B.Sc. PROSTHETICS & ORTHOTICS
SECOND YEAR
PAPER IV – FUNDAMENTALS OF ELECTRICITY & ELECTRONICS

Q.P. Code: 802414

Time: Three hours   **Maximum : 100 Marks**
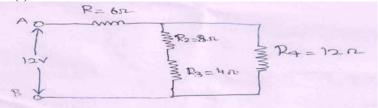   **Answer All questions**

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

1. Explain Transformer in detail.
2. Explain Operational Amplifier and their ideal characteristics.
3. Explain in detail the simple safety procedure to be followed when servicing equipments.

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

1. Define a) AC Circuit
          b) Sine Wave
          c) Frequency
          d) Time Period
2. What are the differences between Extrinsic and Intrinsic Semiconductor?
3. Derive Negative Feedback Equation
4. Explain the working principles of Light Transducers
5. Explain the function of Line, Neutral and Earth in single phase system
6. Explain Miniature Circuit Breaker
7. Describe the principles of Electromyography (EMG)
8. Calculate Current(I)

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

1. Define Bio-electricity
2. A circuit has 10 Ω resistances and voltage across it is 200 V. Find Current through the circuit.
3. Define Transformer Ratio(k)
4. Explain the concept of insulator.
5. Define Amplifier
6. Define Voltage gain
7. Define Feedback
8. What are the types of Sensors used in Prosthetic & Orthotic field?
9. Define Microprocessor
10. Define Fuse

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BACHELOR IN PROSTHETICS AND ORTHOTICS

SECOND YEAR

PAPER IV – FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS
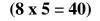
Q.P. Code: 802414

Time: Three Hours   **Maximum: 100 Marks**

Answer all questions

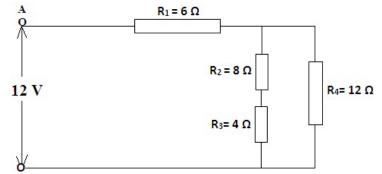## I. Elaborate on: (3 x 10 = 30)

1. Explain the principle of transformer in detail.
2. Explain operational amplifier and their ideal characteristics.
3. Explain the conduction in extrinsic semiconductors.

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

1. Calculate current,

2. Write the difference between intrinsic and extrinsic semiconductors.
3. Derive negative feedback equation.
4. What is transducer? Explain pressure transducers in details.
5. Explain miniature circuit breaker.
6. Explain the function of line, neutral and earth in single phase system.
7. What is sensor? Explain types of sensors.
8. Derive root mean square value (RMS) of A.C. circuit.

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

1. Define current and its unit.
2. What is muscle action potential?
3. Write a short note on EMG (Electromyography).
4. Give the difference between A.C circuit and DC circuit.
5. Define semiconductors.
6. What is positive and negative feedback?
7. Define microprocessor. Write it's any one application in prosthetic field.
8. What are the current practice in pin connection and their colour codes?
9. What is voltage regulator?
10. Define frequency and its unit.

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B.Sc. PROSTHETICS AND ORTHOTICS
SECOND YEAR
PAPER IV – FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS

Q.P. Code: 802414

Time: Three hours   **Maximum : 100 Marks**

Answer All questions

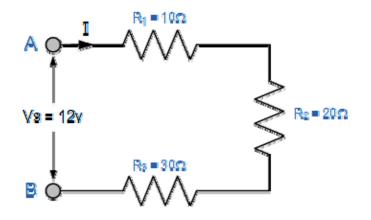**I. Elaborate on:**   **(3 x 10 = 30)**

   1. Explain about transformer in detail.
   2. What is operational amplifier? Explain about ideal characteristic of operational amplifier.
   3. What is semiconductor? Explain in detail about intrinsic semiconductor.

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

   1. Difference between intrinsic and extrinsic semiconductor.
   2. Derive RMS value of current and voltage.
   3. Explain about microprocessor in detail.
   4. What is resistor? Difference between resistor in series and parallel.
   5. A transformer has 500 turns of the primary winding and 10 turns of the secondary winding. Determine the secondary voltage if the secondary circuit is open and the primary voltage is 120 V.
   6. Explain about   the function of line, neutral and Earth in single phase system.
   7. Describe   about   MCB in detail.
   8. Explain in detail about electromyography.

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

   1. Define Bioelectricity. What are its applications in Health Sciences?
   2. Difference between alternating current and direct current.
   3. What is insulator?
   4. What are the current practice in pin connection and colour codes?
   5. What is pressure transducer?
   6. Explain about general feedback equation.
   7. Find R eq.

   8. Define mutual induction.
   9. Difference between n-type and p-type extrinsic semiconductor.
   10. What is electronics measuring instrument?

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B.Sc. PROSTHETICS AND ORTHOTICS
SECOND YEAR
PAPER IV – FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS

Q.P. Code: 802414

Time: Three Hours   **Maximum : 100 Marks**
Answer All questions

I. Elaborate on: **(3 x 10 = 30)**
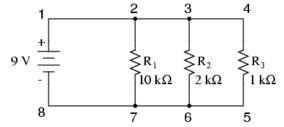
1. Explain the working principle of Transformer.
2. Importance of Electronics measuring instruments.
3. Discuss about the purpose of Fuses and Miniature Circuit Breakers (MCB).

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

1. EMF, Charge, Current, Voltage and Energy.
2. Find the Current in the following Circuit.

3. Total Resistance equations for 3 resistors connected in series and in Parallel.
4. Draw the energy band diagram of Semiconductor and explain it.
5. Voltage Gain, Current Gain, Power Gain in Amplifier.
6. Transducers.
7. Single phase and Three Phase supply system.
8. Bionic Arms.

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

1. AC Circuits.
2. RMS Value.
3. Voltage Ratio in Transformer.
4. Extrinsic Semiconductor.
5. Drift Voltage.
6. Negative Feedback.
7. Electronic Goniometer.
8. Pressure Sensor.
9. Miniature Circuit Breakers.
10. Myo-Electricity.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
SECOND YEAR
PAPER IV – FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS

Q.P. Code: 802414

Time: Three Hours　　　　　　　　　　　　　　　**Maximum : 100 Marks**

Answer All questions
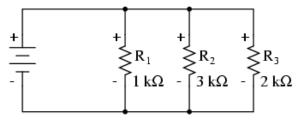
I. Elaborate on:　　　　　　　　　　　　　　　　　　　**(3 x 10 = 30)**

1. Types of Semi-Conductors.
2. Discuss about the ideal characteristics of Operational Amplifier.
3. Electromyography and Myo-Electricity Application in P and O field.

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

1. Given $V = 20v$, $R=4\Omega$　Find I. and $V= 12v$, $I= 2A$ Find R,
2. Find the total resistance of the given circuit.

3. Difference between DC Circuits and AC Circuits.
4. Draw and write short notes about Core Type and Shell Type Transformers.
5. Implanted electrodes and Surface electrodes.
6. Current practice in pin connections and color codes.
7. Voltage regulators Integrated circuits.
8. Microprocessor controlled prosthetic knee joint.

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

1. Potential Difference.
2. Frequency.
3. Resistors in Parallel.
4. Transformers.
5. Doping.
6. Voltage Gain.
7. Transducers.
8. Sensors.
9. Fuse.
10. Bioelectricity.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
SECOND YEAR
PAPER IV – FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS

Q.P. Code: 802414

Time: Three Hours   **Maximum : 100 Marks**
Answer All questions

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

1. Differentiate between single phase and three phase system.
2. What are the different types of measuring instruments used. Explain any one of recording instrument.
3. What do you understand by integrated circuit? Explain briefly about its applications and types.

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

1. Explain about OPAMP and its equivalent circuit.
2. Differentiate between Inductive reactance and capacitive reactance.
3. Four resistors 5 ohm each connected across the side of a square. Find the equivalent resistance across diagonal of square.
4. Explain about electromyography and its use.
5. PN Junction Diode and its characteristics.
6. A 400V 50Hz three phase supply is provided to a 3 phase star connected load each phase of the load absorbs a power of 2000W. The load power factor is 0.8 lagging. Calculate total power and line current.
7. What is sensor and explain about its types and application?
8. Explain the function of line neutral and earth of a single phase system.

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

1. What do you understand by electromotive force?
2. What is sine wave and write its equation?
3. Explain the term Phase and phase difference.
4. What is specific resistance and its unit?
5. Define turns ratio in transformer.
6. What is the function of ammeter, voltmeter and wattmeter?
7. What is impedance? Write down its unit.
8. Define Power factor.
9. What is Voltage regulator and its function?
10. What is Oscillator and its use?

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER VI – BASIC ELECTRONICS

Q.P. Code: 802456

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. DC Circuits and AC Circuits.
2. Transducers for Temperature, Light, Pressure and Sound.
3. Electrical Safety and Safety Procedure for servicing equipment.

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

1. Find the value of Current if the voltage is 20 V and Two Resistances 5 ohms and 10 ohms are connected in parallel.
2. Working Principle of Transformer.
3. Semiconductors.
4. Ideal Characteristics of Operational Amplifier.
5. Advantages of Electronic Measuring Instruments.
6. Types of Electrodes.
7. Pin Connection and Color Codes in electrical wiring.
8. How does a prosthetic robotic arm work?

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

1. Potential Difference.
2. RMS Value.
3. Resistors.
4. Transformer.
5. Extrinsic Semiconductor.
6. Conduction Band.
7. Amplifier.
8. Feedback.
9. MCB.
10. Bioelectricity.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER VI – BASIC ELECTRONICS

Q.P. Code: 802456

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. Resistors, Color Code of Resistors, Resistors in series and in parallel.
2. Single Phase and Three Phase Supply System.
3. Bio-Electricity and its application in the field of P and O.

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

1. Sine Wave, Frequency, Period, Phase and RMS Value.
2. A transformer has 100 turns of the primary winding and 10 turns of the secondary winding. Find out the secondary voltage for the given primary voltage 200 V.
3. Energy Band diagram of Semiconductor.
4. Insulators with examples.
5. Transducer.
6. Implanted Electrodes and Surface Electrodes.
7. Uses of Microprocessor in the field of P and O.
8. Earth leakage detectors.

