Syllabus	
Topic	TIVA

a)

List 4 indications for using a Total Intravenous Anaesthesia (TIVA) technique (4 marks)

1. ……
2. ……
3. ……
4. ……

b)

List 4 potential problems that may occur with drug delivery from intravenous anaesthesia pumps along with a method to prevent / detect each problem (8 marks)

Problem	Prevention / Detection / Solution
1) …… …… ……	…… …… ……
2) …… …… ……	…… …… ……
3) …… …… ……	…… …… ……
4) …… …… ……	…… …… ……

c)

List 4 differences between the Marsh and Schnider models for providing target controlled infusions (TCI) for propofol (4 marks)

1. ……

   .....

2. ……

   .....

3. ……

   .....

4. ……

   .....

d)

List the 4 recommendations from the National Audit Project 5 (NAP-5) for preventing accidental awareness under general anaesthesia when using TIVA (4 marks)

1. ……

2. ……

3. ……

4. .....

Syllabus	
Topic	TIVA

Q	Answer	Mark	Guidance
a)	• Malignant hyperthermia risk • Long QT Syndrome (QTc≥500 ms) • History of severe PONV • 'Tubeless' ENT and thoracic surgery • Patients with anticipated difficult intubation/extubation • Neurosurgery—to limit intracranial volume • Surgery requiring neurophysiological monitoring • Myasthenia gravis/neuromuscular disorders to avoid NMBs • Anaesthesia in non-theatre environments • Transfer of anaesthetised patient between environments • Day-case surgery • Trainee teaching • Patient choice	3	Accept any sensible answer
b)	• IV cannula disconnection or 'tissuing' (i.e. subcutaneous rather than IV infusion) ○ Cannula or central venous catheter visible and accessible during procedure • Disconnection of infusion tubing from pump or at an intermediate connection point ○ Pump and tubing connections visible; use of Luer lock syringes • Low battery / pump paused ○ Modern pumps usually have an audible alarm • Occlusion of IV cannula; tap or clamp closed ○ Pump high infusion pressure alarm • 'False' occlusion alarm because of small cannula or long infusion tubing ○ Adjustable high infusion pressure alarm and users trained in their adjustment • 'Backtracking' of propofol into intravenous	8 marks total	• = Problem ○ = Method to prevent / detect the potential problems identified 1 mark for each problem identified up to a maximum of 4 with 1 mark for each method to prevent / detect the potential problems identified

	fluid infusion tubing when the infusions are given through the same cannula/catheter lumen ○ One-way valves to prevent back-tracking • Use of 1% propofol in a pump which has been programmed for the use of 2% protocol or vice versa ○ Stocking of only one concentration of propofol • When using infusions of both propofol and remifentanil, insertion of the propofol syringe into the pump programmed for remifentanil and vice versa. ○ Prominent pump displays with the drug name and perhaps colour-coding of the pump LCD displays to match the colour of the syringe labels		
c)	• Fixed parameters ○ Marsh: All rate constants ○ Schnider: V_1 = 4.2 litres, V_3, k_{1-3}, k_{3-1} • Variable parameters: ○ Marsh: $V_{1, 2, 3}$ ○ Schnider: V_2, k_{12}, k_{21}, k_{10} • Parameters determined by: ○ Marsh: Weight ○ Schnider: Weight, age, lean body mass • The major difference is the **volume of V1** (Schinder is fixed at 4.27 L, whereas Marsh is variable dependant on inputted weight). For an 85kg person V_1 is calculated as 19.4 litres vs. Schnider 4.27 litres (causes a four-fold difference in calculated peak plasma concentrations) • **Age** is inputted for both models. In Marsh model, only used to ensure >16yrs old and not used in calculations, Schnider it is used in calculations • Because a small fixed volume for V1 is used, lower doses of propofol are required to achieve a given Cpt compared with Marsh. In many instances, this bolus is inappropriately small and results in an	4	

	inadequate clinical effect. Consequently, the **Schnider model can only be recommended for use in effect-site targeting mode** as larger bolus doses are utilised		
d)	• All anaesthetists should be trained in the maintenance of anaesthesia with intravenous infusions. • When using total intravenous anaesthesia, wherever practical, anaesthetists should ensure that the cannula used for drug delivery is visible and patient at all times. • Depth of anaesthesia monitoring should be considered in circumstances where patients undergoing TIVA may be at higher risk of AAGA. These include use of neuromuscular blockade, at conversion of volatile anaesthesia to TIVA and during use of TIVA for transfer of patients. • The relevant anaesthetic organisations should establish a set of standards and recommendations for best practice in the use of TIVA	4	

References:

1) Al-Rifai Z, Mulvey D. Principles of total intravenous anaesthesia: basic pharmacokinetics and model descriptions. BJA Education 16(3):92-97 (2016)

2) Nimmo AF, Cook TM. Report and findings of the 5th National Audit Project. Chapter 18 Total intravenous anaesthesia.
https://www.nationalauditprojects.org.uk/downloads/NAP5%20Chapter%2018.pdf