ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2021
EXAMINATION CATEGORY: TECHNICAL

PAPER III: SUBJECT SPECIALISATION PAPER FOR PHYSIOTHERAPY

Date : October 31, 2021
Total Marks : 100
Writing Time : 150 minutes (2.5 hours)
Reading Time : 15 minutes (prior to writing time)

GENERAL INSTRUCTIONS:

1. Write your Registration Number clearly and correctly on the Answer Booklet.
2. The first 15 minutes is to check the number of pages of Question Paper, printing errors, clarify doubts and to read the instructions. You are NOT permitted to write during this time.
3. This paper consists of **TWO SECTIONS**, namely SECTION A & SECTION B:
    - **SECTION A** has two parts: Part I - 30 Multiple Choice Questions
      Part II - 4 Short Answer Questions

      All questions under SECTION A are COMPULSORY.
    - **SECTION B** consists of two Case Studies. Choose only **ONE** case study and answer the questions of your choice.
4. All answers should be written on the Answer Booklet provided to you. Candidates are not allowed to write anything on the question paper. If required, ask for additional Answer Booklet.
5. All answers should be written with correct numbering of Section, Part and Question Number in the Answer Booklet provided to you. Note that any answer written without indicating the Section, Part and Question Number will NOT be evaluated and no marks will be awarded.
6. Begin each Section and Part on a fresh page of the Answer Booklet.
7. You are not permitted to tear off any sheet(s) of the Answer Booklet as well as the Question Paper.
8. Use of any other paper including paper for rough work is not permitted.
9. **You must hand over the Answer Booklet to the Invigilator before leaving the examination hall.**
10. This paper has **11 printed pages**, including this instruction page.

GOOD LUCK

SECTION A

PART I: Multiple Choice Questions [30 marks]

Choose the correct answer and write down the letter of your chosen answer in the Answer Booklet against the question number e.g. 31 (d). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.

1. Shoulder abduction and adduction movement occurs in which plane and about which axis?
   a) In the sagittal plane and about lateral axis.
   b) In the coronal plane and about anteroposterior axis.
   c) In the scapular plane and about anteroposterior axis.
   d) In the transverse plane and about the vertical axis.

2. The maximum amount of air expelled from the lungs after a maximum inhalation is the vital capacity and ranges from 3 to 5 liters. Which of the following explains the vital capacity?
   a) Inspiratory reserve volume + Tidal volume + Expiratory reserve volume.
   b) Inspiratory reserve volume + Tidal volume.
   c) Expiratory reserve volume + Residual volume.
   d) Inspiratory reserve volume + Tidal volume + Expiratory reserve volume + Residual volume.

3. The metabolic equivalent (MET) is the amount of energy it costs to complete a task, and is determined by the amount of oxygen it requires. What is the MET value of a person who is sitting comfortably in a chair?
   a) 1 MET
   b) 2 METs
   c) 3 METs
   d) 4 METs

4. A child holds the head steady and unsupported, pushes down on legs when the feet are on hard surfaces, rolls over from tummy to back, holds the toy and shakes it, brings hands to mouth, and pushes to elbow when lying on stomach. These are the physical development milestones for a child at which age?
   a) 2 months
   b) 4 months
   c) 6 months
   d) 8 months

5. The largest parts of the motor homunculus are the lips, tongues, and toes, which means number of alpha motor neurons innervating these organs are:
   a) Less than other regions of the body.
   b) More than other regions of the body.
   c) Equal to other regions of the body.
   d) Motor homunculus and motor units do not have any relationship.

6. Which of the following is NOT an example of a synarthrodial joint in the body?
   a) Coronal suture
   b) The fibrous joint between shaft of tibia and fibula
   c) Symphysis pubis
   d) Metacarpophalangeal joint

7. A patient is on Verapamil medication. As a calcium antagonist, which of the following is the action of Verapamil?
   a) Causes decreased contractility of heart and vasodilation of coronary arteries.
   b) Causes decreased contractility of heart and vasoconstriction of coronary arteries.
   c) Causes increased contractility of heart and vasodilation of coronary arteries.
   d) Causes increased contractility of heart and vasoconstriction of coronary arteries.

