



The GIANT

A 2022 Giant compilation on PGY 4110 NEUROSCIENCES

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PGY 4110 NEUROSCIENCES-REVIEW QUESTIONS

Select the ONE answer that is CORRECT.

1. The following statements concern the spinal cord:

- (a) The anterior and posterior gray columns on the two sides are united by a white commissure.
- (b) The terminal ventricle is the expanded lower end of the fourth ventricle.
- (c) The larger nerve cell bodies in the anterior gray horns give rise to the alpha efferent nerve fibers in the anterior roots.
- (d) The substantia gelatinosa groups of cells are located at the base of each posterior gray column.
- (e) The nucleus dorsalis (Clarke's column) is a group of nerve cells found in the posterior gray column and restricted to the lumbar segments of the cord.

2. The following statements concern the white columns of the spinal cord:

- (a) The posterior spinocerebellar tract is situated in the posterior white column.
- (b) The anterior spinothalamic tract is found in the anterior white column.
- (c) The lateral spinothalamic tract is found in the anterior white column.
- (d) The fasciculus gracilis is found in the lateral white column.
- (e) The rubrospinal tract is found in the anterior white column.

3. The following statements concern the spinal cord:

- (a) The spinal cord has a cervical enlargement for the brachial plexus.
- (b) The spinal cord possesses spinal nerves that are attached to the cord by anterior and posterior rami.
- (c) In the adult, the spinal cord usually ends inferiorly at the lower border of the fourth lumbar vertebra.
- (d) The ligamentum denticulatum anchors the spinal cord to the pedicles of the vertebra along each side.
- (e) The central canal does not communicate with the fourth ventricle of the brain.

4. The following statements concern the cell of origin of the tracts listed below: (a)

The fasciculus cuneatus arises from the cells in the substantia gelatinosa.

- (b) The anterior spinal thalamic arises from the cells in posterior root ganglion.
- (c) The fasciculus gracilis arises from the cells in the nucleus dorsalis (Clarke's column).
- (d) The anterior spinocerebellar arises from the cells in the posterior root ganglion.
- (e) The lateral spinothalamic arises from the cells in the substantia gelatinosa.

5. The following statements concern the courses taken by the tracts listed below: (a)

The fasciculus gracilis does not cross to the opposite side of the neural axis.

- (b) The spinotectal tract does not cross to the opposite side of the spinal cord.

- (c) The lateral spinothalamic tract does not cross to the opposite side of the spinal cord.
- (d) The posterior spinocerebellar tract does cross to the opposite side of the neural axis.
- (e) The anterior spinothalamic tract immediately crosses to the opposite side of the spinal cord.

6. The following statements concern the nucleus of termination of the tracts listed below:

- (a) The posterior white column tracts terminate in the inferior colliculus.
- (b) The spinoreticular tract terminates on the neurons of the hippocampus.
- (c) The spinotectal tract terminates in the inferior colliculus.
- (d) **The anterior spinothalamic tract terminates in the ventral posterolateral nucleus of the thalamus.**
- (e) The anterior spinocerebellar tract terminates in the dentate nucleus of the cerebellum.

7. The following statements relate sensations with the appropriate nervous pathways:

- (a) Two-point tactile discrimination travels in the lateral spinothalamic tract.
- (b) Pain travels in the anterior spinothalamic tract.
- (c) **Unconscious muscle joint sense travels in the anterior spinocerebellar tract.**
- (d) Pressure travels in the posterior spinothalamic tract.
- (e) Vibration travels in the posterior spinocerebellar tract.

8. The following statements concern the gating theory of pain:

- (a) Stimulation of small non-pain-conducting fibers in a peripheral nerve may reduce pain sensitivity.
- (b) **Massage applied to the skin over a painful joint may reduce pain sensitivity.**
- (c) Stimulation of delta A- and C-type fibers in a posterior root of a spinal nerve may decrease pain sensitivity.
- (d) Degeneration of large non-pain-conducting fibers in a peripheral nerve decreases pain sensitivity.
- (e) Inhibition of pain conduction in the spinal cord does not involve connector neurons.

9. The following statements concern the reception of pain:

- (a) Serotonin is not a transmitter substance in the analgesic system.
- (b) Substance P, a protein, is thought to be the neurotransmitter at the synapses where the first-order neuron terminates on the cells in the posterior gray column of the spinal cord.
- (c) The enkephalins and endorphins may serve to stimulate the release of substance P in the posterior gray column of the spinal cord.
- (d) Many of the tracts conducting the initial, sharp, pricking pain terminate in the dorsal anterolateral nucleus of the thalamus.
- (e) **The slow-conducting C-type fibers are responsible for prolonged, burning pain.**

10. The following statements concern the corticospinal tracts:

- (a) **They occupy the posterior limb of the internal capsule.**
- (b) They are mainly responsible for controlling the voluntary movements in the proximal muscles of the limbs.

(c) They arise as axons of the pyramidal cells in the fourth layer of the cerebral cortex. (d) Those that control the movements of the upper limb originate in the precentral gyrus on the medial side of the cerebral hemisphere.

(e) Those that are concerned with the movements of the lower limb are located in the medial area of the middle three-fifths of the basis pedunculi.

11. The following statements concern the course taken by the tracts listed below:

(a) The rubrospinal tract crosses the midline of the neuroaxis in the medulla oblongata. (b) The tectospinal tract (most of the nerve fibers) crosses the midline in the posterior commissure.

(c) The vestibulospinal tract crosses the midline in the midbrain.

(d) **The lateral corticospinal tract has crossed the midline in the medulla oblongata.**

(e) The anterior corticospinal tract crosses the midline in the midbrain.

12. The following statements concern the nerve cells of origin for the tracts listed below: (a) The vestibulospinal tract originates from cells of the medial vestibular nucleus situated in the pons.

(b) The tectospinal tract originates from cells in the inferior colliculus.

(c) **The lateral corticospinal tract originates from cells in area 4 of the cerebral cortex.**

(d) The rubrospinal tract originates from cells in the reticular nucleus.

(e) The reticulospinal tract originates from cells in the reticular formation that is confined to the midbrain.

13. The following statements concern muscle movement:

(a) Muscular fasciculation is seen only when there is rapid destruction of the lower motor neurons.

(b) Muscle spindle afferent nerve fibers send information only to the spinal cord.

(c) In Parkinson disease, there is a degeneration of dopamine-secreting neurons that originate in the substantia nigra.

(d) Brain neuronal activity preceding a voluntary movement is limited to the precentral gyrus (area 4).

(e) **Hyperactive ankle-jerk reflexes and ankle clonus indicate a release of the lower motor neurons from supraspinal inhibition.**

14. After a hemorrhage into the left internal capsule in a right-handed person, the following sign or symptom might be present:

(a) Left homonymous hemianopia

(b) **Right astereognosis**

(c) Left hemiplegia

(d) Normal speech.

