



SCHOOL OF ANATOMY & HUMAN BIOLOGY

2ND SEMESTER EXAMINATIONS 2006

HUMAN FUNCTIONAL ANATOMY (ANHB2213)

SURNAME: _____ **STUDENT NO:** _____

GIVEN NAMES: _____ **SIGNATURE:** _____

**This paper contains:
21 pages (including this page)**

Time Allowed: 2 hours 10 minutes

This paper comprises

Two Sections:

Section A: 40 Multiple Choice Questions

15% of total unit mark

Section B: 12 Short-answer Questions

25% of total unit mark

See instructions at the beginning of each section.

PLEASE NOTE

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Examiners' use only

Section A. (15% of the TOTAL unit mark)

Section B. Short answer section Total marks 206 – 25% of the TOTAL unit mark.

Q	1	2	3	4	5	6	7	8	9	10	11	12	total
Mark													
Out of	21	22	20	15	14	19	23	19	14	17	13	9	206

Section A : Multiple choice questions.

In each question, select ONE best alternative from A, B, C, D and E.

Indicate your answer by completely blackening in pencil the appropriate circle for that question in the MCQ answer sheet.

If you wish to change your answer, make sure your first answer is completely erased. MCQs are marked by a computer which rejects double answers and any irrelevant markings on the answer sheet.

Do NOT mark the MCQ sheet beyond Q 40.

1. The deltoid muscle is
 - A. an elevator of the scapula.
 - B. a developmentally dorsal muscle.
 - C. the prime mover for flexion of the glenohumeral joint.
 - D. the main adductor of the shoulder joint.
 - E. one of the rotator cuff muscles.

2. The muscles of the rotator cuff of the shoulder joint :
 - A. are all lateral rotators.
 - B. are supplied by the lateral cord of the brachial plexus.
 - C. include the supraspinatus.
 - D. include the pectoralis major.
 - E. are attached to the surgical neck of the humerus.

3. The lateral cord of the brachial plexus
 - A. gives rise to the ulnar nerve.
 - B. is formed by the ventral division of the lower trunk.
 - C. supplies the lateral rotators of the humerus.
 - D. gives rise to the musculocutaneous nerve.
 - E. supplies the triceps brachii muscle.

4. The axillary Nerve:
 - A. is a ventral nerve arising from the brachial plexus
 - B. supplies latissimus dorsi
 - C. passes between latissimus dorsi and teres major
 - D. supplies teres minor
 - E. none of the above

5. The radial nerve
 - A. is a branch of the posterior cord of the brachial plexus.
 - B. supplies the dorsal interosseous muscles of the hand.
 - C. supplies the flexor carpi radialis muscle.
 - D. winds around the surgical neck of the humerus.
 - E. A, B and C are correct.

6. Regarding extension of the elbow joint, all of the following are true EXCEPT :
- A. The movement is limited by the olecranon process fitting into the olecranon fossa.
 - B. The superior radio-ulnar joint participates in the movement.
 - C. When aided by gravity, it is controlled by the biceps brachii.
 - D. The prime mover for the movement is attached to the ulna.
 - E. The tendon of the brachialis is a limiting factor.
7. If the median nerve is damaged at the elbow:
- A. dorsal cutaneous distribution of the hand is affected
 - B. adduction of the wrist is still possible
 - C. thumb movement is unaffected
 - D. hand grips not involving the thumb can still be performed to optimum ability.
 - E. flexion at the wrist is unaffected
8. The ulnar nerve :
- A. gives branches to the flexor compartment muscles in the arm.
 - B. runs in the spiral groove of the humerus.
 - C. supplies the extensor carpi ulnaris muscle.
 - D. passes through the carpal tunnel.
 - E. supplies all the interosseous muscles of the hand.
9. With reference to supination of the forearm :
- A. The supinator muscle is a developmentally dorsal muscle.
 - B. The biceps can supinate only when the elbow is semiflexed.
 - C. The supinator can act even if the elbow is extended.
 - D. When both muscles act, the biceps is more powerful than the supinator.
 - E. All of the above.
10. The tibialis anterior muscle:
- A. inverts the foot at the subtalar joint
 - B. flexes the ankle joint
 - C. receives innervation from the tibial nerve
 - D. crosses the knee and ankle joints
 - E. none of the above

