WESTERN AUSTRALIA

TERTIARY ADMISSIONS EXAMINATION 1981

HUMAN BIOLOGY

Please place one of your Candidate Identification labels in this box

CANDIDATE'S NUMBER:

In figures

In words

TIME ALLOWED FOR THIS PAPER:

Reading time before commencing: Ten minutes

For working of paper: Three hours

MATERIAL TO BE PROVIDED FOR THIS PAPER:

Question Paper comprising PART I	Pages 3 - 23
PART II	Pages 24 - 25
Essay sheets for PART III	Pages 26 - 33
Answer sheet for PART I	Page 35
Space for rough work	Page 34

INSTRUCTIONS TO CANDIDATES: SEE PAGE 2

FOR EXAMINER'S USE ONLY

Part I	1st Marker	2nd Marker
1-40		
41-60		
61		
62		
63		
64		
65		

Part II (Essays)	1st Marker	2nd Marker
66		
67		
68		
69		
70		
71		
Total		
Conversion Mark		
Average		

INSTRUCTIONS TO CANDIDATES:

Part I consists of 40 multiple choice questions (40 marks), 20 word-completion questions (20 marks), and 5 diagram completion questions (40 marks).

Answer ALL questions in Part I.

Part II consists of three (3) sub-sections. TWO (2) questions should be answered. Each question MUST come from a different sub-section (10 marks each).

The Answer Sheet for questions 1 - 40 is printed on Page 35. At the commencement of the examination OPEN your answer sheet OUT and use it alongside questions 1 - 40.

Answer questions 41 - 65 in the spaces provided on the question paper.

The essays for PART II should be written on Pages 26 - 33 of the question paper.

At the end of the examination carefully check that you have written your candidate number in figures and words on both the front cover of the question paper AND on the answer sheet for questions 1 - 40. FOLD your completed answer sheet BACK inside this question paper and hand the question paper to the supervisor.

SEE PAGE 3

PART I

1. The vertebral column, rib cage and skull form the

   a) axial skeleton
   b) pectoral girdle
   c) appendicular skeleton
   d) pelvic girdle

2. Rods and cones are associated with

   a) hearing
   b) touch perception
   c) heat perception
   d) sight

3. An example of a human cell without a nucleus is a

   a) nerve cell
   b) red blood cell
   c) white blood cell
   d) smooth muscle cell

4. Five human vertebrae fused together constitute the

   a) scapula
   b) sternum
   c) pelvis
   d) sacrum

5. The function of the urinary bladder is

   a) absorption of valuable mineral salts
   b) concentration of urine
   c) storage of urine
   d) changing ammonia to ammonium salts

6. The autonomic nervous system controls

   a) the knee jerk reflex
   b) walking
   c) speech
   d) heart rate

7. The hormone insulin is secreted by the

   a) liver
   b) pancreas
   c) pituitary gland
   d) adrenal gland

SEE PAGE 4

8. In which of the following would the highest blood pressure occur?

   a) the pulmonary artery
   b) the aortic arch
   c) the inferior vena cava
   d) a capillary in the foot

9. One main function of cerebrospinal fluid is to

   a) aid in the transmission of sensory impulses in the cerebral cortex
   b) help lubricate the intervertebral discs
   c) aid in protection of the brain and spinal cord
   d) transmit nerve impulses from inside the brain to other areas of the body

10. The most rapid spurt of growth after birth is

    a) 0-2 years
    b) 5-10 years
    c) 12-15 years
    d) 16-20 years

11. Which of the following substances are received by the pregnant mother from the foetus?

    a) urea and carbon dioxide
    b) carbon dioxide and glucose
    c) urea and amino acids
    d) amino acids and glucose

12. The spinal cord enlarges immediately upon entering the brain to form the

    a) cerebrum
    b) foramen magnum
    c) medulla oblongata
    d) cerebellum

SEE PAGE 5

13.

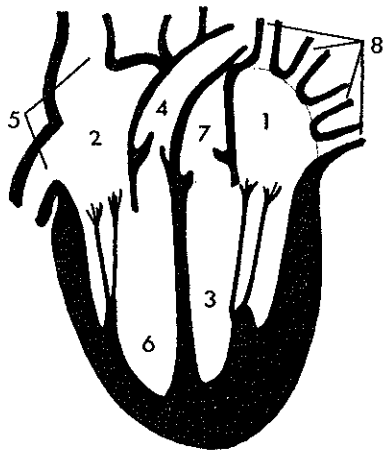

FIGURE 1.