(e) Left-sided positive Babinski response

15. A patient with a traumatic lesion of the left half of the spinal cord at the level of the eighth cervical segment might present the following sign(s) and symptom(s):

- (a) Loss of pain and temperature sensations on the left side below the level of the lesion (b) Loss of position sense of the right leg
- (c) Right hemiplegia
- (d) **Left positive Babinski sign**
- (e) Right-sided lower motor paralysis in the segment of the lesion and muscular atrophy

16. Which of the signs and symptoms listed below is indicative of a cerebellar lesion?

- (a) Cogwheel rigidity
- (b) Hemiballismus
- (c) Chorea
- (d) **Intention tremor**
- (e) Athetosis

17. Which of the following regions of white matter would not contain corticospinal fibers?

- (a) Pyramid of medulla oblongata
- (b) Lateral white column of the spinal cord
- (c) Cerebral peduncle of the midbrain
- (d) **Anterior limb of the internal capsule**
- (e) Corona radiata

A 59-year-old woman was experiencing pain in the back and showed evidence of loss of pain and temperature sensations down the back of her left leg. Three years previously, she underwent a radical mastectomy followed by radiation and chemotherapy for advanced carcinoma of her right breast.

On examination, it was found that she was experiencing pain over the lower part of the back, with loss of the skin sensations of pain and temperature down the back of her left leg in the area of the S1-3 dermatomes. No other neurologic deficits were identified. Radiographic examination of the vertebral column showed evidence of metastases in the bodies of the 9th and 10th thoracic vertebrae. An MRI revealed an extension of one of the metastases into the vertebral canal, with slight indentation of the spinal cord on the right side.

18. The pain in the back could be explained in this patient by the following facts **except**:

- (a) Osteoarthritis of the joints of the vertebral column. (b) The presence of metastases in the bodies of the 9th and 10th thoracic vertebrae.
- (c) The pressure of the tumor on the posterior roots of the spinal nerves.
- (d) A prolapsed intervertebral disc pressing on the spinal nerves.
- (e) **Spasm of the postvertebral muscles following pressure of the tumor on the posterior white columns of the spinal cord.**

19. The loss of pain and temperature sensations down the back of the patient's left leg in the area of the S1-3 dermatomes could be explained by the following factual statements **except**:

- (a) The lateral spinothalamic tracts in the spinal cord conduct the sensations of pain. (b) The lateral spinothalamic tracts are laminated, with the sacral segments of the body located most laterally.
- (c) The sacral segments of the tracts are the most exposed to external cord pressure from a metastasizing tumor.
- (d) The loss of temperature sensations in the leg could be explained by pressure of the tumor on the anterior spinothalamic tract.

20. The severe intractable pain in the back in this patient could be treated by the following methods **except**:

- (a) The prescription of salicylates in large doses.
- (b) The intramuscular injection of morphine or even the direct injection of the opiate into the spinal cord.
- (c) The operation of posterior rhizotomy.
- (d) The operation of cordotomy.
- (e) The injection of opiates into the subarachnoid space.

21. The following statements concern the anterior surface of the medulla oblongata: (a) The pyramids taper inferiorly and give rise to the decussation of the pyramids.

- (b) On each side of the midline, there is an ovoid swelling called the olive, which contains the corticospinal fibers.
- (c) The hypoglossal nerve emerges between the olive and the inferior cerebellar peduncle.
- (d) The vagus nerve emerges between the pyramid and the olive.
- (e) The abducent nerve emerges between the pons and the midbrain.

22. The following general statements concern the medulla oblongata:

- (a) The caudal half of the floor of the fourth ventricle is formed by the rostral half of the medulla.
- (b) The central canal extends throughout the length of the medulla oblongata.
- (c) The nucleus gracilis is situated beneath the gracile tubercle on the anterior surface of the medulla.
- (d) The decussation of the medial lemnisci takes place in the rostral half of the medulla. (e) The cerebellum lies anterior to the medulla.

23. The following statements concern the interior of the lower part of the medulla:

- (a) The decussation of the pyramids represents the crossing over from one side of the medulla to the other of one-quarter of the corticospinal fibers.
- (b) The central canal of the spinal cord is not continuous upward into the medulla.
- (c) The substantia gelatinosa is not continuous with the nucleus of the spinal tract of the trigeminal nerve.
- (d) The medial lemniscus is formed by the anterior spinothalamic tract and the spinotectal tract.
- (e) The internal arcuate fibers emerge from the nucleus gracilis and nucleus cuneatus.

24. The following statements concern the interior of the upper part of the medulla: (a) The reticular formation consists of nerve fibers, and there are no nerve cells. (b) The nucleus ambiguus constitutes the motor nucleus of the vagus, cranial part of the accessory, and hypoglossal nerves.
- (c) Beneath the floor of the fourth ventricle are located the dorsal nucleus of the vagus and the vestibular nuclei.
- (d) The medial longitudinal fasciculus is a bundle of ascending fibers on each side of the midline.
- (e) The inferior cerebellar peduncle connects the pons to the cerebellum.

25. The following statements concern the Arnold-Chiari phenomenon:

- (a) It is an acquired anomaly.
- (b) The exits in the roof of the fourth ventricle may be blocked.
- (c) The cerebellum never herniates through the foramen magnum.
- (d) It is not associated with various forms of spina bifida.
- (e) It is safe to perform a spinal tap in this condition.

26. The following statements concern the medial medullary syndrome:

- (a) The tongue is paralyzed on the contralateral side.
- (b) There is ipsilateral hemiplegia.
- (c) There are ipsilateral impaired sensations of position and movement.
- (d) It is commonly caused by thrombosis of a branch of the vertebral artery to the medulla oblongata.
- (e) There is contralateral facial paralysis.

27. The following statements concern the lateral medullary syndrome:

- (a) The condition may be caused by a thrombosis of the anterior inferior cerebellar artery.
- (b) The nucleus ambiguus of the same side may be damaged.
- (c) There may be analgesia and thermoanesthesia on the contralateral side of the face.
- (d) Contralateral trunk and extremity hypalgesia and thermoanesthesia may occur.
- (e) There may be evidence of seizures.

28. The following statements concern the pons:

- (a) The trigeminal nerve emerges on the lateral aspect of the pons.
- (b) The glossopharyngeal nerve emerges on the anterior aspect of the brainstem in the groove between the pons and the medulla oblongata.
- (c) The basilar artery lies in a centrally placed groove on the anterior aspect of the pons. (d) Many nerve fibers present on the posterior aspect of the pons converge laterally to form the middle cerebellar peduncle.
- (e) The pons forms the lower half of the floor of the fourth ventricle.

29. The following important structures are located in the brainstem at the level stated:

- (a) The red nucleus lies within the midbrain.
- (b) The facial colliculus lies in the cranial part of the pons.
- (c) The motor nucleus of the trigeminal nerve lies within the caudal part of the pons.
- (d) The abducent nucleus lies within the cranial part of the pons.

(e) The trochlear nucleus lies within the midbrain at the level of the superior colliculus.

30. The following statements concern the posterior surface of the pons:

- (a) Lateral to the median sulcus is an elongated swelling called the lateral eminence.
- (b) The facial colliculus is produced by the root of the facial nerve winding around the nucleus of the abducent nerve.
- (c) The floor of the inferior part of the sulcus limitans is pigmented and is called the substantia ferruginea.
- (d) The vestibular area lies medial to the sulcus limitans.
- (e) The cerebellum lies anterior to the pons.

31. The following statements concern a transverse section through the caudal part of the pons:

- (a) The pontine nuclei lie between the transverse pontine fibers.
- (b) The vestibular nuclei lie medial to the abducent nucleus.
- (c) The trapezoid body is made up of fibers derived from the facial nerve nuclei.
- (d) The tegmentum is the part of the pons lying anterior to the trapezoid body.
- (e) The medial longitudinal fasciculus lies above the floor of the fourth ventricle on either side of the midline.

