UNIVERSITY COLLEGE LONDON

University of London

EXAMINATION FOR INTERNAL STUDENTS

For The Following Qualification:-

M.B.,B.S.

MBBS: Written Paper (year 2)

COURSE CODE	:	**MBBS2003**
DATE	:	**15-MAY-06**
TIME	:	**14.30**
TIME ALLOWED	:	**3 Hours**

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TURN OVER

Royal Free and University College Medical School

Phase 1, Year 2: May 2006

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Modified Essay Question paper

3 hours are allowed for this paper.

- **You should attempt all 20 questions, answering each one on the page for that question** – if you need more space, continue on the reverse of the page for that question only. Pages will be separated and given to different people to mark.
- **You are provided with a sheet of bar-code labels. Place one label in the space marked on the page for each question.**
- **You should read through all parts of each question before you begin to answer it – the number of marks for each part question is shown.**
- **Most questions are linked to clinical scenarios. Information about the patient is shown at the top of each question; this may differ from one question to another, as additional information is relevant to the question being asked. Some questions do not refer to any specific patient.**
- **You should allow no more than about 8 minutes for each question.**

This question paper must not be removed from the examination room

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Question 1

A 45 year-old male patient presents with a painful rash on his trunk and is unwell with fever and breathlessness. He had recently received a renal transplant and takes ciclosporin. The rash is diagnosed as shingles, but more seriously, the fever and breathlessness are ascribed to a pneumococcal infection. He is hospitalized and prescribed drug X against the infection causing pneumonia and drug Y to control the shingles.

a) Drug X is a potent antibiotic administered parenterally because it is acid-labile. What is drug X likely to be and what is its mechanism of action? (6 marks)

b) Drug X can be chemically modified to make it available orally. Give an example of one of these modified versions. (2 marks)

c) Drug X and similar drugs can lose effectiveness due to bacterial resistance. What is the main cause of this resistance and what recourses are available to overcome this difficulty? (2 marks)

d) Drug Y acts against a particular range of virus types. Name the drug and the virus types it mostly affects. (3 marks)

e) Discuss the mechanism of action of drug Y. (7 marks).

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Question 2

A 55-year old woman complains that she has been increasing in weight over the past five years. She also has a five-year history of high blood pressure.

a) Name three likely hormonal causes of her high blood pressure? (3 marks)

b) What is the most likely cause in our patient? (1 mark)

c) A year ago, she fell over and fractured her hip. A bone density scan revealed that she had a reduced bone density (osteoporosis). Name four common causes of osteoporosis? (4 marks)

d) Three months ago, she developed polyuria and polydipsia. She saw her general practitioner who noted that she had glucosuria on dipstick testing. What important test should be performed? (1 mark)

e) Over the last few weeks, she has had progressive weakness, affecting her thighs, with difficulty climbing stairs. What are the likely causes of such muscle weakness? (1 mark)

f) On direct questioning she notes that the shape of her face has changed. She also mentions that she bruises easily, and that a wound on her shin that she had six months ago has not healed. What drugs must you ensure she is not taking? (1 mark)

g) Name six clinical signs would you expect to find on examination? (1 mark each)

Blood test results are as follows: (Normal ranges are given in brackets).
Na 146 mmol/l (135-145)
K 3.0 mmol/l(3.5-5.0)
Bicarbonate 34 mmol/l(24-30)
Cortisol (midnight): 880 nM (normally up to 250); (at 9 a.m.) 900 nM (normally between 200-700).
ACTH: 85 ug/dl (10-80)

h) What other investigations would you perform? (2 marks)

i) On the basis of your overall interpretation, what is the likely diagnosis? (1 mark)

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Question 3

A man in his mid-forties arrives at A & E. He has had a headache for 24 hours which rapidly has become severe; he appears confused and drowsy. He is clearly flushed , feels nauseous, has been vomiting and has a stiff neck. He appears to be light sensitive. He has no significant medical history. The doctor notes that the patient has a rash on his stomach that does not fade when pressure is applied.

The doctor takes blood samples and establishes an intravenous line for infusion of fluids and antibiotics. Oxygen ($FiO_2 = 0.4$) is administered via a face mask.
The patient is transferred to intensive care.