11. The musculocutaneous nerve
- A. is developmentally comparable to the femoral nerve in the lower limb.
 - B. supplies muscles of the anterior compartment of the arm.
 - C. winds around the surgical neck of the humerus.
 - D. supplies the triceps brachii muscle.
 - E. is the only nerve in the limbs to supply both muscles and skin.
12. The flexor digitorum profundus muscle can flex the
- A. wrist joint
 - B. metacarpophalangeal joints of the fingers
 - C. distal interphalangeal joints
 - D. joints of the thumb
 - E. A, B and C are correct
13. Regarding the movements of the wrist joint :
- A. It can be flexed by the brachioradialis muscle.
 - B. The range of adduction is greater than abduction.
 - C. All its movements occur only at the radiocarpal joint.
 - D. The movement of pronation takes place at this joint.
 - E. Its flexion is essential in forming a tight grip by the hand.
14. If the radial nerve is damaged by a fracture in the spiral groove :
- A. There is total loss of supination.
 - B. The deltoid muscle is paralysed.
 - C. Extensors of the wrist are paralysed.
 - D. Abduction of the thumb is impossible.
 - E. C and D are correct.
15. The dorsal interossei of the hand:
- A. adduct the fingers
 - B. flex the metacarpophalangeal joints
 - C. are supplied by the radial nerve
 - D. arise from the tendons of flexor digitorum profundus
 - E. flex the interphalangeal joints

16. The quadriceps femoris muscle
- A. acts on the knee joint only.
 - B. has a double nerve supply.
 - C. is developmentally a dorsal muscle.
 - D. has a hiatus for the passage of the femoral artery.
 - E. is attached to the fibula.
17. The short head of biceps femoris is:
- A. a flexor of the hip
 - B. a hamstring muscle
 - C. supplied by the tibial nerve
 - D. developmentally ventral
 - E. none of the above
18. Regarding the nerves of the foot :
- A. The lateral plantar nerve enters the foot from the lateral side.
 - B. The medial plantar nerve is comparable to the ulnar nerve in the hand.
 - C. Both lateral and medial plantar nerves are branches of the tibial nerve.
 - D. The lateral plantar nerve supplies the peroneal muscles.
 - E. Both lateral and medial plantar nerves are purely cutaneous nerves.
19. The psoas major muscle
- A. is a lateral rotator of the femur IF the femoral neck is fractured.
 - B. is attached to the greater trochanter.
 - C. is an extensor of the vertebral column.
 - D. receives nerve supply from the obturator nerve.
 - E. None of the above is true.
20. The ankle joint
- A. is formed by the tibia, fibula and the talus.
 - B. has the deltoid ligament on the lateral side.
 - C. is the joint for the movements of inversion and eversion.
 - D. is a saddle type of joint.
 - E. All of the above are true.

- 21 Which of the following upper limb nerve(s) can be considered to be homologous with the Tibial nerve?
- i) Ulna nerve
 - ii) Median nerve
 - iii) Musculocutaneous nerve
 - iv) Pectoral nerves
 - v) Axillary nerve
- A) (i), (iii) & (v)
B) (ii)
C) (i), (ii) & (iii)
D) (ii) & (iv)
E) (i) & (ii)
22. The posterior cruciate ligament of the knee joint
- A. prevents the femur from slipping forwards on the tibia.
 - B. divides the knee joint into two completely separate compartments.
 - C. is attached to the femur on the posterior side.
 - D. is a part of the popliteus tendon.
 - E. is also known as the meniscomfemoral ligament.
23. The gluteus maximus muscle
- A. has a large part attached to the iliotibial tract.
 - B. takes origin from the ischial tuberosity.
 - C. is a medial rotator of the hip joint.
 - D. is supplied by the femoral nerve.
 - E. prevents tilting of the pelvis to the opposite side during walking.
24. Muscles of the posterior compartment (calf) of the leg
- A. are developmentally dorsal muscles.
 - B. are supplied by the tibial nerve.
 - C. dorsiflex the ankle joint.
 - D. help in clearing the toes from the ground during walking.
 - E. include the peroneus (fibularis) longus.
25. The Trigeminal Nerve:
- A. is the nerve of the second pharyngeal arch
 - B. has only sensory branches
 - C. innervates muscles of facial expression
 - D. innervates tensor tympani and tensor palati
 - E. exits the skull through the foramen magnum