8. You are assessing a comatosed patient who is breathing independently in the intensive care unit. During the assessment of the range of motion of the right upper extremity, you notice that the patient is breathing unusually. The pattern shows an increase in breathing rate and depth followed by brief pauses in breathing. You should notify the appropriate personnel that the patient is exhibiting which of the following pattern?
   a) Biot's respiration
   b) Cheyne-Stokes respiration
   c) Kussmaul respiration
   d) Paroxysmal nocturnal dyspnea

9. On assessment of a patient who has had a stroke, you notice that the patient demonstrates contralateral weakness, contralateral sensory loss of the toes, foot and leg, and inability to make decisions. Urinary incontinence is also noted. The artery that was most likely affected is
   a) Internal carotid artery
   b) Vertebral artery
   c) Anterior cerebral artery
   d) Middle cerebral artery

10. A patient who complains of fatigue, difficulty swallowing and weakness is diagnosed with myasthenia gravis. The physiotherapist, who is teaching the patient with various conservation methods, understands that this condition is most likely caused by which of the following?
    a) Insufficient secretion of acetylcholine.
    b) Insufficient dopamine levels.
    c) Demyelination of the neurons.
    d) Inflammation of the arachnoid and pia mater.

11. The following are the physiological responses to cold therapy during the first 15 to 20 minutes of cold exposure, EXCEPT
    a) Decreased tissue stiffness
    b) Decreased circulation
    c) Decreased arthrogenic muscle inhibition
    d) Decreased muscle spasm

12. When utilizing heat modalities, the physiotherapist considers the different conductivity properties of each tissue type. Which of the following tissues has the highest thermal conductivity?
    a) Muscle
    b) Skin
    c) Adipose tissue
    d) Cortical bone

13. You are assessing the skin of an elderly patient. Understanding the normal age-related changes of the integumentary system, an elderly patient is at risk of the following conditions, EXCEPT
    a) Extravasation of blood into the skin and mucous membranes after a minor injury.
    b) Heat exhaustion.
    c) Skin infections.
    d) Increased rate of wound healing.

14. The deep veins of the legs and the pelvis are the most hospitable sites for venous thrombosis, a condition where a clot forms on the wall of a vein. Which of the following veins is LEAST likely involved in deep vein thrombosis?
    a) Peroneal vein
    b) Popliteal vein
    c) Posterior tibial vein
    d) Great saphenous vein

15. A woman at 12 weeks' gestation is informed what to expect during labor and delivery. The patient is diagnosed with spinal cord injury affecting T1. The patient is informed that the following is more likely to occur during birth, EXCEPT
    a) A painful birth
    b) Ineffective uterine contraction
    c) Autonomic hyperreflexia
    d) Abnormal progression of labor

16. The healing process is subtly or significantly influenced by external factors, which include various treatment modalities. The application of electrical stimulation has the following effects during rehabilitation, EXCEPT
    a) Reduced tissue viscosity
    b) Enhanced protein synthesis
    c) Relaxed muscle spasm
    d) Re-established lymphatic flow

17. Which of the following drugs is prescribed as a first line therapy for trigeminal neuralgia?
    a) Gabapentin
    b) Carbamazepine
    c) Phenytoin
    d) Baclofen

18. Which of the following is the correct way of performing the McMurray test?
    a) Patient position: seated with the knee flexed at 90-degrees; Action: the therapist internally and externally rotates the tibia.
    b) Patient position: prone with the knee flexed at 90-degrees; Action: the therapist applies an axial loads as the lower leg is internally and externally rotated.
    c) Patient position: supine; Action: the therapist extends the knee with the tibia internally rotated and applies varus stress, and then extends the knee with tibia externally rotated and applies valgus stress.
    d) Patient position: supine; Action: the therapist flexes the knee and medially rotates the tibia as the patella is pressed medially with the heel of the other hand, using the fingers to palpate for the medial femoral condyle.