Temperature is 39.5°C
Heart rate 120 beats/min
Arterial blood pressure 92/70 mmHg.
Blood gases and acid-base data:
pH = 7.15
PaO_2 = 8.8 kPa (66 mmHg)
$PaCO_2$ = 5.3 kPa (40 mmHg)
$[HCO_3^-]$ = 12 mmole/litre.

a) What is your provisional diagnosis of the condition? (1 mark)

b) Give reasons for your diagnosis (3 marks)

c) Which antibiotics would you prescribe, and should you wait for blood culture results? (3 marks)

d) Why does the patient have hypotension and tachycardia? (5 marks)

e) The results of his blood culture showed that he had bacterial meningitis. Which bacterium could be responsible? (1 mark)

f) Why does the patient have a purpuric rash? (1 mark)

g) Would you expect him to have a low platelet count, and if so why? (2 marks)

h) What kind of acid-base disturbance does he have, and why is his $PaCO_2$ normal? (4 marks)

TURN OVER

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Question 4

Antibodies are complex protein based molecules produced by B-lymphocytes as part of the immune response. Their normal function is to bind to and help eliminate foreign and infectious agents in the body.

a) In what ways could antibodies be used to in cancer treatment? (10 marks)

b) What is meant by each of the following terms? (2 marks each)

(i) Monoclonal antibody

(ii) Murine monoclonal antibody

(iii) Chimeric antibody

(iv) Humanized antibody

c) What is the reason for making humanized forms of therapeutic antibodies? (2 marks)

TURN OVER

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Question 5

Polly a 27-year old woman attended her GP's surgery complaining of a continuous unquenchable thirst. She felt a constant need to drink water and consumed around 20 large glasses every day. She also kept water beside her bed since she was woken every night by her thirst. She also needed to urinate very frequently. On referral to an endocrine clinic it was found that her fasting serum glucose level was normal and no glucose was detected in her urine. She was then given a water deprivation test in which she was not allowed to drink but was asked to provide urine samples every hour. After the 11.00 am sample had been taken she was given a dose of a modified form of vasopressin (DDAVP) as a nasal spray. The osmolality of her urine samples was measured (a high osmolality representing a concentrated urine).

Time	Urine osmolality mOsm /kg H_2O	Urine vol mL	Uosm
09.00 h	130	175	1220
10.00h	158	180	850
11.00 h	204	140	1090
11.01 h DDAVP Administered			
12.00 h	886	70	1180

a) What would you expect to happen to the osmolality of urine during a water deprivation test? (2 marks)

b) Do you think that the amount of urine produced is normal, above normal or below normal? (1 mark)

c) Is the patient's urine osmolality normal, above normal or below normal? (1 mark)

d) Why did the osmolality of her urine rise after the administration of DDAVP? (2 marks)

e) On which receptors does DDAVP act? (1 mark)

f) What second messenger system does DDAVP binding to its receptor stimulate? (1 mark)

g) What important information did the glucose analysis of the urine provide? (2 marks)

h) What is your diagnosis of her condition? (2 marks)

i) Name TWO possible underlying causes of her condition? (2 marks)

j) What treatment would you offer her? (2 marks)

k) Why would we need to supervise the patient carefully during a water deprivation test? (1 mark)

l) If the patient had failed to respond to DDAVP. What would your diagnosis have been then? (2 marks)

m) In this condition what treatment would you offer? (1 mark)

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Question 6

A middle aged man sustains a laceration to the palmar aspect of the hand that extends across the base of all the fingers. Bleeding has been controlled, but he cannot detect any sensation on the lateral sides of his index finger or little finger.

a) Which nerves may have been damaged (2 marks).

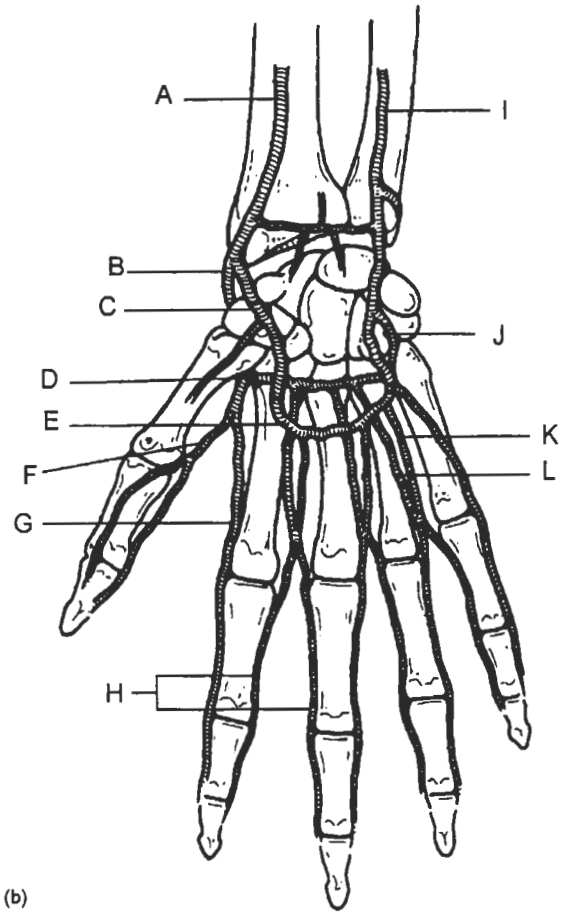
b) Why would you NOT expect the wound to extend into the metacarpophalangeal joints? (2 marks)

