CHAPTER B: Micro Wave Diathermy (MWD):

1. A 50-year-old office worker with chronic shoulder pain presents to your clinic. What is the single most accurate one-sentence definition of Micro Wave Diathermy (MWD) you would note in her file before considering it as a treatment option?
2. The patient asks, “How is this different from ultrasound therapy?” Explain the key frequency and wavelength used in MWD (exact values expected).
3. In the bio-physics of MWD, what type of electromagnetic radiation is used, and how does it primarily produce heat in tissues? (≤ 20 words)
4. Your intern questions the penetration depth. State the approximate depth (in cm) to which MWD can effectively heat muscle tissue, and why it's less than SWD.
5. Bio-physics scenario: In MWD, tissues with high water content heat more due to _____ (fill in the mechanism: one word/phrase).
6. A patient with superficial muscle strain is ideal for MWD. List any THREE common indications for MWD (0.33 mark each).
7. Before starting MWD, you check for contraindications. List FOUR absolute contraindications specific or emphasized for MWD.
8. The patient has a small metallic tattoo near the shoulder. Is this an absolute contraindication for MWD? Justify in one sentence.
9. Bio-physics integration: Unlike SWD, MWD uses a single emitter. What is the shape of the heating pattern produced, and which tissue layer heats the most?
10. Clinical dilemma: A patient with acute sinusitis asks if MWD can help. Is this an indication or contraindication? Explain based on bio-physics (one line).
11. In the bio-physics of MWD, the energy absorption follows the law of _____ (fill: Grotthus-Draper or inverse square?).
12. Your machine manual mentions "selective heating." For an obese patient, which method (MWD or SWD) is better for deep muscles, and why? (bio-physics reason)
13. Indication check: Name TWO musculoskeletal conditions where MWD is preferred over ultrasound due to its bio-physical properties.
14. Safety bio-physics: Why is eye protection mandatory during MWD treatment? (one specific bio-physical reason)
15. Final case: A runner with hamstring strain. Outline a simple rationale for using MWD, covering definition, one bio-physical advantage, one indication, and one contraindication to rule out.

ANSWER KEY:

1. Micro Wave Diathermy is the therapeutic application of electromagnetic microwaves (2450 MHz) to produce deep heating in body tissues for pain relief and improved circulation.
2. Frequency: 2450 MHz; Wavelength: 12.2 cm (or 122 mm).
3. Non-ionizing microwaves; heat produced by dipole rotation and ionic conduction in tissues.
4. 3–5 cm depth; shorter wavelength leads to more superficial absorption compared to SWD.
5. Dipole rotation (or molecular agitation of water molecules).
6. Any three: Chronic arthritis, Muscle strains/sprains, Tendinitis, Bursitis, Myofascial pain, Sinusitis.
7. Any four: Metal implants/pacemakers, Pregnancy, Malignant tumors, Active hemorrhage, Impaired sensation, Eyes/lens, Testes/gonads.
8. Absolute contraindication because microwaves can cause selective overheating and burns in metallic areas.
9. Conical or beam-shaped pattern; superficial muscles and subcutaneous tissues heat the most.
10. Indication – microwaves penetrate well to heat sinuses without excessive surface heating.
11. Inverse square law (intensity decreases with square of distance from emitter).
12. SWD better; MWD's shorter wavelength results in more absorption in fat, limiting deep penetration.
13. Any two: Shoulder capsulitis (frozen shoulder), Tennis elbow, Plantar fasciitis – due to broader heating area.
14. Microwaves can cause cataract formation by heating the lens (poor vascularity leads to heat accumulation).
15. MWD defined as microwave-based deep heating; bio-physical advantage: uniform heating via EM waves; indication: muscle strain relief; contraindication: rule out metal implants or acute inflammation.