32. The following statements concern a transverse section through the cranial part of the pons:

- (a) The motor nucleus of the trigeminal nerve lies lateral to the main sensory nucleus in the tegmentum.
- (b) The medial lemniscus has rotated so that its long axis lies vertically.
- (c) Bundles of corticospinal fibers lie among the transverse pontine fibers.
- (d) The medial longitudinal fasciculus joins the thalamus to the spinal nucleus of the trigeminal nerve.
- (e) The motor root of the trigeminal nerve is much larger than the sensory root.

33. The following statements concern the pons:

- (a) It is related superiorly to the dorsum sellae of the sphenoid bone.
- (b) It lies in the middle cranial fossa.
- (c) Glial tumors of the pons are rare.
- (d) The corticopontine fibers terminate in the pontine nuclei.
- (e) The pons receives its blood supply from the internal carotid artery.

34. The following statements concern the midbrain:

- (a) It passes superiorly between the fixed and free borders of the tentorium cerebelli.
- (b) The oculomotor nerve emerges from the posterior surface below the inferior colliculi.
- (c) The superior brachium passes from the superior colliculus to the medial geniculate body.
- (d) The cavity of the midbrain is called the cerebral aqueduct
- (e) The interpeduncular fossa is bounded laterally by the cerebellar peduncles.

35. The following statements concern the midbrain:

- (a) The oculomotor nucleus is found within it at the level of the inferior colliculus. (b) The trochlear nerve emerges on the anterior surface of the midbrain and decussates completely in the superior medullary velum.
- (c) The trochlear nucleus is situated in the central gray matter at the level of the inferior colliculus.
- (d) The lemnisci are situated medial to the central gray matter.
- (e) The trigeminal lemniscus lies anterior to the medial lemniscus.

36. The following statements concern the internal structures of the midbrain:

- (a) The tectum is the part situated posterior to the cerebral aqueduct.
- (b) The crus cerebri on each side lies posterior to the substantia nigra.
- (c) The tegmentum lies anterior to the substantia nigra.
- (d) The central gray matter encircles the red nuclei.
- (e) The reticular formation is limited to the lower part of the midbrain.

37. The following statements concern the colliculi of the midbrain:

- (a) They are located in the tegmentum.
- (b) The superior colliculi are concerned with sight reflexes.
- (c) The inferior colliculi lie at the level of the oculomotor nerve nuclei.
- (d) The inferior colliculi are concerned with reflexes of smell.
- (e) The superior colliculi lie at the level of the trochlear nuclei.

38. The following statements concern the third cranial nerve nuclei:

- (a) The oculomotor nucleus is situated lateral to the central gray matter.
- (b) The sympathetic part of the oculomotor nucleus is called the Edinger-Westphal nucleus.
- (c) The oculomotor nucleus lies posterior to the cerebral aqueduct.
- (d) The nerve fibers from the oculomotor nucleus pass through the red nucleus.
- (e) The oculomotor nucleus lies close to the lateral longitudinal fasciculus.

A 63-year-old man complaining of difficulty in swallowing, some hoarseness of his voice, and giddiness was seen by a neurologist. All these symptoms started suddenly 4 days previously. On physical examination, he was found to have a loss of the pharyngeal gagging reflex on the left side, left sided facial analgesia, and left-sided paralysis of the vocal cord.

39. Based on the clinical history and the results of the physical examination, select the **most likely** diagnosis.

- (a) A meningeal tumor in the posterior cranial fossa on the right side
- (b) Lateral medullary syndrome on the left side
- (c) Medial medullary syndrome on the left side
- (d) Lateral medullary syndrome on the right side
- (e) Medial medullary syndrome on the right side

A 7-year-old girl was seen by a neurologist because she complained to her mother that she was seeing double. Careful physical examination revealed that the double vision became worse when she looked toward the left. The patient also had evidence of a mild motor

paralysis of her right lower limb without spasticity. There was also a slight facial paralysis involving the whole left side of the face.

40. Based on the clinical history and the clinical examination, the following neurologic deficits could have been present **except**:

- (a) The double vision caused by weakness of the left lateral rectus muscle.
- (b) The complete left-sided facial paralysis caused by involvement of the left seventh cranial nerve nucleus or its nerve.
- (c) **The mild right hemiparesis produced by damage to the corticospinal tract on the right side.**
- (d) An MRI revealed the presence of a tumor of the lower part of the pons on the left side. (e) There was damage to the left sixth cranial nerve nucleus.

A 42-year-old woman complaining of a severe, persistent headache visited her physician. At first, the headache was not continuous and tended to occur during the night. Now, the headache was present all the time and was felt over the whole head. Recently, she has begun to feel nauseous, and this has resulted in several episodes of vomiting. Last week, on looking in the mirror, she noted that her right pupil looked much larger than the left. Her right upper lid appeared to droop.

41. The physical examination revealed the following most likely findings **except**:

- (a) There was weakness in raising the right eyelid upward.
- (b) There was severe ptosis of the right eye.
- (c) There was obvious dilatation of the right pupil.
- (d) Ophthalmoscopic examination revealed bilateral papilledema.
- (e) **There was a loss of taste sensation on the posterior one-third of the tongue on the left side.**

42. The combination of the clinical history and the findings in the physical examination enabled the physician to make the following **most likely** diagnosis.

- (a) A tumor involving the left cerebral hemisphere
- (b) **A tumor involving the right side of the midbrain at the level of the superior colliculi** (c) Severe migraine
- (d) A cerebral hemorrhage involving the left cerebral hemisphere
- (e) A tumor of the left side of the midbrain

MEDICAL PHYSIOLOGY

SECTION A

In questions 1 – 40 select the one that is the best in each case. Each question carries 1 mark.

1. The stretch reflex:
 - (a) The receptor organ is the extrafusal muscle fibre
 - (b) It does not normally respond to very minor degrees of stretch
 - (c) The muscle spindles involved in this reflex are most plentiful in the large antigravity muscles
 - (d) The gamma-efferent fibres that supply the spindles are unmyelinated
 - (e) None of the above

2. Regarding Cerebellar Cortex:
 - (a) After lesions, disturbances are contralateral to the lesion
 - (b) It coordinates somatic motor activity and regulates muscle tone
 - (c) Sensory information received by the cerebellum is acted upon at a conscious level by this structure
 - (d) Speech is rarely disrupted after cerebellar damage
 - (e) All are correct

3. In spinal shock:
 - (a) The duration is a function of cerebral dominance
 - (b) Bladder function is lost
 - (c) A and B are correct
 - (d) Noxious stimuli applied to the skin after spinal transaction evoke flexion responses immediately
 - (e) All are correct

4. The dermatome rule is used:
 - (a) Clinically by physicians to determine level of pain perception
 - (b) To explain referred pain
 - (c) To discern the slow pain response