c) How would you test for damage to the tendon of flexor digitorum superficialis? (2 marks)

d) How would you test for damage to the tendon of flexor digitorum profundus? (1 mark)

e) Which nerve supplies the flexor digitorum profundus muscle of the little finger? (1 mark)

f) Using the table below, label this diagram of the arteries of the wrist and hand (12 marks)



(b)

A	
B	
C	
D	
E	
F	
G	
H	
I	
J	
K	
L	

Place your bar code label here

Question 7

a) What communication skills should a doctor or medical student employ in a consultation when a patient needs to talk about a sexual problem? List 5 things (10 marks)

b) When having a discussion with a patient about sexual problems, what detailed information might you need to gather? List five things. (10 marks)

Place your bar code label here

Question 8

A woman of 56 yr arrives in the surgery complaining of breathlessness and fatigue. She has also noticed that she has oedema around the ankles. Further she finds climbing the stairs at home makes her very breathless and her limbs feel heavy. She is not cyanosed but she has heart rate of around 95 beats/min and low BP at rest.

a) What is the most likely diagnosis and what is the main physiological consequence of this disease? (2 marks)

b) How can drugs reverse the underlying pathophysiology? (4 marks)

c) What type/s of drug/s can be used and what is their basic mechanism of action? (14 marks)

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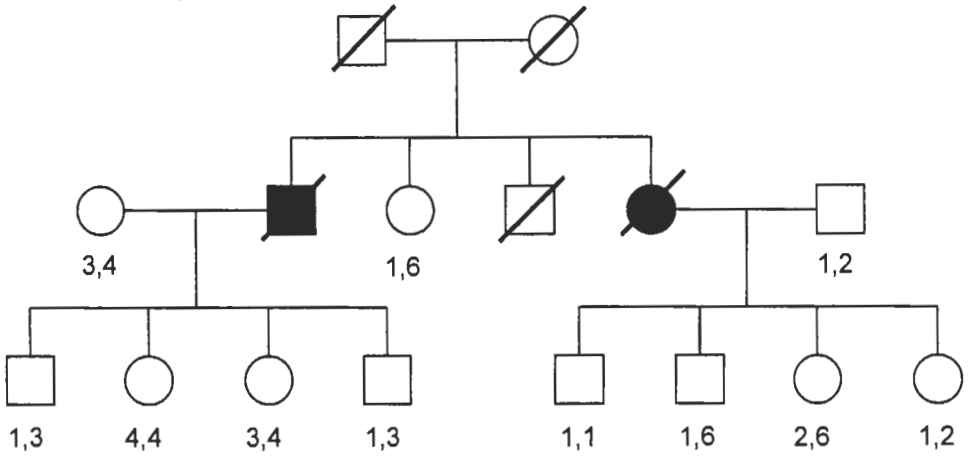
Question 9

Paget's disease of bone is a genetically heterogeneous metabolic bone disease characterized by excessive bone resorption and formation due to activated osteoclasts. Some cases (PDB2) are caused by mutation in the TNFRSF11A gene on chromosome 18q22.1, which encodes RANK, a protein essential in osteoclast formation. The phenotype linked to chromosome 5q35 (PDB3) is caused by mutation in the SQSTM1 gene, the product of which is associated with the RANK pathway. Other disease loci have been mapped to 6p (PDB1), 5q31 (PDB4), and 18q23.

a) In the above description, what does the term "genetically heterogeneous" mean? (4 marks)

b) The disease does not usually manifest until age 40 or over. What is the apparent mode of inheritance shown in the following family? (All those family members shown are over 50 or were over 50 when they died, younger members of this family exist but have not been shown.) (4 marks)



c) In addition to the genetic etiology, electron microscopic demonstration of virus-like bodies in bone cells in Paget disease suggests a viral aetiology. What term is used to describe an environmentally caused disease which mimics a genetic disease? (2 marks)

d) A microsatellite repeat with many possible alleles within an intron of the SQSTM1 gene was studied in the above family. Six alleles were observed. The genotype of each person who could be tested is shown in the figure. Explain whether this pattern of inheritance is consistent with the disease causing mutation being in the SQSTM1 gene in this family? (10 marks)