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

1. Units for Voltage, Current, Resistance, Charge, Power and Frequency.
2. Microprocessor.
3. Doping.
4. Valence Band.
5. Operational Amplifier.
6. Measuring Instruments.
7. Sensors.
8. Line, Neutral and Earth.
9. Fuse.
10. EMG.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER VI – BASIC ELECTRONICS

Q.P. Code: 802456

Time: Three Hours   **Maximum : 100 Marks**
Answer All questions

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

1. Transformer and its types.
2. Single Phase and Three Phase Supply System.
3. Myo-electrodes and its application in the field of P and O.

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

1. Voltage, Current, Resistance, Charge and Power.
2. Calculate the total resistance for the 4 resistors value of 10 ohms each are connected in parallel.
3. A transformer has 200 turns of the secondary winding and 10 turns of the Primary winding. Find out the secondary voltage for the given primary voltage 150 V.
4. Energy Band diagram of Semiconductor.
5. Voltage Gain and Current Gain in Amplifier.
6. Negative feedback and Positive feedback
7. Fuse.
8. Muscle Action Potential.

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

1. Ohm's Law.
2. Sine Wave.
3. Frequency.
4. Voltage Ratio in Transformer.
5. Intrinsic Semiconductor.
6. Insulators.
7. Transducer.
8. Microprocessor.
9. Surface Electrodes.
10. Myo-electricity.

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[AHS 0321]　　　　　**MARCH 2021**　　　　Sub. Code: 2456
(AUGUST 2020 EXAM SESSION)
BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR (Regulation 2017-2018)
PAPER VI – BASIC ELECTRONICS
Q.P. Code : 802456

Time: Three hours　　　Answer ALL Questions　　　Maximum: 100 Marks

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

1. 3 Resistors are in Series and Parallel.
2. Transducers.
3. Bio-Electricity.

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

1. RMS Value.
2. Semiconductors.
3. Voltage and Current Gain.
4. Oscillators.
5. Surface Electrodes.
6. MCB.
7. Integrated Circuit.
8. Safety Procedure to be followed while servicing the equipment.

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

1. Voltage.
2. Ohm's Law.
3. Direct Current.
4. Sine wave.
5. Frequency.
6. Transformer.
7. Doping.
8. Insulators.
9. Amplifier.
10. Voltage Regulators.

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[AHS 0422]   **APRIL 2022**   Sub. Code: 2456
(FEBRUARY 2021 & AUGUST 2021 EXAM SESSIONS)
BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR (Regulations 2017-2018)
PAPER VI – BASIC ELECTRONICS
Q.P NO. 802456

Time: Three Hours   Answer All questions   Maximum : 100 Marks

I.   **Elaborate on :**   **(3X10=30)**

1. Explain the working principle of Transformer.
2. What is semiconductor? Explain in detail about intrinsic semiconductor.
3. Single Phase and Three Phase Supply System.

II.   **Write Notes on :**   **(8X5=40)**

1. Derive RMS value of current and voltage.
2. Explain in detail about electromyography.
3. Transducers.
4. Safety Procedure to be followed while servicing the equipment.
5. Negative feedback and Positive feedback
6. What is sensor? Explain types of sensors.
7. A Transformer has a primary coil and a secondary coil with the number of loops are 500and 5000. Input voltage is 220 V. What is the output Voltage?
8. What is resistor? Difference between resistor in series and parallel.

III.   **Short Answers on :**   **(10X3=30)**

1. What is muscle action potential?
2. What is Ohm's Law?
3. What is the meaning of Doping?
4. Define frequency and its unit.
5. What is voltage regulator?
6. Write down names of Electronic Measuring Instrument.
7. What is MCB?
8. Explain Electro motive force.
9. Define Power factor.
10. What is Oscillator and its use?

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER VII – PROSTHETICS – I

Q.P. Code: 802407

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. Describe the Biomechanics of Partial Foot Prosthesis with neat diagrams.
2. Write down the complete fabrication process of a transtibial Prosthesis.
3. Describe different types of Prosthetic foot.

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

1. What is IPOP? Explain its advantages.
2. Chopart amputation and its Prosthetic management.
3. Draw a labeled diagram of Amputations at foot level.
4. Explain extension prosthesis and its indications.
5. Explain Thigh corset suspension system.
6. Multi-axial foot
7. Patellar tendon bearing Socket.
8. Compare and contrast Endoskeletal and Exoskeletal BK prosthesis.

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

1. What is Phantom limb Pain?
2. What are the advantages of using Prosthesis?
3. What is Static alignment?
4. Write short note on SAFE Foot.
5. Define Pressure sensitive area and write down the names in BK stump.
6. Define Total contact socket.
7. Draw a leveled diagram showing the different parts and components of an endoskeletal transtibial prosthesis.
8. Write short note on STEN foot.
9. What is Boyd amputation?
10. Write short note on PTB-SCSP socket.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER VII – PROSTHETICS – I

Q.P. Code: 802407

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. What is alignment? Describe different alignment methods used in Prosthetics.
2. Define gait deviations. Explain the common gait deviations observed in transtibial amputee while using the Prosthesis.
3. What are the various types of Transtibial Prosthesis? Explain any one with its measurement and Casting technique.

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

1. Describe on PTB-SC socket and its prescription criteria.
2. Explain various suspension methods in trans-tibial prosthesis.
3. Write in detail Check out procedure of BK prosthesis.
4. Explain Jaipur Foot with diagram.
5. Draw and describe Canadian type syme's prosthesis.
6. Write a note on Flexible Socket.
7. What are the Functional Characteristics of Energy Storing Foot?
8. Write a note on Pin and Shuttle lock suspension system.

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

1. Define Neuroma.
2. Write down the Functional Levels of amputee.
3. Seattle foot.
4. Define amputation. Give any five major causes of amputation in India.
5. Define Pressure Tolerant area and write down the names in BK stump.
6. PTB socket.
7. Write down the advantages of endoskeletal BK prosthesis over exoskeletal prosthesis.
8. Lisfranc amputation.
9. Quantum foot.
10. Close ended socket.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER VII – PROSTHETIC SCIENCE – I

Q.P. Code: 802457

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. Prosthetic management for Syme's Amputation.
2. Explain about Prosthetic Alignment for Trans Tibial Prosthesis.
3. Biomechanics of Partial foot prosthesis.

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

1. Trans Tibial Prosthetic gait deviation.
2. Check-Out Procedures for Syme's Prosthesis
3. Prosthetic Components used for Trans Tibial Prosthesis.
4. Types of Prosthetic Feet.
5. Suspension System Used for Trans Tibial Prosthesis.
6. Explain about Endoskeleton prosthesis and Exoskeletal prosthesis.
7. Biomechanics of Trans Tibial Prosthesis.
8. Materials used for partial foot prostheses.

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

1. Check-out Procedures for Chopart.
2. PTB Socket.
3. Check-out Procedures for Trans Tibial Prosthesis.
4. PTBSC Socket Trim lines.
5. SACH Foot.
6. Trans Tibial Patient Physical Assessment.
7. Roles of Multidisciplinary team members.
8. TSB Socket.
9. Casting Procedure for Syme's Amputation.
10. Syme's Prosthesis Suspension System.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER VII – PROSTHETIC SCIENCE – I

Q.P. Code: 802457

Time: Three Hours   **Maximum : 100 Marks**
Answer All questions

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

1. Prosthetic Management for Partial Foot Amputation.
2. Syme's Prosthetic Gait Deviation.
3. Explain about types of Prosthetic Feet.

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

1. Types of Trans Tibial socket designs.
2. Fabrication techniques of partial foot prosthesis.
3. Explain about PTB-SCSP Socket.
4. Fabrication Technique for Tans-Tibial Conventional Prosthesis.
5. Endoskeletal prosthesis and Exoskeletal prosthesis.
6. Check-out Procedures for Chopart.
7. Materials used for Trans – Tibial Prosthesis.
8. Prosthetic Management for Trans Tibial knee flexion contracture.

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

1. Trans Tibial Prosthesis Suspension System.
2. Measurement Techniques for Partial Foot Prostheses.
3. Trans – Tibial Resin Lamination socket fabrication Procedure.
4. Check-Out Procedure for Syme's Prostheses.
5. Material Used for Partial foot Prosthesis.
6. SACH Foot.
7. Casting Technique for Syme's Prosthesis.
8. PTBSC Socket Trim lines.
9. Roles of Multidisciplinary team members.
10. Trans Tibial Prosthesis Bench alignment.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER VII – PROSTHETIC SCIENCE – I

Q.P. Code: 802457

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. Types of Prosthetic Feet. Partial Foot Measurement Procedures.
2. What is Jaipur foot? Chopart amputation describe in detail.
3. Check-Out Procedures for Trans Tibial Prosthesis.

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

1. Partial Foot prosthesis Fabrication Procedures.
2. Syme's Prosthesis check-Out Procedures.
3. Trans Tibial Prosthetic Gait Deviation.
4. Components used for Trans Tibial Prosthesis.
5. Measurement Procedure for Syme's Prosthesis.
6. Prosthetic Components used for Syme's Prosthesis.
7. Biomechanics of partial foot prosthesis.
8. Explain about energy storage foot.

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

1. Types of Trans Tibial Prosthetic Suspension.
2. Trans Tibial Prosthetic Measurement.
3. Bench Alignment for Syme's Prosthesis.
4. Materials used for Trans-Tibial Prosthesis.
5. Exoskeletal Prosthesis.
6. Lower Extremity Levels of Amputation.
7. PTB-SCSP socket Trim line.
8. Trans Tibial Prosthesis Static Alignment.
9. Endoskeletal prosthesis.
10. Materials Used for Partial foot Prosthesis.

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

[AHS 0422] **APRIL 2022** **Sub. Code: 2457**
(FEBRUARY 2021 & AUGUST 2021 EXAM SESSIONS)
BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR (Regulations 2017-2018)
PAPER VII – PROSTHETIC SCIENCE I
Q.P NO. 802457

Time: Three Hours **Answer All questions** **Maximum : 100 Marks**

I. **Elaborate on :** **(3X10=30)**

1. Historical development in Lower Extremity Prosthetics.
2. Trans-tibial Prosthetic Prescription Guidelines.
3. Biomechanics of Symes foot prosthesis.