- (d) To determine the extent of Cutaneous tissue damage
 - (e) A and C are correct
5. Which of the following are not part of the analgesia system?
- (a) Periaqueductal gray matter
 - (b) Periventricular nuclei of the hypothalamus
 - (c) Raphe magnus nucleus
 - (d) Lateral spinothalamic tract
 - (e) A and C are correct
6. The sympathetic division of the autonomic nervous system is characterized by:
- (a) Presynaptic inhibition
 - (b) Thoracolumbar outflow from the spinal cord
 - (c) Short postganglionic fibers
 - (d) Adrenergic preganglionic fibers
 - (e) The vagus nerve, which is its major component
7. The primary motor cortex:
- (a) Receives no sensory input
 - (b) Is active in the adjustment of motor activity to current sensory input
 - (c) Is not necessary for fine motor movement
 - (d) Gives rise to the extrapyramidal tract
 - (e) Is localized only in the frontal lobe
8. The vomiting center is located in the:
- (a) Cerebral cortex
 - (b) Thalamus
 - (c) Hypothalamus
 - (d) Medulla oblongata
 - (e) Cervical spine
9. Synaptic innervations of a number of cells by one fiber is an example of:
- (a) Convergence
 - (b) Chronaxie
 - (c) Rheobase

- (d) Divergence
- (e) Reverberation

10. The functions of the basal ganglia include:

- (a) The inhibition of muscle tone if they are all stimulated
- (b) Coordinate fine movements of the digits
- (c) The globus pallidus is not involved in setting background muscle tone
- (d) The caudate nucleus and putamen inhibit gross motor movement
- (e) B and D are correct

11. The pyramidal tract:

- (a) Is composed solely of axons from pyramidal cells
- (b) Is a crossed pathway
- (c) Projects solely to the thalamus
- (d) Originates from several areas of the cortex including area 4, frontal lobe, and the parietal lobe
- (e) B and D are correct

12. The hypothalamus is associated with:

- (a) Food intake
- (b) Perception
- (c) Water control
- (d) Appropriate integration and control of cardiovascular regulation
- (e) All of the above

13. Lesions that produce complete inhibition of fear responses and loss of emotion can often be seen in lesions involving the:

- (a) Sensory cortex
- (b) Amygdaloid nuclei

- (c) Olfactory lobes
- (d) Medulla oblongata
- (e) None are correct

14. Deep sleep is or may be:

- (a) Indicated by the appearance of very high voltage low-frequency waves on the EEG
- (b) Associated with a decrease in vegetative functions of the body
- (c) The result of synaptic fatigue
- (d) The result of a nearly complete lack of input into the cortex from the reticular activity system
- (e) All the above are correct

15. Which of the following functions are not attributable to the level of the spinal cord and/or lower brain?

- (a) Walking motions
- (b) Reflex control of blood vessels
- (c) Equilibrium
- (d) Subconscious activities
- (e) None of the above

16. Which one is not a feature of the central nervous system of mammals?

- (a) Spinal cord
- (b) Cerebral cortex
- (c) Sympathetic post-synaptic neuron
- (d) Cerebellum
- (e) Brain stem

17. Which of the following are not located in the anterior horn of the spinal cord?

- (a) Anterior motor neurons
- (b) Interneurons
- (c) Gamma motor neurons
- (d) Alpha motor neurons

(e) None of the above

18. More than half of the fibers descending and ascending the spinal cord:

- (a) Provide multisegmental reflex pathways
- (b) Are referred to as propriospinal fibers
- (c) Include pathways for reflex coordination of simultaneous movement of body parts
- (d) Are involved in nociception
- (e) A, B, and C are correct

19. When a normally innervated skeletal muscle is stretched, the initial response is contraction but with increasing stretch, the muscle suddenly relaxes. This relaxation occurs because:

- (a) With strong stretch, gamma efferent discharge is decreased
- (b) With strong stretch, the discharge from the annulospiral endings of afferent nerve fibers is inhibited
- (c) With strong stretch, there is decreased activity in the afferent nerve fibers from the Golgi tendon organs
- (d) With strong stretch, there is increased activity in the afferent nerve fibers from the Golgi tendon organs
- (e) Because of reciprocal innervations, there is increased discharge in the afferent nerve fibers from the antagonists to the stretched muscle

20. When the head is rotated to the left:

- (a) Neural activity from the ampulla of the left horizontal semicircular duct is increased
- (b) The eyes deviate slowly to the left
- (c) The discharge rate of sensory axons supplying hair cells in the utricular macula increase
- (d) Endolymph in the right horizontal semicircular duct shifts toward the

utricle

- (e) Hair cells in the saccular macula are depolarized
21. A lesion of which of the following structures may result in incoordination, reduced postural tone, and pendular phasic stretch reflexes?
- (a) Midbrain locomotor system
 - (b) Motor cortex
 - (c) Premotor cortex
 - (d) Cerebellum
 - (e) Superior colliculus
22. An alpha- motoneuron that innervates a postural muscle such as the soleus muscle:
- (a) Is excited mono synaptically by Golgi tendon organ afferents
 - (b) Forms endplates on 3 to 6 skeletal muscle fibers
 - (c) Contributes to the patellar reflex
 - (d) Belongs to a fast fatigable motor unit
 - (e) Is inhibited disynaptic when the antagonist muscle is stretched
23. In the retina:
- (a) Rods are depolarized when light strikes the outer segment
 - (b) Different rod photopigments discriminate between wavelengths
 - (c) Rods are more sensitive to low intensities of light than are cones
 - (d) Defective rods account for colour blindness
 - (e) Rods are most concentrated in the fovea
24. In a patient subjected to surgical replacement of the abdominal aorta, the arterial circulation of the spinal cord is compromised, resulting in damage to the white matter of the lateral and anterior funiculi but not of the posterior funiculi at the level of T4. What functional deficit would be expected?
- (a) Ataxic gait
 - (b) Cannot recognize numbers written on the toes
 - (c) Failure to detect the vibrations of a tuning fork placed on the ankle
 - (d) Inability to distinguish between warm and cold on the feet
 - (e) Weakness of the arms

25. In the cochlea:

- (a) Oscillations of the basilar membrane in response to high-frequency sound are greater near the apex of the cochlea than at the base
- (b) The receptor potentials of the hair cells can be recorded as the cochlear microphonic potential
- (c) Cochlear nerve fibers discharge at the frequency as the sound over the entire range of audible frequencies
- (d) The intensity of sound is encoded by hair cells near the base of the cochlea
- (e) Olivocochlear efferents cause contraction of the basilar membrane

26. Raising the skin temperature to 52°C activates:

- (a) Meissner's corpuscles
- (b) Merkel's cell endings
- (c) Nociceptors
- (d) Pacinian corpuscles
- (e) Ruffini endings

27. The sensation of high-frequency vibration is signaled by:

- (a) Golgi tendon organs
- (b) Meissner's corpuscles
- (c) Muscle spindles
- (d) Nociceptors
- (e) Pacinian corpuscles

28. The cell type that forms cerebrospinal fluid is the:

- (a) Ependymal cell
- (b) Neuron
- (c) Oligodendroglial cell
- (d) Satellite cell
- (e) Schwann cell

29. The cerebrospinal fluid (CSF):

- (a) Has a higher concentration of glucose than blood
- (b) Contains more protein per unit volume than blood