TURN OVER

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Question 10

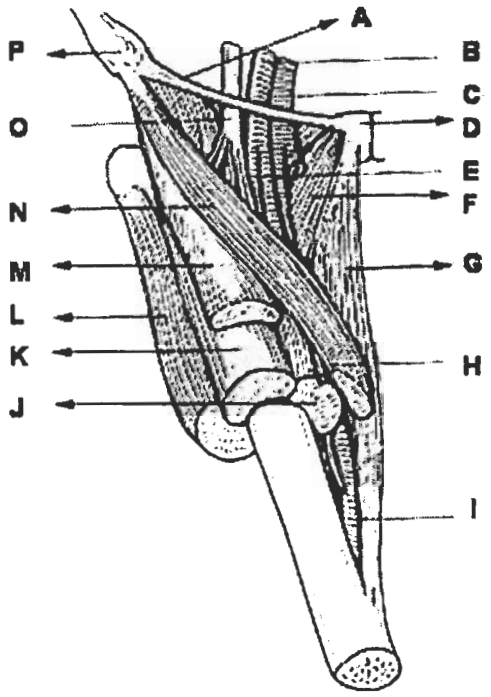
A teenage boy sustains a 2 cm laceration to his groin just below the mid point of the inguinal ligament. Pressure is applied over the wound to stop the arterial bleeding.

a) Name the artery that has been damaged (1 mark)

b) Name two bones and a muscle against which the artery would have been compressed by the applied pressure (½ mark each)

Bone:
Bone:
Muscle:

c) Using the table below, label this diagram of the anterior thigh (16 marks)



A	
B	
C	
D	
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P	

You suspect damage of the nearby nerve.

d) Which area of skin would you test? (½ mark)

e) Which muscle group would you test? (½ mark)

f) Which deep tendon reflex would you test? (½ mark)

Place your bar code label here

Question 11

a) What is the current government target for physical activity in the UK? (4 marks)

b) Outline four barriers that may prevent individuals from meeting the target (8 marks)

c) Describe four health promotion approaches to increase levels of physical activity in the UK (8 marks)

Place your bar code label here

Question 12

a) Explain briefly what is meant by each of the following terms? (1 mark each)

(i) Basal Metabolic rate (BMR)

(ii) Physical Activity Ratio (PAR)

(iii) Respiratory Quotient (RQ)

b) What is the average Physical activity level (PAL) in UK? (1 mark)

c) What is a desirable PAL for cardiovascular health? (1 mark)

Regardless of the fuel being oxidised, there is an energy expenditure of 20 kJ / litre of oxygen consumed.

Carbohydrate provides 16 kJ /gram and fat 37.

The RQ for carbohydrate is 1.0, and for fat 0.707. This means that the percentage of energy derived from carbohydrate can be calculated as:

$$\frac{(RQ - 0.707)}{(1 - 0.707)} \times 100$$

d) The table below shows oxygen consumption and carbon dioxide production for a student at rest and exercising at two different rates on a treadmill. In each case the measurements were taken over a 30 minute period. Calculate her energy expenditure, RQ, % energy derived from both carbohydrate and fat (assuming only carbohydrate and fat are being metabolised) and the amount of fat metabolised in the 30 minute period, at each level of activity, and enter your answers in the table below.

(1 mark each)

		A		B	C	D	E
	L O_2	Energy expenditure kJ / 30 min	L CO_2	RQ	% energy from carbohydrate	% energy from fat	grams fat metabolised
at rest	11.5		8.3				
speed 1	16.8		12.4				
speed 2	64.5		53.9				

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Question 13

A farmer has been crop spraying all day and when he arrives home he shows signs of restlessness, dizziness, miosis, nausea, hypersalivation, vomiting, abdominal colic, diarrhoea, bradycardia and sweating. Later the farmer develops muscle weakness and fasciculation and copious bronchial secretions along with arrhythmias.

a) What is the diagnosis and what chemical transmitter is responsible for these effects? (2 marks)

b) What class of drugs causes these effects giving an example and what is their mechanism of action? (6 marks)

c) What drug/s would you give to reverse the above effects giving the mechanism of action (4 marks)

d) What are the clinical uses of the drugs of the type that have caused the above poisoning? (3 marks)

e) Explain how the poison causes neuromuscular block and name a drug that is used to cause this type of block and in what situation is used? (5 marks)

TURN OVER

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Question 14

In many medical encounters, both doctors and patients are faced with complex decisions. Discuss what psychological theory can do to contribute to an understanding of the process. (20 marks)

TURN OVER

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Question 15

Mr C has a body mass index of 32. He is concerned about his health and so visits his GP.

