

**KMCT COLLEGE OF ALLIED HEALTH SCIENCES
MUKKOM, KOZHIKODE, KERALA.
DEPARTMENT OF PHYSIOTHERAPY.
FIRST YEAR BPT**

BIOMECHANICS & KINESIOLOGY - QUESTION BANK

Essays

1. Describe in detail about Newton's laws of motion.
2. Explain the structure configuration of hip joint in relation to weight bearing in unilateral and bilateral stance along with factors contributing for its stability.
3. Compare architectural characteristics on functions of quadriceps versus hamstring muscles.
4. Discuss in detail the articulating structure, osteokinematics and arthrokinematics of the tibio-femoral joint. Add a note on pathomechanics of knee joint
5. Explain the general properties of connective tissue
6. What is Prehension? Explain power grip and precision handling in detail with examples
7. Explain the structure and function of Plantar arches in detail.
8. What is Scapulohumeral rhythm? Explain the phases of scapulohumeral rhythm in detail with neat diagram.
9. Describe why using a cane on the side opposite to hip joint pain or weakness is more effective than using the cane on the same side.
10. Explain the structure, configuration of hip joint in relation to weight bearing in unilateral and bilateral stance with stability factors
11. Biomechanics of Knee joint.
12. Discuss in detail the prehension activities of the Hand.
13. Discuss in detail the kinematic variables that describe the motion.
14. Explain three orders of Levers with examples. Add a note on mechanical advantage.
15. Write the structure and function of the Hip joint, with the Hip joint pathology.

16. Write the structure and contractile unit of a muscle. Write the types of muscle fibre and the types of muscle contraction.
17. Difference between Phasic and Tonic muscle and add the notes on active and passive insufficiency.
18. Describe the general effects of injury and disease of the joint structure.
19. Discuss the Kinematics and Kinetics of Patella Femoral Joint adding note on applied anatomy also.
20. Discuss in detail the Kinematic variables that describe the motion of Scapulothoracic and Glenohumeral joint.
21. Describe the structure and functions of Hip joint.
22. Describe in detail the structure and function of Humeroulnar and Humeroradial joints.
23. Describe hip complex and explain the role of abductors in bilateral and unilateral stance with an example.
24. Elaborate the structure and function of the shoulder joint
25. Discuss the structure and functions of plantar arches and deviations from normal.
26. Elaborate on the structure and functions of knee joint and effects of aging and disease
27. Describe biomechanics of shoulder joint. Discuss stability and mobility function of shoulder joint complex.
28. Describe in detail the mobility and stability components of hip joint.
29. Explain the analysis of following activities: sitting to standing, lifting
30. Discuss the structure and functions of the arches of foot
31. Discuss the biomechanics of ankle joint
32. What is a lever? Explain the various types of levers with examples and add a note on application of levers in physiotherapy
33. Describe the knee complex and locking mechanism of knee.
34. Explain about the scapulo humeral rhythm during elevation through abduction of shoulder complex.
35. Describe the kinetics and kinematics of motion with relation to the shoulder joint.

36. Enumerate the various types of joints. Explain in detail each type giving examples.
37. Analyze the various types of grips and pinches. Describe the movement occurring at the joints.
38. Discuss the biomechanics of shoulder complex and explain the dynamic stability in detail
39. What is difference between osteokinematics and arthrokinematics? Describe the arthrokinematics and osteokinematics at the shoulder joint
40. Explain various types of power and precision grips with muscle action and joint position
41. Describe biomechanics of abduction of shoulder joint with factors contributing for its stability.
42. What are the ligaments of hip joint? Explain bilateral and unilateral stance with examples.
43. What is the functional position of hand? Add note on power grips.
44. Describe the structure of hip joint. Add a note on kinetics and kinematics.
45. Elaborate on the structure and function of plantar arches and deviations from normal
46. Describe the hip complex. Explain the role of abductors in the unilateral and bilateral stance. Add a note on motion of pelvis on femur.
47. Name the components of shoulder complex. Explain the scapulo-humeral rhythm in detail. Add a note on dynamic stabilizers of the glenohumeral joint.
48. What is stress and strain. Explain load / deformation curve with example.
49. Intrinsic plus and intrinsic minus hand.
50. Explain the screw-home mechanism of knee joint.
51. Mobility and stability functions of muscles
52. Explain levers with examples in human body
53. The effects of disease, injury and immobilization of joints
54. Describe biomechanics of abduction of shoulder joint with factors contributing for its stability.