- (c) Is formed at a rate that is proportional to the CSF pressure
 - (d) Is absorbed at a rate that is proportional to the CSF pressure
 - (e) Is removed largely through dural sleeves of the spinal nerve roots
30. An automobile accident causes an injury of the sciatic nerve. As a consequence of the injury, you would expect:
- (a) Death of all of the dorsal root ganglion cells whose axons were interrupted
 - (b) Release of antibodies to nerve growth factor from Schwann cells ensheathing damaged axons
 - (c) Regrowth of the axons distal to the injury at a rate of 400 mm/day
 - (d) Chromatolysis of motoneurons in the lumbosacral spinal cord
 - (e) Eventual complete restoration of sensory and motor function
31. This question concerns peripheral and central neurotransmitters and neuromodulators, which statement is most appropriate?
- (a) Noradrenaline is not found in neurons in the central nervous system
 - (b) Glutamate is an inhibitory transmitter
 - (c) The peptide substance P is found in peripheral motor nerve axons
 - (d) Somatostatin, vasointestinal peptide and cholecystokinin are peptides which are found both in the gut and in neurons of the brain
 - (e) GABA receptors are found in the peripheral tissues
32. Which of the following is most closely related to slow-wave sleep?
- (a) Dreaming
 - (b) Atonia
 - (c) Bed-wetting
 - (d) High frequency electroencephalogram (EEG) waves
 - (e) Irregular heart rates
33. Which one of the receptors is responsible for monitoring the rate of muscle stretch?
- (a) Nuclear bag intrafusal fibers
 - (b) Nuclear chain intrafusal fibers

- (c) Golgi tendon organs
- (d) Pacinian corpuscles
- (e) Ruffinis corpuscles

34. Which one of the following is more descriptive of rods than of cones?

- (a) Not located within the fovea
- (b) Provide information about the colour of an object
- (c) Recover their sensitivity more rapidly after exposure to bright light
- (d) Responsible for the high visual acuity of the visual system
- (e) Organized into on-center, off-surround receptor fields

35. Which one of the following statements about the optical properties of a myopic eye is correct?

- (a) A converging lens can be used to correct the optical defect
- (b) The image of a distant object is formed in front of the retina
- (c) The power of accommodation for near vision is greater than normal
- (d) The refractive power of the lens is less than normal
- (e) The far point is greater than normal

36. Which one of the following statements best describes cold receptors?

- (a) Cold receptors produce a sensation of warmth when their firing frequency is very low
- (b) Sudden decreases in temperature always increase the firing frequency of cold receptors
- (c) Cold receptors are tonic receptors that slowly increase their firing rate when the temperature is decreased
- (d) Cold receptors do not fire at skin temperatures above body temperature
- (e) Cold receptors produce a sensation of pain when their firing frequency is very high

37. Which one of the following statements about pain sensation is correct?

- (a) Painful sensations can be elicited by any sensory neuron if its firing frequency is high enough

- (b) Painful sensation arising from a particular area of the skin occur only when pain fibers from that area of the skin are stimulated
- (c) Cutting the anterolateral tract or both sides of the spinal cord will permanently eliminate painful sensations arising from skin region innervated by sensory neurons located below the site of the lesion
- (d) Pain fibers conduct impulses to the spinal cord and to skin regions surrounding the site of a painful stimulus
- (e) All the above are correct

38. Which one of the following sensory systems uses unmyelinated fibers to convey information to the central nervous system (CNS)?

- (a) Proprioception
- (b) Vision
- (c) Vibration
- (d) Temperature
- (e) Pressure

39. Which characteristic of a sensory stimulus is encoded better by phasic receptors than by tonic receptors?

- (a) How strong the stimulus is
- (b) The type of energy producing the stimulus
- (c) How rapidly the stimulus is applied
- (d) The duration of the stimulus
- (e) Where the stimulus is located

40. Which one of the following stimuli normally activates a receptor that is located on the free ending of a sensory neuron?

- (a) Taste
- (b) Gravity
- (c) Light
- (d) Sound
- (e) Smell

SECTION B

In questions 41 – 120 each consists of a stem and four statements. Write 'T' or 'F' if the statement is true/false respectively against the letter a, b, c, d, corresponding to the statement. Each question carries 2 marks. ¼ mark will be deducted for incorrect judgment.

41. Typical effects of ageing on the special senses include gradual loss of:
- (a) Near vision
 - (b) Olfaction sensitivity
 - (c) Hearing affecting bone and air conduction similarly
 - (d) Hearing affecting high and low frequencies similarly
42. Aqueous humour:
- (a) Is produced by diffusion and active transport in the ciliary bodies
 - (b) Pressure is close to mean arterial pressure
 - (c) Is absorbed into veins at the junction of iris and the cornea
 - (d) Is more easily absorbed when the pupil is widely dilated
43. The hair cells in the semicircular canals are stimulated by:
- (a) Movement of the perilymph
 - (b) Linear acceleration
 - (c) Gravity
 - (d) Movement of endolymph relative to hair cells
44. The tympanic membrane:
- (a) Modifies the frequencies of sound waves impinging on the ear
 - (b) Stops vibrating almost immediately after the sound stops
 - (c) Transmits sound more effectively when the small muscles of the middle ear are contracted
 - (d) Transmits sound more than 80% less efficiently when the membrane is perforated
45. The basilar membrane:

- (a) Is broader at the base of the cochlea than at the apex
- (b) Vibrations stimulate receptors to generate impulses at the frequencies of the applied sounds
- (c) In the apical region vibrates only to incoming sounds of low frequency
- (d) Can be made to vibrate by pressure waves traveling through skull bone

46. Poor balance is more likely when there is:

- (a) Semicircular canal rather than cochlear damage
- (b) Spinothalamic tract rather than posterior column damage
- (c) Dim rather than bright light
- (d) Recent rather than long-standing destruction of one labyrinth

47. In long sightedness:

- (a) Objects at infinity cannot be focused sharply on the retina
- (b) Objects at the usual near-point are focused behind the retina
- (c) Ciliary muscle contracts more strongly to bring objects in mid-visual range into clear focus
- (d) The near-point can be brought closer to the eye by the use of a biconcave lens

48. Interruption of the visual pathway in the:

- (a) Left optic tract causes blindness in the right visual field
- (b) Optic chiasma causes blindness in the nasal half of each visual field
- (c) Left optic radiation causes loss of vision to the right
- (d) Occipital cortex causes loss of the light reflex

49. The cerebellum receives its information concerning muscle movement from the:

- (a) Cortex
- (b) Muscle spindles

- (c) Golgi tendon apparatus
- (d) Medulla

50. In the middle ear:

- (a) Destruction of the auditory ossicles abolishes hearing
- (b) Paralysis of the auditory muscles makes sounds more faint
- (c) Immobilization of the stapes causes greater deafness than removal of the ossicles
- (d) Air pressure is normally atmospheric pressure

51. In cerebral cortex:

- (a) Stellate cells are plentiful in the primary sensory cortex
- (b) The grey matter contains normally 8 layers
- (c) Over 90% of corticospinal fibers are myelinated
- (d) Stellate cells are plentiful in the primary visual cortex

52. Sensory disturbance consisting of:

- (a) Pain, sensory loss and paraesthesiae in one leg suggests a spinal cord lesion
- (b) Loss of pain, temperature but not touch sensation suggests a lesion in the thalamus
- (c) Loss of all sensations in the skin region suggests a peripheral nerve or posterior root lesion
- (d) Loss of two-point discrimination but not touch sensation suggests a lesion in the thalamus

53. Posterior damage in the spinal cord may impair:

- (a) The ability to stand steadily with the eyes closed
- (b) Touch sensation
- (c) The flexor plantar response to stimulation of the sole
- (d) Vibration sense

54. Lower motor neuron disease:

- (a) Causes loss of voluntary movements but not of reflex movements
- (b) Causes eventual wasting of muscles concerned

- (c) Does not affect ventilation of the lungs
- (d) Is associated with involuntary twitching of small fasciculi in the affected muscles

