNS – System A.K. Amputees	E.A. Lewis
16.	Use of temporary Prosthesis & Adjustable walking Jig.	C.F. Mealler
17.	A.K. Prosthesis Socket Shape related to Anatomy of Hip & Thigh	Univeristy of California
18.	Functional Consideration in the Fitting of A.K. Prosthesis	C.W. Radcliffe
19.	Above Knee Amputation – Prosthetic Principles & Practice	Zame Grim
20.	Self Energised Power System for A.K. Prosthesis	R. Seliktaw
21.	Problems in the fitting & Services of Prosthetic devices for A.K. Amputees	Arun Setm
22.	B.K. & A.K. Prosthesis	National Academy of Science
II. Upper Extremity Prosthetics		
1.	Upper Extremity Prosthetics	Veteran Adma. N.Y.
2.	Upper Extremity Prosthetics.	North Western University Medical Sector – I
3.	Upper Extremity Prosthetic for Prosthetists	-do
4.	Manipulator & U.E. Prosthetics	National Academy of Science
5.	The use of Low fiction Housing Liner in U.E. Prosthesis	F. Sammons
6.	Cine Plastic Above- Elbow Prosthesis	Thomas J. Canty
7.	Manual of Upper Extremity Prosthetics	Willam R. Santshi Edn.
8.	How to fit Robin Aids partial hand Prosthesis	Miles H. Anderson.
9.	Evaluation of the Heidelberg Pneumatic prosthesis	Luigi Lucaccini & Other
10.	Clinical Evaluation of External Powered Upper Limb Prosthesis	Carol A. Ross.

III. General Prosthesis		
1.	Materials & Tools for Prosthesis	
2.	Maintenance & Care of the Prosthesis	C. A. Hannesseg.
3.	Principles in Prosthetic Management for Multiple Handicapped	E.F. Murphy
4.	April Hook Training Lessons	Sicra Engineering
5.	A Hemipel tectomy Prosthesis	Fred Hampton
6.	The Limb Deficient Child	Berton Blake
7.	Report of the U.N. Inter –regional seminar on Training Prosthetists	United Nations
8.	Limb Prosthetics – 72	A. Benittoo Wilson
9.	Prosthetics	World Veteran Federat
10.	Muscles Skeletal System	E.F. Murphy
11.	Deigning to Meet the Challenges in Prosthetics	E.F. Murphy
12.	Hip Disarticulation Prosthesis	C.A. Melaucik
13.	The Canadian type of Hip Disarticulation Prosthesis	J.Froot
14.	Casting Hemipeltectomy & Hip Disarticulation Prosthesis	V.A. Prosthetic Centre
15.	Evaluation of Total Hip Replacement	D.A. Mc. Grouther.
IV. Lower Extremity Orthotics		
1.	Lower Limb Orthotics Conventional	University of Strathclyde.
2.	Use of External support in the treatment of Low Back Pain.	
3.	Selected Lower Limb Anomalico	Goorgo T. Aitken
4.	Workshop Panel on L.E. Orthotics	R.D. Keagy & Orther
5.	Powered Lower Limb Orthotics in Paraplegia	J. Hughoo

V- Upper Extremity Orthotics

1.	Development of Externally powered Upper Extremity orthotics	Bayior University
2.	The strength of hand	A.B. Samson & Orther
3.	Clinical Evaluation of the Engen	Hecter M.Kag
4.	Hand Splint	
5.	Development of U.E. Orthotics	T.J Engen
6.	Lumbo–sacral support	