55. What are the ligaments of hip joint? Explain bilateral and unilateral stance with examples.
56. What is the functional position of hand? Add note on power grips.
57. What is difference between osteokinematics and arthrokinematics? Describe the arthrokinematics and osteokinematics at the shoulder joint
58. What is a lever? Explain the various types of levers with examples and add a note on application of levers in physiotherapy
59. Define posture. Discuss postural reflex and explain the various postural deviations of spine
60. Define posture, its types and describe the effects of posture on pregnancy and occupation
61. Discuss in detail the Define posture and postural control. Discuss the postural analysis
62. Clinical features, kinetics and kinematics of gait with a note on movement analysis lifting
63. Explain the analysis of following activities: sitting to standing, Define static and dynamic posture. Explain the analysis of standing posture. Add a note on effects of age on posture.
64. Discuss the biomechanics of cervical spine
65. Describe in detail the types of posture, postural control and postural analysis Define posture. Discuss postural reflex and explain the various postural deviations of spine
66. Explain the biomechanics of lumbar spine.
67. What is posture? What is postural reflex? Explain the sagittal plane analysis of the posture
68. Elaborate on the structure and function of regions of vertebral column and effects of aging and disease
69. Explain the features, kinetics and kinematics of gait with a note on movement analysis
70. Discuss the biomechanical analysis of running gait versus walking
71. Describe the normal curves of vertebral column and discuss the factors responsible for its mobility and stability.

72. Analyze posture and explain the postural deviations
73. Explain about effect of injury and developmental defects of vertebral column.
74. Pathomechanics of gait.
75. Analyse posture and explain the postural deviation.
76. Describe the structure and function of vertebral column.
77. Kinetics, Kinematics and Pathomechanics of lumbar spine.
78. Biomechanics of Gait
79. Describe the relationship between the Zygapophyseal joints and the Interbody joints of vertebral column.
80. Describe the role of muscles that maintain the erect posture.
81. Define Gait. Mention the phases Of gait Cycle, Explain sagittal plane analysis Of gait
82. Discuss in detail kinetics and kinematics of thoracic rib cage. 3, Classify joints in detail with examples and neat diagrams,
83. Define posture. Discuss postural reflex and explain the various postural deviations of spine
84. List the ligaments attached in vertebral column and the importance of stability and mobility of the vertebral column.
85. Role of disk in temporomandibular joint.
86. Define static and dynamic posture. Explain the analysis of standing posture. Add a note on effects of age on posture.
87. Describe the structure of a vertebra. Add a note on curves in the vertebral column with its articulations and functions

Short essays:

1. Muscular weakness and atrophy
2. Closed chain motion of the elbow.
3. Functional position of the wrist.
4. Scapulo humeral rhythm
5. Bursae around knee.
6. Talocalaneo navicular joint .
7. Composition of the connective tissue.
8. Axial rotation in the knee joint.
9. Ways to reduce forces acting on the femoral head.
10. Rotator cuff stabilization.
11. . Excitation-contraction coupling.
12. Compare action of anconeus and triceps.
13. Cross-eyed patella.
14. .Structures limiting motion in supination and pronation
15. Cumulative strain in tendons
16. Clavicular contribution to elevation of arm
17. Effects of immobilization in a lengthened versus a shortened position
18. Triceps surae
19. Codman's paradox
20. Passive insufficiency
21. Triangular fibrocartilage complex (TFCC)
22. Pelvic tilts
23. Pronation twist of tarsometatarsal joint
24. Power grip
25. Explain about Pes planus

26. Explain patella as an Anatomic Pulley
27. Advantages and disadvantages of
28. Coracoacromial arch
29. Explain Tennis Elbow
30. Differentiate Coxa valga from Coxa vara
31. What is “Q” angle of knee joint? How is it measured and what implications does it have for patellofemoral problems?
32. Explain the factors affecting muscle function 32. Explain the ligaments of Radioulnar joints
33. Explain about the extensor mechanism of wrist and hand
34. Explain Newton’s law of inertia with example.
35. Osteokinematics of hip joint
36. Winging of scapula
37. Locking and Unlocking of knee
38. Tensile forces
39. Centre of gravity and Line of gravity
40. Functions of hand
41. Talocalcaneo navicular joint
42. Trabecular system of hip joint
43. Shoulder joint stability.
44. Nurse maid’s elbow.
45. Metatarsal break.
46. Inversion and Eversion.
47. Osteokinematics and Arthrokinematics.
48. Lumbricals.
49. Active and Passive insufficiency
50. Torque

