AMREF INTERNATIONAL UNIVERSITY

SCHOOL OF MEDICAL SCIENCES

DEPARTMENT OF REHABILIATION MEDICINE

BACHELOR OF SCIENCE IN PHYSIOTHERAPY

END OF TRIMESTER EXAMINATIONS JANUARY TO APRIL 2026

UNIT CODE: PHT 313

UNIT NAME: NEUROREHABILITATION I (MAIN PAPER)

DATE: 13th April 2026

TIME: 9am-11am (2 Hours)

INSTRUCTIONS

1. **All students will have two (2) hours to complete the examination**
2. **It is the student's responsibility to report any page and number missing in this paper.**
3. **Check that the paper is complete**
4. **Total number of pages is 8 including the cover.**
5. **Read through the paper quickly before you start.**

SECTION A: MULTIPLE CHOICE QUESTIONS. CHOOSE THE CORRECT ANSWER. EACH CORRECT ANSWER IS ONE MARK (30 MARKS)

1 A 60-year-old patient, 18 months post-stroke, presents with right-sided weakness. He has 20 degrees of active wrist extension and 10 degrees of active finger extension from a flexed position. He rarely uses his right arm at home, relying almost entirely on his left. Based on the classic inclusion criteria for CIMT, is this patient a suitable candidate?

A. Yes, he has plateaued and has some distal movement.

B. Yes, he demonstrates "learned non-use" and meets the minimum motor criteria (10° wrist extension, 10° thumb abduction/extension, 10° extension in at least 2 other fingers).

C. No, he has too much spasticity to participate.

D. No, the chronicity of his stroke (>12 months) makes him ineligible.

2 You have been asked to evaluate a patient's fall-risk and decide to use Berg's balance scale (BBS). Which of the following individual outcome measures is also included within the BBS?

A. The six-minute walk test (6MWT)

B. Functional reach test (FRT)

C. The timed up and go (TUG) test

D. The BBS does not include an individual outcome measure.

3 You are obtaining a subjective history from a new patient diagnosed with right-side hemiplegia. You note that although the patient is able to understand spoken language, he is unable to speak well as most of his words are incomprehensible, and he has difficulty in providing names for everyday objects. Your hypothesis for a possible diagnosis is:

A. Cerebellar aphasia

B. Broca's aphasia

C. Global aphasia

D. Wernicke's aphasia

4 You are currently working with a patient who has a shoulder dysfunction and who demonstrates a limited AROM in flexion, abduction, and external rotation. Which of the following upper extremity PNF stretching techniques would be the most appropriate for this patient?

A. D2 flexion

B. D1 flexion

C. D1 extension

D. D2 extension

5 You are designing a plan of care for a 60-year-old woman who recently had a stroke with a focus on pregait activities. Which of the following proprioceptive neuromuscular facilitation (PNF) diagonals best encourages normal gait?

A. PNF is contraindicated.
B. Pelvic PNF patterns only
C. D1
D. D2

6 You are examining a 70-year-old woman who suffered a stroke 3 weeks ago involving the dominant hemisphere and is now presenting with contralateral hemiparesis, a sensory loss greater in the lower extremity than the upper extremity, mental confusion, and aphasia. What is the most likely location of the infarction?

A. Anterior cerebral artery
B. Posterior cerebral artery
C. Internal carotid artery
D. Middle cerebral artery

7 You are examining a 66-year-old man who has suffered a recent stroke and has apraxia. The patient cannot brush his teeth on command but can point out the toothbrush and verbalize the purpose of the brush. From this information, what sort of apraxia does the patient have, and how should you approach treatment?

A. Ideational apraxia. You should speak in short, concise sentences.
B. Ideomotor apraxia. You should always give the patient three-step commands.
C. Ideational apraxia. You should always give the patient three-step commands.
D. Ideomotor apraxia. You should speak in short, concise sentences.

8 What does the Reflex Theory propose about the nature of movement?

A. Reflexes are irrelevant to motor control.
B. All movements are initiated by conscious thought.
C. Reflexes are the building blocks of complex movement.
D. Movement is solely controlled by voluntary actions.

9 According to the Hierarchical Theory, where does the control of movements primarily occur?

A. Within the central nervous system (CNS), from top to bottom.
B. Only at the spinal cord level.
C. Exclusively through peripheral nervous system pathways.
D. Movement control is decentralized and random.

10 What does the term 'degrees of freedom problem' refer to in the context of motor control?

A. The inability to perform any voluntary movements.
B. The lack of coordination in muscle activation patterns.
C. The complexity of controlling multiple joints and muscles.
D. The simplicity of executing basic reflexes.

11 What does the Systems Theory by Bernstein emphasize about the body?
   A. The body functions solely based on reflexes without considering the environment.
   B. The body is controlled exclusively by the nervous system.
   C. The body is a mechanical system with many degrees of freedom.
   D. The body operates under a single, rigid movement pattern.