a) Name four clinical problems that he could be experiencing as a direct consequence of his body weight (4 marks)

b) Describe three different endogenous factors that increase body weight. (6 marks).

c) What are the principal mechanisms by which a medicine could promote a reduction in body weight? (4 marks)

d) Name two drugs that currently are used legitimately as anti-obesity agents. Briefly outline their mechanism of action. (6 marks)

Place your bar code label here

Question 16

Outline one of the ways of coping used by patients when given a diagnosis such as arthritis. (20 marks)

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Question 17

A 75-year old woman becomes forgetful – she finds it increasingly difficult to remember people's names and often forgets minor events, misses appointments and misplaces objects. However, she is well-groomed, socially appropriate and has normal use of eating utensils. She can repeat three words immediately after hearing them but five minutes later she can recall only one of them and then only by selecting it from a list. Speech comprehension is normal.

Brain imaging reveals moderate cerebral atrophy with widened cortical sulci and enlarged lateral and third ventricles and there is bilateral shrinkage of the hippocampus. Metabolic and toxicological studies to exclude treatable causes of dementia are normal.

Over the next five years, her mental state and memory problem worsen. Her speech deteriorates because of increasing difficulty with naming objects and facts. She wanders off and she does not know her age or the current year. Next, she begins to neglect her appearance and has difficulty in using eating utensils. At age 81, she enters a nursing home and progressively stops walking until she sits motionless in a chair. She dies from pneumonia.

At autopsy, there is seen to be diffuse cerebral atrophy, especially in the prefrontal, temporal-parietal cortex and hippocampus, with marked neuronal loss and moderate astrocytosis. Throughout the cerebral cortex there are senile plaques and neurofibrillary tangles in neurons of the hippocampus, entorhinal cortex and amygdala.

a) What is the name of this patient's condition? (2 marks)

b) What is the molecular identity of the senile plaques and the neurofibrillary tangles seen at autopsy? (2 marks)

c) In the early stage of the disease, which type or types of memory are affected and which type or types are unaffected? (2 marks)

d) Briefly describe the characteristics of the affected and non-affected memory types. How does this pattern of memory loss change as the disease advances? (10 marks)

e) Cerebral acetylcholine (ACh) levels are known to be depleted in this condition. Which brain region supplies a major cholinergic input to the cerebral cortex? Treatments addressing this ACh depletion have been tried. Describe the basis of these treatments and whether they are successful. (4 marks)

TURN OVER

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Question 18
Janet and John have completed a cycle of IVF and have had a positive pregnancy test.

They have had two previous first trimester miscarriages, and some years ago Janet underwent a therapeutic termination of pregnancy because the embryo was diagnosed as suffering from spina bifida. Janet is now 39 years old. (1 mark for each answer)

The IVF cycle involved a number of interventions:

a) What is the name of the hormone administered to stimulate ovarian activity?

b) Which hormone is used to induce oocyte maturation in a stimulated IVF cycle?

c) Would you recommend Pre-implantation Genetic diagnosis to this couple?

d) On what basis do you make this recommendation?

e) Which hormone is measured in a pregnancy test?

f) What is responsible for secretion of this hormone?

g) What receptor does the hormone act on?

h) In which organ are the receptors located?

i) Which hormone was administered early in pregnancy to account for a possible luteal insufficiency?

Janet was advised to take 1500 µg of folic acid daily before the cycle of IVF began.
j) When does the neural tube close:

k) Why was she advised to take such high folic acid supplements?

l) Why was she advised to start the folic acid supplements before the start of the cycle of IVF?

The pregnancy has reached the end of the first trimester and all appears well on the scan.
m) Given the maternal age would you recommend an amniocentesis?

n) What is the reason for this decision:

o) What is the risk of a Downs syndrome at maternal age of 40?

p) In which meiotic division does trisomy 21 normally arise?

TURN OVER

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Question 19

Miss C is 76 years old. She was diagnosed with Parkinson's disease when she was 67. Her doctor prescribed benzatropine. This helped initially, but as her condition and mobility deteriorated she was switched to capsules containing a combination of L-DOPA and carbidopa. This treatment made a big difference and allowed her to lead a normal life for a further 5 years.

a) What receptors does benzatropine block and why is it effective? (4 marks)

b) Why is L-DOPA a useful treatment for Parkinson's disease? (8 marks)

c) Why is L-DOPA given together with carbidopa? (4 marks)

d) Why are dopamine agonists e.g. bromocriptine and apomorphine used instead of L-DOPA? (4 marks)

TURN OVER

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Question 20

Ivan is a 50-year old man who suffers from alcoholism. He developed an unsteady gait several years ago when drinking a bottle of vodka every day. He has had periods of no alcohol intake, but his gait remains ataxic.