51. Explain active and passive tension.
52. Plantar arches – mechanism.
53. Centre of gravity and its application.
54. Reverse scapulohumeral rhythm.
55. Prehension
56. Explain the coupled movements of subtalar pronation and supination
57. Structure of shoulder complex
58. Mention In detail about various deviations occurring at knee joint.
59. Static stability of hip joint
60. Concurrent force systems
61. Enumerate different types of muscle contraction.
62. Palmar arches and its significance
63. Define pulley and enumerate various pulleys present in human body.
64. Active and passive insufficiency
65. Static stability of shoulder joint
66. Analyse various pinches of hand.
67. Supination and pronation twist
68. Compare Lumbo pelvic rhythm with Scapula humeral rhythm.
69. What is biarticular muscle? Explain their property of active in sufficiency with an example.
70. Discuss in brief about length tension and force velocity relationship of a muscle.
71. Time dependent and rate dependent properties of connective tissue
72. Properties of connective tissues
73. Compare and contrast different muscle contractions
74. . Analysis the forces acting on hip joint during unilateral stance phase Explain the phases of swing phase of a gait cycle.
75. Describe the movement of stair climbing.

76. Explain the joint movement that occurs during breathing
77. Explain the movements of facet joint of the vertebral column. Define posture and mention about various types of abnormal posture. Phases of gait cycle
78. Describe ventilatory motions
79. Primary and secondary curves of vertebral column
80. The muscles of vertebral column
81. The structure and function of vertebral column
82. Define gait and explain about phases of gait cycle.
83. Mention in detail about muscles responsible for normal ventilation.
84. Structure and function of Temporomandibular joint
85. Kinematics of gait cycle
86. Explain the pathomechanical changes of thorax in scoliosis
87. Kinematics of chest wall in breathing.
88. Explain the structure and function of intervertebral disc
89. Mechanics of ventilation
90. Define posture and mention in brief about abnormalities of posture.
91. Gait cycle in detail
92. The muscles of vertebral column
93. Movements of rib cage during breathing - Explain the role of inter costal muscles in breathing.
94. Explain the movements of temporomandibular
95. The structure and function of vertebral column joint
96. Balancing of the head and vertebral column.
97. Load-deformation curve. Determinants of gait
98. Optimal posture
99. Determinants of gait
100. Phases of Gait cycle

101. Explain stair gait cycle.
102. Codman's paradox.
103. Factors affecting normal posture.
104. Functions of intervertebral disc.
105. Explain the structure of Temporomandibular joint.
106. Musculo skeletal changes following COPD
107. Energy expenditure Of gait
108. Kinetics and kinematics of posture
109. List out various gait deviations. Discuss any two in detail
110. Explain the mechanics of rib cage movement during inspiration

Answer briefly:

1. Articularis genu.
2. Tarsal canal.
3. Common hip axis.
4. Kinesthesia and proprioception.
5. Pelvic balance.
6. Gluteus medius limp.
7. Patellar plicae.
8. Synergist
9. Angular Velocity
10. Concentric Exercise
11. Acromioclavicular joint.
12. Line of gravity
13. Second class lever

14. Law of inertia
15. Lumbricals
16. Point of application of force.
17. Scaption.
18. . Isoinertial exercise.
19. Perturbation.
20. Quadriceps angle.
21. Convex-concave principle.
22. Sustentaculum tali.
23. Volar wrist musculature.
24. Vincula tendinum.
25. Reverse action
26. Bunnell's sign
27. Pes Anserinus
28. Lister's tubercle
29. Dowager's hump
30. Sternoclavicular disk
31. Nutation
32. Divergent muscle pull
33. Voluntary control
34. .Hysteresis.
35. Agonists and Antagonists
36. Volar plate
37. Pars interarticularis
38. Subacromial space
39. Functional position of the hand

