AMREF INTERNATIONAL UNIVERSITY

SCHOOL OF MEDICAL SCIENCES

DEPARTMENT OF REHABILIATIVE MEDICINE

BACHELOR OF SCIENCE IN PHYSIOTHERAPY

END OF TRIMESTER EXAMINATIONS JANUARY TO APRIL 2024

UNIT CODE: PHT 126
UNIT NAME: MEDICAL PHYSICS

DATE: 8TH APRIL 2024 **TIME: 11.15-1.15PM**

INSTRUCTIONS

1. **All students will have two (2) hours to complete the examination**
2. **Attempt all questions as per the instruction**
3. **It is the student's responsibility to report any page and number missing in this paper.**
4. **Check that the paper is complete**
5. **Total number of pages is 6 including the cover.**
6. **Read through the paper quickly before you start.**

MULTPLE CHOICE QUESTIONS (40 MARKS)

1. Which branch of physics deals with the study of forces acting on objects in motion?

    A. Thermodynamics

    B. Mechanics

    C. Electromagnetism

    D. Optics

2. In physiotherapy, which of the following is an example of a first-class lever in the human body?

    A. Elbow joint during bicep curls

    B. Neck during head rotation

    C. Ankle joint during calf raises

    D. Knee joint during squatting

3. When a physiotherapist applies a force to move a patient's limb through its range of motion, in internal and external rotation, they are primarily applying which principle of physics?

    A. Torque

    B. Friction

    C. Momentum

    D. Impulse

4. Which of the following is a measure of the rotational force applied to an object?

    A. Momentum

    B. Torque

    C. Impulse

    D. Acceleration

5. In physiotherapy, which of the following factors affects the amount of work done in a muscle contraction?

   A. Length of the muscle

   B. Type of muscle fibers

   C. Frequency of nerve impulses

   D. All of the above

6. Which of the following principles explains why a person standing on one leg may lose balance more easily than when standing on two legs?

   A. Newton's First Law

   B. Newton's Second Law

   C. Newton's Third Law

   D. None of the above

7. There are three planes of motion in the body. Which one of the following does NOT match with its plane of motion?

   A. Sagittal plane for flexion and Extension
   B. Frontal plane for Abduction and Adduction
   C. Transverse plane for dorsiflexion and planter-flexion
   D. None of the Above

8. Which of the following statement BEST describes parallel force systems of the body

   A. All forces occur along same action line.
   B. Cervical traction where by the machine and the weight of the head are in opposite directions.
   C. Rotation of the pelvis in the sagittal plane
   D. None of the above

9. What principle of physics is primarily utilized in heat and cold therapy by physiotherapists?

   A. Electromagnetism

   B. Thermodynamics

   C. Fluid mechanics

   D. Kinematics

10. What role does understanding pressure play in physiotherapy?

A. It helps in designing exercise programs.

B. It aids in diagnosing neurological conditions.

C. It assists in performing manual therapy techniques.

D. It determines the intensity of electrical stimulation

11. In Boyle's law, what is the relationship between gas pressure and volume?

A. Directly proportional

B. Inversely proportional

C. No relationship

D. Exponential relationship

12. In physiotherapy, which aspect of gas behavior is relevant for understanding respiratory function?

A. Liquids phase changes

B. Gas diffusion

C. Solid-state properties

D. Electromagnetic interactions

13. What is the primary focus of gas laws in physiotherapy?

A. Understanding solid properties

B. Analyzing liquid behavior

C. Assessing gas behavior

D. Investigating plasma dynamics

14. What are the two types of forces with respect to the body?

A. External and internal

B. Gravity and friction

C. Push and pull

D. Acceleration and deceleration

15.Which of the following is an example of an external force in physiotherapy?

A. Muscle contraction

B. Ligament tension

C. Gravity

D. Bone strength

16.Which of the following is an example of an internal force in the body?

A. Thera band resistance

B. Weight cuff

C. Muscle contraction

D. Manual therapy technique

17.In physiotherapy, the resistance provided by a patient's own body weight during exercises represents which type of force?

A. External force

B. Internal force

C. Gravitational force

D. Magnetic force

18.How does cryotherapy work to reduce pain and inflammation?

A. By increasing blood flow to the affected area

B. By causing blood vessels to constrict and reducing blood flow

C. By expanding blood vessels and promoting circulation

D. By numbing the nerves in the affected area

19.Which of the following statements about thermotherapy is true?

A. It causes blood vessels to constrict.

B. It decreases blood flow to the affected area.

C. It is primarily used to numb the area.

D. It helps to increase tissue elasticity and flexibility.

20. When a physiotherapist applies torque to a joint, they are primarily influencing what motion

A. Acceleration

B. Angular motion

C. Linear motion

D. Magnetic motion

SHORT ANSWER QUETIONS

State the kinetic theory of gases and its application in physiotherapy (5marks)

In kinematics, there are five variables of interest: Explain? (10 marks)

LONG ANSWER QUESTION

Describe the sound waves and their properties, Ultrasonic sound and their applications in physiotherapy (15 Marks)