26. The Ophthalmic Nerve:
- A. is the second division of the trigeminal nerve
 - B. supplies the muscles of mastication
 - C. passes through the foramen rotundum
 - D. supplies the area of skin derived from the embryonic frontonasal process
 - E. gives off the infraorbital nerve
27. Regarding muscles of facial expression, all of the following are true EXCEPT :
- A. They develop from the second branchial arch.
 - B. They are supplied by the 7th cranial nerve.
 - C. They include the elevator of the upper eyelid (levator palpebrae superioris).
 - D. They all have at least one end attached to the skin.
 - E. They are under voluntary control.
28. All of the following are dural venous sinuses EXCEPT :
- A. Sigmoid sinus
 - B. Frontal sinus
 - C. Transverse sinus
 - D. Straight sinus
 - E. Cavernous sinus
29. The maxillary division of the trigeminal nerve supplies
- A. a large part of the nasal cavity
 - B. lower teeth
 - C. the posterior one third of the tongue
 - D. muscles of the soft palate
 - E. none of the above.
30. Regarding structures which develop from branchial arches, which of the following pairs is correctly matched?
- A. Muscles of the tongue : first arch
 - B. Constrictors of the pharynx : third arch
 - C. Styloid process : second arch
 - D. Muscles of the larynx : third arch
 - E. Temporalis muscle : second arch

31. All of the following describe the Facial nerve (CN VII) **EXCEPT**
- A. Exits the cranial cavity through the internal acoustic meatus
 - B. Supplies the stapedius muscle in the middle ear
 - C. Provides motor innervation to the muscles of mastication
 - D. Provides taste to the anterior 2/3 of the tongue
 - E. Provides parasympathetic innervation to submandibular and sublingual glands
32. The vagus nerve
- A. supplies the anterior two thirds of the tongue.
 - B. carries parasympathetic fibres.
 - C. controls the secretion of the parotid salivary gland.
 - D. has a spinal root.
 - E. None of the above.
33. Regarding the dural venous sinuses, which of the following pairs is matched **INCORRECTLY?**
- A. Superior sagittal sinus : arachnoid granulations.
 - B. Transverse sinus : sphenoid bone.
 - C. Inferior sagittal sinus : free margin of the falx cerebri.
 - D. Sigmoid sinus : jugular foramen.
 - E. Cavernous sinus : middle cranial fossa.
34. Regarding parasympathetic nerve supply to the structures in the head and neck :
- A. Parasympathetic fibres in the oculomotor nerve (III) control the lacrimal gland.
 - B. Parasympathetic fibres in the facial nerve end in the otic ganglion.
 - C. The pterygopalatine ganglion sends fibres to the parotid gland.
 - D. The submandibular ganglion receives fibres from the glossopharyngeal nerve.
 - E. The ciliary ganglion sends fibres to the constrictor pupillae muscle.
35. The lateral rectus muscle is:
- A. an intrinsic muscle of the eye
 - B. supplied by the Abducens nerve (CN VI)
 - C. an adductor of the eye
 - D. supplied by the Oculomotor nerve (CN III)
 - E. an elevator the eye

36. *Pure* elevation (without any adduction or abduction) of the eyeball is produced by which of the following?
- i) superior oblique
 - ii) superior rectus
 - iii) inferior oblique
 - iv) lateral rectus
- A. (i) & (ii)
 - B. (ii)
 - C. (i) & (iv)
 - D. (ii) & (iii)
 - E. (iii) & (iv)
37. Regarding the functional anatomy of the larynx :
- A. The larynx is elevated during swallowing.
 - B. Vocal cords control airflow through the larynx.
 - C. During speech the vocal cords are close to each other.
 - D. A and C are correct.
 - E. A, B and C are correct.
38. Regarding the process of swallowing :
- A. The soft palate closes the passage between the nasopharynx and oropharynx.
 - B. Respiratory movements stop during swallowing.
 - C. Cricopharyngeus relaxes at the end of the pharyngeal phase.
 - D. The entire sequence of events is under voluntary control.
 - E. A, B and C are true.
39. With reference to the foramina in the skull and structures passing through them, which of the following pairs is **correctly** matched?
- A. Superior orbital fissure : Maxillary nerve
 - B. Foramen ovale : Mandibular nerve
 - C. Optic canal : Oculomotor nerve
 - D. Jugular foramen : Hypoglossal nerve
 - E. Foramen magnum : Internal carotid artery
40. The glossopharyngeal nerve (IX)
- A. carries taste fibres from the posterior one-third of the tongue.
 - B. supplies the constrictors of the pharynx.
 - C. is developmentally the nerve of the second branchial arch.
 - D. carries parasympathetic fibres for the sublingual gland.
 - E. supplies the muscles of the tongue.

