Quiz: Electrotherapy - High Frequency (Short Wave Diathermy)

This quiz assesses the understanding of Short Wave Diathermy (SWD) for Bachelor of Physiotherapy students, aligned with the course objectives from the *Electrotherapy - II* syllabus (Pages 62-63). It includes 5 multiple-choice questions (MCQs) on biophysics and production, and 5 short-answer questions on technique or method of application, with one design-thinking (DT) question. The quiz is designed to evaluate the ability to list indications/contraindications, demonstrate techniques, and describe effects of electrotherapy modalities.

1. Multiple-Choice Questions (Biophysics and Production)

1. **What is the primary mechanism by which Short Wave Diathermy produces deep heating in tissues?**
   a) Conduction
   b) Convection
   c) Conversion of electromagnetic energy to heat
   d) Radiation

2. **Which component of the SWD machine is responsible for generating the high-frequency oscillations?**
   a) Patient circuit
   b) Resonator circuit
   c) Machine circuit or Oscillator circuit
   d) Electrode

3. **For the SWD circuits to be effective, what condition must be met?**
   a) Circuits must be out of tune
   b) Circuits must be in tune
   c) Circuits must have low frequency
   d) Circuits must be disconnected

4. **Which biophysical principle is used in the capacitor field method of SWD?**
   a) Magnetic field induction
   b) Electrostatic field between plates
   c) Ultrasonic waves
   d) Infrared radiation

5. **What is the typical frequency used in Pulsed Short Wave Diathermy?**
   a) 27.12 MHz
   b) 1 MHz
   c) 2450 MHz
   d) 50 Hz

2. Short-Answer Questions (Technique or Method of Application)

6. Describe the preparation of equipment for SWD application, including warming, tuning, and testing.
7. Explain the condenser field method of SWD application, including types of electrodes and spacing.
8. What are the different electrode positioning techniques in the condenser field method? Describe each briefly.
9. Outline the cable method (Inductothermy) for SWD, including advantages and dosage considerations.
10. (Design-Thinking Question) Propose how Short Wave Diathermy can be integrated into a treatment plan for a patient with chronic low back pain. Consider indications, contraindications, and potential physiotherapy interventions to optimize outcomes.

3. Answer Key with Explanations and References

3.1 Multiple-Choice Questions

1. **Answer: c) Conversion of electromagnetic energy to heat**
   Explanation: SWD produces deep heating by converting high-frequency electromagnetic energy into thermal energy within tissues, based on the biophysics of dielectric heating. This is essential for therapeutic effects in conditions requiring deep tissue warming.
   Reference: Syllabus, Page 62, Chapter A-Short Wave Diathermy, 4. Biophysics of deep heating using SWD.
2. **Answer: c) Machine circuit or Oscillator circuit**
   Explanation: The oscillator circuit generates the high-frequency alternating current necessary for SWD production.
   Reference: Syllabus, Page 62, Chapter A-Short Wave Diathermy, 1 Production, 1. Construction-A. Machine circuit or Oscillator circuit.
3. **Answer: b) Circuits must be in tune**
   Explanation: For efficient energy transfer, the machine and patient circuits must be in resonance or tuned to the same frequency.
   Reference: Syllabus, Page 62, Chapter A-Short Wave Diathermy, 3. Indications for circuits to be in tune.
4. **Answer: b) Electrostatic field between plates**
   Explanation: The capacitor field method uses an electrostatic field created between two electrodes acting as capacitor plates to heat tissues.
   Reference: Syllabus, Page 62, Chapter A-Short Wave Diathermy, 1. Capacitor or condenser field method.
5. **Answer: a) 27.12 MHz**
   Explanation: Pulsed SWD typically operates at 27.12 MHz, with parameters

like pulse repetition rate and duration for controlled heating.
Reference: Syllabus, Page 63, 5 Pulsed Short Wave Diathermy, A. Definition, Frequency, Wavelength.

3.2 Short-Answer Questions

6. **Answer**: Preparation involves warming the machine to stabilize components, tuning the circuits for resonance, and testing for proper function and safety before patient application. This ensures efficient and safe energy delivery.
Reference: Syllabus, Page 63, 2 Technique or Method of application of SWD, 1. Preparation of equipment (warming, tuning, testing of machine).

7. **Answer**: The condenser field method uses electrodes as capacitor plates to create an electric field. Types include flexible or rigid electrodes; spacing can be wide (for deeper penetration) or narrow (for superficial heating).
Reference: Syllabus, Page 63, 2. Application of treatment- A. Condenser field method/Capacitor field method; 3. Condenser field method, A. Type of electrode, B. Size of electrode, C. Electrode spacing-Wide & Narrow spacing.

8. **Answer**: 1. Co-planar: Electrodes on the same plane for superficial areas. 2. Contra planar: Electrodes on opposite sides for through-heating. 3. Mono planar: Single electrode over the area. 4. Cross fire method: Alternating positions for uniform heating in joints.
Reference: Syllabus, Page 63, 3. Condenser field method, D. Electrode positioning-1. Co-planar, 2. Contra planar, 3. Mono planar, 4. Cross fire method.

9. **Answer**: Cable method uses a coiled cable to induce a magnetic field for heating. Advantages include better heating of irregular surfaces; dosage is based on intensity, duration, and patient sensation.
Reference: Syllabus, Page 63, 2. Application of treatment- B. Cable method/Inductothermy 4. Cable field method, A. Electrode, B. Electrostatic field & Magnetic field, C. Advantage, D. Dosage.

10. **Answer**: For chronic low back pain, SWD can be used to reduce pain and muscle spasm via deep heating (indication: musculoskeletal conditions). Avoid in acute inflammation or metal implants (contraindications). Integrate with exercises like core strengthening and manual therapy to enhance mobility and prevent recurrence, leveraging patient-centered design for personalized plans.
Reference: Syllabus, Page 62, 3 Indication & contraindication of SWD; Page 63, 4 Precautions and contraindication of SWD (aligned with overall course objectives for management).

4. Suggested Digital Platform

Google Forms is recommended for delivering this quiz and collecting responses. It is user-friendly, allows for multiple-choice and short-answer question formats, and provides automatic response collection and analysis. Features include:

- Customizable question types (MCQs, short-answer).

- Option to include answer explanations post-submission.
- Data export for grading and feedback.
- Accessibility for students via a link, compatible with mobile and desktop devices.

To implement:

1. Create a new Google Form.
2. Add the 10 questions, ensuring MCQs have radio buttons and short-answer questions have paragraph response fields.
3. Enable response collection and set a submission deadline.
4. Share the form link with students via email or a learning management system.
5. Use the “Responses” tab to review and grade submissions, providing feedback based on the answer key.