On examination, his gait is broad-based and wobbly. When he lies down and attempts to move either heel along the opposite shin, the movements are clumsy and there is a side-to-side tremor. But Ivan has quite good control of his feet and toes - he can tap them rhythmically on the floor and he has normal movements of the arms, with no signs of clumsiness or tremor.

Mentally, Ivan is normal except for a mildly impaired memory: he can recall only one from three unrelated words after an interval of 5 minutes. He can remember events from his childhood but memory for events in recent years is patchy. But he can still drive a car, though he does not remember the details of when and where he took his driving test.

a) Ivan was given a brain scan. In which structure would you expect to see signs of degeneration that account for his ataxic gait? Proximal leg and lower trunk movements are affected but arm movements are not. What does this pattern tell us about the localisation of degeneration within the affected brain structure? (4 marks)

b) Ivan has tremor of the legs only when attempting movement. What do we call this type of tremor? If Ivan had shown a "resting" tremor, what other brain structures would likely be involved? (4 marks)

c) Ivan's alcoholism has led to memory impairments. What types of Ivan's memory are impaired and what types are normal? Are the impairments characteristic of anterograde amnesia, retrograde amnesia or both? Ivan's alcoholism-related amnesia is associated with damage to which brain structures? How are these structures thought to be involved in learning and memory? (10 marks)

d) Ivan's memory impairments arise from alcoholism-related vitamin deficiency. In severe cases, the amnesia is accompanied by global confusional state, lethargy and disordered perception. What vitamin therapy can help with some or all of these symptoms? (2 marks)

END OF PAPER

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Station 2

The diagram shows an endocrine organ.

a) Identify the structures shown by the letters A to E on the diagram (2 marks each)

A	
B	
C	
D	
E	

b) Name two hormones transported along structure B (1 mark each)

c) Name 5 hormones secreted from region D (1 mark each)

d) Name a factor arising in region A which is capable of inhibiting hormone synthesis/secretion in region D (1 mark)

e) What is the most likely cause of failure in structures B and D? (2 marks)

OSPE.ppt 136

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Station 3

The graph shows a log dose response curve.

a) At high concentrations, drug A elicits 100% of the maximum response the tissue is capable of. What general term describes drug A? Drug C produces a different maximum. What is the general term for drug C? (2 marks)

b) Apart from the maximum, the dose-response curves of drugs A and C differ in another respect. Describe this difference and say how you would measure and express it quantitatively . (2 marks)

c) In a second experiment, drug A is applied in the presence of another type of drug (compound X). Given its effect on the dose-response curve, what is the action of compound X? What is a general term for the action of compound X? (2 marks)

d) In another experiment, drug B produces a parallel shift to the right in the dose-response curve of drug A, leaving the maximum tissue response unchanged. What type of drug is B? Give a named example. (2 marks)

e) What sort of analysis can you do with drugs A and B in order to obtain K_B? What is K_B, what does it depend on and how is it useful in practice? (4 marks)

OSPE.ppt 137

Station 4

This person is attending their GP's surgery for the first time for a routine medical examination. They have a past history of asthma. Please measure their blood pressure first of all, and then their peak expiratory flow rate.

Place your barcode label here

Station 5

The diagram shows the effect of three drugs, infused intravenously, on arterial pressure, peripheral resistance and heart rate.

a) Why does isoprenaline cause a fall in peripheral resistance when infused intravenously? (4 marks)

b) What is the effect of intravenous infusion of noradrenaline on peripheral resistance and heart rate? (2 marks)

c) Why does noradrenaline have these effects when it is infused intravenously? (6 marks)

Place your barcode label here

Station 6

The figure shows 4 karyotypes with numerical abnormalities.

For each, give the shorthand notation and name the disorders associated with them.
(2 marks per notation, 2 marks per name of disorder)

karyotype	Shorthand notation	Disorder
A		
B		
C		
D		

OSPE.ppt 140

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Station 8

The figure shows dipstick tests on plasma and urine from two patients with diabetes mellitus

a) What are the results of the plasma tests with Clinistix to measure glucose and Ketostix to measure ketone bodies? (4 marks)

sample	plasma glucose	plasma ketone bodies
patient 1		
patient 2		

b) What are the results of the urine tests with Clinistix to measure glucose, Ketostix to measure ketone bodies and Albustix to test for albumin? (6 marks)

sample	urine glucose	urine ketone bodies	urine albumin
patient 1			
patient 2			

c) Which patient is likely to be young with Type I diabetes and which one is likely to be middle aged and have Type II diabetes? (2 marks)