In Figure 1 above, the heart chambers and main blood vessels are numbered. Which of the following numbered sequences is correct for tracing the passage of a drop of blood from the time it returns to the heart from the body until it finally leaves to go around the body again?

   a) 4,6,2,5,7,3,1,8
   b) 7,3,1,8,4,6,2,5
   c) 5,2,6,4,8,1,3,7
   d) 8,1,3,7,5,2,6,4

14. The mode of inheritance of phenylketonuria (PKU) is autosomal recessive. The defective allele is represented as p and the normal allele P. In a survey of a large number of families in which both parents are carriers (Pp) of PKU, which of the following proportions of genotypes are most likely to occur among the offspring?

   a) 25% PP 25% Pp 50% pp
   b) 25% PP 50% Pp 25% pp
   c) 50% PP 50% pp
   d) 50% PP 25% Pp 25% pp

SEE PAGE 6

15. In the human male the testes are suspended in the scrotum outside the body, and as a result they are

    a) better protected
    b) kept free from antibodies
    c) given better support
    d) at a lower temperature

16. A foreign protein in the body is called an

    a) antihistamine
    b) antigen
    c) antibody
    d) anticoagulant

Questions 17 and 18 refer to Figure 2. below:

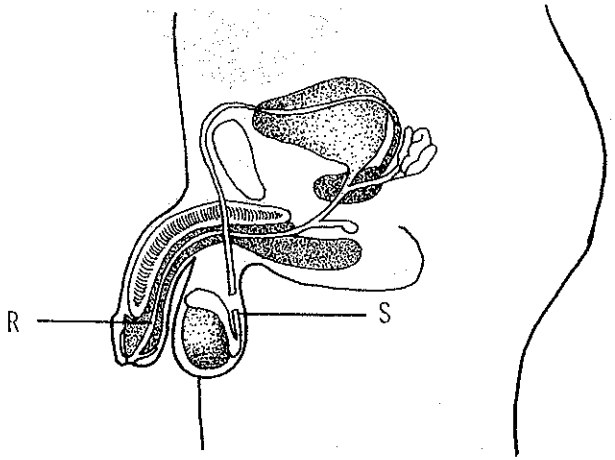

FIGURE 2.

17. The structure labelled R

    a) produces urine only
    b) transports urine only
    c) produces urine and semen
    d) transports urine and semen

18. The structure S has been cut in an operation known as a vasectomy. Which of the following conditions will occur as a result of this operation?

    a) a lack of sperm in the semen
    b) a loss of sex drive
    c) an increase in sperm count
    d) a decrease in production of male sex hormones

SEE PAGE 7

19. The major form of sugar transported in the blood plasma is

    a) sucrose
    b) fructose
    c) glucose
    d) lactose

20. The normal body temperature of a human being is approximately

    a) 98°C
    b) 37°C
    c) 20°C
    d) 73°C

21. A protein is made up of

    a) simple sugars
    b) fatty acids
    c) glycerol
    d) amino acids

22. The carbon dioxide level of the blood is likely to be at its lowest

    a) after vigorous exercise
    b) when holding your breath for 2 minutes
    c) whilst walking slowly
    d) when relaxing in an easy chair

23. Suffocation victims are usually given a mixture of 95% oxygen and 5% carbon dioxide rather than pure oxygen, because the carbon dioxide

    a) acts on the respiratory centre in the brain to stimulate breathing
    b) decreases the danger of choking by reducing mucous secretion
    c) increases the speed with which gases pass through the alveoli of the lungs
    d) directly stimulates the diaphragm to produce the breathing action

24. Smooth muscle tissue

    a) forms the walls of the heart
    b) is in the walls of veins
    c) is attached to the skeleton
    d) is consciously controlled

25. Protective padding around the kidney and behind the eye is composed of

    a) cartilage
    b) white fibrous tissue
    c) adipose tissue
    d) yellow elastic tissue

