

 **KENYA MEDICAL TRAINING COLLEGE**

**DEPARTMENT: ORTHOPAEDICS AND TRAUMA MEDICINE**

 **DIPLOMA IN ORTHOPAEDIC PLASTER TECHNOLOGY**

**FINAL QUALIFYING EXAMINATION**

**PAPER:** CASTING

**DURATION:** 3 Hours

**TIME:** 9 a.m. – 12 Noon

**INSTRUCTIONS**

1. Write your examination number on answer book/sheet provided
2. Section one: MCQs – choose single best response
3. Section two: mark T(True) or F(False) for each response
4. Section three: answer all questions.
5. Section four: answer one question.
6. Do not cheat
7. Use legible handwriting

**SECTION ONE: MULTIPLE CHOICE QUESTIONS**

1. **Long arm casts usually begin at the middle of the humerus, extends down the arm, and ends at the\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
2. Base of the wrist
3. Base of fingers
4. End of the fingers
5. Mid-point of the forearm
6. **A fracture to which of the following fingers would most likely require an ulna gutter splint**
	1. Pinky fingers
	2. Middle fingers
	3. Pointer fingers
	4. Thumb
7. **Besides fractures, what other types of finger injury is likely to require the use of ulna gutter or radial gutter splint**
	1. Blood clots
	2. Severe sprains
	3. Tendinitis
	4. Carpal tunnel syndrome
8. **When doing plaster casting , the following statement is true**
	1. Bonny prominences are covered with wool
	2. Stockinette and wool must be always be used
	3. One layer of wool is recommended
	4. Circular cast is advisable in posterior slab where no swelling of the limb is anticipated
9. **Which one is not a feature of arterial obstruction on a casted limb?**
	1. Paralysis of fingers or toes
	2. Paresthesia of fingers and toes
	3. Pallor of the skin with disturbed capillary return
	4. Severe pain at the fracture site
10. **Which of the following is true for casting of below knee with a swelling**
	1. Back-slab covers whole limb circumference
	2. Partial cast is applied on the limb
	3. Spica is always used
	4. External fixator applied
11. **The purpose of reducing the elbow joint using the ‘100-900’ tricky is to:**
12. Reduce pain at the elbow joint.
13. Avoid creasing of the cast at the elbow joint.
14. To improve blood circulation.
15. To enhance healing of the fracture.
16. **Mallet finger splints are used for avulsions of extensor tendon. Which of the following describes this type of injury?**
	1. Tendon detaches from the bone
	2. Tendon becomes weak
	3. Tendon becomes inflamed
	4. Tendon is stretched out
17. **A lady presents with swelling of hands with shiny skin. She had a history of fracture of radius and kept on P.O.P cast for 4 weeks. The most likely diagnosis is?**
	1. Malunion
	2. Myositis ossificans progressiva
	3. Reflex sympathetic syndrome
	4. Rupture of extensor pollicis longus tendon
18. **Which of the following is not an advantage of fiber glass cast?**
	1. Fiber glass cast will retain its structural integrity in water
	2. Fiber glass cast is light weight yet strong
	3. Fiber glass cast will not expand to accommodate any swelling
	4. Fiber glass cast comes in many colours
19. **Thumb spica splints are commonly used for injured thumbs and are usually worn until\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
20. Swelling of injury goes away
21. Injury is completely healed
22. A person regains feeling in the thumb
23. A person can move their thumb
24. **Which of the following types of finger splint is applied to only the tip of the finger**
25. Buddy taping
26. Finger spica splint
27. Dorsal extension-block splint
28. U-shaped splint
29. **During cast removal, the patient may get injuries from the cast saw blade due to the following reasons except**
30. Dragging the blade up and down motions
31. Blood stained casts
32. Due to edema
33. Resin based materials
34. **A cast is usually wedged to do which of the following:**
35. Relieve swelling
36. Properly align a reduced-displaced fractured bone
37. Reduce skin irritation
38. Permit suture removal
39. **Which of the following is not one of the signs and symptoms of cast sores?**
40. Local heat.
41. Loose cast.
42. Burning sensation.
43. Offensive smell.
44. **Patients with knee injuries will benefit from which of the following treatments?**
	1. Rest, ice, compression, elevation
	2. Hiking, ice, long term splint use, sunlight
	3. Rest, traction, massage therapy, gait therapy
	4. Heat, exercise, water therapy, pain medication
45. **Cylinder cast is indicated to the following conditions EXCEPT**
	1. Malleoli fracture
	2. Knee dislocations
	3. Patella fractures
	4. Knee sprains
46. **Both posterior ankle splints and bulky Jones splints are used for fractures of the malleolus. What is malleolus?**
47. A bone in the middle of the foot
48. The bone at the base of the big toe
49. The round bone that sticks out from the sides of the ankle joint
50. The bone that makes up the heel of the foot
51. **During physical examination of a patient before casting the following clinical methods are observed except**
	1. Mode of injury
	2. History
	3. Radiographic examination
	4. All the above
52. **Which situation would a splint NOT be the best choice for treatment**
	1. A patient with finger dislocation
	2. A patient with non-displaced , closed fracture
	3. A patient with a sprained ankle joint
	4. A patient with tendonitis of the elbow.
53. **In a minimally displaced fracture of the proximal humerus with impacted fragments, the major treatment is:**
	1. Immobilization in hanging arm cast
	2. Immobilization in an elevated cast
	3. Immobilization with a sling and swathe
	4. Immobilization in a U-slab
54. **The Dennis Browne splint is used in the treatment of:**
	1. Clubfeet
	2. Torticollis
	3. Springe’s deformity
	4. Brachial palsy.
55. **In which situation would a cast be the treatment of choice on the day of injury**
56. A patient with a closed, non-displaced fracture
57. A patient with a displaced fracture requiring reduction
58. A patient with an open fracture
59. A patient with a compound fracture requiring surgery
60. The following is not a physical property of plaster of Paris.
61. Creamy.
62. White in colour.
63. Easily moudable.
64. Comes in many colours.
65. **When long arm casts are applied, the elbow joint is usually bent at \_\_\_\_\_\_degrees.**
66. 450
67. 600
68. 900
69. 1200
70. **Which type of cast will you apply on a dislocated-reduced elbow joint?**
71. Hanging cast.
72. Above elbow posterior slab.
73. Above elbow cast.
74. U-slab
75. **What is the reason for applying P.O.P cast diagonally?**
76. To have a firm cast.
77. To prevent cast breakages.
78. To avoid tourniqueting the limb
79. To increase the strength of the cast.
80. Which are not the possible areas of applying reinforcement sticks on casts?
81. At knee joint of above the knee cast.
82. At the hip joint of hip spicas.
83. At the level of fracture site on the cast.
84. Along the shafts of the casts
85. **Short arm casts are frequently used for Colle’s fractures. Where do Colle’s fractures occur?**
86. On the radius near the wrist
87. On the radius near the elbow
88. On the ulna near the elbow
89. On the ulna near the wrist
90. **Which of the following is a benefit of treatment using a splint**
91. Splints are water proof, so that one may continue with their daily swimming
92. Splints permit swelling, thereby reducing the risk of neurovascular compromise
93. Splints cannot be removed, providing a constant stable environment for healing
94. Splints can be removed, so that the patient can put it on and off as much as they want