12 A person with major depressive disorder has the symptom of anhedonia (loss of pleasure). From an ICF perspective, coding "lack of motivation to socialize" should be carefully distinguished because:
   A. It should be coded as a Personal Factor (e.g., coping style).
   B. "Motivation" itself is not directly coded in the ICF; instead, one would code the impaired mental function (b130 Energy and drive functions) and its impact on Activities/Participation (e.g., d710 Basic interpersonal interactions, d920 Recreation and leisure).
   C. It is an Environmental Factor (e.g., negative attitudes of others).
   D. It is only relevant for psychiatric diagnoses, not the ICF.

13 The "Etiology Pathway" in ICF-based assessment is best described as:
   A. A mandatory link that must be established between an ICD diagnosis and every ICF code.
   B. A suggested, clinically useful link to understand that a health condition (from the ICD) may lead to impairments, which in turn may influence activities and participation, with all levels influenced by contextual factors.
   C. A deterministic, linear causal chain from disease to disability.
   D. A framework for classifying the causes of environmental barriers.

14 Which statement about "Personal Factors" is MOST accurate?
   A. They are currently not classified in the ICF due to significant social and cultural variation, but they are acknowledged as important contextual components.
   B. They have a detailed appendix with codes for factors like gender and education level.
   C. They are considered less important than Environmental Factors and are often ignored.
   D. They are coded using the same letter prefix as Body Functions.

15 Using the ICF to design a community intervention for older adults, a planner focuses on installing benches along walking paths (e1201, Assistive products and technology for personal mobility). This intervention primarily targets:
   A. Reducing an impairment in muscle endurance functions (b740).
   B. Mitigating an Environmental Factor that is a barrier to the activity of walking (d450) and the participation domain of community life (d910).
   C. Directly treating the health condition of osteoarthritis.
   D. A Personal Factor related to exercise motivation.

16 A criticism sometimes levelled at the ICF is that its broad scope and numerous codes can lead to:

A. Excessive focus on a single medical diagnosis.
B. "Checklist" approaches that lose sight of the individual's lived experience and goals.
C. It being too simple for complex rehabilitation cases.
D. The inability to distinguish between activity and participation.

17 A 68-year-old patient, 4 weeks post-left MCA ischemic stroke, presents with right hemiplegia. In supine, the right shoulder is internally rotated and adducted, the elbow is flexed, and the forearm is pronated. When the therapist attempts to passively extend the elbow, significant resistance is felt, which increases with the speed of the stretch. According to Bobath theory, what is the primary driver of this increased resistance?

A. Overactivity of the stretch reflex due to upper motor neuron lesion.
B. Fibrotic changes and contracture in the biceps brachii muscle.
C. Lack of voluntary inhibition from the damaged motor cortex, leading to abnormal tonic reflex activity.
D. Compensatory overuse of the biceps brachii during attempted weight-bearing.

18 The same patient is now sitting. The therapist wants to facilitate right-sided weight-bearing through the arm to improve postural control. The patient's hand is fisted and the arm is held in a flexor synergy. Which of the following is the MOST appropriate Bobath intervention to prepare the arm for weight-bearing?

A. Passively open the fingers with a firm stretch and place the flat palm on the plinth.
B. Use a resting hand splint to maintain the wrist in neutral before the activity.
C. Inhibit the flexor tone by using gentle, sustained elongation of the pectorals and subscapularis, followed by facilitation of scapular protraction.
D. Instruct the patient to "push through the straight arm" to activate the triceps.

19 The patient has made some progress and can now stand with minimal assistance. During standing, his right knee hyperextends (genu recurvatum) during the stance phase. From a Bobath perspective, what is the most likely underlying cause of this knee hyperextension?

A. Weakness of the quadriceps muscle group.
B. A compensatory strategy for a lack of stable knee extension to achieve postural security.
C. Spasticity of the hamstrings, pulling the tibia posteriorly.
D. Impaired motor control at the ankle and foot, preventing the tibia from moving forward over a stable foot.

20 A patient with chronic stroke (2 years post) has a fixed flexion contracture at the elbow of 30 degrees. The therapist is applying a low-load, prolonged stretch. In the context of Bobath, what is the primary goal of this intervention for this patient?

A. To directly reduce spasticity in the biceps brachii.
B. To influence the biomechanical and viscoelastic properties of the muscle and soft tissues to maintain length.
C. To facilitate eccentric control of the elbow extensors.
D. To provide sensory input to the joint to improve proprioception.

21 A patient with left hemiparesis is struggling to initiate a righting reaction of the trunk when pulled slightly off-balance to the left while sitting. Which PNF technique and pattern would be MOST appropriate to facilitate this righting response?

A. Rhythmic initiation using a D1 flexion pattern of the left arm.
B. Combination of isotonics using a chopping pattern (D1 extension) to facilitate trunk control.
C. Slow reversals using a lifting pattern (D2 flexion) of the right arm to elongate and then activate the left trunk.
D. Contract-relax applied to the left quadratus lumborum.

22 A patient has fair strength (3/5) in right shoulder flexion but cannot maintain the contraction against even minimal resistance through the full range. The movement is jerky and inconsistent. To improve the endurance and coordination of this movement, which PNF technique is MOST suitable?

