

BACHELOR IN PROSTHETICS AND ORTHOTICS
(New Syllabus 2017-2018)

SECOND YEAR

PAPER IV – BIOMECHANICS - II

Q.P. Code: 802464

Time: Three Hours

Maximum : 100 Marks

Answer All questions

I. Elaborate on:

(3 x 10 = 30)

1. What is gait? Explain about features of gait and gait parameters.
2. Explain about Trans femoral gait analysis and deviation.
3. Explain about biomechanical principle of KAFO and FRO.

II. Write notes on:

(8 x 5 = 40)

1. Explain about biomechanics of IC socket and socket force analysis.
2. Explain about three, four and five point pressure system.
3. Explain about KAFO gait deviation due to pathological condition.
4. Explain about types of gait analysis.
5. Explain about through knee socket force analysis.
6. What an EMG? Role of EMG in pathological condition.
7. Types of orthotic knee joints.
8. Biomechanics of energy storing foot.

III. Short answers on:

(10 x 3 = 30)

1. Biomechanical discrepancies of Scissoring gait.
2. Define relation between pressure and area.
3. Step length and stride length.
4. KAFO Alignment Procedure.
5. Waddling gait.
6. Rheumatoid arthritis knee biomechanics.
7. Electromyography.
8. Kinetics and kinematics.
9. Foot orthosis.
10. Degree of freedom.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 0321]

MARCH 2021

Sub. Code: 2464

(AUGUST 2020 EXAM SESSION)

BACHELOR IN PROSTHETICS AND ORTHOTICS

SECOND YEAR (Regulation 2017-2018)

PAPER IV – BIOMECHANICS - II

Q.P. Code : 802464

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on:

(3 x 10 = 30)

1. Explain about effects of Floor Reaction Orthosis in CP children.
2. Explain about instantaneous centre of rotation in prosthetic polycentric knee joint.
3. Explain about Through knee biomechanics and alignment techniques.

II. Write notes on:

(8 x 5 = 40)

1. Explain about medial whip and lateral whip with causing factor.
2. Explain about joint forces during and stance phases.
3. Biomechanics of prosthetic hip joint.
4. Biomechanics of HKAFO.
5. Biomechanics of energy storing foot.
6. Explain about Types of orthotic hip joint.
7. Kinematics of anatomical knee joint.
8. Placement of COG in Trendelenburg gait.

III. Short answers on:

(10 x 3 = 30)

1. Torsional stress.
2. Biomechanics of safety knee joint.
3. Explain about cadence and velocity in gait.
4. How Transfemoral prosthesis aligned for voluntary control of knee?
5. What are the advantage of carbon fibre in KAFO?
6. Step length and stride length.
7. What is three point and four point gait?
8. Why the abduction tendency more common in trans femoral stump?
9. Vaulting.
10. Energetics of walking.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 0222]

**FEBRUARY 2022
(AUGUST 2021 EXAM SESSION)**

Sub. Code: 2464

**BACHELOR IN PROSTHETICS AND ORTHOTICS
SECOND YEAR (Regulation 2017-2018)
PAPER IV – BIOMECHANICS - II
Q.P. Code : 802464**

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on: (3 x 10 = 30)

1. Explain about gait cycle and gait parameters.
2. Explain about biomechanics of knee orthosis for osteoarthritis knee joint.
3. Biomechanical principle of HKAFO and KAFO.

II. Write notes on: (8 x 5 = 40)

1. TT gait deviations.
2. Biomechanics of quadrilateral socket.
3. Explain about different types of crutch gait.
4. Biomechanical principle of correcting genu varum and valgum.
5. Explain about closed and open kinematic chain.
6. Biomechanics of safety knee joint.
7. Explain about biomechanical forces on AFO by altering trim lines.
8. Gait deviation using foot orthosis.

III. Short answers on: (10 x 3 = 30)

1. Define gait and pathological gait.
2. Advantage of pyramid alignment system.
3. Four point pressure system.
4. Biomechanical Forces of FRO.
5. Bony lock in IC socket.
6. Windlass mechanism.
7. What is mal- alignment?
8. Through knee prescription principle.
9. Biomechanics of SACH foot.
10. Biomechanical forces in MAS socket.