55. The ankle jerk reflex is exaggerated:

- (a) When the muscles are voluntarily contracted
- (b) Immediately after complete spinal cord transection at the cervical level
- (c) In extrapyramidal system disorders such as Parkinsonism
- (d) When cerebellar function is lost

56. In the upper motor neurone lesion affecting one side of the body, the following abnormalities occur in the affected limb:

- (a) Wasting of muscles
- (b) Increased response to phasic stretch reflex
- (c) Greater weakness in the flexor muscles of the affected arm than extensors
- (d) Increased firing in the type of afferent fibres from the muscle

57. The lateral lobe of cerebellum (neocerebellum):

- (a) Integrates the vestibule – cerebello – spinal reflexes
- (b) Receives inflow from the cerebropontine fibres
- (c) Primarily integrates proprioceptive information from joints and ligaments received from the dorsal spino-cerebellar tract
- (d) Controls rapidly alternating voluntary movement

58. These areas of cerebral cortex are involved in the following functions:

- (a) The precentral gyrus of the frontal lobe and motor activity
- (b) The temporal lobe and the perception of light touch
- (c) The occipital lobe and visual field of the opposite side
- (d) The parietal lobe and the perception of speech

59. In the descending tracts in the spinal cord:

- (a) The lateral corticospinal tract extends laterally to the surface of the spinal cord
- (b) The vestibulospinal tract is a major crossed tract from the opposite vestibular nuclei

- (c) The vestibulospinal tract predominantly inhibits extensor motorneurons
- (d) Reticulospinal fibres are scattered throughout the anterior white columns

60. The ascending tracts in the spinal cord:

- (a) The fasciculus gracilis and cuneatus contain fibres that mediate tactile discrimination
- (b) The lateral spinothalamic tract carries vibration and pressure modalities
- (c) The spinocerebellar tracts convey impulses from Golgi tendon organs
- (d) All afferent fibres cross the midline at some stage in the spinal cord

61. The thalamus:

- (a) Acts as an important sensory relay station
- (b) Is very important for awareness and cognition
- (c) Has each half of the body represented topographically
- (d) After infarcting can have spontaneous excessive pain

62. Sensory nerves terminating in the grey matter of the spinal cord:

- (a) Elicit reflex responses
- (b) Enter the cord through the sensory roots
- (c) Enter the cord through the corticospinal tracts
- (d) Have facilitatory functions

63. The primary sensory endings of a muscle spindle in a voluntary muscle is stimulated by:

- (a) Shortening of an antagonist muscle
- (b) Relaxation of the muscle when under load
- (c) Shortening of the extrafusal fibers of the muscle
- (d) Stimulation of the gamma efferents to the muscle spindle

64. In which of the following tracts in the spinal cord do second-order sensory neurons with cell bodies in the dorsal horn ascend to more rostral spinal segments or to the brain?
- (a) Ventral corticospinal tract
 - (b) Lateral spinothalamic tract
 - (c) Anterior vestibulospinal tract
 - (d) Ventral spinothalamic tract
65. Regarding the reticular formation and limbic system:
- (a) The reticular formation is a loose collecting of neurons and fibres extending through the brain stem
 - (b) The only proven functions of the reticular formation are associated with wakefulness arousal, and posture control
 - (c) The hypothalamus is the main outlet for limbic system
 - (d) The amygdaloid nucleus is mainly concerned with memory
66. Blockage of parasympathetic activity causes a reduction in:
- (a) Sweat production
 - (b) Resting heart rate
 - (c) The stretch of skeletal muscle contraction
 - (d) Intestinal motility
67. Pain receptors in the gut and urinary tract may be stimulated by:
- (a) Distension
 - (b) Inflammation of the wall
 - (c) Acid fluid
 - (d) Vigorous rhythmic contractions behind an obstruction
68. Hearing loss is best diagnosed as either conductive or sensorineural by:

- (a) Examination of the tympanic membrane with an otoscope
- (b) Testing vestibular function
- (c) Comparing air and bone conduction thresholds
- (d) Looking for a low frequency hearing loss

69. General sensory pathways:

- (a) The anterior spinothalamic tracts transmit pain and crude touch
- (b) The pain receptors are free nerve endings
- (c) Information from the muscle spindle and golgi tendon organ does not reach consciousness
- (d) Both the spinothalamic and dorsal column pathways are highly discrete

70. The pyramidal system:

- (a) Destruction causes weakness and clumsiness
- (b) Has fibres which originate from the pre-motor area
- (c) Is also concerned with gross movements
- (d) Controls posture

71. A typical result of severe damage to the visual pathway at the level of the:

- (a) Left optic tract is an inability to see objects in the right half of the normal visual field
- (b) Optic chiasma by a pituitary tumour is an inability to see objects in the nasal field
- (c) Optic radiation is loss of the visual field on the opposite side to the damage
- (d) Occipital cortex is loss of foveal vision with preservation of peripheral vision

72. The cerebro-spinal fluid:

- (a) Is formed by selective secretion by the cells of the choroid plexus
- (b) Acts as a supporting medium for the brain and spinal cord
- (c) Has a pressure higher than that of the blood in the superior sagittal sinus

- (d) Is defined as an extracellular fluid

73. Volume and composition of cerebro-spinal fluid (CSF):

- (a) About half of the CSF is in the ventricles at any one time
- (b) CSF has similar composition to plasma except for protein
- (c) CSF protein levels are about half that in plasma
- (d) CSF glucose falls dramatically in tuberculous meningitis

74. In reflex actions:

- (a) The interval between the stimulus and the final effect is chiefly determined by the length of the afferent and efferent nerves
- (b) Spatial summation refers to simultaneous threshold stimulation of two or more nearby afferent nerves
- (c) Synapses are the first part of a reflex to become fatigued
- (d) Flexor reflexes are probably the most primitive of all reflexes

75. In the transmission of painful stimuli:

- (a) Pain receptors are polymodal in nature
- (b) Sharp, rapid, intense pain is carried by heavily myelinated fibres
- (c) Unmyelinated C fibres only carry slow, dull, diffuse, aching pain (d) Some pain fibres remain uncrossed in the spinal cord

76. Thermoperception:

- (a) The end organs of Krause and Ruffini subserve cold and heat
- (b) Thermoreceptors that respond to cold (cold spots) are more plentiful than those that respond to heat (hot spots)
- (c) Maximal discharge from 'hot spots' is between 40 and 45°C
- (d) Cold spots show a rapid discharge when the temperature exceeds 45°C

77. Regarding the reticular formation (RF) and the limbic system:
- (a) The only proven functions of the RF are associated with wakefulness, arousal and posture control
 - (b) The hypothalamus is the main outlet for the limbic system
 - (c) The amygdaloid nucleus is mainly concerned with memory
 - (d) The hippocampus is important in behavioral disorders
78. In the cerebral cortex:
- (a) The grey matter is normally about 1 cm thick
 - (b) Granule (stellate) cells are plentiful in the primary sensory cortex
 - (c) An understanding of concepts is predominantly a function of the right hemisphere
 - (d) Over 90% of corticospinal fibres are myelinated
79. Damage to the cerebral cortex may cause loss of:
- (a) Pain sensations on the opposite side of the body
 - (b) Skilled movements in the absence of paralysis
 - (c) Ability to identify an object by its tactile characteristics
 - (d) Vision in one eye only
80. Long-term consequences of transaction of the spinal cord in the lower cervical region include:
- (a) Inability to erect the penis and ejaculate semen
 - (b) Inability to regulate sympathetic tone in leg blood vessels in response to baroreceptor stimulation
 - (c) Paralysis of bladder muscle
 - (d) Loss of thermoregulatory sweat production in the legs