**SECTION TWO: TRUE/FALSE.**

1. Appropriate technique for an ortho-trauma technician to implement for the client who is being casted is to?
2. Apply ice on top of the cast F
3. Monitor clinical changes at the finger/toe tips T
4. Maintain the extremity below the level of the heart F
5. Handle the wet cast with finger tips F
6. Fold the stockinet or padding over the outer cast edges T
7. When teaching cast care, the ortho-trauma technician instructs the patient to\_
8. Report changes in the sensation or mobility to the injured area T
9. Blow dry the wet cast on hot setting F
10. Use only soft objects to slide down the cast for scratching F
11. Cut away edges of the cast if the skin becomes irritated F
12. Cover the limb with a polythene bag tightly while walking F
13. The following are factors affecting setting time of plaster of Paris casts.
14. Type of the plaster. T
15. Thickness of the cast. T
16. Alignment of the bone fragments. F
17. Temperature of the water. T
18. Impurities. T
19. The following are injuries for which a posterior or stirrup splint would likely NOT be the best treatment of choice
20. Ankle sprains F
21. Foot fractures T
22. Fractures of the lateral malleolus F
23. Tendon Achille’s tear F
24. Osteoarthritis of the ankle joint. F
25. The following are features of arterial obstruction in a casted limb:
26. Paresthesia of the limb. T
27. Pallor of the skin. T
28. Ability to flex and extend the limb. F
29. Severe pain at the fracture site. T
30. Disturbed capillary return. T
31. An expected outcome/s of cast application that the ortho-trauma technician evaluates is
32. Skin irritation at the cast edge F
33. Decreased capillary refill F
34. Paleness of the digits F
35. Tingling sensation at the distal of the cast F
36. Slight edema, limitation of range of motion. T

**SECTION THREE: SHORT ESSAY QUESTIONS.**

1. State five (5) characteristics of plaster of Paris. [ 5 marks ]

-It soaks rapidly.

-Smooth when moulding.

-It is creamy and

-Innocuous to the skin (Innocuous-harmless)

-It sets fast- can be moulded as desired.

-Light cast is translucent to X-rays.

-It has a combined strength with durability.

1. Discuss three (3) complications of casts [6 marks]

- Deep venous thrombosis (DVT) leading to pulmonary embolism

- Compartmental syndrome when the cast is too tight hence increased muscle pressure

-Causes circulatory catastrophes when the cast is too tight

-Causes pressures sores especially at the bony prominences when padding isn’t enough

-Swelling of the limb. A plaster produces constricting effect on the limb and most of it is well tolerated but a moderate constriction will produce compression of the veins, damming the blood, and causing swelling,

-Pain which may be due to tissue damage at injury or reduction, swelling within the cast, muscle spasm, pressure on blood vessels or nerves, skin irritation or sores.