II. **Write Notes on :** **(8X5=40)**

1. Distinguish between PTB and PTS socket designs.
2. Distinguish between Open and Closed ended below knee Socket.
3. Describe TSB transtibial Socket with a neat labelled diagram.
4. Describe supracondylar cuff suspension with a neat labelled diagram.
5. Dynamic alignment of transtibial prostheses.
6. Patellar tendon bearing socket principles.
7. Gait characteristics of a unilateral transtibial amputee with a prosthesis.
8. Effects of Ill-fitting Transtibial sockets.

III. **Short Answers on :** **(10X3=30)**

1. STEN Foot.
2. Hydrostatic Socket.
3. Multi-axial prosthetic feet.
4. Uses of Prosthetic Socks.
5. Prosthetic solution of Ray Amputation.
6. Thigh Corset Suspension for below knee Prostheses.
7. Wood and metal Below knee prosthetics.
8. Exoskeletal Below knee leg.
9. Pressure-relief areas in Transtibial Socket.
10. Conventional Prostheses.

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B.Sc. PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER I – ANATOMY

Q.P. Code: 802401

Time: Three Hours   **Maximum : 100 Marks**
Answer All questions

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

1. Describe in detail on the type, articular surface, ligaments, relation and movements of the shoulder joint.
2. Describe in detail about the formation, course branch and applied anatomy of the Median nerve.
3. a) Valves of the heart.
   b) Lumbar Plexus.

Write notes on: **(8 x 5 = 40)**

1. Quadriceps femoris.
2. Erb's Palsy.
3. Cubital fossa.
4. Femoral Artery.
5. Sciatic nerve.
6. Classification of the Bone.
7. Broncho Pulmonary segments of the right lung.
8. Medial longitudinal arch.

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

1. Patella.
2. Muscles attached to the ischial tuberosity.
3. Name the ligaments of knee joint.
4. Claw hand.
5. Name the major openings of the diaphragm.
6. Types of uniaxial joint with example.
7. Types of cartilage.
8. Peritoneum.
9. Boundaries of adductor canal.
10. Types of muscle with example.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER I – ANATOMY

Q.P. Code: 802401

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. Describe in detail on the longitudinal arches of the foot and add a note on its applied anatomy.
2. Classify joints. Write in detail on synovial joint and its type.
3. a) Femoral triangle.
   b) Sensory distribution of hand.

Write notes on: **(8 x 5 = 40)**

1. Biceps brachii.
2. Claw hand.
3. Femoral nerve and its branches.
4. Popliteal fossa.
5. Sartorius.
6. Valves of the heart.
7. Classification of Muscle.
8. Crutch Palsy.

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

1. Achilles tendon.
2. Branches of brachial artery.
3. Formation of Median Nerve.
4. Name the ligaments of knee joint.
5. Lumbricals of hand.
6. Sesamoid of hand.
7. Movement in subtalar joint and muscles responsible for it.
8. Types of bone.
9. Name the branches of Lumbar plexus.
10. Relation of the Kidney.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER I – ANATOMY

Q.P. Code: 802451

Time: Three Hours   **Maximum : 100 Marks**
Answer All questions

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

1. Describe the Hip joint under the following headings:
    (a) Type   (b) Articulation   (c) Ligaments   (d) Movement.
2. Describe the stomach under the following headings: (a) Parts
    (b) External and internal features   (c) Blood supply (d) Applied aspect.
3. Describe the kidney under the following headings: (a) location (b) External
    features   (c) Cross sectional appearance   (d) Blood supply   (e) Applied aspect.

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

1. Intercostal muscles.
2. Median nerve.
3. Gluteus maximus.
4. Movements of shoulder joint.
5. Pericardium.
6. Fibrous joint.
7. Cubital fossa.
8. Conducting system of heart.

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

1. Give three examples of secondary cartilaginous joints.
2. List any three muscles of hamstring group.
3. List three muscles supplied by ulnar nerve.
4. List the parts of large intestine.
5. Name the three major arteries supplying the heart.
6. List the muscles of anterior compartment of leg.
7. List three contents of femoral triangle.
8. List the parts of hip bone.
9. Name the arches of foot.
10. Name any three contents of axilla.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER I – ANATOMY

Q.P. Code: 802451

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. Describe the Small intestine under the following headings: (a) Parts
   (b) External and internal features   (c) Blood supply   (d) Applied aspect.

2. Describe the thoracic diaphragm under the following headings: (a) Origin
   and insertion, (b) nerve supply (c) action (d) openings in the diaphragm.

3. Describe the Shoulder joint under the following headings:
   (a) Type   (b) Articulation   (c) Ligaments   (d) Movement.

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

1. Ligaments of knee.
2. Blood supply of heart.
3. Ulnar nerve.
4. Quadriceps femoris
5. Popliteal fossa.
6. Haversian system of bone.
7. Secondary cartilaginous joints.
8. Triceps brachii.

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

1. List the contents of axilla.
2. List three contents of femoral triangle.
3. Pleural cavity.
4. List three ligaments of hip joint.
5. Adductors of the hip joint.
6. Names three muscles of hand supplied by median nerve.
7. List the parts of stomach.
8. Name the terminal branches of brachial artery.
9. Give three examples of fibrous joints.
10. Pronators of the hand.

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

[AHS 0321]   **MARCH 2021**   **Sub. Code: 2451**
(AUGUST 2020 EXAM SESSION)
BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR (Regulation 2017-2018)
PAPER I – ANATOMY
Q.P. Code : 802451

Time: Three hours   **Answer ALL Questions**   **Maximum: 100 Marks**

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

1. Write about hip Joint.
2. Types of Joints in a human body.
3. Explain anatomy of heart with diagram.

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

1. Significance of the Arches of the foot.
2. Write about Femoral Triangle.
3. Nerve Supply and functions of Urinary Bladder.
4. Axis and Planes of the human Body.
5. Lymphatic drainage of the lower limb.
6. Muscles that originate and insert into the Scapula.
7. Origin, Insertion, Nerve supply and action of Diaphram.
8. Write about Ulnar Nerve.

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

1. Carpal bones.
2. Sesamoid Bone.
3. Cubital Fossa.
4. Elbow Joint.
5. Cartilage.
6. Types of Connective Tissue.
7. Lobes of the lung.
8. Pronation.
9. Tensor Fascia Lata.
10. Interosseous Membrane.

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[AHS 0422]   **APRIL 2022**   Sub. Code: 2451
(FEBRUARY 2021 & AUGUST 2021 EXAM SESSIONS)
BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR (Regulations 2017-2018)
PAPER I– ANATOMY
Q.P NO. 802451

Time: Three Hours   **Answer All questions**   **Maximum : 100 Marks**

I.   **Elaborate on :**   (3X10=30)
1. Describe in detail about Knee joint under the following headings:
   a) Type   b) Articulation   c) Ligaments   d) Movements
   e) Applied anatomy.
2. Describe in detail about Ulnar nerve under the following headings:
   a) Formation   b) Course   c) Branches   d) Applied anatomy.
3. Describe in detail about Right Lung under the following headings:
   a) Borders and surfaces b) Fissures and lobes   c) Applied anatomy.
      Add a note on bronchopulmonary segments.

II.   **Write Notes on :**   (8X5=40)
1. Attachments, nerve supply and action of Diaphragm.
2. Erb's palsy.
3. Classification of bone.
4. Blood supply of heart.
5. External features of stomach.
6. Rotator cuff muscles.
7. Types of synovial joint.
8. Venous drainage of upper limb.

III.   **Short Answers on :**   (10X3=30)
1. List the types of simple epithelium.
2. List the subdivisions of mediastinum.
3. List the cardinal planes of human body.
4. List the muscles attached to the medial border of scapula.
5. List the contents of femoral triangle.
6. Parts of mandible.
7. List the branches of arch of aorta.
8. Types of connective tissue.
9. List the muscles of front of arm.
10. List the contents of inguinal canal, in males.

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B.Sc. PROSTHETICS AND ORTHOTICS
FIRST YEAR
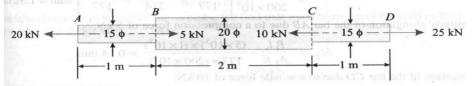## PAPER IV – APPLIED MECHANICS AND STRENGTH OF MATERIALS

Q.P. Code: 802404

Time: Three hours   **Maximum : 100 Marks**

Answer All questions

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

1. A Steel bar ABCD 4m long is subjected to forces as shown in the fig. Find the elongation of the bar. Take E for the steel as 200 Gpa.

2. Find the centre of gravity of a channel section 100mm x 50mm is 15mm thick.
3. Discuss about the control system and its application in Prosthetics & Orthotics.

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

1. What is Mechanics, Statics, Dynamics, Kinematics and Kinetics?
2. State parallelogram and triangle law of forces.
3. Write the different types of stresses with diagram.
4. Define the term 'Factor of safety' and state its significance.
5. Discuss about the different types of loads.
6. State Theorem of Parallel Axis.
7. Difference between Open and Closed Helical Springs with diagrams.
8. Define Ergonomics with relevant example.

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

1. What is Scalar & Vector Quantity?
2. What is Derived Units?
3. What is meant by resultant of force?
4. Define Stress & Strain.
5. Define Poisson's Ratio.
6. What is Cantilever beam?
7. What is Centre of Gravity?
8. What is Moment of Inertia?
9. What is Stiffness of the spring?
10. What is meant by Torque?

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B.Sc. PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER IV – APPLIED MECHANICS AND STRENGTH OF MATERIALS

Q.P. Code: 802404

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. A mild steel rod of 20mm diameter and 300mm long is enclose centrally inside a hollow copper tube of external diameter 30 mm and internal diameter 25 mm. The ends of the rod and tube are brazed together and the composite bar is subjected to an axial pull of 40 kN. If E for the steel and copper is 200 Gpa and 100 Gpa respectively find the stresses developed in the rod and tube. Also find extension of steel rod.

2. Explain about torsion. Derive an expression for torsional stress and strain.

3. A cantilever beam AB 1.8 meter long carries a point load 2.5 kN at its free end and uniformly distributed load of 1kN/m from A to B. Draw the sheer force and bending moment diagram for the beam.

