

**Programme Project Report (PPR)**

**for**

**Distance Learning Programme under School of Distance Education**

**Diploma in Prosthetics and Orthotics (DPO)**

**Course Co-ordinator: Dr. P T Baburaj**

*Academic support by*

**International and Inter University center for Disability Studies  
(IUCDS)**

**Mahatma Gandhi University**

**Kottayam, Kerala**

# **DIPLOMA IN PROSTHETICS AND ORTHOTICS (DPO)**

**(Distance Learning Programme - Diploma Programme)**

## **PROGRAMME PROJECT REPORT**

Mahatma Gandhi University started the School of Distance Education in 1989 with the vision of providing the opportunity for quality education to all realms of society. Since the beginning, thousands of students have availed themselves of this opportunity for higher education to a great extent throughout Kerala. Many students outside the State had also benefited from this. But after the new directions of the UGC in 2014, the University had stopped all its Off-Campus Centres of the School of Distance Education both inside and outside the State.

Now it is the new endeavour of the School to revamp its functioning by offering different types of Diploma and Certificate programmes very relevant to contemporary society, in addition to the conventional Graduate and Post Graduate programmes. This is being done with the academic and infrastructural support of the eminent Schools and Interdisciplinary Interuniversity Centres of the University. All these Schools/ Centres have already conducted similar Programmes or Post Graduate Programmes in the same area. This Diploma Programme has been designed by the International and Inter University center for Disability Studies and to be conducted by the School of Distance Education with the academic support of the Centre.

### **A) Programmers vision, mission & objectives**

This programme is envisaged to provide knowledge and practical exposure in orthotics and prosthetics education. The programme is designed to prepare individuals to be experts in the field of prosthetics and orthotics technology as a frame work for problem solving. The one year diploma programme in applied science curriculum combines clinical orientation programme such as rehabilitation medicine, allied health sciences, prosthetics and orthotics engineering. This programme failure to meet the needs of business, technology and health case. The curriculum formed aim to impart knowledge and to train category 3 personnel (bench workers) for assembly and filling of orthopedic appliances, artificial limbs and other rehabilitation aids under the supervision of prosthetics and orthotics. (category 1, profession)

**B) Relevance of the programme with HEI's mission gods.**

The need to provide better prosthetic and orthotic care in the treatment of physically challenged in the rehabilitation setting is very high. To meet the requirement of these personnel this course will provide the students with clinical problem solving skill for lifelong learning combined with bio-mechanical education. This course will also help the society and the institute in the field of prosthetics and orthotics with growing technological advancement and human resource development.

**C) Nature of prospective target group learners.**

Students from science streams and ITI trades such as fitter, carpenter, leather and certificate course in prosthetics and orthotics, special educators, professionals in the field of nursing and paramedicals, undergraduates, NGO's volunteers working in the field of disability and rehabilitation.

**D) Appropriateness of the programme to be conducted in open and distance learning mode to acquire specific skills and competency:**

Importance of prosthetics and orthotics is crucial part in the rehabilitation of differently abled persons. Timely intervention and management can reduce the degree of disablement and empower the individual to the maximum. Hence the information on prosthetics and orthotics will provide adequate knowledge and training to significant section of learners through the open and distance learning programme.

**E) Instructional Design**

The programme is of one year duration comprising six courses with a total of 32 credits. There are adequate contact classes, practical session and the assessment involve both internal as well as external components.

Course Co-ordinator: Dr. P.T. Baburaj

Duration :12 months

Course Code	Course Type	Course Name	Contact Sessions (hours)	Credits	*Internal Marks	External Marks	Total Marks
Semester I							
DE-PO -1	Core course	Basic Clinical Science ( a. Anatomy b. Physiology c. Physical medicine and rehabilitation d. Surgery/	12	4	20	80	100

		orthopaedics.)					
DE-PO -2	Core course	Workshop practice, machines and tools & materials	12	4	20	80	100
DE-PO -3	Core course	Orthotics (lower, upper and spinal )	12	4	20	80	100
DE-PO-4	Practical	Prosthetics ( upper and lower )	90	4	20	80	100
<b>Semester II</b>							
DE-PO-5	Core course	Basics of research methodology and statistics	12	4	20	80	100
DE-PO 6	Project	Project work and viva voce	12	4	20	80	100
DE-PO 7	Agency Visit	Observation visit to an agency and Case Study Analysis		4	20	80	100
DE-PO 8	Core Course	Psychology & Sociology	12	4	20	80	100
<b>Total</b>			<b>162</b>	<b>32</b>	<b>160</b>	<b>640</b>	<b>800</b>

**F) Procedure for admission, curriculum transaction and evaluation:**

Candidates (undergraduates, graduates, and postgraduates in science stream, ITI and diploma in Technology, certificate course in Prosthetics and orthotics etc.. ) are eligible for admission irrespective of age. The study materials will be delivered through online and print forms. Assignments and reports can be submitted online. The candidate will be graded based on the grading pattern after assessment.