-Cause stiffness of joint due to reduced joint movement

-Immobilization in trunk plasters or plaster beds may also produce nausea, abdominal muscle cramps, retention of urine and abdominal distention.

-Bones become osteoporotic as a result of disuse.

1. Discuss bi-valving in casting. [ 5 marks]

To bivalve a cast means to cut it on both sides from top of the cast to the bottom so it can "open up" and allow for swelling. After cut, the cast is usually held together with a crepe bandage to keep it in place. A cast is usually bi-vlaved after a surgery or immediately after an injury to stabilize a body part and allow for swelling.

Any complete splint can be converted into a removable splint by bi-valving it. A bi-vavled cast is simply one that has been cut into two pieces, usually anterior and posterior half. A cast that is cut in half to detect or relieve pressure underneath, especially when a patient has decreased or no sensation in the portion of body surrounded by the cast. "Windows" are often cut out of the cast over the pressure areas to assess circulation or open wounds under the cast (wedging of a cast).

**Indication for bi-valving.**

* To facilitate daily dressing of a wound and immobilization is to continue.
* To facilitate care of a complication (pressure sore) when immobilization remains necessary.
* To support the foot and wrist in the appropriate position.
* A bivalve cast may be used for immobilization during the rest periods or at night.
* To facilitate exercise programs between periods of immobilization
1. Outline four possible ways of removing a cast from a limb [4 marks]
2. Using hack saw
3. Using plaster shear
4. Plaster Spreader
5. Plaster Saw
6. Electric Plaster cutter/oscillating machine
7. By soaking the cast in water to dissolve

**SECTION FOUR: LONG ESSAY**

1. Describe the process of applying and removing long leg cast. [20 marks]

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* Ensure privacy of the patient
* Explain to the patient the procedure you are planning to do and seek the consent.
* Acquire the necessary materials and tools to be using in the procedure
* Make sure you have an assistant who will help you in manipulation and cast application
* Let the patient be seated on the couch will the limbs are hanging freely
* Clean the skin thoroughly by washed and then dry it before cast application.
* Apply the Stockinet and the necessary amount of padding for protection of bony prominences
* Expose the gypsona or pop by unwrapping them
* Have water on a stainless steel bucket
* The assistant must hold the patient in the desired way.
* Reduce the fractured limb if necessary by pulling or manipulation by the help of the assistant
* Immerse the bandage fully in water at angle of 45 degrees so as to encourage the release of the bubbles.
* Hold the bandage gently- otherwise will not penetrate between the layers so effectively.
* After five (5) seconds – the bubbles ceases.
* Keep the leading end free when handling the bandage and squeeze in order to expel water using two hands.
* Keep the leading end free when handling the bandage to the operator.
* Immerse another bandage as the operator unrolls the wet bandage round the limb in an even manner.
* Use circular and spiral turn and no reverse turns should be made.
* Remove the pop from water and squeeze excess water from it.
* Starting from the fractured site, apply wet plaster bandages by rolling them over the fractured limb without tension. Each bandage covers one-half of the previous bandage without wrapping circumferentially.
* Moulding of the bandage should be done by constant smoothing with the palm of the wet hands to avoid pressure sores through the cast.
* After obtaining the thickness, the extremities of the cast may require trimming – for free movement of the digits.
* To be done when the cast is still wet not fully dry
* Hold the limb in the appropriate joint positioning until the cast is set.
* When dry, the calendar time, fracture location, and other documentation is written on the cast.
* Send the patient for the check x ray
* Advice the patient on how to take care of a cast and they should report back at the hospital after 24 hours.

**TECHNIQUES OF CAST REMOVAL**

* The cast may be removed by an electric cutting device or plaster shears.
* For children, or if electricity is not available, plaster shears are necessary.
* Prior to removal, gather all materials needed. These include scissors, removal tools materials to wash the limb after, and supportive material.
* Position and drape the patient. For upper extremity casts the patient can be in the sitting or supine position. For the lower extremity the patient should be in the supine position.
* Determine cutting lines, and do not cut over bony prominences.
* When using plaster shears, ensure correct blade alignment with each cut, and after 4-6 cuts clear the blades, utilize the benders, and continue. Never cut around corners, remove the blade and cut from the opposite direction.
* When using an electric cutter, ensure the patient is comfortable and understands the blade will not cut their skin.
* After the cast is removed, assess the skin for any damage from removal and assess the form of the limb following immobilization.
* Wash and dry the area, and apply oil or lotion to assist in restoration of normal skin nutrition.
* The patient needs to be educated about care of the skin and of the injured limb as the muscle tone returns.
1. Discuss five (5) features that would necessitate the removal of a cast. [20 marks]
2. When there is loss of position (displacement) of the fractures.
3. When the cast crumble and disintegrate before the required date of removal
4. When the fractured bone have healed and the removal date is due
5. When the cast is too tight thus causing circulation embarrassment
6. When there is skin infection to the limb with the cast
7. When the casted limb has a wound e.g. osteomyelitis
8. When the cast was done at an abnormal range of motion