SEE PAGE 8

26. The region at the back of the mouth which is a com pathway for both air and food is the

a) larynx
b) bronchus
c) pharynx
d) oesophagus

27. The total volume of air that can be expired after a maximum inspiration is known as the

a) tidal volume
b) vital capacity
c) total lung capacity
d) residual volume

28. An involuntary control centre for respiration is located in the

a) medulla oblongata
b) cerebrum
c) thalamus
d) cerebellum

29. Which one of the following fluids contains no digestive enzymes?

a) bile
b) gastric juice
c) saliva
d) pancreatic juice

30. Which one of the following nutrients, after digestion, could be expected to enter the blood stream via the thoracic duct?

a) starch
b) milk sugar
c) protein
d) fat

31. Which of the following represents the dental formula for the permanent dentition of humans?

	Incisor	Canine	Pre-molar	Molar	Total Number
a)	2/2	1/1	2/2	3/3	32
b)	2/2	1/1	0/0	2/2	20
c)	2/2	1/1	3/3	2/2	32
d)	2/2	1/1	0/0	4/4	28

SEE PAGE 9

32. Which of the fo ing three substances are stored in the liver?

a) red blood cells, iron and bile
b) glycerol, glycogen and vitamin B
c) iron, glycogen and amino acids
d) vitamin D, glycogen and iron

33. Roughage is important in the diet to stimulate

a) absorption of water
b) peristalsis
c) enzyme secretion
d) absorption of mineral salts

34. In the evolution of the Primates, the relative importance of the sense of smell has generally

a) increased
b) remained constant
c) been reduced
d) varied with their evolution

35. Which of the following factors has contributed to the increase in world human population?

a) legalization of abortion
b) increased use of contraception
c) improved sanitation
d) counselling in family planning

SEE PAGE 10

Questions 36 and 37 refer to Figure 3. below:

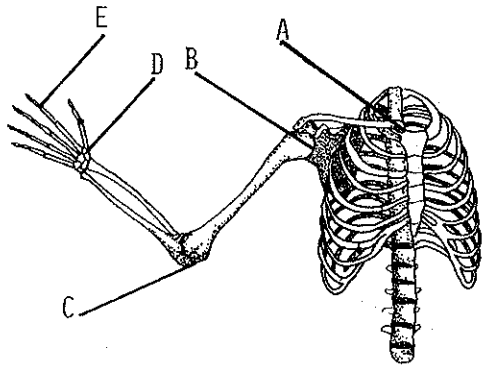

FIGURE 3.

36. Which of the following is a hinge joint?

a) A
b) B
c) C
d) D

37. Which one of the following pairs of movements is possible at the joint named E?

a) flexion and abduction
b) extension and rotation
c) extension and adduction
d) flexion and extension

38. The hepatic portal vein carries blood from the

a) liver to the heart
b) intestines to the liver
c) intestines to the heart
d) heart to the intestines

SEE PAGE 11

39.

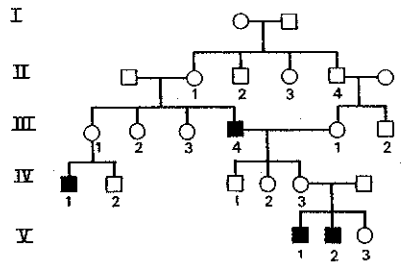

FIGURE 4

The above pedigree shows the pattern of inheritance of haemophilia in a certain family. The mode of this inheritance is X-linked recessive. Which of the following genotypes is most likely to be that of individual III 4? The gene for haemophilia is represented by X^h and its normal allele is represented by X^H.

a) X^hY
b) X^HY
c) X^HX^H
d) X^hX^h

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40.

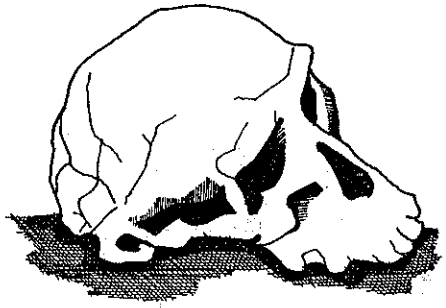


FIGURE 5

A fossil primate skull found recently in a cave near Johannesburg, South Africa, has aroused considerable scientific interest. Some details of the discovery are set out below:-

(i) Estimated age of rock in which skull was found: about 2 million years.