81. This question is concerned with the major tracts that originate in particular areas of the brain and that descend the spinal cord to determine motor output:
- (a) The axons of the majority of pyramidal tract neurons synapse directly with spinal motoneurons
 - (b) Complete section of the pyramids in the medulla results in a permanent loss of precision in the performance of motor tasks
 - (c) The vestibulospinal tract to the lumbar spinal cord controls extensor rather than flexor motoneurone output
 - (d) Most tectospinal tract neurons control motoneurons that are used to achieve orientation of the head on the body
82. These statements concern peripheral and central factors that determine the appreciation and intensity of pain:
- (a) Nerve section leads to a permanent loss of pain sensation
 - (b) Referred pain is the term given to the painful sensation that are felt in a peripheral structure, such as arm, but which are associated with trauma to the deep viscera such as the heart
 - (c) The groups of naturally occurring peptides known as endorphins and enkephalins influence pain transmission in the CNS
 - (d) Lesions to the thalamus can produce raised threshold for pain
83. What are the results of unilateral damage to the cerebellum in man?
- (a) Disturbances of posture and disorganization of voluntary movement
 - (b) Hemiplegia on the same side
 - (c) Hemiplegia on the opposite side
 - (d) Loss of sense of position on the same side of the body causing uncoordinated movements if the eyes are shut
84. Transaction of the brain stem immediately below the superior colliculus results in:
- (a) Stimulation of the gamma activating system of the muscle spindles
 - (b) Decrease in muscle tone
 - (c) Diminished postural reflexes
 - (d) Loss of most of the functions of the reticular system

85. In the spinal cord:

- (a) Pain impulse traffic may be modulated in the posterior horn
- (b) Gamma-aminobutyric acid may act as an excitatory neurotransmitter
- (c) Reflex centers are normally inhibited by descending impulses from supraspinal centers
- (d) Postsynaptic excitation may be mediated by amino acid derivatives acting as neurotransmitters

86. Primary neurons serving conscious muscle proprioception:

- (a) Conduct impulses at a similar rate to somatic motor neurons
- (b) Have their bodies in the ipsilateral posterior horn of the spinal cord
- (c) Synapse with secondary neurons whose axons project (dorsal) columns of the spinal cord
- (d) Synapse with neurons which cross the midline of the body in the brain stem

87. The autonomic nervous system:

- (a) Has preganglionic fibres which functions exclusively by means of acetylcholine
- (b) Has post-ganglionic fibres in both parasympathetic and sympathetic divisions
- (c) Is not characterized by EPSP and IPSP membrane changes (d) Is not organized on the basis of the reflex arc

88. In descending tracts in the spinal cord:

- (a) Reticulospinal fibres modulate voluntary movements and mediate control of unconscious movement
- (b) The vestibulospinal tract predominantly inhibits extensor motoneurons
- (c) Vestibulospinal tracts mediate control of conscious movement
- (d) The vestibulospinal tract is uncrossed it synapses on ipsilateral motoneurons

89. Concerning neural conduction:

- (a) Nodes of Ranvier are found only in myelinated nerves
- (b) In demyelinated conditions conduction rates are often increased
- (c) Compound action potentials increase as the stimulus is increased
- (d) Nodes of Ranvier contain a very large concentration of K^+ channels

90. As part of the visual pathways:

- (a) Frontal eye fields control ipsilateral eye movement
- (b) A complete visual field is represented in each lateral geniculate body
- (c) The fovea projects mainly into the contralateral optic tract
- (d) Only the central parts of the retina are topographically aligned in the primary visual area

91. In the perception of light:

- (a) In humans, all photopigments contain carotinoids derived exclusively from the food
- (b) Night blindness is one of the earliest signs of vitamin A deficiency
- (c) The rods react maximally at the yellow/red end of spectrum
- (d) Cones have a lower threshold to light than rods

92. Regarding sound energy:

- (a) Humans can hear over a range of 70 – 2000 Hz
- (b) The bel scale is logarithmic usually expressed in decibels (dBs)
- (c) Absolute lack of sound corresponds with an intensity of zero decibels
- (d) Pitch reflects the pressure attained with each sound wave cycle

93. Regarding vestibular function:

- (a) The semicircular canals respond to all rotational positions of the head
- (b) Nystagmus is usually labeled in the direction of slow phase
- (c) Small changes in the volume of the endolymph cause an illusion of movement which is unrelated to the actual body/head position

- (d) Optokinetic nystagmus is typified by a slow involuntary oscillatory eye movement with a fast return

94. Visual acuity is greatest in:

- (a) An area that contains mostly rods
- (b) The fovea centralis
- (c) The lateral edges of the retina
- (d) Dark lighting conditions

95. Pain receptors are:

- (a) Free nerve endings
- (b) Widespread in superficial layers of the skin
- (c) Widespread in arterial walls
- (d) Encapsulated receptors

96. Impairment of the sense of smell:

- (a) May be confined to certain odours only
- (b) Is likely after thalamic damage
- (c) Can be caused by inflammation of the nasal mucosa
- (d) Is a recognized effect of temporal lobe tumour

97. Squinting (strabismus) may result from:

- (a) A refractive error in childhood
- (b) Central suppression of vision in one eye in childhood
- (c) Damage to the cerebellum
- (d) Damage to the internal capsule

98. In the visual field of the left eye, an object:

- (a) At the center of the field of vision is detected in the optic disc
- (b) In the nasal half is more likely to be perceived in binocular vision than one in the temporal half
- (c) In the temporal half generates impulses which travel in the left optic tract
- (d) Focused on the blind spot is in the nasal half of the visual field

99. Cortical speech centers:
- (a) Wernicke's and Broca's areas are situated in same gyrus
 - (b) Both sides of the brain are needed for sensible fluent speech
 - (c) Destruction of Wernicke's area (sensory aphasia) impairs comprehension of written language
 - (d) Destruction of Broca's area causes complete loss of speech while comprehension is retained
100. Smell and taste are similar in that:
- (a) The primary sensory areas for both are in the neocortex
 - (b) The receptors for both are chemoreceptors
 - (c) The receptors for both are teleceptors
 - (d) Both play an important role in determining the flavor of food
101. Neurons in the taste pathway have cell bodies in:
- (a) Ganglia on cranial nerves
 - (b) The medial geniculate body
 - (c) The nucleus of the tractus solitaries
 - (d) The inferior colliculus
102. The functions of the limbic system include:
- (a) Regulation of sexual behavior in the males
 - (b) Expression of fear
 - (c) Olfaction
 - (d) Temperature regulation
103. The thalamus:
- (a) Acts as an important sensory relay station
 - (b) Has each half of the body represented topographically
 - (c) After infarcting can have spontaneous excessive pain
 - (d) Is important for cognition and awareness
104. In unilateral vestibular disease typical features include:

- (a) The sensation that the external world is revolving
- (b) A tendency to stagger when walking
- (c) A tendency to fall in the dark
- (d) Nausea and vomiting

105. Special sensory tract termination:

- (a) The visual tracts in the occipital cortex
- (b) The auditory in the superior temporal gyrus
- (c) The taste in the postcentral gyrus
- (d) The smell, some in the limbic cortex