19. On gait assessment and balance evaluation, the patient demonstrates difficulty in advancing the trunk forward in terminal stance. The pelvis flexes forward to maintain vertical orientation of the trunk. Increased lumbar spine extension is observed. Based on these findings and on the gait pattern of the patient, which of the following conditions is most likely?
    a) Hip extensor weakness
    b) Hip abductor weakness
    c) Hip pain
    d) Hip flexion contracture

20. A patient with cervical pain that radiates to the deltoid area and anterior aspect of the entire arm to the ase of the thumb is being evaluated by the physiotherapist. Physical examination reveals a positive result for a foraminal compression test or spurling test. Cervical radiculopathy is suspected. Which of the following is the diagnostic method of choice for the evaluation of cervical radiculopathy?
    a) Magnetic resonance imaging
    b) Plain radiography
    c) CT scan
    d) Myelography with CT scanning

21. A total rehabilitation program consists of two basic elements: therapeutic modalities and therapeutic exercise. For a therapeutic exercise to be effective, specific parameters must be followed sequentially. I. Flexibility and range of motion. II. Strength and muscle endurance. III. Proprioception, coordination, and agility. The parameters in their proper sequence are:
    a) I, II, III
    b) I, III, II
    c) II, I, III
    d) III, I, II

22. Direct-thrust, a direct manipulation technique, requires well-localized and specifically-directed forces. This technique is contraindicated to the following patients, EXCEPT
    a) A patient with spinal deformity.
    b) A patient with osteomalacia.
    c) A patient on systemic anticoagulation treatment.
    d) A patient with atlanto-occipital dysfunction.

23. The child's left leg is shorter than the right in supine position with the hips and news flexed. Assessment findings indicate that the child has developmental dysplasia of the hip. Before the surgery, traction is advised to the patient. Which of the following is the most appropriate traction for the patient?
    a) Buck's extension traction
    b) Bryant's traction
    c) Russel traction
    d) 90-90 traction

24. When suctioning the patient, the following actions by the physiotherapist ensures safety and maximal benefit of the therapy, EXCEPT
    a) Use of sterile technique.
    b) Suctioning intermittently for 10 seconds.
    c) Lubricating the catheter with sterile water before suctioning.
    d) Application of suction when inserting the catheter.

25. Chest physiotherapy intervention uses percussion and vibration over the thorax to loosen the respiratory secretions in the affected segments of the lung. Which of the following is the best time to perform chest physiotherapy manipulations?
    a) Before sleeping.
    b) 2 to 3 hours before meals.
    c) 2 to 3 hours after meals.
    d) After a morning exercise

26. Non-steroidal anti-inflammatory drugs are the most frequently used anti-inflammatory drugs for the treatment of musculoskeletal injuries. Which of the following NSAIDs is the most recommended drug for a patient who has a history of peptic ulcer disease?
    a) Ibuprofen
    b) Celecoxib
    c) Aspirin
    d) Indomethacin

27. Manipulative care is included in the comprehensive program for a female patient with a musculoskeletal problem involving the neck. Before the start of the therapy, the patient should be informed that which of the following is most likely to occur as a side effect of manipulation?
    a) Increased or early menses
    b) Weakness
    c) Increased sweating
    d) Increased neck discomfort

28. You are looking at the complete blood count report of a patient who had come to you with complaints of severe right knee pain that is swollen and limited in range of motion. You observe that total white blood cells had raised over 13000/microlitre, Neutrophils count had raised over 70%, and the inflammatory markers the CRP level is raised more than normal and ESR is extremely high. From the blood report, which of the following will you suspect the most?
    a) Acute stage septic arthritis of the right knee or the peri-articular infection.
    b) Acute primary osteoarthritis of the right knee.
    c) Secondary osteoarthritis.
    d) Referred pain of the psoas abscess.

29. A patient complains of low back pain that radiates down to the leg. The patient reports that the pain is usually aggravated by bending or sitting and alleviated by standing. Which of the following tests is the most specific for disk herniation?
    a) Straight-leg raise test
    b) Contralateral-leg raise test
    c) Slump test
    d) Nachlas test

30. A patient has limited knee extension owing to tight semimembranosus tendon of the hamstrings. You want to increase the extensibility of this tendon before applying stretching manipulation. Which of the following electrotherapy agents is most effective in heating this tendon?
    a) Ultrasonotherapy
    b) Shortwave diathermy
    c) Microwave diathermy
    d) Contrast bath

PART II – Short Answer Questions [20 marks]

This part has 4 Short Answer Questions. Answer ALL the questions. Each question carries 5 marks. Mark for each sub-question is indicated in the brackets.

1. Explain pain mechanisms and modulation of pain. (2.5+2.5=5)

2. Yongmin is a 50-year-old woman, who recently suffered a hand injury. The flexor tendons of her 2nd, 3rd and 4th fingers are injured. She has now developed tingling and numbness in her hands and she has problems with manipulating and grasping objects. A hand therapist had fabricated a hand splint to support wound healing.