(ii) Description of skull: brain capacity about 600cm^3; rounded cranium; absence of bony crest for attachment to neck muscles; position of hole for entry of spinal cord suggests that animal walked upright; jaw rounded rather than U-shaped; canine teeth small and relatively inconspicuous.

(iii) Tools embedded in rock of the same age, were found a short distance from the skull.

This evidence suggests that the fossil could be the remains of

a) Australopithecus
b) Homo erectus
c) a gorilla
d) Neanderthal man

SEE PAGE 13

In questions 41-60, give the most appropriate term to match the statement. Answer the questions in the spaces provided.

41. Outbreak of a disease in a large number of people at the same time _____

42. The fluid surrounding the foetus in the uterus _____

43. Chemical messengers secreted by endocrine glands _____

44. The suborder of Primates to which lemurs and lorises belong _____

45. A neuronal process that conducts impulses away from the nerve cell body _____

46. Minute blood vessels that connect the arterioles with the venules _____

47. Substances which are known to cause cancer _____

48. A grip in which the object is held between the fingers and the palm of the hand, as in holding a hammer. _____

49. A general term for structures within the cytoplasm of a cell, which carry out specific functions _____

50. The membrane between the outer ear and the middle ear _____

51. Deficiency disease of the bones caused by a lack of vitamin D _____

SEE PAGE 14

52. The Old Stone Age cultures featuring stone tools made by chipping and flaking, and a hunter-gatherer economy _____

53. The fusion of two gametes _____

54. A collective name for the protective membranes surrounding the brain and spinal cord _____

55. Soft tissue in the centre or ends of bones, producing red blood cells, platelets and some white blood cells _____

56. The genetic make-up of an individual including recessive alleles which are not expressed _____

57. The maintenance of relatively stable conditions in the internal environment _____

58. The remains of traces of organisms that lived in past geological ages _____

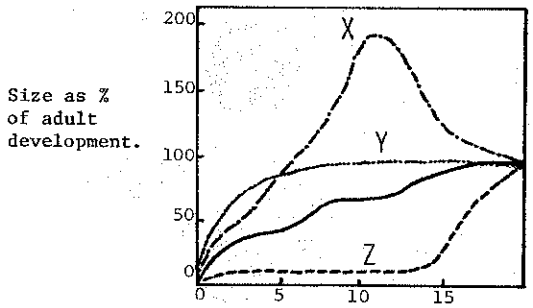
59. The structure connecting muscles to bones. _____

60. The period of life during which both sexes first become functionally capable of reproduction _____

SEE PAGE 15

61. Figure 6 shows a graph of growth curves for different tissues in the body.

FIGURE 6



(a) Choose from the following list the system which is represented by graphs X,Y and Z and give an explanation for your choice.

(i) Excretory system
(ii) Nervous system
(iii) Digestive system
(iv) Lymphatic system
(v) Reproductive system

X _____

_____

_____

Y _____

_____

_____

Z _____

_____

_____

(6 marks)

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62. Before undergoing major surgery Mr X had a blood sample taken. This was:

(i) examined under the microscope (see Figure 7)
and (ii) tested for the ABO and Rhesus blood groups (see Table 1).

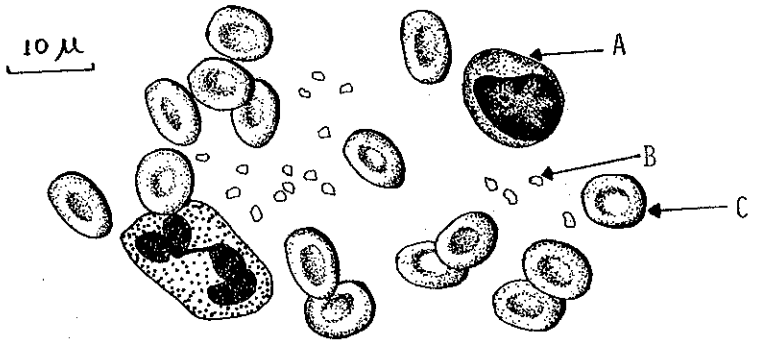


FIGURE 7. A stained smear of Mr X's blood.