Section B : Q 1 to 12 : Short-answers : Answer only in the space provided.

Question 1. Muscle actions in locomotion

At each stage of locomotion, for each joint and muscle group indicate the movement and whether the muscle is active and what sort of action (concentric, isometric, eccentric) it is performing

From heel strike to foot flat

Movement of the hip joint _____

Hamstring muscles _____

Movement of the knee joint _____

Quadriceps muscle _____

Movement of the ankle joint _____

Anterior tibial muscles _____

From foot flat to heel off

Movement of the ankle joint _____

Calf muscles _____

From heel off to toe off

Movement of the ankle joint _____

Calf muscles _____

Just after toe off

Movement of the hip joint _____

Hip flexors _____

Movement of the ankle joint _____

Anterior tibial muscles _____

21 marks

Question 2. The Brachial plexus

Roots

The brachial plexus is formed from the _____ rami of the _____
_____, _____, _____, _____ and _____ spinal nerves.

Trunks

The roots unite to form 3 trunks: the upper trunk forms from _____, the
middle trunk forms from _____, and the lower trunk forms from
_____ roots.

Divisions

Each trunk divides into _____ and _____ divisions.

Cords and nerves

The **posterior cord** of the brachial plexus is derived from _____.

Posterior cord ends by dividing into the _____
and _____ nerves, and it also gives branches that supply the _____
and _____ muscles.

The **lateral cord** is derived from _____.

The lateral cord ends by dividing into the _____ nerve and
_____, and it gives off a branch that supplies
_____.

The **medial cord** is derived from _____.

The medial cord ends by dividing into the _____
_____ nerve and _____,
and it gives off branches that supply _____ and
_____.

22 marks

Question 3. Scapular movements and muscles

Give an example of each of the following movements of the scapula.

Elevation _____

Retraction _____

Upward rotation _____

Use ticks to complete the following table showing the muscles that perform the movements

	Elevate	Depress	Protract	Retract	Up rotate	Down rotate
Levator scapulae						
Serratus anterior						
Rhomboids						
Pectoralis minor						
Trapezius - Upper						
Trapezius - Middle						
Trapezius - Lower						
Pectoralis major						
Latissimus dorsi						

State the nerve supply of the following muscles:

Levator scapulae and Rhomboids _____

Pectoralis major and minor _____

Trapezius _____

Serratus anterior _____

Latissimus dorsi _____

20 marks

Question 4. Femoral triangle

The femoral triangle is a space in the thigh bounded by the _____ ligament superiorly, the _____ border the _____ muscle laterally, and the _____ border of the _____ muscle medially.

The femoral triangle is roofed over by the _____.

The muscular floor of the triangle is formed by three muscles. From medial to lateral these muscle are _____, _____ and _____.

The femoral triangle contains four major structures that pass between the abdomen and thigh. The most lateral of these structures is the _____.

Medial to it is the _____, then comes the _____, and the most medial thing is the _____.

There is a hole in the roof of the triangle which allows the _____ vein to pass through and join the _____ vein.

15 marks

Question 5. The rotator cuff

The rotator cuff is group of muscles that support the _____ joint.

Name the two rotator cuff muscles that cross behind the joint and give their nerve supply

Muscle	Nerve supply

To what part of the humerus do they attach? _____

Name the rotator cuff muscle that crosses above the joint, and give its nerve supply

Muscle	Nerve supply

To what part of the humerus does it attach? _____

Name the rotator cuff muscle that crosses the front of the joint, and give its nerve supply

Muscle	Nerve supply

To what part of the humerus does it attach? _____

What action does it have on the arm? _____

Are the rotator cuff muscles derived from dorsal or ventral parts of the limb bud?