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[AHS 0423]

APRIL 2023

Sub. Code: 2464

BACHELOR IN PROSTHETICS AND ORTHOTICS

SECOND YEAR (Regulation 2017-2018 onwards)

PAPER IV – BIOMECHANICS II

Q.P. Code: 802464

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on:

(3 x 10 = 30)

1. Mechanical Characteristics of Bone and Muscle.
2. Explain in detail Instrumented GAIT Analysis.
3. GAIT Deviations in Trans Tibial Prosthesis.

II. Write notes on:

(8 x 5 = 40)

1. Biomechanical Principals of HKAF0.
2. Force distribution in Symes Prosthesis.
3. Biomechanics of Ankle Foot Orthosis (AFO).
4. Function of Ligaments and Muscle.
5. Whip and Circumduction gait deviation.
6. Function of Knee cap in KAFO.
7. Merits and demerits of Polycentric Knee joint.
8. Trans femoral Prosthetic Socket Design variants.

III. Short answers on:

(10 x 3 = 30)

1. Kinetics and Kinematics.
2. Pathological gait deviation in Cerebral Palsy.
3. Define Genu-recurvatum.
4. Gait benefits in Carbon fiber foot pieces.
5. Microprocessor Knee joint.
6. Foot Slapping gait deformity.
7. Lateral Trunk bending gait deviation.
8. Advantages of pyramid alignment system.
9. Force distribution in SMO.
10. Advantages of quadrilateral socket design for TF amputee.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 0424]

APRIL 2024

Sub. Code: 2464

BACHELOR IN PROSTHETICS AND ORTHOTICS

SECOND YEAR (Regulation 2017-2018 onwards)

PAPER IV – BIOMECHANICS II

Q.P. Code: 802464

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on:

(3 x 10 = 30)

1. Instrumental gait analysis system and its components.
2. Gait deviation of KAFO and force system.
3. Describe various designs of transfemoral socket with biomechanics.

II. Write notes on:

(8 x 5 = 40)

1. Differentiate between moment and torque.
2. SACH foot and its function.
3. Offset Knee joint and its principles.
4. Alignment procedures for KAFO.
5. Prosthetic hip joint and its location.
6. Trendelenburg gait.
7. Determinant of gait.
8. Hip hiking Vs Vaulting.

III. Short answers on:

(10 x 3 = 30)

1. Differentiate between torsional stress and axial bending stress.
2. Arches of foot and its function.
3. Effects of malalignment.
4. What is windlass mechanism?
5. Swing to Vs Swing through crutch gait.
6. Biomechanical advantage of patella.
7. What is the advantage of ischial containment socket?
8. Single axis Vs Polycentric knee joint.
9. Force system in knee orthosis.
10. Inversion and eversion of foot and shoe modification.

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[AHS 1125]

NOVEMBER 2025

Sub. Code: 2464

BACHELOR IN PROSTHETICS AND ORTHOTICS

SECOND YEAR (Regulation 2017-2018 onwards)

PAPER IV – BIOMECHANICS II

Q.P. Code: 802464

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on:

(3 x 10 = 30)

1. Define Gait. Mention different types of gait parameters. Discuss kinetics and kinematics of a normal gait cycle with neat sketches.
2. Explain the biomechanics of anatomical hip joint with neat sketches.
3. Explain the biomechanics differences between Ischial containment socket and Quadrilateral socket with neat sketches.

II. Write notes on:

(8 x 5 = 40)

1. Write about Joint Reaction Force in knee joint.
2. Discuss any five types of pathological gait deviation.
3. Biomechanical force in Quadrilateral transfemoral socket.
4. Explain “Screw-home” mechanism of knee joint.
5. Explain Botta principle in Through Knee prosthetic socket design.
6. Explain any five KAFO gait deviations.
7. A 40-year young man walking with a constant step length of 65 cm, if he covered a distance of 350 meter in six minutes calculate his -
a) Stride length b) Cadence c) Velocity of walking
8. Explain the relation of Zone of Stability with Polycentric Prosthetic knee joint.

III. Short answers on:

(10 x 3 = 30)

1. Write about Circumduction gait deviation.
2. Discuss Coxa-vara deformity.
3. Define Isometric contraction.
4. Why the abduction tendency more common in transfemoral stump?
5. Discuss about Pressure mat and its functions.
6. Explain Swing-to and Swing-through crutch gait.
7. Biomechanics of osteoarthritis knee brace.
8. Mention different types of gait determinants.
9. How Transfemoral prosthesis aligned for voluntary control of knee?
10. Floor reaction Orthosis.