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

1. Equilibrium and its equation.
2. Two like parallel forces 50N and 100N act at the ends of a rod 360mm. Find the resultant force and the point at which it act.
3. Find the CG of T section 100mmx 150mmx30mm T section.
4. Define force and its effects. Find the force which can give a body of mass 100 kg accelerated at 3.5 m/sec ^{2}.
5. Polar moment of inertia.
6. Water pollution and its causes and preventive measures.
7. Control system in prosthetics with example.
8. Elastic limit and hooks law.

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

1. What do you understand by ultimate stress?
2. Find the unit vector of 3i+4j.
3. State Newton's second law.
4. What is volumetric Strain?
5. Explain about deflection of beam.
6. Write briefly on close loop and open loop in control system.
7. Tensile and compressive stress.
8. Angular velocity.
9. Conservation of Energy.
10. Man machine interaction.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER IV – APPLIED MECHANICS AND STRENGTH OF MATERIALS

Q.P. Code: 802404

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. State Hook's Law. Explain stress and strain diagram for tension.
2. A simply supported beam of 3 meter span carries two loads of 5 kN each at 1 meter and 2 meter from left hand support. Draw shear force and bending moment diagram for beam.
3. Explain about moment and moment of inertia. Find the moment of inertia of a rectangular section 30 mm wide and 40 mm deep about X-X axis and Y-Y axis.

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

1. State parallelogram law of forces. Find the resultant of two forces equals to 50N and 100N acting at an angle 30°.
2. What is centre of gravity? Find CG of a I section top flange 100x20 mm web is 200x30mm and bottom flange is 300x40 mm.
3. Angle of friction and co efficient of friction.
4. Ergonomics and its laws.
5. Air pollution and its causes and preventive measure
6. Work and power.
7. A steel rod 1 met long 20mmx20 mm cross section is subjected to tensile force 40kN. Determine elongation of rod if modulus of elasticity 200Gpa.
8. Section modulus.

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

1. Define factor of safety.
2. Differentiate between scalar and vector quantity.
3. Represent vector AB if A and B coordinates are (0,-3) and (2,4)respectively.
4. What is inertia of rest? Give example.
5. Define shear force and bending moment.
6. What is stiffness of a spring?
7. Differentiate between open loop and close loop control system.
8. What you understand by Bio cybernetics?
9. Write down three factors responsible for noise pollution.
10. Define Poisson's ratio.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
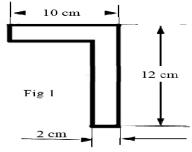## PAPER IV – APPLIED MECHANICS AND STRENGTH OF MATERIALS

Q.P. Code: 802454

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. Find out the position of the centriod of a section, shown in fig 1.

Fig 1

2. Types of Beams and Loads.
3. Parallel and Perpendicular Axis Theorem.

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

1. Triangle Law of Forces and Parallelogram Law of Forces.
2. Principle of Resolution of Forces.
3. Moment of Inertia.
4. Define Friction and its types.
5. A Circular Shaft of 30 mm diameter and length 100 mm is subjected to a axial load of 50 N. Determine the stress in the shaft.
6. Types of Springs.
7. Environmental Pollution.
8. Control System.

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

1. Define Force.
2. Modulus of Elasticity.
3. Buckling.
4. Factor of Safety.
5. Center of Gravity.
6. Shear Force.
7. Bending Moment.
8. Momentum.
9. Leaf Spring.
10. Ergonomics.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER IV – APPLIED MECHANICS AND STRENGTH OF MATERIALS

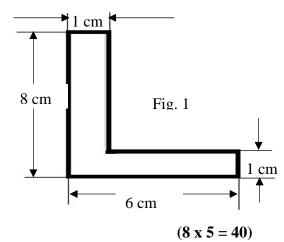*Q.P. Code: 802454*

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. Find out the position of the centriod of a section, shown in fig 1.

2. Open and Close looped Control system.
3. Classification of Springs with neat sketch.

Fig. 1

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

1. State and derive Lami's Theorem.
2. Center of Gravity.
3. Shear Force and Bending Moment.
4. Young's Modulus.
5. Longitudinal Stress and Longitudinal Strain.
6. Find the Horizontal and vertical components of force 100 N inclined at an angle of 30 degree, where cos 30 is 0.8 and sin 30 is 0.5.
7. A Circular Shaft of 50 mm diameter and length 150 mm is subjected to an axial load of 10 KN. Determine the stress induced in the shaft.
8. Noise Pollution.

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

1. Define Stress.
2. Poisson's ratio.
3. Fatigue.
4. Mechanics.
5. Torque.
6. Shear Stress.
7. Moment of inertia.
8. Acceleration.
9. Centroid.
10. Friction.

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

[AHS 0321]   MARCH 2021   Sub. Code: 2454
(AUGUST 2020 EXAM SESSION)
BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR (Regulation 2017-2018)
PAPER IV – APPLIED MECHANICS AND STRENGTH OF MATERIALS
Q.P. Code : 802454

Time: Three hours   Answer ALL Questions   Maximum: 100 Marks

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

1. Stress and Strain Curve
2. With neat sketch, describe the various types of beams with different loads.
3. Control Theory and its applications in Prosthetics and Orthotics.

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

1. Newton's Laws of Motion.
2. State and derive Lami's Theorem.
3. Hooke's Law and Elastic Limit.
4. Determine the stress induced in the circular shaft of the dimensions 20 mm diameter and length 100 mm is subjected to an axial load of 5 KN.
5. Torque, Friction, Moment of Inertia.
6. Safety Factor and Pollution.
7. Open Helical Spring and its diagram.
8. Ergonomics Principles with examples.

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

1. Scalar and Vector Quantity.
2. Force and Force Systems.
3. Strain.
4. Poission's Ratio.
5. Shear Force.
6. Inertia.
7. Bending Moment.
8. Buckling.
9. Control Systems.
10. Noise Pollution.

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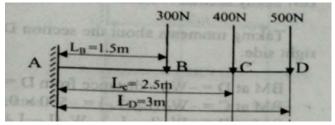**THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY**

[AHS 0422]   APRIL 2022   Sub. Code: 2454
(FEBRUARY 2021 & AUGUST 2021 EXAM SESSIONS)
BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR (Regulations 2017-2018)
PAPER IV – APPLIED MECHANICS & STRENGTH OF MATERIALS
Q.P NO. 802454

Time: Three Hours   Answer All questions   Maximum : 100 Marks

I.   Elaborate on :   **(3X10=30)**

1. Find the Centroid of a channel section 100mm $\times$ 50mm $\times$ 15mm.
2. Explain types of forces with neat sketch.
3. A cantilever beam of length 3m carries the point loads as shown in fig.
    Draw the shear force and Bending moment diagrams for the cantilever
    beam.

II.   Write Notes on :   **(8X5=40)**

1. Triangle law of forces.
2. Define ergonomics with Objectives.
3. Define Equilibrium and its equation.
4. Youngs modulus, rigidity modulus.
5. Define work, Power & energy.
6. Types of Moments.
7. Angle of friction with neat sketch.
8. A steel rod 1m long and 20mm $\times$ 20mm in cross-section is subjected to
    tensile force of 40KN. Determine the elongation of the rod, if modulus
    of elasticity for the rod materials is 200Gpa.

III.   Short Answers on :   **(10X3=30)**
1. Define torque.
2. Volumetric strain.

P.T.O.

3. Factors responsible for noise pollution.
4. Define Buckling.
   P.T.O.
5. Factor of Safety.
6. What is meant by ductile materials?
7. State Parallelogram law of forces.
8. What is meant by column?
9. Explain about closed coil Helical Spring.
10. Define applied mechanics.

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B.Sc. PROSTHETICS AND ORTHOTICS

FIRST YEAR

PAPER VI – BIOMECHANICS - I

Q.P. Code: 802406

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions
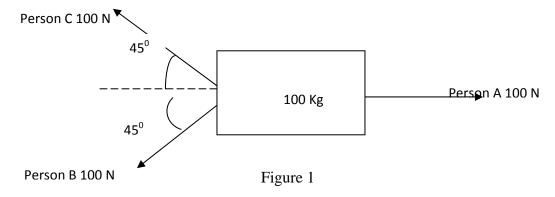
I. Elaborate on: **(3 x 10 = 30)**

1. What is a joint? Discuss structural and functional classification of a Bone.
2. Explain with the help of a diagram, kinematics of hip joint during one gait cycle.
3. How many rockers are present in one gait cycle? Explain them with the help of a labeled range of motion graph.

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

1. Why is skin preparation needed before you record surface EMG?
2. What is whip? Discuss the reasons for whip in trans femoral prosthesis user.
3. Discuss third law of motion by citing an example?
4. Draw a labeled diagram and explain load deformation curve for connective tissue.
5. What do you understand by eccentric contraction of a muscle? Explain with an example.
6. Explain stress relaxation with an example?
7. Define degree of freedom? How many degrees of freedom does hip joint have? Show them with the help of diagram.
8. A block of mass 100 Kg in weight, tied to a string is pulled by three persons A, B and C in the directions as shown in the fig 1. What will be the resultant force acting on the mass and what will be its direction?

Person C 100 N

45^0

45^0

100 Kg

Person A 100 N

Person B 100 N   Figure 1

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

1. Define Energy. What is its SI unit and dimension?

2. Is velocity a vector or a scalar quantity? Justify with an example.

3. What is osteokinematics?

4. What is the advantage of instrumental gait analysis over conventional video gait analysis?

5. Write short notes on biomechanics of Symes prosthesis. Explain with the help of a diagram.

6. If a trans femoral prosthetic user exerts 750 N against the ground during push off phase of the gait. How much force will the ground exerts on the person? Assume the weight and height is 62Kg and 160cm respectively.

7. Consider the partial knee illustrated in the figure 2. The forces applied by quadriceps F_Q =10 N and patella tendon Fp = 10 N respectively. Calculate the magnitude and direction of the resultant force on the patella due to forces applied by quadriceps and patella tendon.
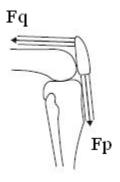

Figure 2

8. In which plane will you record movement of medial and lateral rotation of pelvis? Draw the corresponding plane showing this movement.

9. What do you mean by concurrent forces? Comment on the direction of resultant force if two concurrent forces are acting on a object in opposite direction?