14 marks

Question 6. Radial nerve - course distribution and lesions

Injuries

The radial nerve is most commonly damaged where it passes around the _____
_____ of the humerus.

Root values

The radial nerve is derived from the _____ spinal
nerves.

Distribution

In the arm the radial nerve supplies the _____ and _____ muscles.

List ten forearm muscles that are supplied y by the radial nerve

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Deficit

A radial nerve lesion results in a condition called _____

_____, in which the limb takes up a position where the:

Elbow is _____

Forearm is _____

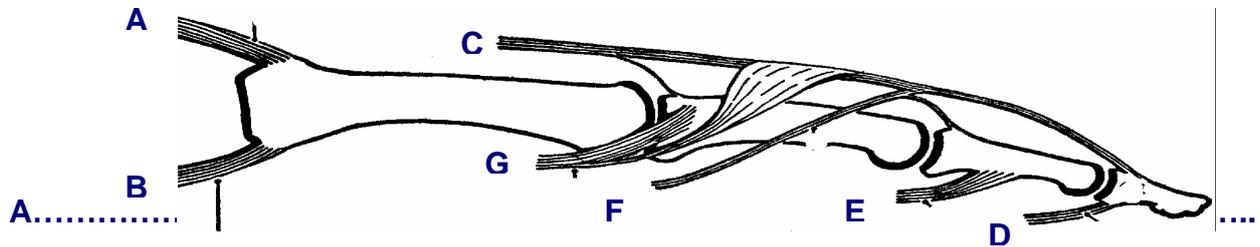
Wrist is _____

Metacarpophalangeal joints are _____

19 marks

Question 7. Index Finger movements and the extensor expansion.

Name the muscles indicated in the figure, AND
 In the table, write "Flex" and "Extend" to indicate the principal flexor and extensor of each (only indicate the PRINCIPAL flexor and extensor of each joint)



Muscles	Metacarpophalangeal	Proximal interphalangeal	Distal interphalangeal
C			
D			
E			
F			
G			

What position would the finger joints take if the intrinsic muscles of the hand were paralysed: Metacarpophalangeal joints _____

Interphalangeal joints _____

What muscle acting on the INDEX finger is NOT shown in the figure? _____

_____ (muscle H)

Put the letters A, B, C, D, E, F, G, H beside each of the nerves below to indicate which muscles are supplied by each nerve: Radial nerve _____

Ulnar nerve _____, Median nerve _____

(23 marks)

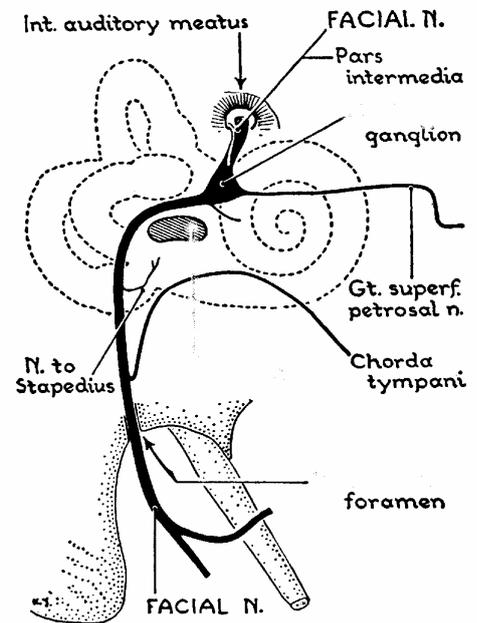
Question 8. Facial nerve

The Facial nerve is the nerve of the _____ pharyngeal arch.

Name the group of voluntary muscles that it supplies

Name 4 of the branches that supply voluntary muscle

These nerve all emerge from a common stem through the _____ foramen



Name the two **other major components that arise in the nervus intermedius** and are delivered in the greater petrosal and chorda tympani nerves: _____

_____ and _____.

The ganglion of the **greater petrosal nerve** is the _____.

Its fibres are distributed with branches of the _____, to the _____ and _____ (regions).

The ganglion of the **chorda tympani nerve** is the _____.

Its fibres are distributed with branches of the _____, to the _____ and _____ (glands) and the _____ (region).