VI -Miscellaneous Orthotics

1.	Spinal Orthotics	Rehabilitation Services Administration
2.	Materials & Tools for Orthotics	American Orthotic & Prosthetic Association
3.	Orthotic Services USA	AO & PA
4.	Orthopedic Appliances Atlas	AAOS
5.	The Red Book of Anatomical Support	AAOS
6.	Principles of fracture fixation	Charles O. Bechtul
7.	Orthopedic Corset & Bolts	Veteran Administration
8.	Congenital Limb Deficiency	Charles A. Frank
9.	Orthotic Research & Development	By R.O. Rattily, National Academy of Science
10.	Orthotic Systems & Research	R.N. Scott
11.	The Advance in Orthotics	George Murdon, ED.
12.	Atlas of Orthotics: Bio-Mechanical Principles & Application	Anerical Academy of Ortho. Surgeons.
13.	Orthotic Etcetera	John. E. Redford University
14.	Course on Orthotics	North Western University Medical School
15.	Orthotic Prescription	W.H. Handerson.

The following are important publications on Prosthetic and Orthotic and enquires may kindly be made to them to get the latest catalogues for procurement of books.

1. American Academy of Orthotists & Prosthetists, 717, Pendleton Street, Alexandria – VA 22314.
2. American Orthotic & Prosthetic Association, 717, Pendleton, Street, Alexandria- VA 22314.
3. The Superintendent of Document, US Govt. Printing office, Washington, DC 20402 USA.
4. Prosthetic & Orthotics, New York University P.G. Medical School 317, East 34th Street, New York 10016.
5. National Academy of Science, 2101 Construction Avenue, Washington, DC 20418.

Important Journals dealing in Prosthetics and Orthotics.

S. No.	Title	Editor & Publisher
1.	Journal of Prosthetic and Orthotic International	International Society for Prosthetics and Orthotics. Secretariat: ISPO, Borgervaenge – 5, 2100 Copenhagen,

		Denmark
2.	Clinical Prosthetics and Orthotics	American Academy of Orthotists & Prosthetists, 717 Pendleton Street, Alexandria VA-22314.
3.	Orthotic and Prosthetics	American Orthotic & Prosthetic Association, 717, Pendleton Street Alexandria, Virginia- 22314
4.	Inter Clinic Information	Prosthetics & Orthotics, NY University, P.G. Medical School 317, East 34 th Street, New York-10016
5.	The Journal of Rehabilitation in Asia	Editor, W.G. Rama Rao , Hon. Treasurer, ISRH, C/o P.C. Hansotic & Co. 51, M.G. Road, Bombay-400 023
6.	Archives of Physical Medicine and Rehabilitation	Circulation Manger, Archives of Physical Medical & Rehabilitation, 30 N. Michigan Avenue, Secte-992 CHICAGO- Illinois – 60602.

Appendix II

Recommended Staff pattern for Conducting two Years Diploma Course in Prosthetic / Orthotics.

1. Professor & Head of the Deptt. of Prosthetics / Orthotics. 1 (As per UGC or C.G. Scales).
2. Asstt. Professors in Prosthetics/ Orthotics 2 –(do)
3. Lecturers in Prosthetics / Orthotics 2 –(do)
4. Asstt. Lecturers in Prosthetics Orthotics 9 (2 Full time & 7 Part time.)
 1. Technical Drawing (Full Time)
 2. Rehabilitation & Psychology (Part-Time)
 3. Anatomy (Part-Time)
 4. Physiology (Part-Time)
 5. Pathology (Part-Time)
 6. Orthopaedics (Part-Time)
 7. Amputation Surgery (Part-Time)
 8. Workshop Technology materials tools, and equipment (Full time)
 - *9. Applied Mech. and Stores of Materials (To be taken by Asstt. Prof.)
 - *10 Kinesiology & Bio-Mechanics (To be taken by Prof.)
 - *11 Electronics & Bio-electricity, (To be taken by Asstt. Prof.)
 12. Physical & Medicine Rehab, (Part-Time)
 13. Social Work / Vocational Counselling (Part-Time)
5. Instructors in Prosthetics / Orthotics 15 (1:4) ratio.
6. Instructors in Surgical shoes / Leather work..... 4

(Ministerial Staff & Others not included.)