10. Name the different arches of foot?

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER VI – BIOMECHANICS - I

Q.P. Code: 802406

Time: Three hours   **Maximum : 100 Marks**

Answer All questions

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

1. What are connective tissues? Discuss their mechanical properties?
2. Explain with the help of a diagram, kinematics of ankle joint during one gait cycle.
3. How many arches are present in the foot? What are their functions?

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

1. Discuss advantages and disadvantages of surface EMG recording over needle EMG?
2. What is vaulting? Discuss the reasons for vaulting in a transfemoral prosthesis user.
3. Discuss first law of motion by citing an example?
4. Draw a labeled diagram and explain force elongation curve for connective tissue.
5. What do you understand by concentric contraction of a muscle? Explain with an example.
6. Explain creep with an example?
7. Define degree of freedom? How many degrees of freedom does hand have? Show them with the help of diagram.
8. Consider a weight lifter performing an exercise (Fig. 1) to strengthen the biceps muscle, which is located at a distance of a=1 cm from elbow joint. Assume that combined center of mass of hand and weight is 100 N and is located at a distance of b=7.5 cm from the elbow joint O. If the hand is held in horizontal position as shown in the figure. Calculate the mechanical advantage if it is class 2 lever system. What will be the direction of movement of the hand?
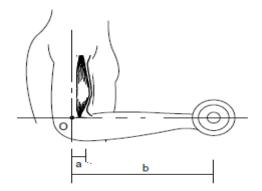

Figure 1

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

1. Define work. What is its SI unit and dimension?

2. Is acceleration a vector or a scalar quantity? Justify with an example.

3. What is hypomobility of a joint?

4. What is the purpose of recording EMG while performing gait analysis?

5. What are the different types of foot amputations? Briefly describe the biomechanics of a prosthesis given for mid foot amputation? Draw diagram.

6. Consider the partial knee illustrated in the figure 2. The forces applied by quadriceps F_Q =12 N and patella tendon F_p = 5 N respectively. Calculate the magnitude and direction of the resultant force on the patella due to forces applied by quadriceps and patella tendon.
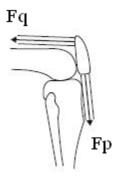

Figure 2

7. If a trans tibial prosthetic user exerts 700 N against the ground during push off phase of the gait, how much force will the ground exert on the person? Assume the weight and height is 63Kg and 165cm respectively.

8. In which plane will you record movement of abduction and adduction of shoulder or leg? Draw the corresponding plane showing this movement.

9. What do you mean by concurrent forces?

10. Why do you need conductive gel for surface EMG recording?

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER V – BIOMECHANICS - I

Q.P. Code: 802455

Time: Three Hours   **Maximum : 100 Marks**
Answer All questions
I. Elaborate on: **(3 x 10 = 30)**

1. Explain and draw the following plane:
   (a) Sagittal plane movements   (b) Frontal plane movements
   (c) Transverse plane movements
2. Explain with the help of a diagram, kinematics of knee joint during one gait cycle.
3. What is EMG? How is it recorded? Discuss advantages and disadvantages of surface EMG recording over needle EMG?

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

1. Plantar arches and their functions.
2. Explain degree of freedom.
3. Explain parallel and concurrent force system.
4. Discuss advantages and disadvantages of surface EMG recording over the needle EMG.
5. What is whip? Discuss the reasons for whip in Trans femoral prosthesis user.
6. Discuss third law of motion by citing an example?
7. Draw a labelled diagram and explain load deformation curve for connective tissue.
8. What do you understand by eccentric contraction of a muscle? Explain with an Example.

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

1. What is hypo mobility of joint?
2. How many arches are present in foot name them?
3. What is force platform?
4. Define energy. What is its SI unit and dimension?
5. Is velocity a vector or a scalar quantity? Justify with an example.
6. What is osteokinematics?
7. What is the advantage of instrumental gait analysis over conventional video gait?
8. Explain joint reaction forces.
9. Write short notes on biomechanics of syme's prosthesis. Explain with the help of a diagram.
10. Name the different arches of foot.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER V – BIOMECHANICS - I

Q.P. Code: 802455

Time: Three Hours   **Maximum : 100 Marks**
Answer All questions

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

1. Explain normal human locomotion in details
2. Explain the classification of levers using appropriate figures and examples.
3. Explain biomechanics of ankle joint during gait cycle.

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

1. Explain parallel and concurrent force system.
2. Why is skin preparation needed before you record surface EMG?
3. Draw a labeled diagram and explain load deformation curve for connective tissue.
4. Explain three point force principle and give any one orthotic example.
5. Explain strain rate sensitivity with an example.
6. State the laws of motion with examples.
7. Define degree of freedom? How many degrees of freedom does hip joint have? Show them with the help of diagram.
8. What do you understand by eccentric contraction of a muscle? Explain with an example.

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

1. Define Energy. What is its SI unit and dimension?
2. What is force platform?
3. Differentiate Kinematics and kinetics.
4. Describe the biomechanics of Syme's prosthesis with diagram.
5. What is hypermobility of a joint?
6. Define Cadence.
7. Describe the concept of free body diagram.
8. Define motion and explain the types of motion.
9. Define tendon and ligament. Give one function for each.
10. Define stability and instability.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER V – BIOMECHANICS - I

Q.P. Code: 802455

Time: Three Hours　　　　　　　　　　　**Maximum : 100 Marks**

Answer All questions

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

1. What are the types of muscles in the body? What do you understand by eccentric contraction of a muscle? Explain with an Example and draw diagrams.
2. Write down the properties of specific tissues with in the human joints and brief.
3. Explain with the help of a diagram, kinematics of knee joint during one gait cycle.

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

1. Explain degree of freedom.
2. State the law of motion with example.
3. Draw a labelled diagram and explain stress strain curve for connective tissue.
4. Explain three point force principle and give any one orthotic example.
5. Draw and explain the anatomical planes.
6. EMG, its recording and its applications.
7. Tensile forces with examples.
8. Factors determining the active tension in the muscle.

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

1. Explain Joint reaction forces.
2. What is Force platform?
3. What are concurrent forces?
4. What is vaulting?
5. What is pistoning effect?
6. Is displacement a vector or scalar quantity? Justify with an example.
7. Define Velocity and Acceleration.
8. Define motion and explain the types of motion.
9. Define terms Kinesiology and Biomechanics.
10. Name the different arches of foot?

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[AHS 0321]　　　　　**MARCH 2021**　　　　**Sub. Code: 2455**
(AUGUST 2020 EXAM SESSION)
BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR (Regulation 2017-2018)
PAPER V – BIOMECHANICS I
Q.P. Code : 802455

Time: Three hours　　　**Answer ALL Questions**　　　**Maximum: 100 Marks**

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

1. Explain about the various types of tissues in the body and list their properties.
2. Explain the different types of levers using examples
3. Write in detail about the kinematics of ankle joint during gait cycle

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

1. What is EMG? Write about its uses.
2. What is kinetics? Explain in detail.
3. Write about the degrees of freedom.
4. How does the centre of gravity play a role in the stability of human body?
5. How is elasticity beneficial in the human body?
6. Explain about parallel force system.
7. Write about joint hypomobility.
8. Biomechanics of Symes prosthesis.

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

1. What is acceleration?
2. Define energy? Give examples of types of energy
3. Connective tissue
4. List arches of foot
5. Write about the first law of motion
6. List types of human joints
7. Types of muscle contraction
8. What is vaulting?
9. What is mechanical advantage?
10. Explain the term "Medial".

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THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY
[AHS 0422]   APRIL 2022   Sub. Code: 2455
(FEBRUARY 2021 & AUGUST 2021 EXAM SESSIONS)
BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR (Regulations 2017-2018)
PAPER V – BIOMECHANICS I
Q.P NO. 802455

Time: Three Hours   **Answer All questions**   **Maximum : 100 Marks**

I.   **Elaborate on :**   (3X10=30)

1. Explain the biomechanics of Transtibial Prosthesis?
2. How many rockers are present in one gait cycle? Explain them with the help of a labeled range of motion graph.
3. Explain the classification of levers using appropriate figures and examples.

II.   **Write Notes on :**   (8X5=40)
1. Discuss the biomechanics involved in Hallux Valgus
2. Discuss about stride parameters.
3. Define EMG. Explain EMG study & recording.
4. Discuss the Bench alignment of transtibial prosthesis, with reference to stability.
5. What are the properties of skeletal tissues?
6. Draw diagrams showing the three planes of body and state the movements taking place in each plane.
7. Write short notes on biomechanics of Floor Reaction Orthosis. Explain with the help of a diagram.
8. Define the following with examples:
     a) Creep b)Elasticity c)Moment of inertia d)Ductility e) Torque

III.   **Short Answers on :**   (10X3=30)
1. Define Centre of Gravity and its location in human body, at double stance phase of gait cycle.
2. Define speed, velocity and acceleration with basic empirical formulae.
3. What is hypomobility of a joint?
4. Define Energy. What is its SI unit and dimension?
5. Muscle work and its types.
6. What is the advantage of instrumental gait analysis over conventional video gait?
7. Explain joint reaction forces.
8. What is force? Discuss balanced & unbalanced forces.
9. Name the different arches of foot & explain it.
10. Define base of support.

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B.Sc. PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER V – ENGINEERING DRAWING

Q.P. Code: 802405

Time: Three hours   **Maximum : 100 Marks**

Answer All questions

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

1. Below fig. shows the sectional view of Double action ankle joint. Draw the same in full size (1 : 1 size)

 A= 20 mm; B= 6 mm; D= 9mm and R= 15 mm

2. Draw Involute of circle of radius 30 mm.

3. Write the following sentence in single stroke vertical letters in ratio of 4:6.

RESIDUAL LIMB SOCKET INTERFACE

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

1. Draw conventional representation of the following:-
    a) I section
    b) Spiral spring
    c) External Screw thread

2. Explain with the help of neat sketch what is offset section?

3. Draw free hand proportionate sketch of Counter sunk headed screw.

4. Draw the half sectional front view and side view of a flexible coupling having shaft diameter is 45 mm.

5. Sketch a pin type flexible coupling.

6. Represent two views of hexagonal nut and square nut with proportions and dia of bolt as 30mm.

7. Construct an isometric scale.

8. Draw the symbols for the following:-
   a) Fillet weld
   b) Spot weld
   c) Seam weld

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

1. What is difference between pitch and lead?

2. Mention various types of bearings?

3. Write any 4 difference between 1st angle projection and third angle projection.

4. Define engineering drawing. Why drawing is called universal language of engineers?

5. What are the standard sizes of drawing sheets according to I.S.I. and which is suitable for drawing work?

6. What is a scale?

7. What is the representative fraction (R.F.) or scale factor (S.F.)?

8. What is the difference between a quadrilateral and a polygon?

9. What is an auxiliary view?

10. What do you mean by Frustum?

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B.Sc. PROSTHETICS & ORTHOTICS

FIRST YEAR

PAPER V – ENGINEERING DRAWING

Q.P. Code: 802405

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. Draw the plan and elevation of the object given below. All the dimensions are in mm.