	Type I	Type II
Patient 1		
Patient 2		

d) Urine glucose was measured using both an alkaline copper reagent and Clinistix in the following people:

A) a normal subject
B) a normal subject taking supplements of 3 g of vitamin C per day
C) a normal subject who has just eaten 3 pears, which are a rich source of pentose sugars
D) a person with idiopathic pentosuria (excretion of 5-carbon sugars in the urine)
E) a person with idiopathic pentosuria taking supplements of 3 g of vitamin C per day
F) a person with poorly controlled diabetes mellitus
G) a person with poorly controlled diabetes mellitus taking supplements of 3 g of vitamin C /day

Tick the box(es) in the table below if you think that one or more of these subjects A – G might have given the results shown More than one subject may give any of the results.

(1 mark each, -1 for an incorrect answer)

alkaline copper	Clinistix	subject						
		A	B	C	E	F	G	None of them
negative	negative							
positive	negative							
positive	positive							
negative	positive							

Station 9

Answer this question on lines 1 – 8 of the computer-readable card provided.

The diagram shows a number of endocrine organs.

Mark which of the following hormones (A – P) **acts on** each numbered endocrine organ (1 – 8) in the diagram provided. Some of the hormones listed may not act on any of these organs; some hormones may act on more than one organ.

If you simply mark all correct you will score zero.

A) ACTH
B) Aldosterone
C) Angiotensin II
D) Calcitonin
E) Calcitriol
F) Cortisol
G) FSH (follicle stimulating hormone)
H) Growth hormone
I) LH (luteinising hormone)
J) Oestradiol
K) Parathyroid hormone
L) Progesterone
M) Testosterone
N) Thyroxine
O) TSH (thyrotropin)
P) None of the above

OSPE.ppt 8

Place your barcode label here

Station 10

During the previous five months, a 24-year-old man had had several painless burns on his hands. He had no history of cranial or cervical trauma. Sensitivity to painful stimuli and heat was lost in both upper limbs, and over the upper part of the anterior thoracic wall and upper back. Cutaneous two-point discrimination was preserved in upper and lower limbs and no gait abnormality was identified.

He had marked atrophy of the right deltoid, biceps, and upper trapezius muscles and of the hypothenar eminence and dorsal interosseous muscles of the right hand. Biceps, triceps, and brachioradialis reflexes were bilaterally abolished.

Sagittal, magnetic resonance imaging (MRI) of the spine showed abnormality of the central canal in upper parts of the spinal cord (arrows in Panels A and B).

a) What type of MRI image is shown in the figure? (2 marks)

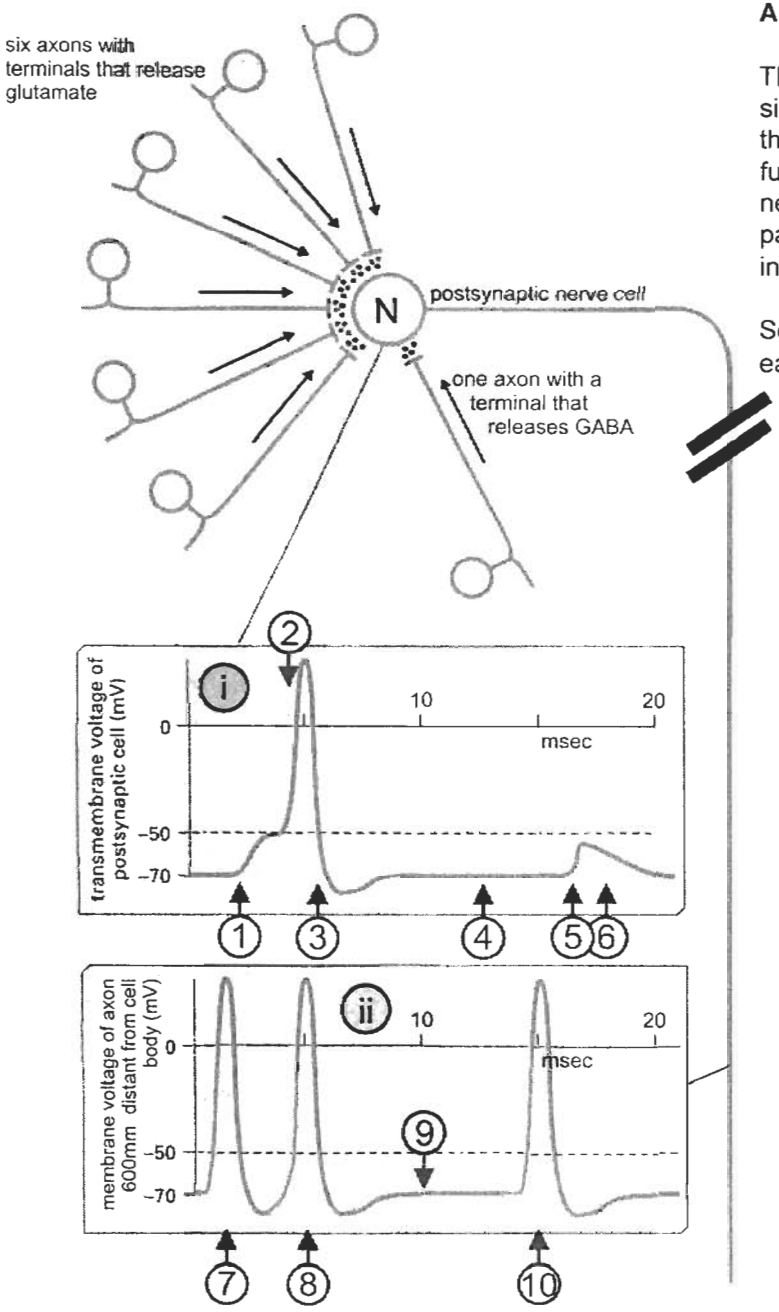
b) Describe the spinal cord abnormality and name this condition. (4 marks)