(a) In the spaces below, identify the labelled components shown in Figure 7 and give one function for each.

A. NAME _____
FUNCTION _____
_____

B. NAME _____
FUNCTION _____
_____

C. NAME _____
FUNCTION _____
_____

(3 marks)

SEE PAGE 17

62. (continued)

TABLE 1. ABO and Rhesus typing of Mr X's blood.

Anti A	Anti B	Anti A + Anti B	Anti D
-	-	-	+

+ indicates agglutination
- indicates no agglutination

Table 1 above shows the results obtained when a drop of each of the antibodies was added to separate drops of Mr X's blood.

(b)i To which of the ABO blood groups does Mr X belong?

_____
(1 mark)

ii To which of the Rhesus blood groups does Mr X belong?

_____
(1 mark)

iii Which antigens do Mr X's blood cells possess?

_____
(1 mark)

iv If Mr X were the recipient of a blood transfusion, to which of the ABO blood groups should the donor belong?

_____
(1 mark)

v Mr X's wife is Rhesus negative. Her first son was Rhesus positive. Explain why subsequent children may suffer red cell damage in the uterus.

_____
_____
_____
_____
_____
_____
_____
(3 marks)

SEE PAGE 18

63.

FIGURE 8: A vertical section through the kidney. Inset C is a magnified section from the region indicated.

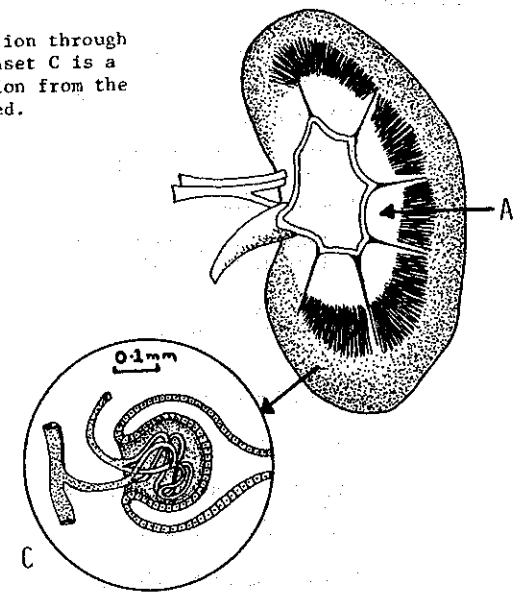
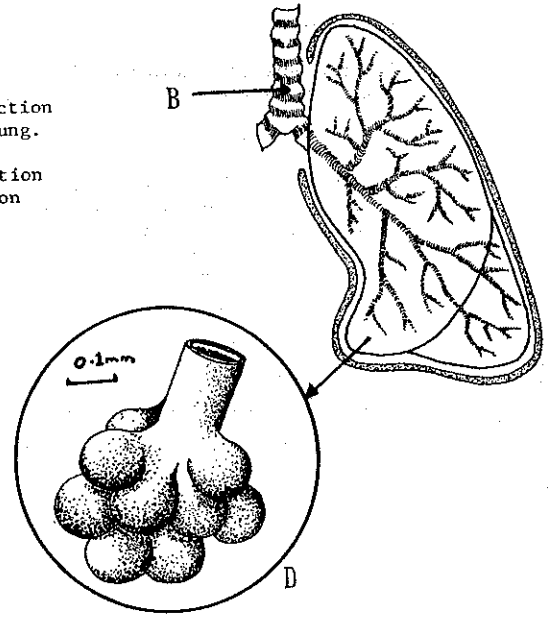


FIGURE 9 : A vertical section through the lung. Inset D is a magnified section from the region indicated.



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63. (continued)

Figures 8 and 9 depict two organs which, although possessing different functions also have a similar function - that of excretion of metabolic wastes.

(a) Identify the structures A and B shown in Figures 8 and 9 respectively.

A _____

B _____

(1 mark)

(b) Identify C and D and give their respective functions.

C. NAME _____

FUNCTION _____

_____

D. NAME _____

FUNCTION _____

_____

(3 marks)

(c) Name one end product of metabolism (excluding water) excreted by the organ shown in:

Figure 8 _____

Figure 9 _____

(2 marks)

(d) Name an organ involved in excretion other than those shown in Figures 8 and 9.

