



**UNIVERSITI KUALA LUMPUR
ROYAL COLLEGE OF MEDICINE PERAK**

**FINAL EXAMINATION
MARCH 2026 SEMESTER**

COURSE CODE : RFD14502
COURSE NAME : ELECTROTHERAPEUTIC 1
PROGRAMME NAME : DIPLOMA IN PHYSIOTHERAPY
DATE : 24 JUNE 2026
TIME : 9.00 AM – 11.00 AM
DURATION : 2 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read **CAREFULLY** the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. This question paper consists of **TWO (2)** sections; Section A and Section B.
4. Answer **ALL** questions in Section A and **THREE (3)** questions in Section B.
5. Please mark/write your answers on the OMR answer script and answer booklet provided.
6. Answer all questions in English language **ONLY**.

THERE ARE 8 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A: MULTIPLE CHOICE QUESTIONS (Total: 20 marks)**INSTRUCTION: Answer ALL questions.****Please use the OMR sheet provided.**

1. Identify the risk of applying electrotherapy over malignant tumors.
 - A. Reduced pain.
 - B. Improved healing
 - C. Spread of cancer cells.
 - D. Increased muscle strength.

2. Select the importance of proper electrode placement in electrotherapy.
 - A. To target specific tissues.
 - B. To reduce treatment cost.
 - C. To shorten session duration.
 - D. To ensure even tanning of the skin.

3. Identify the event during hyperpolarization in an action potential.
 - A. Chloride ions rush-in.
 - B. Sodium channels open.
 - C. Calcium channels close.
 - D. Potassium channels remain open.

4. What is Wallerian degeneration? (T2, C1)
 - A. Regrowth of nerve fibers.
 - B. Hyperpolarization of the neuron.
 - C. Formation of new myelin sheaths.
 - D. Degeneration of the axon distal to the injury site.

5. Identify the function of myelin on nerve signal transmission.
 - A. Causes random firing of neurons.
 - B. Prevents action potentials entirely.
 - C. Speeds up conduction via saltatory propagation.
 - D. Slows down conduction by blocking ion channels.

6. Find the type of pain that persists for more than 3 to 6 months.
- A. Acute pain.
 - B. Chronic pain.
 - C. Neuropathic pain.
 - D. Breakthrough pain.
7. How does aerobic activity triggers endogenous pain control?
- A. By blocking C-fiber transmission.
 - B. By decreasing blood flow to injured tissues.
 - C. By activating the sympathetic nervous system.
 - D. By stimulating the release of natural painkillers.
8. What is the role of the dorsal root ganglia (DRGs) in nociception?
- A. Regulate body temperature.
 - B. Produce endogenous opiates.
 - C. Transmit motor signals to muscles.
 - D. Modulate pain signals before reaching the spinal cord.
9. Identify the condition that can be diagnosed using electromyography (EMG).
- A. Hypertension.
 - B. Osteoporosis.
 - C. Neurogenic diseases.
 - D. Respiratory disorders.
10. Select the type of electrode that is inserted directly into the muscle during an EMG procedure.
- A. Needle electrodes.
 - B. Surface electrodes.
 - C. Thermal electrodes.
 - D. Galvanic skin response electrodes.

11. Identify the role of the feedback loop in biofeedback.
- A. To diagnose muscle and nerve disorders.
 - B. To assess the duration of muscle contractions.
 - C. To measure the strength of electrical stimulation applied to the muscle.
 - D. To provide real-time information to the patient about their physiological processes.
12. Find the type of heat transfer that requires direct contact between surfaces.
- A. Radiation.
 - B. Convection.
 - C. Conduction.
 - D. Evaporation.
13. Identify the substance used to reduce the melting point of paraffin wax in therapeutic applications.
- A. Water.
 - B. Glycerin.
 - C. Silica gel.
 - D. Mineral oil.
14. Why are sensitive areas covered during infrared therapy?
- A. To reduce vasodilation.
 - B. To prevent tissue damage.
 - C. To enhance heat absorption.
 - D. To increase radiation intensity.
15. What is the significance of the Grothuss-Draper law in infrared (IR) therapy?
- A. The angle of radiation penetration.
 - B. The heat transfer through conduction.
 - C. The measurement of tissue thickness.
 - D. The radiation must be absorbed to produce effects.

16. Identify the physiological effect of heat that contributes to tissue healing.
- A. Reducing oxygen supply.
 - B. Constricting blood vessels.
 - C. Increasing metabolic activity.
 - D. Decreasing collagen elasticity.
17. Find the optimal temperature range commonly used in therapeutic ice baths.
- A. 0°C to 5°C.
 - B. 10°C to 15°C.
 - C. 20°C to 25°C.
 - D. 30°C to 35°C.
18. Which inflammatory phase that will benefiting by cold therapy?
- A. Proliferation phase.
 - B. Remodelling phase.
 - C. Acute inflammatory phase.
 - D. Chronic inflammatory phase.
19. Why cold therapy should be avoided in patients with peripheral vascular disease?
- A. It promotes vasodilation.
 - B. It reduces circulation to the tissue.
 - C. It enhances nerve conduction velocity.
 - D. It increases blood flow to the extremities.
20. Select immediate action following the onset of numbness from ice application.
- A. Discontinue treatment.
 - B. Rest the patient before continue the treatment.
 - C. Change the treatment by using thermal therapy.
 - D. Increase the layer before continue the treatment.

SECTION B: MODIFIED ESSAY QUESTIONS (Total: 60 marks)**INSTRUCTION: This section consists of FOUR (4) questions.****Answer THREE (3) questions in the answer booklet provided.****Question 1**

- (a) List **FOUR (4)** contraindications for electrotherapy. (4 marks)
- (b) Describe **THREE (3)** physiological effects of shortwave diathermy (SWD). (6 marks)
- (c) List **FOUR (4)** phases involved in the generation of an action potential. (4 marks)
- (d) Describe **SIX (6)** benefits of electrical stimulation on denervated muscles. (6 marks)

Question 2

- (a) List **FIVE (5)** types of pain. (5 marks)
- (b) How the Central Biasing Theory illustrates the influence of emotions on the perception of pain? (5 marks)
- (c) List **FIVE (5)** types of biofeedback. (5 marks)
- (d) Explain the role of biofeedback in rehabilitation. (5 marks)

Question 3

- (a) List **THREE (3)** physiological effects of superficial heat therapy. (3 marks)
- (b) Identify **FIVE (5)** methods of paraffin wax therapy application. (5 marks)
- (c) Explain Lambert's Cosine Law applies to infrared therapy. (4 marks)
- (d) Describe **THREE (3)** infrared wavelength that affects tissue penetration depth. (6 marks)
- (e) List **TWO (2)** indications of IRR therapy. (2 marks)

Question 4

- (a) Give **THREE (3)** principal modes of heat transfer in cold therapy. (3 marks)
- (b) List **THREE (3)** physiological effects of cryotherapy on circulation. (3 marks)
- (c) Describe the Lewis Reaction. (6 marks)
- (d) Explain the role of cryotherapy in acute inflammation management. (6 marks)
- (e) Identify **TWO (2)** precautions prior to cryotherapy application. (2 marks)

END OF EXAMINATION PAPER