c) Why were pain and temperature sensation lost, why were these losses bilateral and why were they restricted to the upper body? (8 marks)

d) Why was cutaneous two-point discrimination unaffected for all parts of the body? (2 marks)

e) Consider carefully the pattern of sensory losses and then describe why there were losses of upper limb muscle stretch reflexes and evidence of upper body muscle atrophy. (4 marks)

OSPE.ppt 149



Answer this on lines 1 – 10 of the card provided.

The sketch represents a neurone N which receives input from a number of glutamatergic axons, of which six are shown, and a number of GABAergic axons, of which one is shown. Neurone N extends an axon that conducts at 60 metres sec^{-1}. Graph i shows the membrane voltage at the cell body of neurone N as a function of time, while graph ii shows the simultaneously recorded membrane voltage in the axon of neurone N, 600mm distant from the cell body. Arrows below and above the graphs indicate the time of particular pre- or post-synaptic events. Select the one most appropriate letter to identify each of the indicated events or states.

Some letters may be used more than once, and some not at all. There is only one correct answer for each numbered question.

A) Resting voltage of axon, generated by the balance of sodium and potassium ion flows at nodes of Ranvier.

B) Rapidly depolarizing phase of action potential: many voltage gated sodium channels are open.

C) Peak of an axonal action potential

D) Peak of the axonal action potential corresponding to the cell body action potential illustrated in graph i.

E) The cell body of neurone N is repolarizing, most of its voltage gated sodium channels are in the ready to open state, closed but with the inactivation plug not blocking the pore.

F) The cell body of neurone N is repolarizing, most of the ionotropic gluamate receptors are in the inactivated state, with the inactivation plug blocking the pore.

G) The cell body of neurone N is repolarizing, most of its voltage gated sodium channels are in the inactivated state, with the inactivation plug blocking the pore.

H) Action potentials in a number of presynaptic GABAergic axons evoke no detectable voltage change in neurone N.

I) At this time action potentials are occurring in a number of presynaptic glutamatergic axons. These then evoke an EPSP in neurone N but neurone N is not depolarized to threshold.

J) At this time action potentials are occurring in a number of presynaptic glutamatergic axons. These then evoke an EPSP in neurone N that depolarizes neurone N to threshold.

K) Action potentials in a number of presynaptic glutamatergic axons evoke no detectable voltage change in neurone N.

Station 12

Answer this question on lines 1 – 8 of the computer-readable card provided. There is only one correct answer for each line 1 – 8; if you mark more than one answer correct you will score zero for that line.

The table shows the hormonal profile in a number of people:

subject	oestradiol	progesterone	FSH	LH	testosterone	hCG
1	high	low	high	high	low	low
2	low	high	low	low	low	high
3	medium	low	low	low	low	low
4	low	low	low	low	low	low
5	high	low	low	low	low	low
6	medium	high	low	low	low	low
7	low	low	medium	medium	low	low
8	high	high	low	low	high	high

For each subject 1 – 8 select the <u>one</u> most probable description from the list below:

A	A pregnant woman during the first trimester
B	A pregnant woman shortly before parturition
C	A woman on day 1 of a normal menstrual cycle
D	A woman on day 9 of a normal menstrual cycle
E	A woman on day 14 of a normal menstrual cycle
F	A woman on day 16 of a normal menstrual cycle
G	None of the above