2. Construct a cycloid of generating circle diameter 60 mm Draw a tangent at any point on the curve.

3. Briefly explain about all the drawing instruments with their use.

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

1. Show the lay out of drawing sheet.

2. Write different type of machine drawing and its use.

3. Construct a plane Scale 1:250 to measure up to 40 meter and measure a distance of 27 meter on scale.

4. Draw the involute of a circle of radius 30 mm.

5. What you mean by Plan and elevation?

6. Draw the isometric view of cone of base diameter 40 mm and height 60 mm.

7. Draw the plan and elevation of single riveted butt joint of rivet dia is 15 mm.

8. Draw three views of hexagonal headed bolt 24mm dia and 100mm long.

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

1. List out the different type of scales.

2. What is dimensioning? Describe the terms used.

3. Write down the use of set square.

4. Define orthographic projection.

5. Divide a line of length 125 mm into seven equal parts.

6. Draw a free hand sketch of shaft coupling.

7. Describe about screw tread.

8. Draw the sketch of flanged nut.

9. Sketch three types of rivet head.

10. Draw sketch of coupling used in prosthesis.

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BACHELOR IN PROSTHETICS & ORTHOTICS

FIRST YEAR

PAPER V – ENGINEERING DRAWING

Q.P. Code: 802405

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. Draw the plan and elevation of the object given below. All the dimensions are in mm.

2. Draw the isometric view of Square pyramid of base 25 mm side axis 60 mm and one of the side is parallel to VP.

3. A line AB is 75 mm long is inclined at 30 degree to HP and 45 degree to VP. Its end A is 25 mm above HP and 15 mm in front of VP. Draw its projection.

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

1. What is "title box"? Draw and write particulars of title box.

2. Explain about Five type of lines with its use.

3. Construct a Scale 1: 400 to show meters and long enough to measure up to a distance of 44 meter.

4. Construct a ellipse whose major axis is 120 mm and minor axis is 80 mm.

5. Differentiate between Orthographic and Isometric Projection.

6. Draw three views of Hexagonal nut.

7. Write different forms of bolt.

8. Describe about welding process and its types.

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

1. What is RF in Scale?

2. Show the parts of Drafting Machine and its use.

3. What is French curve?

4. A point P is 30 mm above HP and 40 mm in front of VP. Draw projection.

5. Draw the diagram of Square head bolt.

6. What is the pitch of screw thread?

7. Write down the types of welded joint.

8. Draw the sketch of Auxiliary crutch.

9. Define oblique projection.

10. What do you understand by "tolerance"?

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B.Sc. PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER VIII – ORTHOTICS – I

Q.P. Code: 802408

Time: Three hours   **Maximum : 100 Marks**

Answer All questions

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

1. Explain in detail about Tracing, Measurement and Layout for Metallic Ankle Foot Orthosis.
2. Give a brief classification of various types of Foot Orthosis and describe those in details.
3. Explain the Biomechanical force system in Plastic Ankle Foot Orthosis.

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

1. Function and indication of Fracture Bracing.
2. What is Charcot Foot and explain its orthotic management?
3. Explain about klenzak orthotic ankle joint.
4. Explain in detail Valgus and Varus strap.
5. Differentiate between Weight bearing and Weight relieving Orthosis.
6. What are the different types of Arch support? Draw neat sketches.
7. Draw and explain about different types of stirrup.
8. Explain trimlines of plastic ankle foot Orthosis with diagram.

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

1. Write a short note on Flanger AFO.
2. AFO can be explained as a Cantilever Beam. Justify.
3. Write a short note on Thomas heel.
4. What are the Clinical Objectives of Orthotic Fitment?
5. Write about Pes cavus deformity and its Orthotic management.
6. What do you mean by Corrective Forces in Orthosis?
7. What is Calcaneal spur and explain its management?
8. Write a note on Foot drop Conditions.
9. Briefly explain the types of shoe.
10. What is code of Ethics?

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BACHELOR IN PROSTHETICS & ORTHOTICS
FIRST YEAR
PAPER VIII – ORTHOTICS – I

Q.P. Code: 802408

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. Orthotic Prescription criteria and Principles.
2. Describe about various type of ankle joint and its indication.
3. Describe with a neat labeled diagram of shoe and their parts.

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

1. UCBL.
2. Various materials used in Orthotics.
3. Different types of shoes and it functions.
4. Various types of mechanical Ankle joints with one example to each.
5. Bio Mechanics of Ankle foot orthosis.
6. Weight distribution on normal foot.
7. Write on Shoe last, its types and functions.
8. Congenital talipes equinovarus.

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

1.   What is the function of arch support and metatarsal pad?
2.   How Orthotic ankle joint aligned with anatomical ankle joint?
3.   What is Calcaneal spur? Write about its footwear modification.
4.   When you will prescribe limited motion ankle joint?
5.   Write about Pes cavus deformity and its Orthotic management.
6.   Draw the Measurement of Calf Band.
7.   Explain 3-point force system.
8.   How lower limb orthoses are nomenclatured?
9.   What are the roles of an Orthotist?
10. Explain T - Strap.

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BACHELOR IN PROSTHETICS & ORTHOTICS

FIRST YEAR

PAPER VIII – ORTHOTICS – I

Q.P. Code: 802408

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. Congenital Talipes Equinovarus and its orthotic Management.
2. Foot Orthosis and its types.
3. Explain any three types of Ankle Foot Orthosis.

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

1. Differentiate Internal and External shoe modification.
2. What is Shoe last and its function? What are the different types of Shoe Last?
3. Explain Supra Malleolar Orthosis and its prescription criteria.
4. Articulated Ankle foot orthosis indication and contraindication.
5. Explain leaf spring ankle foot orthosis.
6. Explain the mechanism of double action assist orthotic ankle joint.
7. Explain Denis Browne splint with neat sketches.
8. Explain various fabricating materials used in lower Orthotics.

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

1. Functions of medial longitudinal arch.
2. Explain Valgus strap.
3. What are the Objectives of Foot Orthosis?
4. Explain Shoe Upper and its parts.
5. Define eversion movement of the foot.
6. Indication to prescribe the Dorsiflexion assist ankle joint.
7. Write a short note on Metatarsal Pad.
8. Write a note on limb length discrepancy.
9. Draw a neat labeled sketch of Hemi spiral AFO.
10. Define Windlass mechanism of the foot.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER VIII – ORTHOTICS SCIENCE - I

Q.P. Code: 802458

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. Explain about different types of Ankle foot orthosis.
2. Briefly explain about different types of shoes.
3. Explain about foot orthosis and types.

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

1. Charcot foot and its Orthotic management.
2. Congenital talipes equino varus.
3. Shoe last, its type and function.
4. Bio Mechanics of Ankle foot orthosis.
5. Explain Denis Browne splint with neat sketches.
6. Explain the mechanism of double action assist orthotic ankle joint.
7. Briefly describe Diabetic foot conditions and outline its orthotic management.
8. Explain Supra Malleolar Orthosis and its prescription criteria.

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

1. Functions of medial longitudinal arch.
2. Placement of medial longitudinal arch support.
3. Explain Valgus strap.
4. Explain plantar flexion stop ankle joint.
5. Explain Shoe Upper and its parts.
6. Define eversion movement of the foot.
7. Indication to prescribe the Dorsiflexion assist ankle joint.
8. Functions of Metatarsal Pad.
9. Functions of Thomas heel.
10. Define Windlass mechanism of the foot.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER VIII – ORTHOTICS SCIENCE - I

Q.P. Code: 802458

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. Draw and explain the various types of ankle joint used in Ankle foot orthosis.
2. Explain different types of rocker modifications and functions.
3. Orthotic Prescription criteria and Principles.

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

1. Short notes of UCBL.
2. Various materials used in Orthotics.
3. Internal and External Shoe Modifications. And examples.
4. Various types of Mechanical Ankle joints with one example of each.
5. Differentiate Internal and External shoe modification.
6. Short notes of supra malleolar orthosis.
7. Explain any three footwear modifications.
8. Articulated Ankle foot orthosis indication and contraindication.

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

1. How you measure foot pressure. Explain?
2. Define Leg Length discrepancy.
3. What are the objectives of Orthotics Prescription?
4. Explain T - Strap.
5. Write a short note on Metatarsal Pad.
6. What are the roles of an Orthotist?
7. How lower limb orthoses are nomenclatured?
8. What are the different types of Arch support?
9. Explain 3-point force system.
10. Draw the Measurement of Calf Band.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER VIII – ORTHOTICS SCIENCE - I

Q.P. Code: 802458

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. Explain different types of rocker modifications and functions.
2. Congenital Talipes Equino Varus and Its orthotic Management.
3. Draw and explain the various types of ankle joint used in Ankle foot orthosis.

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

1. Explain any three footwear modifications.
2. Short notes of Hemi spiral Ankle foot orthosis.
3. Short notes of supra malleolar orthosis.
4. Explain the placement procedure of mechanical ankle joint.
5. Shoe modification for Calcaneal Spur.
6. Define Pes cavus and orthotic management.
7. Define Orthotist, orthotics and orthosis.
8. Conventional AFO and function.

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

1. When you will prescribe limited motion ankle joint?
2. Hammer toe and claw toe.
3. What is the function of arch support and metatarsal pad?
4. How you measure foot pressure. Explain?
5. Stirrup and types.
6. Foot drop.
7. Explain Valgus strap.
8. Write a note on limb length discrepancy.
9. Explain Denis Browne splint.
10. Explain 3-point force system.