19 marks

Question 9. Bones of the nose

Anterior opening of the nose is called the

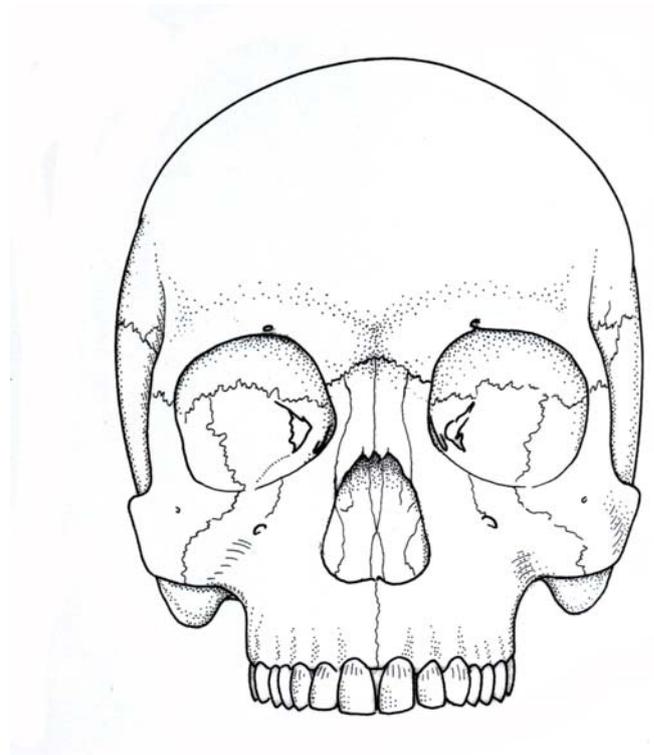
It is bounded by the _____.

and _____ bones

The floor and walls of the nasal cavity are

formed by the _____ and _____

_____ bones



The upper part and roof of the nasal cavity is mainly formed by the _____ bone.

The nasal septum is formed partly by cartilage but also by two bones: _____

_____ and _____

The posterior opening of the nasal cavity is called the _____ it is

bounded on the sides by the _____ of the sphenoid bone

The paranasal sinuses lie adjacent to the nose:

The _____ sinus is lateral to the nose

The _____ sinus is above the anterior part of the nose

The _____ sinus is posterior to the upper part of the nose

The _____ air cells are situated between the orbits and nasal cavity

14 marks

Question 10. The trigeminal nerve

The trigeminal nerve has three divisions that are sensory to, and develop with, elements of the developing face. The mandibular division also carries motor fibres to the muscles of the _____ pharyngeal arch.

List 4 muscles supplied by the Trigeminal nerve (there are actually 8)

Use the diagram provided to draw the areas of skin supplied by each division of the trigeminal nerve. KEY:

Ophthalmic

Maxillary

Mandibular



Name three tissues other than the skin that receive sensory innervation from the trigeminal nerve.

For each division of the trigeminal nerve name two branches:

Ophthalmic : _____

Maxillary : _____

Mandibular : _____

17 marks

Question 11. Temporomandibular joint

The temporomandibular joint has an intraarticular disc that partitions the joint into an upper part and a lower part

The upper part is between the intra-articular disc and the _____ bone.

The movements that take place here are _____ and _____

The lower part of the joint is between the articular disc and the condyle of the _____

The movements that occur here are _____ and _____

Complete the following Table to indicate the actions of masticatory muscles

Muscle	Elevation	Depression	Protraction	Retraction
Temporalis				
Masseter				
Medial pterygoid				
Lateral pterygoid				

Opening the mouth involves depression of the mandible and what other movement?

What movements of the temporomandibular joint are involved in chewing movements where the chin moves from side to side? _____

13 marks

Question 12. Motor nerves of the mouth, pharynx and larynx

For each nerve listed below, state how it contributes to the motor innervation of the mouth, pharynx and larynx.

Trigeminal nerve

Facial nerve

Hypoglossal nerve

Vagus nerve (includes cranial accessory nerve)

Glossopharyngeal nerve

Make sure you have considered all the muscles and structures listed below

Cheeks, Palate, Tongue intrinsic, Tongue extrinsic, Muscles of mastication, Lips, Other muscles associated with the tongue (like digastric, geniohyoid, stylohyoid), Other muscles in the floor of the mouth (mylohyoid, anterior belly of digastric), Pharyngeal muscles, stylopharyngeus, laryngeal muscles

9 marks

END OF PAPER