Admission to the programme will be done by the University through a common procedure for all the programmes under the School of Distance Education. Fee structure will be decided by the University. The School will prepare an academic calendar/activity planner and will be circulated among all the learners at the time of admission itself. The academic calendar will include all the significant activities, important dates, schedule of submission of assignments, schedule of contact classes, schedule of examinations, etc.

Evaluation of the courses shall be done by the faculty themselves on the basis of internal assessment and end semester examinations. 20% of the marks will be decided by the internal evaluations and the remaining 80% by the end semester examinations which will be done by the University. The performance of a student in each course is evaluated in terms of percentage of marks with a provision for conversion to grade points.

Each student shall be required to do one Assignment/Book Review/Debate/Seminar/ Presentation of case study for each course. Assignments/Book Review after valuation shall be returned to the students. The teacher shall define the expected quality of the above in terms of structure, content, presentation and the like, and inform the same to the students.

**Grading System** will be followed for the evaluation on a ten point scale. The details of the grading system are given in the following Table.

**Percentage Equivalence of Grade:**

Range of % of Marks	Grade Letter	Performance	Grade Point
95 - ≤ 100	O	Outstanding	10
85 - < 95	A plus	Excellent	9
75 - < 85	A only	Very Good	8
65 - < 75	B plus	Good	7
55 - < 65	B only	Above Average	6
45 - < 55	C	Average	5
40 - < 45	P	Pass	4
< 40	F	Fail	0
Absent	Ab	Absent	0

'P' grade is required for a minimum pass in a course. The minimum GPA required for a pass in the Certificate programme is 4. **Minimum Credit requirement for the Post Graduate Diploma in Prosthetics and Orthotics is 32.**

**Calculation of Grade Point Average (GPA) :**

**Credit Points for the Course** = (No. of Credits assigned for the course x Grade Point secured for that course).

**GPA** indicates the performance of a student in the programme. GPA is based on the total **credit points** earned by a student in all the courses divided by the total number of credits assigned to the courses required in the programme.

Note: GPA is computed only if the candidate passes in all the required courses (gets a minimum required grade for a pass in all the required courses as per the curriculum).

**GPA =**

**Total credit points earned by the student from all the required courses of the programme**

**Total credits of all courses required in the programme**

This formula shall be printed on the Grade Card issued to the student with a note that it could be used to convert the grades into mark-percentages. (The details of the grading system as indicated above shall also be printed on the Grade Card).

**Conversion of GPA to Grade**

GPA	Grade
10	O
9.0 - < 10	A plus
8.0 - < 9	A only
7.0 - < 8	B plus
6.0 - < 7	B only
5.0 - < 6	C
4.0 - < 5	P

< 4	F
Absent	Ab

**Conversion of GPA to percentage**

**Equivalent Percentage = (GPA obtained) X 10**

**G) Requirement of the laboratory support and library resources:**

The library and infrastructure support of the Centre and the University will be extended to the learners as per the requirement.

Mahatma Gandhi University Library and Information System consists of University Library, libraries of the Schools and 4 study centre Libraries. The University Library was established in 1989. The University Library which is situated in the main campus occupies purpose-built accommodation, and provides a variety of facilities and has a user-friendly environment. These include individual work spaces, room for group study and teaching, audio-visual access and online information retrieval system. The building of the University Library is 2000 sq.m in area consisting of the cellar, the ground floor and the first floor.

Academic as well as public users are given the facility to use the library. Special category membership is provided to journalists. The library is providing service from 8 am to 8 pm in three shift timings for its staff. The library functions on an average of 345 days in a year. The libraries of teaching departments are open during working hours of the Schools. Reading space is provided in all the three floors housing the various sections of the library. The library provides reading facility to the visually impaired users too. For this, an electronic lab custom made for visually and physically challenged users has been set up during 2016.

The University Library has a Library Advisory Committee. It is an 18 member committee with Vice-Chancellor as Chairman and University Librarian as Convener.