40. Close – packed position
41. Carrying angle
42. Angulation of the femur
43. Define Torque
44. What is the instantaneous axis of rotation?
45. What is a motor unit?
46. What is glenoid labrum?
47. What is carrying angle?
48. Name the ligaments of Hip joint
49. What is patella baja?
50. Attachment of medial collateral ligament of knee joint
51. State the ligaments of Talonavicular joint
52. Define moment arm
53. What are the pelvic floor muscles?
54. What is Nutation and counternutation?
55. Moment arm
56. fibrous joint
57. Slow-twitch oxidative fibres
58. Lumbar-pelvic rhythm
59. Cross eyed patella
60. . Volar wrist musculature
61. Juncturatendinae
62. Pars Interarticularis.
63. Angulations of femur.
64. Bunnell’s sign.
65. Dowgers hump.

66. Patella Alta and Baja.
67. Sesamoid bone.
68. Coupled motions.
69. Claw toe and hammer toe.
70. . Levers.
71. Carrying angle.
72. Pulleys.
73. Pes Planus.
74. Supinator twist.
75. Vertical steering muscles of Shoulder joint.
76. Fast-twitch fibres.
77. Cubitus Valgus and CubitusVarus.
78. Force and Acceleration.
79. . Load deformation curve.
80. Extensor hood.
81. Trendelenberg sign.
82. Line of gravity.
83. Accessory movements.
84. Rocker bottom foot.
85. Grip.
86. Osteokinematics.
87. Arcuate lines.
88. Tensile forces.
89. Grasp.
90. Angle of femoral torsion – function. Second order lever an example. Resistance.
91. Functional position of hand.

92. Hooke's law.
93. Optimal length.
94. Nursemaid's elbow.
95. Extensor expansion.
96. Force couple.
97. Arthrokinematics.
98. What is mechanical advantage? Explain mechanical advantage in relation to pulleys
99. What are the factors affecting muscle function?
100. Add a note on shunt and spurt muscles
101. Define centre of gravity, base of support, line of gravity
102. Define active insufficiency. Explain in detail with appropriate examples
103. Write a note on open and closed kinematic chain exercises with appropriate examples
104. Explain the gleno-humeral rhythm
105. Name the ligaments of shoulder joint.
106. Functions Of Meniscus
107. Clinical significance Of plantar arches
108. Agonists
109. What is thumb opposition?
110. Index plus minus foot
111. Angle of inclination
112. patella plica
113. Planter aponeurosis
114. Carrying angle
115. Scoliosis
116. Concurrent force systems
117. Stair climbing

118. Patella Plica
119. Visco elasticity
120. Pes Planus and Pes Cavus
121. Pulleys
122. Open Kinematic chain
123. Palmar arches
124. Ground reaction force
125. Hooke's law
126. Isometric exercises Explain good and bad posture
127. Convex-Concave rule Muscular control of temporomandibular joint (TMJ) and add a note on TMJs relationshipwith cervical spine
128. Isotonic contraction
129. Patellar movements
130. Write a note on open and closed kinematic chain exercises with appropriate examples
131. List out various gait deviations. Discuss any two in detail
132. Explain the mechanics of rib cage movement during inspiration
133. Flat back posture
134. Scoliosis
135. Define step length and stride length.
136. Scoliosis
137. Dynamic posture
138. Mention in detail about muscles responsible for normal ventilation.
139. Explain good and bad posture
140. Any two pathological gait deviation
141. Scoliosis
142. Define postural sway

143. Primary and secondary curves of vertebral column
144. Name the muscles of Inspiration and Expiration
145. Running gait.
146. Ligaments of spine
147. Postural set.
148. Lordosis
149. Pes Anserinus
150. What is Cadence?
151. Attachment of thoracolumbar fascia
152. What is Calcaneal gait?
153. What is the normal postural sway?
154. What are zygapophyseal joints?
155. What is lumbosacral angle?
156. Role of upperlimb in gait
157. Trendelenberg sign.
158. Nucleus pulposus.
159. Posture.
160. Effects of gravity on posture.
161. Temporal and distance variables in gait.
162. Ataxic gait.
163. Frontal plane deviations from optimal vertebral alignment.
164. Equinus gait.
165. Static and dynamic balance
166. Flat back posture
167. Scoliosis
168. Forward head posture.

169. . Function of diaphragm in tidal breathing.

170. Atypical vertebrae of cervical spine.