UNIVERSITY MEDICINE • EXERCISE SHEET

5.6 Gastrointestinal physiology

Name: _____ Class: _____ Date: _____ **Total: 23 marks**

KEY WORDS enteric nervous system

Objective

Balance the gut's fluid ledger and predict segment-failure signatures.

1 Key knowledge and worked examples

■ **The ledger**

~9 L/day: drink 2, food 1, secretions 6; stool loses 0.1–0.2 L. The jejunum is the workhorse; the ileum signs for B12 and bile salts; the colon absorbs ~1.3 L.

■ **Worked example: two clocks**

Ileal resection: bile-salt diarrhoea appears in months (pool shrinks), B12 deficiency in years (stores) ✓.

2 Practice

2.1 Sum the nine litres (input side). [3]

2.2 Which segment absorbs B12, and what must accompany it? [3]

2.3 What drives the migrating motor complex? [3]

3 Exam-style questions

3.1 Cholera (fictional epidemic context): litres of painless watery stool.

Explain the secretion mechanism (toxin-welded Gs → cAMP → Cl^- out, per MED02). Explain why the mucosa remains intact histologically. State the therapy principle. [7]

3.2 After ileal resection (fictional).

Predict the two malabsorption consequences with their timelines. Explain why fat malabsorption worsens over months (bile-salt pool depletion). State one therapy for each clock. [7]

Solutions

2.1

- $2 + 1 + 1.5 + 2.5 + 0.5 + 1.5 + 1 = 10$ ($\approx 9 \pm$ secretions estimate) ✓.

2.2

- The ileum; intrinsic factor (from the stomach).

2.3

- The enteric nervous system's fasting cycle (motilin-timed housekeeping).

3.1

- Toxin ADP-ribosylates Gs → constitutive adenylyl cyclase → maximal cAMP → Cl^- channels open → salt and water pour out.
- The epithelium is intact (no invasion): secretion, not destruction – histology is normal.
- Replace the lost fluid and electrolytes (volume is the killer, not the toxin, which decays).

3.2

- B12 deficiency (years of stores) and bile-salt loss with steatorrhoea AND bile-acid diarrhoea (months).
- The pool recycles ileum→liver→gut ~6×/day: each lost cycle shrinks it until fat digestion fails.
- B12 injections (bypass the gut); bile-salt sequestrants or fat restriction for the diarrhoea.