The library has a collection of 59,000 books, 232 journals, 2,135 Ph.D. theses and has access to 15000+ e-journals under E-Shodh Sindhu. The activities of the Library are comprehensively automated using open source library management software KOHA. OPAC, Journal Article Index, By monthly Bibliography compilation and Literature Search Service are also available

The library is a member of the INFLIBNET Centre, Ahmedabad as well as DELNET (Developing Library Network). As a member of these networks, the library provides access to the resources of other major libraries in the country. In addition to the access to UGC INFONET consortium, it has access to major online databases, such as EBSCO, ProQuest dissertations and theses, Oxford Scholarship Online, IEEE All Society Periodicals Package etc. Mahatma Gandhi University had won the State IT Award during the year 2009 in the e-learning category for its university online theses digital library. The various department libraries have a good collection of subject specific books and journals.

<b>A. MAHATMA GANDHI UNIVERSITY LIBRARY</b>	
<b>Category</b>	<b>No.</b>
Books	59000
Journals	232
Bound Journals	7500
Ph.D Theses	2135
E-Journals (in UGC-Infonet, renamed as E-ShodhSindhu)	15000
Online databases (in UGC Infonet)	11
Online Archives subscribed	185 Titles
Online databases subscribed	4
E-books	7338
DVDs: Educational Videos	293

**H) Cost estimate of the programme and the provisions:**

<b>B</b>	<b>Name of School/Centre</b>	<b>Total No. of books</b>	<b>Books added during the last three years</b>
	Inter University Centre for Disability Studies	250	123

Budget estimate (for 100 students)

S.No.	Item	Amount (Rs. in Lakhs)
1.	Manpower	2.5
2.	Study material	1.5
3.	Laboratory/ Library	2
4.	Internal assessment	.5
5.	End semester examination	1.5
	<b>Total</b>	<b>8.</b>

**Total programme fee: Rs.8000/-**

**I) Quality assurance mechanism and expected programme outcomes:**

The quality of the programme will be ensured through strict monitoring by an executive committee including the Co-ordinator of the programme, the subject experts, Director, School of Distance Education and Head of the International and Inter University center for Disability Studies .The Co-ordinator of the programme shall ensure the regular student feedback of courses, teachers and programme in the prescribed format towards the end of the semester and the same shall be analyzed to draw conclusions for effecting improvement. Periodical review meetings on the programme efficacy will be held in which the remarks of teachers on curriculum, syllabi and methods of teaching and evaluation will be given due importance. Moreover, the progress and the quality of the programme will be monitored by the

Internal Quality Assurance Cell of the University from the outcome and feedback of the learners as well as the proper documentation maintained in the Centre.

The students trained from this programme could have worked as an expert Orthotist and Prosthetist in the Physical Medicine and rehabilitation fields.

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## **SYLLABUS**

### **DIPLOMA IN PROSTHETICS AND ORTHOTICS (DPO)**

**Paper 1. Basic Clinical Science ( a. Anatomy b. Physiology c. Physical medicine and rehabilitation d. Surgery/ orthopaedics.)**

#### **1. Anatomy**

- Introduction to anatomy , surface anatomy , muscular system( different types of muscles and attachment , nerve and blood supply , action, lower extremity) some for upper extremity trunk, abdomen and spine)
- Skeletal system and
- Basic biomechanics .

#### **2 Physiology**

- Introduction to Physiology , circulatory system, cardiac system , - heart and its function – blood pressure – pulse- control of heart.
- Respiratory system, structure of lungs- mechanism of respiration
- Urinary system , mechanism of micturition
- Digestive system, mechanism of defecation .
- Nervous system –chief tracts- reflex action – postural reflex-peripheral nervous system .

#### **3 Surgery/ orthopaedics**

- Introduction to Surgery/ orthopaedics, various levels of amputation , both upper extremity and lower extremity
- Examination of stump skin condition , sensation , contractures deformities etxc.
- Congenital and acquired deformities
- Disease of nervous system – polio myelitis obstetrical paralysis – spastic paralysis – hemiplegia, paraplegia – pyogenic infection – leprosy
- Chronic arthritis – neuropathic arthritis – metabolic disease – rickets – avitaminosis
- **Disorders** : paralysis pain and deformities of spine foot and upper extremity

#### **4. Physical medicine and rehabilitation**

- Introduction to physical medicine and rehabilitation
- Basic knowledge of physical therapy/ occupational therapy



- Basic understanding of human locomotion and gait
- CBR concept in rehabilitation , govt schemes for rehabilitation and concretion to handicapped.