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Time: Three hours   Answer ALL Questions   Maximum: 100 Marks

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

1. Explain about AFO fabrication procedure.
2. Explain about common below knee fracture and its orthotic management.
3. Explain about types of ankle joint.

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

1. Differentiate solid AFO with articulated AFO.
2. Define Orthotist, orthotics and orthosis.
3. Conventional AFO and function.
4. Define Thomas heel and reverse Thomas heel with function.
5. UCBL orthosis with biomechanical function.
6. Explain about objectives of orthosis.
7. Explain Dennis Browne splint and shoes with function.
8. Define Pes cavus and orthotic management.

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

1. Plantar pressure of foot.
2. Hammer toe and claw toe.
3. Function of anatomical arch support.
4. Draw neat diagram of orthopedic shoes with labeled parts.
5. Anesthetic foot.
6. Define Metatarsal algia and orthotic management.
7. Foot drop.
8. Stirrup and types.
9. CTEV AFO features.
10. Orthotic management for LLD.

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B.Sc. PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER II – PHYSIOLOGY
Q.P. Code: 802402

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. List the various constituents of blood. What are the functions of blood?
2. With the help of a diagram, describe the structure of a neuron. List the different neuroglial cells seen in the nervous system along with their functions.
3. With a help of a diagram, describe the various lung volumes and capacities.

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

1. What is an ECG? Draw and label the waves in a normal ECG.
2. What is the normal blood pressure? Mention some causes where the blood pressure can vary from the normal value.
3. List the functions of insulin and glucagon.
4. Describe the steps in transmission across the neuromuscular junction.
5. Describe the micturition reflex.
6. List the different functions of skin.
7. What is meant by active transport and passive transport? Give examples of each.
8. Describe the monosynaptic stretch reflex.

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

1. Define cardiac output. List two factors affecting cardiac output.
2. What is hypoxia? List two conditions causing hypoxia.
3. List the muscles involved in inspiration and expiration.
4. Classify body fluid compartments.
5. What is erythrocyte sedimentation rate (ESR)?
6. What is Diabetes Mellitus? List some clinical features of this disease.
7. What is muscle fatigue? What are the possible causes?
8. Draw and label the action potential of a neuron.
9. What is a cystometrogram?
10. What is the pacemaker of the heart? How is the impulse from the pacemaker conducted in the heart? (conducting system of the heart)

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B.Sc. PROSTHETICS & ORTHOTICS
FIRST YEAR
PAPER II – PHYSIOLOGY

Q.P. Code: 802402

Time: Three hours   **Maximum : 100 Marks**
Answer All questions

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

1. Draw a labeled diagram of a cell. List the various organelles present and write one function of each of them.
2. List the hormones produced by the pancreas. Describe the action of the hormone insulin. What is diabetes mellitus?
3. Describe the different phases of the cardiac cycle. Add a note on the heart sounds.

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

1. Describe the process of coagulation of blood.
2. Describe the structure of the neuromuscular junction with the help of a diagram.
3. Describe the conducting system of the heart.
4. With the help of a diagram describe the different lung volumes and capacities.
5. Describe the differences between an Upper Motor Neuron lesion and a Lower Motor Neuron Lesion.
6. List the functions of the hypothalamus.
7. Describe the Micturition reflex.
8. Describe the structure and function of Red Blood Cells.

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

1. List the functions of Skin.
2. Define the terms dyspnoea and orthopnoea.
3. What is meant by the term Resting Membrane Potential?
4. What is a cystometrogram?
5. List the muscles of inspiration and expiration.
6. Describe the features of cardiac muscle.
7. List the functions of the cerebellum.
8. What is meant by the term Erythrocyte Sedimentation Rate (ESR)? Mention the Normal value of ESR.
9. Explain the terms active transport and passive transport.
10. List the functions of the respiratory System.

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BACHELOR IN PROSTHETICS & ORTHOTICS
FIRST YEAR
PAPER II – PHYSIOLOGY

Q.P. Code: 802402

Time: Three hours   **Maximum : 100 Marks**
Answer All questions

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

1. List the different White blood cells present in the blood and list the functions of each cell. What is meant by the term immunity?
2. Anatomy of a neuron with a labeled diagram of a neuron. What is meant by the term Resting Membrane Potential?
3. With a help of a diagram, describe the different lung volumes and capacities.

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

1. With the help of a diagram, describe the normal ECG.
2. Describe the secretion and functions of insulin. Add a note on diabetes mellitus.
3. Describe the micturition reflex.
4. Describe how a nerve impulse is conducted across the neuro muscular junction.
5. Define the term cardiac output. What are the factors that affect cardiac output?
6. List the different ascending tracts in the body. Describe the pathway for pain.
7. List the various organelles in the cell and write down one function of each.
8. What is the normal blood pressure? What are the factors that affect blood pressure? Add a note on hypertension.

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

1. Describe the structure of skin.
2. List the different transport mechanisms across the cell membrane.
3. List some common plasma proteins and their functions.
4. List the functions of platelets.
5. List the actions of glucagon.
6. Describe the structure of smooth muscle. Where is it found in the body?
7. What is a cystometrogram?
8. What is meant by the term hypoxia? List two conditions when hypoxia can be seen.
9. What is meant by muscle fatigue? What are its possible causes?
10. Define the terms apnoea and tachypnoea.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER II – PHYSIOLOGY

Q.P. Code: 802452

Time: Three Hours   **Maximum : 100 Marks**
Answer All questions

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

1. With the help of a diagram, describe the structure of a neuron. List the parts of the nervous system. List the functions of the nervous system.
2. What is meant by coagulation of blood? Briefly describe the pathways of clotting.
3. Describe the mechanism of carbon di oxide and oxygen transport in the blood.

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

1. Describe the mechanics of breathing.
2. List the composition and functions of blood.
3. Describe the features of an upper motor neuron (UMN) lesion.
4. What is the normal blood glucose level? Describe how insulin and glucagon maintain blood glucose levels?
5. What is meant by cardiac output? Describe the factors affecting cardiac output.
6. Describe the various events in the cardiac cycle.
7. Describe the pathway for pain. What is meant by referred pain?
8. Describe the micturition reflex.

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

1. Describe the function of the: (a) endoplasmic reticulum (b) mitochondria
2. What is meant by Packed Cell Volume (PCV)? What is the normal value of the PCV?
3. What is a meant by the term reflex? What are the parts of a reflex arc?
4. What is meant by muscle tone?
5. What is the pacemaker of the heart? Where is it located?
6. List the functions of skin.
7. List the properties of cardiac muscle.
8. What is muscle fatigue?
9. List the functions of the Cerebellum.
10. What is a motor unit?

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER II – PHYSIOLOGY

Q.P. Code: 802452

Time: Three Hours **Maximum : 100 Marks**
Answer All questions

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

1. Describe the neuro muscular junction. Describe how the nerve impulse crosses the neuro muscular junction?
2. Describe the conducting system of the heart. What is the normal heart rate? Describe factors that regulate the heart rate.
3. Describe the structure and function of the Red Blood Cell. What is the normal RBC count? What is meant by anemia? List three causes of anemia.

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

1. Describe the various lung volumes and capacities.
2. Describe the action potential of a neuron.
3. List the different neuroglia found in the body and their functions.
4. Describe the properties of cardiac muscle. What are the special features of cardiac muscle?
5. Describe the different phases of the cardiac cycle.
6. List the hormones produced by the pancreas and their functions.
7. List the different lobes of the cerebral cortex. What are the main functions of these lobes?
8. Describe the micturition reflex.

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

1. What is meant by the term Osmosis?
2. List the different body fluid compartments.
3. How does the skin help in skin in temperature regulation?
4. What is the function of the following organelles in a cell:
    (a) Mitochondria   (b) Lysosome
5. What is muscle fatigue? Why does it occur?
6. Draw and label the normal ECG.
7. What is meant by the terms : (a) Apnoea (b) Hyperpnoea
8. List the muscles of inspiration and expiration.
9. List the functions of plasma proteins.
10. List the functions of the hypothalamus.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER II – PHYSIOLOGY

Q.P. Code: 802452

Time: Three Hours   **Maximum : 100 Marks**

Answer All questions

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

1. List the different descending tracts. Describe the origin, course, termination and functions of the pyramidal tracts.
2. Describe the various events that occur during the cardiac cycle.
3. With the help of a diagram, describe the different lung volumes and capacities.

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

1. Describe the mechanics of breathing.
2. What is an action potential? Describe with a diagram.
3. Describe the structure of skeletal muscle.
4. Describe the different mechanisms of transport across the cell.
5. List the different White blood cells (WBCs) with their functions.
6. Describe the micturition reflex.
7. Describe the action of insulin. Add a note on Diabetes mellitus.
8. Describe the functions of skin.

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

1. List the functions of the kidney.
2. List the functions of the cerebellum.
3. What is meant by the following terms?
   (a) Apnoea   (b)   Tachypnoea
4. What is hypertension?
5. What is the normal RBC count?
6. What are the functions of platelets?
7. What is meant by muscle fatigue?
8. What is meant by anemia? Give two causes.
9. What is referred pain?
10. What is lymph? What are the functions of lymph?

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER II – PHYSIOLOGY

Q.P. Code: 802452

Time: Three Hours   **Maximum : 100 Marks**
Answer All questions

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

1. Describe in brief the mechanism by which coagulation (clotting of blood) occurs?
2. What is a reflex? Describe the reflex arc. What are monosynaptic and polysynaptic reflexes? What are superficial reflexes?
3. Describe the secretion, action and regulation of insulin. Add a note on diabetes mellitus.

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

1. Describe the different types of neuroglia and their functions.
2. Describe the transmission of a nerve impulse across a synapse.
3. Describe the composition and functions of lymph.
4. Describe the structure and function of the kidney.
5. Describe the normal electrocardiogram (ECG) with the help of a diagram.
6. Describe the mechanics of breathing. List the muscles of inspiration and expiration.
7. Describe the functions of the lung.
8. Describe the functions of skin.