_____

(1 mark)

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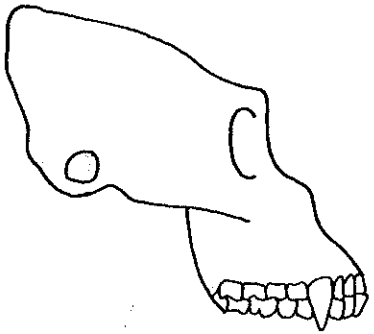
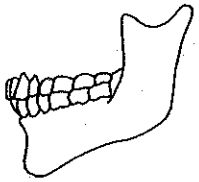
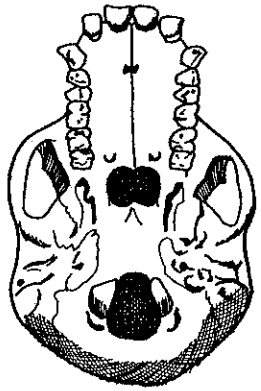
64.



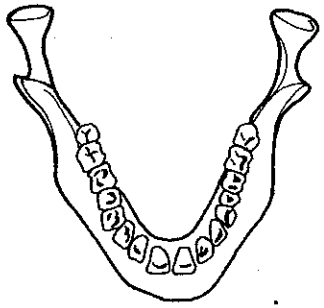
Fossil A - side view



Fossil B - side view



Fossil A - view from below



Fossil B - view from above

FIGURE 10 : Two views of fossils A and B respectively.

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64. (continued)

Two fossil hunters each dug up a piece of primate skull at the same site. Diagrams of the re-constructed fossil pieces are shown in Figure 10.

(a) Identify the family to which fossil A belongs.

_____

(1 mark)

(b) Does fossil B belong to the same family as fossil A? Give three reasons for your answer.

_____

_____

_____

_____

_____

_____

_____

(3 marks)

(c) What type of locomotion did fossil A have? Give one reason for your answer.

_____

_____

_____

_____

(3 marks)

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65.