A. Repeated contractions (RC) from the lengthened range.
B. Rhythmic stabilization.
C. Slow reversal-hold.
D. Alternating isometrics.

23 A patient is able to bring his right hand to his mouth (hand-to-mouth pattern) but does so with a jerky, uncontrolled motion. The therapist wants to facilitate a smoother, more controlled movement. This patient is a good candidate for which PNF technique?

A. Contract-relax.
B. Rhythmic rotation.
C. Rhythmic initiation.
D. Replication.

24 A patient presents with significant weakness in her left quadriceps, making it difficult to initiate knee extension from a flexed position in sitting. A PNF therapist decides to use the "irradiation" or "overflow" principle. How would this be applied?

A. By applying maximum resistance to knee extension to recruit more motor units.
B. By first having the patient perform a strong contraction of the left hip flexors and dorsiflexors, and then quickly reversing to knee extension while maintaining resistance.
C. By passively moving the knee into extension to give sensory input.
D. By applying quick stretches to the quadriceps tendon immediately before the active movement.

25 A patient can achieve full range of motion in right shoulder D2 flexion (flexion-abduction-external rotation) but has poor control and strength in the return pattern (D2 extension). To improve the strength and control of D2 extension, which technique would be employed?

A. Hold-relax at the end of D2 flexion.
B. Slow reversals, moving from D2 flexion to D2 extension without a pause.
C. Rhythmic stabilization at the midpoint of range.
D. Contract-relax applied to the antagonists of D2 extension.

26 A patient 3 days post-stroke is lying in bed with his affected arm unsupported. The therapist observes that the scapula is retracted and depressed, and the shoulder is internally rotated. According to Carr & Shepherd, what is the FIRST priority regarding the patient's positioning?

A. Place a pillow under the axilla to prevent adduction contracture.
B. Position the patient in side-lying on the unaffected side to take weight off the affected limb.
C. Instruct the nurse to perform passive range of motion every 2 hours.
D. Align the scapula in a neutral, protracted position with the arm supported in a weight-bearing position to prevent soft tissue

27 A patient is learning to walk. She is able to stand and shift weight but during the swing phase, her toes catch the floor. The therapist identifies the problem as insufficient knee flexion and dorsiflexion at initial swing. According to Carr & Shepherd, what is the MOST appropriate intervention?

A. Practice the specific component of knee flexion and ankle dorsiflexion in a non-weight-bearing position (e.g., prone or sitting).
B. Use an ankle-foot orthosis to prevent the foot from dragging.
C. Apply electrical stimulation to the tibialis anterior during the swing phase of gait.
D. Have the patient practice walking with exaggerated high steps.

28 A patient presents with severe hypotonia (low muscle tone) in the trunk and neck muscles 5 days post-stroke. He has difficulty holding his head upright in sitting. According to Rood's framework, which type of sensory stimulation would be MOST appropriate to initially facilitate muscle tone and contraction in the neck extensors?

A. Gentle, slow stroking over the posterior neck muscles.
B. Prolonged, light icing (cold) applied to the skin over the neck extensors.
C. Fast brushing (quick icing/fast stroking) over the skin innervating the muscles of the posterior neck.
D. Sustained deep pressure applied to the forehead.

29 A different patient, now 3 months post-stroke, has moderate spasticity in the biceps and finger flexors of the affected arm. Which of the following Rood-based techniques is indicated to help inhibit this high tone?

A. Quick icing of the biceps muscle belly.
B. Lightly tapping over the muscle belly of the triceps.
C. Maintaining the arm in a prolonged, neutral temperature stretch or applying neutral warmth (e.g., with a towel wrap).
D. Rapidly stretching the biceps muscle.

30 A patient is struggling to initiate a voluntary contraction of his weak quadriceps to begin extending his knee in sitting. Using Rood's principle of facilitating muscle contraction through proprioceptive input, what is an appropriate technique?

A. Apply light brushing over the skin of the anterior thigh.
B. Apply a quick, maintained stretch (tapping/stroking) to the quadriceps tendon.
C. Slowly and rhythmically rock the patient's lower leg.
D. Apply deep pressure to the patellar tendon.

SECTION B: SHORT ANSWER QUESTIONS. ANSWER ALL QUESTIONS, EACH QUESTION IS 5 MARKS (20 marks)

1 Describe bedside examination of higher cortical functions.
2 Discuss recent advances in gait training in stroke patients.
3 Design evidence-based strategies for management of unilateral neglect
4 Evaluate the use of virtual reality and augmented reality in stroke rehabilitation.

SECTION C: LONG ANSWER QUESTIONS (LAQS) 20MARKS
ANSWER ALL QUESTIONS EACH ONE IS 10 MARKS

1. Critically discuss the role of the ICF model in guiding **stroke rehabilitation**. How does it enhance a patient-centered approach, and what are its advantages over traditional impairment-based models (10 MARKS)
2. Constraint-Induced Movement Therapy (CIMT) is based on the concept of neuroplasticity. Explain how CIMT promotes cortical reorganization and motor recovery after stroke (10 MARKS)