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

1. What is meant by
   (a) Tactile localization   (b) Stereognosis
2. Define cardiac output.
3. Define the term vital capacity.
4. What is meant by the term "pacemaker of the heart"?
5. Describe the features of cardiac muscle.
6. List the different body fluid compartments.
7. What is meant by the terms active transport and passive transport?
8. What is a cystometrogram?
9. Describe the function of the following
   (a) Mitochondria   (b) Endoplasmic reticulum
10. Explain the cause of the first and second heart sound.

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

[AHS 0321]   MARCH 2021   Sub. Code: 2452
(AUGUST 2020 EXAM SESSION)
BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR (Regulation 2017-2018)
PAPER II – PHYSIOLOGY
Q.P. Code : 802452

Time: Three hours   Answer ALL Questions   Maximum: 100 Marks

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

1. List the various ascending sensory tracts and describe the pathway for pain.
2. With the help of a diagram, describe the structure of the cell.
3. What are the different white blood cells present in the blood and what are their functions? What is immunity?

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

1. Describe the micturition reflex.
2. What is hypoxia? What are the different types of hypoxia? How can this be treated?
3. Describe the conducting system of the heart.
4. What is the normal value of blood pressure? What are the factors that determine blood pressure?
5. Describe the functions and actions of insulin.
6. Describe how oxygen and carobon-dioxide are transported in the blood?
7. Describe the structure and function of skin.
8. Describe an action potential with the help of a diagram.

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

1. List the functions of the hypothalamus.
2. Define muscle tone.
3. What is meant by the following terms?
   (a) Dyspnea   (b) Orthopnea
4. What is the effect of the sympathetic and parasympethic nervous system on the heart?
5. What is the normal RBC count?
6. What are the functions of platelets?
7. What is meant by packed cell volume (PCV)?
8. What is meant by the term Resting Membrane Potential (RMP)?
9. List the different body fluid compartments.
10. List the functions of the kidney.

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

[AHS 0422]   **APRIL 2022**   **Sub. Code: 2452**
(FEBRUARY 2021 & AUGUST 2021 EXAM SESSIONS)
BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR (Regulations 2017-2018)
PAPER II – PHYSIOLOGY
Q.P NO. 802452

Time: Three Hours   **Answer All questions**   **Maximum : 100 Marks**

I.   Elaborate on :   **(3X10=30)**

1. What is a Synapse? Write a note on classification of Synapse and Synaptic transmission.
2. Write in detail about the regulation of secretion of Insulin and Glucagon. Add a note on Diabetes Mellitus.
3. Explain with the help of a neat diagram about the physiological anatomy and nervous connections of Bladder. Briefly explain the Micturition reflex.

II.   Write Notes on :   **(8X5=40)**

1. Write about the composition of different body fluid compartments.
2. List the functions of plasma proteins .
3. Write a note on Resting Membrane Potential.
4. With a diagram explain the Conducting system of heart.
5. Explain Lung Volumes.
6. Functions of Cerebellum.
7. Write a note on Hemisection of Spinal cord.
8. Describe the various events in Cardiac cycle.

III.   Short Answers on :   **(10X3=30)**

1. What is meant by Erythrocyte Sedimentation Rate (ESR)? What is its normal value?
2. What is Hypoxia?
3. Define Arterial Blood Pressure and write its normal value.
4. List the properties of cardiac muscle.
5. Describe an Action Potential.
6. What are the functions of Blood?
7. Define the term - Hypotonia and Hypertonia.
8. What are the different types of Memory?
9. Write about Intraplueral Pressure.
10. What is meant by Stereognosis and name the pathway for it.

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B.Sc. PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER III – MATERIAL AND WORKSHOP TECHNOLOGY

Q.P. Code: 802403

Time: Three hours   **Maximum : 100 Marks**

Answer All questions

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

1. Lathe Machine and its various operations.
2. Classification of Wood and Different types of wood joints.
3. Types of Fiber Reinforced Plastics and Properties of Carbon Reinforced Plastics.

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

1. Operation of Tensile testing machine.
2. Various stages involved in Case Hardening of steels.
3. Drilling machine and its operations.
4. Processing of Fiber reinforced plastic using Pultrusion method.
5. Explain about Polypropylene and its uses.
6. Environmental Hazards of using Plastics.
7. Operation of Drilling Machine.
8. Types of Vice used in P & O Workshop.

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

1. Difference between Ferrous and Non-ferrous Metals.
2. Different types of metals used in P & O.
3. Properties of Aluminum.
4. What is soldering?
5. What is the Chemical formula of plaster of Paris?
6. List few Wood working tools.
7. What is Vegetable tanning process?
8. Define Viscoelastic behavior of plastic.
9. What is the use of Power hacksaw?
10. What is the need of Hot air oven in P & O application?

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B.Sc. PROSTHETICS & ORTHOTICS
FIRST YEAR
PAPER III – MATERIAL AND WORKSHOP TECHNOLOGY

Q.P. Code: 802403

Time: Three hours   **Maximum : 100 Marks**

Answer All questions

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

1. Operation of Drilling Machine and its uses.
2. Properties and uses of Polypropylene.
3. Different types of cutting tools used in P & O application.

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

1. Operation of grinding machine.
2. Various stages involved in annealing of metals.
3. Thermosetting plastic and its P & O application.
4. Define polymer and process of polymerization.
5. Explain in detail about metal welding process.
6. Environmental Hazards of using foams.
7. Process of surface coating of metals.
8. Types of hand files used in P & O workshop.

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

1. Define stress and strain.
2. Difference between thermoplastic and thermosetting plastics.
3. Properties of steel.
4. What is Fiber Reinforced Plastic?
5. Uses of soft foams in P & O application.
6. List few power tools used in P & O workshop.
7. What are the uses of silicon in P & O application?
8. Uses of dust collector.
9. Uses of resins in P &O application.
10. Different types of materials used to make sockets.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER III – WORKSHOP TECHNOLOGY AND MATERIAL SCIENCE

Q.P. Code: 802453

Time: Three Hours **Maximum : 100 Marks**

Answer All questions

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

1. Heat treatment of metals.
2. Classify leather on the basis of origin, grain pattern. Explain each in brief.
3. Special tools and equipment used in fabrication of Prostheses and Orthoses.

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

1. Biodegradable and Non-Biodegradable materials.
2. Work Bench Tools.
3. Wood Work in P and O.
4. Lathe Machine.
5. Tanning Process of Leather.
6. Fibre-Reinforced Plastics.
7. Safety Gadgets in Workshop.
8. Soldering and Brazing.

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

1. Smart Materials.
2. Hook Knife.
3. Ferrous Metal.
4. Torque Wrench.
5. Wood Preservation.
6. Sprit Level and Plumb Line.
7. Thermoforming Plastics.
8. Emery Sanding Cone.
9. Polyurethane Foam.
10. Chisels.

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BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR
PAPER III – WORKSHOP TECHNOLOGY AND MATERIAL SCIENCE

Q.P. Code: 802453

Time: Three Hours   **Maximum : 100 Marks**
Answer All questions

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

1. Wood and types of wood.
2. Discuss the steps of converting raw hide / skin into leather.
3. Workshop Safety and Hazards and Care.

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

1. Surface coating of Metals.
2. Measuring Tools.
3. Fabric Material.
4. Drilling Machine.
5. Selection and Quality Control of Materials.
6. Compressors.
7. Plastic Moulding.
8. Gas Welding and Electric Arc Welding.

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

1. Biomaterials.
2. Types of Hammers.
3. Properties of Leather.
4. Bending Iron.
5. Pigment.
6. Deburring Tool.
7. Composite Materials.
8. Oscillating Saw.
9. Plaster of Paris.
10. Laser Line Alignment Apparatus.

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[AHS 0321]   **MARCH 2021**   Sub. Code: 2453
(AUGUST 2020 EXAM SESSION)
BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR (Regulation 2017-2018)
PAPER III – WORKSHOP TECHNOLOGY AND MATERIAL SCIENCE
Q.P. Code : 802453

Time: Three hours   Answer ALL Questions   Maximum: 100 Marks

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

1. Operation of Lathe Machine and its Types.
2. Types of Wood and Tools used for wood working.
3. Heat Treatment of Metal.

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

1. Types of Measuring Tools.
2. Boring and Tapping operation using drilling machine.
3. Properties of Non - Ferrous Metals.
4. Properties of Polypropylene.
5. Polyurethane Foam uses in P & O.
6. Welding & Brazing process.
7. Operation of Electric Oven.
8. Types of Resins used in P & O.

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

1. Different types of plastics used in P & O.
2. What do you mean by creep?
3. Types of Vice used in P & O workshop.
4. Properties of Aluminum.
5. Defects found in wood.
6. Merits and Demerits of foam.
7. Name few operations done using Milling machine.
8. What is soldering?
9. Thermoforming Plastics.
10. Power Hacksaw

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

[AHS 0422]   APRIL 2022   Sub. Code: 2453
(FEBRUARY 2021 & AUGUST 2021 EXAM SESSIONS)
BACHELOR IN PROSTHETICS AND ORTHOTICS
FIRST YEAR (Regulations 2017-2018)
PAPER III – WORKSHOP TECHNOLOGY AND MATERIAL SCIENCE
Q.P NO. 802453
Time: Three Hours   Answer All questions   Maximum : 100 Marks

I.   Elaborate on :   (3X10=30)

1. Types of metals and its classification, properties and usage in Orthotics.
2. Lathe Machine with sketch , parts function and usage.
3. Types of Measuring tools and its use in Prosthetics and Orthotics.

II.   Write Notes on :   (8X5=40)

1. Reinforced Plastic
2. Wood working tools.
3. Fabrics used in Prosthetics.
4. Plaster of Paris and its properties.
5. Differentiate between welding and soldering.
6. Pneumatic tools and its application in prosthetics.
7. Abrasive machine and its use.
8. Workshop accidents and safety.

III.   Short Answers on :   (10X3=30)

1. What is the difference between thermoplastic and thermosetting plastic?
2. List different types of files and its use.
3. What is the use of hot air gun in prosthetics?
4. Explain about the vice which is useful for prosthetic work.
5. What is the role of caliper in prosthetics work?
6. What is jig bending stirrup and its use in orthotics?
7. Define heat treatment of material
8. Write short note on leather and properties.
9. What do you mean by Elastomer and its use?
10. What are the fabrics used in prosthetic work?

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