## REFERENCES

1. Prosthetics atlas and orthotics atlas – C V Mosby
2. Orthotics in neurological Rehabilitation - Aisen , Demos publication .
3. Chaurasia's Human Anatomy (2005) Sathish Kumar Jain, CBS Publishers and distributors, New Delhi , 5<sup>th</sup> edition .

### Paper II Workshop practice, machines and tools & materials

- Knowledge of operating and maintenance of different machines required in limb fitting centres such as Sewing machines, Ortho- Vac , Grinders, Drill machines etc.
- Hand tools like screw drivers files clamps etc.
- Special purpose tools
- Materials used in Orthotics and Prosthetics such as plastic, wood, aluminium , iron , rubber , foam , leather etc.
- Workshop safety and first aid.
- Handling and transportation of patients , persons with disabilities.

## REFERENCES

- The functional foot orthosis, New York, Churchill Living stone Philips J W (1995).
- Lower Limb amputations : A guide to rehabilitation F A Davis
- Three dimensional analysis of human movement , human kinetics –Allard P Stokes I Blanchi .

### Paper III Orthotics ( lower, upper and spinal )

#### a. Orthotics ( lower)

- Orthotics lower extremity, deformities, disorders and pains in lower extremity .
- Nomenclature and knowledge of different type of orthosis their purpose of giving and check up
- Measurement casting –impressions.
- Selection of components , assembly , alignment , check ups of different type of orthotics

#### b.Orthotics ( upper)

- Orthotics upper extremity

- Deformities , disorders and pains in upper extremity
- Nomenclature and knowledge of different types of orthosis their purpose of giving and check up .
- Measurement – casting – impressions.
- Selection of components , assembly, alignment , check up of different type of orthosis

### c. Spinal Orthotics

- Spinal orthotics
- Deformities, disorders and pain
- Nomenclature and knowledge of different types of orthosis their purpose of giving and check up
- Measurement – casting – impressions.
- Selection of components , assembly, alignment , check up of different type of orthosis

### REFERENCES

- Orthotics: Clinical practice and rehabilitation technology – Churchill Living stone Reford, J B (1993)
- Scientific basis of human movement – Gowitzke, Williams and Wilkins , Blatimore ,1988.
- Hand splinting : Principles and methods ( 2<sup>nd</sup> edition ) , St. Louis, C V Mosby

### **Paper IV Prosthetics( upper and lower )**

#### **a. Prosthetics upper**

- Prosthetics upper
- Measurement- casting- impressions
- Nomenclature and knowledge of different type of prosthesis their purpose of giving and check up
- Selection of components , assembly, alignment , check up of different type of prosthesis

#### **b. Prosthetics lower**

- Prosthetics lower
- Measurement- casting- impressions
- Nomenclature and knowledge of different type of prosthesis their purpose of giving and check up
- Selection of components , assembly, alignment , check up of different type of prosthesis

**c. Mobility aids and other appliances**

- Wheel chairs and tricycle : types, design, strength and special purpose wheel chair/ tricycle dimensions.
- Crutches, canes and sticks : measurements strength, types etc.
- Walkers / other mobility aids : measurements types design strength.

**REFERENCES**

- Hand rehabilitation Christine , Churchill , Living stone , London.
- Bio feedback – a practitioners guide Kerb D , Guiford press.
- Gait Analysis – Perry J , Black Thorofare , New Jersey, 1992.

**Paper V**

**BASIC RESEARCH METHODOLOGY AND STATISTICS**

**Course Objective:** This course intended to provide basic knowledge in different types of research, methodology and various research methods and develop abilities to apply various measures of descriptive and inferential statistics. This course will help to improve the skills of the students to write the research/ project reports

**Unit I:**

Basic principles of research, Meaning and importance of Research, Theory building, Creativity, innovation,

**Unit II:**

Preparation of proposal, Selection and formulation of research problem, Review of literature, Literature search procedures, Sources of Literature  
Formation and types of hypothesis and testing of the hypothesis, Organization of project Report – Types, Structure and Components – Contents, Bibliography, Appendices

**Unit III:**

Research methods: Qualitative and quantitative methods, Descriptive, Experimental and Epidemiological methods