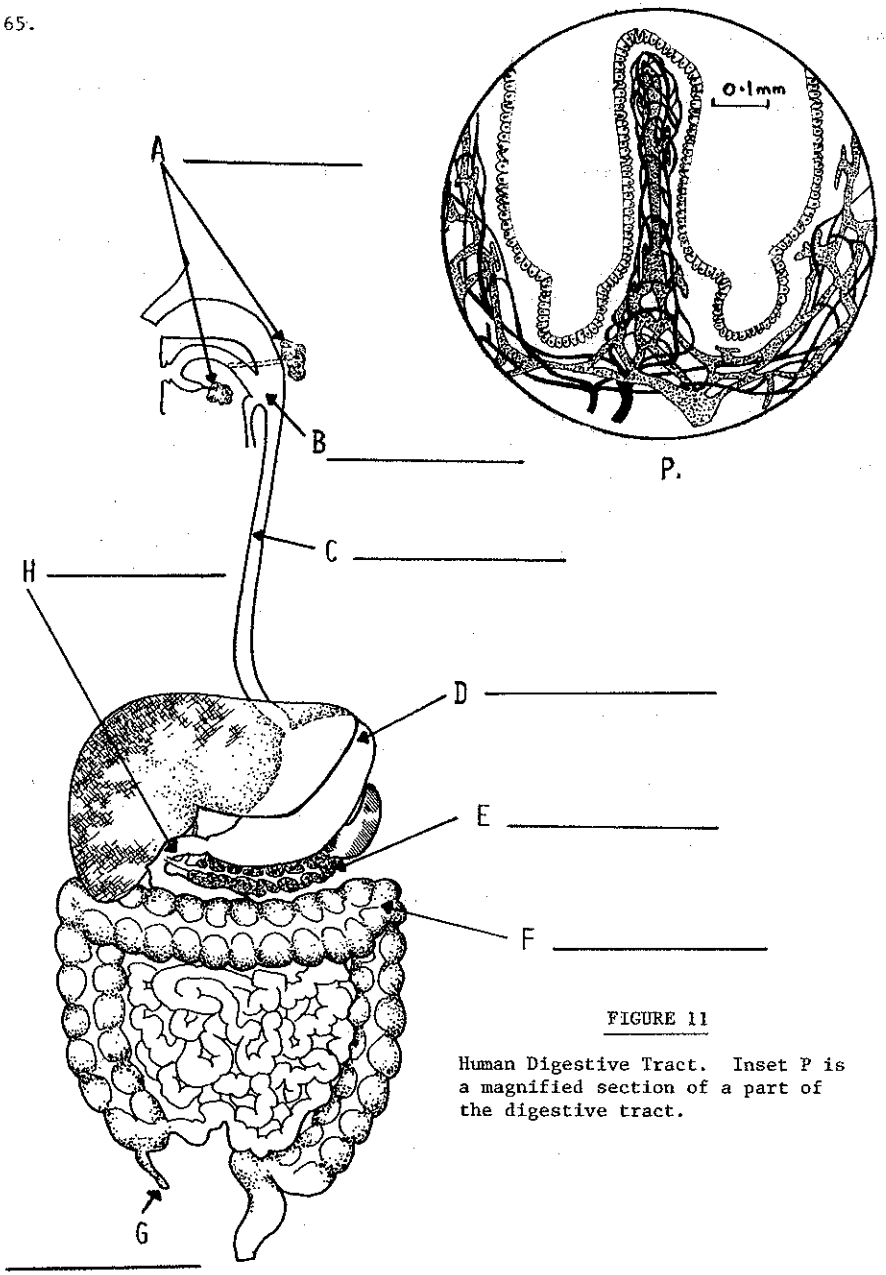

FIGURE 11

Human Digestive Tract. Inset P is a magnified section of a part of the digestive tract.

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65. (a) Label the diagram of the human digestive tract in the spaces provided in Figure 11.

(4 marks)

(b)i Identify P. _____

(½ mark)

ii In which region of the digestive tract is P found?

_____

(½ mark)

iii Name the major function of P, and give TWO reasons why it is suited to this function.

_____

_____

_____

_____

_____

_____

(3 marks)

(c) When alcohol is consumed and all traces of the alcohol are removed from the mouth, a breathalyser test only 5 minutes later would indicate the presence of alcohol. State briefly why the alcohol can be detected in such a short time.

_____

_____

_____

_____

(2 marks)

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PART II

Essay Section

THIS SECTION IS DIVIDED INTO THREE (3) SUB-SECTIONS. ATTEMPT TWO (2) QUESTIONS WHICH MUST COME FROM DIFFERENT SUB-SECTIONS E.G. QUESTION 2 (SUB-SECTION I) AND QUESTION 3 (SUB-SECTION II). ILLUSTRATE YOUR ANSWERS WITH DIAGRAMS, WHERE APPROPRIATE.

SUB-SECTION I

66. From the time an Olympic athlete is waiting to be called up to the starting blocks until several minutes after the race, changes occur in all his body systems to allow him to produce his best performance.

Discuss:

a) the physiological changes which take place in the cardiovascular and respiratory systems (6 marks)

b) the ways in which the above changes are controlled. (4 marks)

67. Two processes that occur in most cells are mitosis and protein synthesis. Describe how each of these processes is carried out. (10 marks)

SUB-SECTION II

68. Write brief notes on any TWO of the following.

a) Nutritional problems found in affluent societies. (5 marks)

b) The advantages that variations in skin colour and body shape give to humans in different environments. (5 marks)

c) Why the human population has increased so rapidly in the 20th Century. (5 marks)

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69. Studies of the skeletal remains and associated artifacts of the fossil hominids reveal two major evolutionary trends:-

a) skeletal changes

b) the emergence and development of a culture

Discuss these trends from australopithecines through Homo erectus and Neanderthal man to Cro-magnon man. (10 marks)

SUB-SECTION III

70. a) Describe the menstrual cycle and its control by hormones. (6 marks)

b) What hormonal and physical changes occur following conception to the time of implantation? (4 marks)

71. The provision of local health services forms an important part of the responsibilities of the Public Health Department.

Write brief notes on the services provided by any TWO of the following:

a) School Health Services (5 marks)

b) Child Health Clinics (5 marks)

c) Environmental Health Services (5 marks)

END OF PAPER

1981