

No. of Printed Pages: 4

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**BPT 1<sup>st</sup> YEAR, ANNUAL EXAMINATION, MAY 2024  
BASIC PHYSICS AND PHYSICAL PRINCIPLES OF EXERCISE THERAPY (THEORY)  
PAPER CODE: BPT – 166**

Time: 3 hours

Maximum Marks: 75 Marks

(Write your Roll No. on top of the paper immediately)

**Instructions:**

1. Draw diagrams wherever necessary.
2. All sections are compulsory.
3. Give examples wherever necessary.

**Section – A**

**Multiple choice Questions (All are compulsory) (15 × 1 Mark = 15 Marks)**

- Q1.** Muscles that help the agonist in performing the desired action are called:
- a) Prime movers      b) Synergists      c) Antagonists      d) Fixators
- Q2.** The branch of Biomechanics that studies the description of motion without regard for the forces producing the motion is called:
- a) Osteokinematics      b) Arthrokinematics      c) Kinetics      d) Both a and b
- Q3.** Which one of the statements is correct for center of gravity?
- a) For an object to be stable the center of gravity must fall within the base of support
- b) The center of gravity lies approximately anterior to the second sacral vertebra
- c) The larger the base of support of an object, the greater the stability of that object
- d) All of the above
- Q4.** The finger flexors that cross the wrist joint do not create enough tension during the wrist full flexion as the finger flexors become shortened in this position. In other words, there is a difficulty in making a fist when a wrist is fully flexed. Inability of making a fist in full wrist flexion is called?
- a) Passive insufficiency      c) Passive deficiency
- b) Active insufficiency      d) Active deficiency
- Q5.** Patella is an anatomic pulley and Pulleys are frequently used in exercise and traction equipment to
- a) Change the direction of a force
- b) Increase or decrease the magnitude of a force
- c) Not only change the direction of pull but also to improve its leverage too
- d) All of the above

- Q6.**  $MAd = EA/RA$  whereas,  $MAd$  is mechanical advantage,  $EA$  is effort arm and  $RA$  is resistance arm. This means mechanical advantage is the ration of the effort arm to the resistance arm. Which one of the sentences is correct for mechanical advantage of the lever?
- First class lever does not follow the above-mentioned rules related to the mechanical advantage. In all first-class lever, effort arm can either be greater, lesser or equal to the resistance arm.
  - In all second class of lever, the mechanical advantage of the lever will always be greater than 1 as the effort arm is greater than the resistance arm ( $EA > RA$ ).
  - In all third-class lever mechanical advantage will always be lesser than 1 as the resistance arm is greater than the effort arm.
  - All of the above
- Q7.** A patient finds difficulty in initiating voluntary exercise, however, there is a good strength in the middle and inner range of muscle work. Which one of the following exercises should be administered to the patient?
- Active assisted resisted exercises
  - Active resisted exercises
  - Passive exercises
  - Progressive resistive exercises
- Q8.** The ability to maintain balance and spatial orientation without visual clues is the result of working multiple sensory systems together such as eyes, inner ears, and proprioceptors is called
- Lever
  - Force and force system
  - Equilibrium
  - Muscle tension
- Q9.** Which one of the following statements is not correct for the range of muscle work for the joint which has normal range from  $0^\circ$  to  $140^\circ$ ?
- The inner range of muscle work will be between  $40^\circ$  and  $140^\circ$
  - The middle range of muscle work will be between  $40^\circ$  and  $100^\circ$
  - The outer range of muscle work will be between  $0^\circ$  and  $120^\circ$
  - All of the above
- Q10.** In which of the methods of strengthening 10RM is reduced gradually. Initially 10 lifts are performed with 10 RM and then 10 lifts are performed with 10 RM minus 1lb, and then 10 lifts with 10 RM minus 2lb and so on.
- DeLorme
  - Zinovief (Oxford method)
  - Mac Queen Method
  - Watkins
- Q11.** A quick, powerful movement in which muscle contracts eccentrically followed by (immediate) concentric contraction of the same muscle. Such type of contraction happens in jumping and are employed to improve the work performance. Which one of the following exercises is mentioned above?
- Progressive resistive exercise
  - Plyometric exercise
  - Muscle energy exercise
  - All of the above

- Q12.** There is increased pelvic angle from  $30^{\circ}$  to  $40^{\circ}$  with anteriorly tilting of the pelvis. Gluteus maximus and abdominals are reduced in the strength. There is shortening of the iliopsoas and erector spinae of the lumbar spine. The center of gravity shifts posterior to the lumbar spine. Which one of the following abnormal postures is mentioned above?
- a) Hyper lumbar lordosis                      c) Sway back
  - b) Reduced Lumbar lordosis                  d) Kyphosis
- Q13.** Which one of the following exercises is contraindicated to the post fracture stiffness of elbow joint as it may cause myositis ossificans?
- a) Contract relax exercises of the elbow flexors
  - b) Forced passive stretching of the elbow flexors
  - c) Active assisted exercises of elbow flexors
  - d) All of the above
- Q14.** Ely's stretching is done for
- a) Quadriceps shortening                      c) Gastrocnemius shortening
  - b) Hamstrings shortening                      d) Iliopsoas shortening
- Q15.** Which one of the following is the example of synarthroses joint?
- a) Interosseous tibiofibular joint
  - b) Interosseous radioulnar joint
  - c) Articulation of teeth in alveolar socket of mandible and maxilla by periodontal ligament
  - d) All of the above

### Section – B

Answer any **THREE** of the following:

(3 × 10 Marks = 30 Marks)

- Q1.** Write in detail the basic principles of general fitness. Write a note on warm up and cool down exercises,
- Q2.** Define 10 repetition maximum (RM). Calculate 10RM for four weeks for a patient with grade 3 quadriceps. Write a note on progressive resistance exercise.
- Q3.** How local relaxation exercises are different from general relaxation exercises. Write in detail the principles, procedure, and indications of a contract relaxation exercise.
- Q4.** What is therapeutic gymnasium? Write in detail the various equipment required to set up a therapeutic gymnasium?

### Section – C

Answer any *TWO* of the following:

(2 × 15 Marks = 30 Marks)

- Q1.** Explain in detail the therapeutic effects, indications and contraindications of passive stretching exercises. Write a note on modified Thomas stretching for right side iliopsoas shortening.
- Q2.** Discuss the difference between active assisted resisted exercise and resisted exercise. Write in detail the indications, contraindications, and therapeutic uses of active exercises.
- Q3.** What are various fundamental and their derived positions. Write in detail the indications (uses) of supine lying and its derived positions.

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