**Unit IV:**

Review of descriptive statistics: Scales of measurement, Measures of central tendency and dispersion, Measures of Variability, Measures of relationships, Measures of correlation, Probability, normal distribution and other theoretical distributions

**References**

- 1 Best, J.W., and Kahn, J.V. (1992). *Research in Education*. Prentice Hall of India Pvt. Ltd., New Delhi.
- 2 Borg, W.R., and Gall, M.D. (1989). *Educational Research (5<sup>th</sup> edn.)*. Longman, New York.
- 3 Christenson, L.B. (1988). *Experimental Methodology (4<sup>th</sup> edn.)*. Boston: Allyn and Bacon Inc.,
- 4 Kerlinger, F.N. (1983). *Foundations of Behavioural Research (2<sup>nd</sup> edn.)*. Surjeet Publications, Delhi.
- 5 Kothari, C.R. (2006). *Research Methodology, Methods and Techniques (2<sup>nd</sup> edn.)*. New Age International Pvt. Ltd., New Delhi.
- 6 Panneerselvam, R. (2005). *Research Methodology*. Prentice-Hall of India Pvt. Ltd., New Delhi.

### **PAPER VI. PROJECT WORK AND VIVA VOCE**

The students need to conduct a project and submit the report in the field of early intervention. Students need to attend the viva voce also.

### **PAPER VII. OBSERVATION VISIT TO AN AGENCY**

To visit at least one of the well established rehabilitation centres in the country, other than the place of work.

Note:

1. Practices will be provided for each lecture.
2. practical work ( orthosis ) Each student will be given on the job training and will have to bend, assemble and fit 2 B K. Orthosis, 2.A.K Orthosis, and various types of splints ( bracing of feet deformities – shoe modifications , fabrication of shoes below knee orthosis – above knee orthosis , knee cage , bilateral orthosis – orthosis of upper limbs, orthosis spina.
3. Practical work ( prosthetics )
  - a. Prosthetics : Each student will be given on the job training in the fabrication of socket, assembly, alignment and fitting on patients.
  - b. Lower limb prosthetics : each student will be required to independently take cast of stump, modify cast, fabrication of socket , shaping of socket , assembly of components , static and dynamic alignment and gait analysis . At least two B K Prosthesis and one A.K Prosthesis is to be fitted.
  - c. Upper limb prosthesis : at least two upper limb prosthesis are to be fitted after taking cast of stump, modification, fabrication of socket and assembly of all components with harness and control.

### **PAPER VIII. PSYCHOLOGY AND SOCIOLOGY**

#### **A. Psychology & Social work:**

Introduction to Psychology, Outline of Psychology and behavior, Intelligence and abilities, Learning and Remembering, Psychological Development, Cognitive Processes, Personality, Moral Development, Psychological aspect of disability. The Role of the Family, Child with the disability, parents of the disabled child. Acceptance of Severely disabled persons. Social-Sexual Relationships. Independent Living.

Introduction to Sociology and outline of Society, definitions, Outline of Social works, Nature of Social organization, types of organizations. Non-governmental organisations and its role in prosthetics & orthotics. Structure and functions of Social Institutions.

Village as a community. Social Changes, Social Problems, Social Welfare, Vocational Rehabilitation, Employment, Self-Employment Job analysis, Job placement.

### **Disability & Development:**

Background to social, political and economic issues in India and other Low Income countries. Affect on poor who live in rural and urban areas. Disability and women 57.

Introduction to community based rehabilitation as compared to the existing medical model and its function.

Local resources available and referral. Income generation schemes, Purpose of Sangha/group of PWDs. Access, adaptations and change of environment where people live or work.

Removing Environmental Barriers, Recreation for the Disabled Community Welfare organizations, Social welfare programmes. Professional and social work in medical & rehabilitation set up. Practical and environmental difficulties of patients in use of appliances. Outline of Educational aspects, PWD act.

### **References**

- 1 James N. Butcher ,Susan Mineka ,Jill M.Hooley, Abnormal Psychology, Fifteenth Education published by Pearson Education Inc.2013.
- 2 Robert A. Baron ,Nyla R. Branscombe,Social Psychology,2015 ,Pearson Education Inc.
- 3 Carr, J.H. andShepherd, R.B, Butterworth, Oxford, Neurological Rehabilitation.
- 4 Kottke, F.J. and Lehman J.F.W B Saunders, London, Handbook of Physical Medicine and Rehabilitation.
5. Bromley, Ida Churchill-Livingston, London, Tetraplegia and Paraplegia