   Assign the ICF nomenclature and equivalent to the case in terms of Health Condition, Body structure, Body function, Impairment, Activity and participation restriction, Personal factor, and Environmental factor.

3. A 30-year-old female with a history of multiple pregnancy (Gravida 6 para 3) presents with heaviness, pain in vaginal region at 34 weeks of gestation. She reports that she has problems with urine leakage on sneezing, laughing and during sexual intercourse for the past two months. She is willing to manage her urinary incontinence problems as soon as possible to avoid progressions of symptoms.

   a) List the topics that you find it relevant to discuss in your interview with the patient. (1.5 marks)

   b) Mention at least five healthy bladder habits as an early intervention to manage incontinence symptoms. (1.5 marks)

   c) Explain how you would manage this case, from physiotherapy assessment to treatment and possible follow ups. (2 marks)

4. An athlete sustained a left ankle injury during a game the previous night. History suggests that he had an inversion injury. He can barely put weight on his left foot. He complains of pain over the lateral aspect, the ankle is grossly swollen and is ecchymotic.

   Provide your management plan including the assessment findings, radiological investigations, pharmacological and non-pharmacological pain management - the type and doses, and PEACE and LOVE protocols.

SECTION B: Case Study [50 marks]

Choose either CASE I OR CASE II from this section. Each case study carries 50 marks. Mark for each sub-question is indicated in the brackets.

CASE I

A young man was brought to the hospital after a gasoline cylinder exploded while he was in the kitchen cooking meals. He sustained burn injuries to both forearms including the digits. There are also signs of flash burns on his face. Burn sites have broken blisters, non-blanching areas, white, leathery and relatively mild or no pain. Although he has no abdominal burn he complains of abdominal pain. Family members recall that the patient was thrown several meters away from the blast spot. Currently, the patient is admitted and managed in the surgical ward. He has an underwater sealed chest drain on the right side that sustained multiple ribs fractures.

Answer all the following questions. Illustrate with diagrams wherever necessary.

1. What is the Wallace rule of nine? Draw a diagram showing different burn percentages on our body. Give an approximate TBSA burn percent and its degree of burns for this patient. (1+4+2=7 marks)
2. List four indications for chest tube insertion. (4x0.5=2 marks)
3. How will you differentiate if it is pleural collection or pneumothorax by looking at the chest drain? (1 mark)
4. Mention precautions or measures to be taken while ambulating the patient with chest tube on? (3 marks)
5. Will you suggest this patient for skin graft? Substantiate your answer with clinical reasoning. (0.5+1.5=2 marks)
6. Differentiate degrees of burns with the help of a labelled skin diagram. (5 marks)
7. Define burn shock. Enumerate the clinical features of burn shock. (1+2=3 marks)
8. Write a short note on fluid resuscitation after burn injury. (3 marks)
   (*Should write about Parkland formula*)
9. How is mesh graft different from split thickness graft? (2 marks)
10. List down the early and late complications of burn injury. (1.5+1.5=3 marks)

11. If you were the first person to assess the above burn injury patient, how would your assessment look like? Write a brief note on your assessment. (5 marks)

12. What are the clinical signs of inhalation injury? Mention the risk factors. (2+2=4 marks)

13. What are tendon gliding exercises? Mention its components. (1+2=3 marks)

14. This patient has rib injuries, inhalation burns, and chest drain. How do you assess for tracheal deviation? What are its inferences? (1+2=3 marks)

15. Define tactile fremitus. (1 mark)

16. Define the following terms. (3x1=3 marks)
    a) Neovascularization
    b) Inosculation
    c) Imbibition

CASE II

A 51-year-old male construction worker with no previous history of back pain experienced sudden stabbing pain emanating from the low back several weeks ago after lifting a heavy hose. He dropped the hose and could not immediately straighten due to severe pain. After 10 minutes, pain had subsided somewhat and he continued working, using a 30 Kg jackhammer in a flexed posture. After half an hour of operating the jackhammer, his back pain recurred and became increasingly severe over the next several hours to the point where he could not bend or straighten. A co-worker drove him home and he went to bed as lying down, while still in pain, felt more comfortable than standing or sitting. After several days in bed, he was able to get up for trips to the toilet and meals, although sitting in either a hard or soft chair aggravated pain.

Ten days after the onset of symptoms, he was walking up a hill and experienced a sudden and severe pain in the middle of the right buttock with radiation down the posterolateral aspect of the thigh and lateral aspect of the leg and ankle as corresponding to diminishment of back pain. Once leg symptoms became dominant, pain was aggravated by sitting and changing position and relieved when standing and walking. Coughing, sneezing, laughing, and straining during bowel movements aggravated buttock pain.

Observation – The patient is strong, muscular and normally stands erect without deformity. No muscle wasting observed. A loss of lumbar lordosis is noted.
Palpation – Mild pain to firm palpation in the lumbosacral region. No palpable step noted.
Range of motion – Spinal flexion is markedly restricted and causes radiating pain to the right buttock. Extension is negative, as is bilateral lateral bend, although pain occurs in the right buttock when bending to that side.
Strength – Patient walks on heels, toes, and the lateral and medial borders of his feet without difficulty. The right extensor hallucis longus (EHL) is slightly weaker than the left. The right gluteus medius muscle is graded Good minus (4-).

Flexibility – Normal soft tissue extensibility in the lower extremity musculature.

Girth measurement – No muscle wasting evident at the mid-thigh or mid-calf level.

Sensation – Normal sensation except for a small area over the dorsomedial aspect of the right forefoot, where there is diminution to pinprick.

Deep tendon reflexes – Brisk and equal knee and ankle reflexes, whereas plantar response is downward. Mild diminution of the right tibialis posterior reflex.

Special tests – The right straight leg raise (SLR) is limited to 30 degrees and there is a positive Lasegue sign with pain radiating down the posterior aspect of the thigh. Left Left SLR is 75 degrees and a negative Lasegue. Positive slump test on the right. Femoral stretch test is bilaterally negative. A prone press up somewhat relieves and centralizes pain.

Sacroiliac and hip joint - Negative Gaenslen test and Faber maneuver. Peripheral Circulation - The lower extremity pulses are intact.

Answer all questions. Illustrate with diagrams wherever necessary.

1. What is the most likely cause of this patient's symptoms? (1 mark)

2. What are the structural components of the intervertebral disk? Draw a labelled diagram of the cross section of an intervertebral disc. (4 marks)

3. What is internal disc disruption? What are the two enstage pathologies that may result secondary to internal disc disruption? (1+2=3 marks)

4. Briefly explain the progressive sequence or stages of disc prolapse. (3 marks)

5. Explain the disc pathogenesis of symptoms in this patient. (4 marks)

6. SLR for this patient is 30 degrees on the right and 75 degrees on the left. Explain how you will administer the SLR test on this patient. Explain how you will elicit a positive slump test on the right for this patient. (2.5+2.5=5 marks)

7. What is the diurnal SLR test and what is its clinical significance? How will this patient respond to the diurnal SLR test? (1+2+2=5 marks)

8. What is a trunk list? Explain mechanism of lateral shift for contralateral and ipsilateral disc pathology. (1+2=3 marks)

9. The SLR on the left for this patient is 75 degrees which means the crossed SLR test does not reproduce symptoms on his right leg although he has a disc protrusion. Explain why the crossed SLR test does not reproduce right leg symptoms in this patient. (2 marks)

10. The patient was assessed to have diminished tibialis posterior reflex, good minus muscle power of the right gluteus medius and weak right EHL, and diminished sensation to pinprick over the right dorsomedial aspect of the right forefoot. Interpret these assessments. (2 marks)

11. What is the most likely level of disc prolapse in this patient? Identify the traversing nerve root and exiting nerve root at this level. (1+1+1=3 marks)

12. How can you differentiate between nerve root impingement deriving from spinal stenosis and disc pathology? (2 marks)

13. What is malingering? What are the signs and symptoms of malingering? How will you test if the patient is malingering? (1+2+1=4 marks)

14. Mention five differential diagnosis of low back pain. (0.4x5=2marks)

15. Mention a single surgical indication related to disc pathology. (1 mark)

16. How will you manage this patient? Provide a sequence of management strategies for this patient? Provide three drugs and the reason for their use for this patient, in addition to non-pharmacological management. (4+2=6 marks)

TASHI DELEK