106. Difficulty in maintaining normal balance is more likely:

- (a) When there is semicircular canal damage than when there is cochlear damage
- (b) When there is inadequate circulation through the basilar rather than through the carotid arteries
- (c) When vision is impaired, in the case of a patient with impaired proprioception
- (d) Within days rather than within weeks of the surgical removal of one labyrinth

107. The brain areas activated by visual stimuli include:

- (a) The visual cortex (area 17)
- (b) The inferior temporal cortex
- (c) The superior colliculus
- (d) The amygdale

108. The primary sensory ending of a muscle spindle in a voluntary muscle is stimulated by:

- (a) Shortening of an antagonist muscle
- (b) Relaxation of the muscle when under load
- (c) Stimulation of the gamma efferent fibres to the spindle
- (d) Shortening of the extrafusal fibres

109. Astrocytes:

- (a) Are important in supplying glucose needs of nearby neurons
- (b) Are believed to secrete K^+ into the ECF of the brain
- (c) Provide directional cues for growing nerve fibres
- (d) Are necessary for the uptake and recycling of neurotransmitters (NTs)

110. The Cerebro-Spinal Fluid (CSF):

- (a) Helps maintain a constant intracranial volume
- (b) Removes waste products of cerebral metabolism
- (c) Has a nutritive role for the brain
- (d) Forms an hydraulic cushion, almost halving the virtual weight of the brain

111. In the functioning of sensory nerve endings:

- (a) There is an overlap between the specific receptors for different modalities (pain, temperature, touch, vibration and pressure)
- (b) Free nerve endings are found innervating individual cells
- (c) Free nerve endings are only found in the skin and surface epithelium
- (d) Meissner's corpuscles are embedded in onion-like layers of connective tissue found in dermal papillae

112. Papillary reflexes and reactions:

- (a) A lesion involving the mid-brain decussation of optic fibres can cause bilateral loss of eight reflexes with retention of the near reflex, lid reflex, and psychosensory reactions
- (b) A lesion of the ciliary ganglion can cause an ipsilateral Argyll Robertson pupil
- (c) The stimulus to accommodation is a illumination of the actual image
- (d) Papillary dilation due to non-ocular sensory stimuli is solely from stimulation of sympathetic fibres to the pupil

113. The cerebellum:

- (a) Modifies the discharge of spinal motor neurons

- (b) Is essential for finely coordinated movements
- (c) Has an afferent input from the motor cortex
- (d) Has an afferent input from muscle proprioceptors

114. Which is the effect of damage to the motor area of the cerebral cortex?

- (a) There is paralysis of voluntary movements on the opposite side of the body
- (b) All movements are in-coordinated but there is no paralysis
- (c) There is paralysis of voluntary movements on the same side of the body
- (d) Limbs on the opposite side are rigid but not paralysed

115. Skeletal muscle tone is:

- (a) The resistance of a muscle to passive stretch
- (b) Diminished after loss of function in posterior pituitary
- (c) Increased by increasing the gamma efferent discharge to the muscle spindles
- (d) Is a form of contraction

116. In the vestibular apparatus:

- (a) The fluid in the vestibular apparatus is separate from that in the scala media
- (b) Small collections of calcium carbonate crystals are found in the cupola of the semicircular canals
- (c) Linear acceleration is sensed by the semicircular canals
- (d) A nodding movement of the head is detected by semicircular canals

117. Impairment of vision in:

- (a) Albinism can be related to a lack of melanin, e.g. in the iris and the pigment layer of the retina
- (b) Melanism can lead to blindness due to excess melanin in the pigment layer
- (c) Solar retinopathy occurs mostly in the peripheral fields of vision
- (d) Retinal detachment occurs as the pigment layer and the rest of the retina separate

118. Abnormal colour vision is 20 times more common in men than women because it is caused by an abnormal:

- (a) Dominant gene on the X chromosome
- (b) Dominant gene on the Y chromosome
- (c) Recessive gene on the X chromosome
- (d) Recessive gene on the Y chromosome

119. Otoliths are mainly involved in sensing:

- (a) Sound amplitude and frequency
- (b) Angular velocity and acceleration
- (c) Linear velocity
- (d) Linear acceleration

120. Tractus rubrospinalis and tractus reticulospinalis lateralis:

- (a) Inhibits contraction of the flexor muscles
- (b) Inhibits function of alpha and gamma-motoneurons of the extensor muscles
- (c) Stimulates contractions of the flexor muscles
- (d) Stimulates contraction of the extensor muscles

LANGE QUESTIONS AND ANSWERS IN CLINICAL NEURAL SCIENCE PART 1

In the following questions, select the single best answer.

1. The basic neuronal signalling unit is

- A. the equilibrium potential
- B. the action potential
- C. the resting potential
- D. the super normal period

2. In a motor neuron at rest, an excitatory synapse produces an EPSP of 15mV, and an inhibitory synapse produces an IPSP of 5mV. If both the EPSP and IPSP occur simultaneously, then the motor neuron would

- A. depolarize by about 10mV
- B. depolarize by 20mV
- C. depolarize by more than 20mV
- D. change its potential by less than 1mV

3. The equilibrium potential for K⁺ in neuron is ordinarily nearest

- A. the equilibrium potential for Na⁺
- B. resting potential
- C. reversal potential for the EPSP
- D. the peak of the action potential

4. Generation of the action potential

- A. depends on depolarization caused by the opening of K channels
- B. depends on hyperpolarization caused by the opening of K channels
- C. depends on depolarization caused by the opening of Na channels
- D. depends on hyperpolarization caused by the opening of Na channels
- E. depends on second messengers

5. The cerebrum consists of the

- A. thalamus and basal ganglia
- B. telencephalon and mid brain

C. telencephalon and diencephalon

D. brainstem and prosencephalon

E. cerebellum and prosencephalon

6. The somatic nervous system innervates the

A. blood vessels of the skin

B. blood vessels of the brain

C. muscles of the heart

D. muscles of the body wall

E. muscles of the viscera

7. The peripheral nervous system

A. includes the spinal cord

B. is sheathed in fluid-filled spaces enclosed by membranes

C. includes cranial nerves

D. does not include spinal nerves

E. is surrounded by bone

8. ATP provides an essential energy source in the CNS for

A. division of neurons

B. maintenance of ionic gradients via ATPase

C. generation of action potentials

D. EPSPs and IPSPs

9. Myelin is produced by

A. oligodendrocytes in the CNS and Schwann cells in the PNS

B. Schwann cells in the CNS and oligodendrocytes in the PNS

C. oligodendrocytes in both CNS and PNS

D. Schwann cells in both CNS and PNS

TRUE OR FALSE

10. A spinal motor neuron in an adult-

A. Maintains its membrane potential via the active transport of sodium and potassium ions

B. Synthesizes protein only in the cell body and not in the axon

C. Does not synthesize DNA for mitosis

D. Does not regenerate its axon following section of its peripheral portion

11. The myelin sheath is-

A. Produced within the CNS by oligodendrocytes

B. Produced within the peripheral nervous system by Schwann cells

C. Interrupted periodically by the nodes of Ranvier

D. Composed of spirally wrapped plasma membrane

12. Astrocytes-

- A. May function to buffer extracellular K
- B. Are interconnected by gap junctions
- C. Can proliferate to form a scar after an injury
- D. Migrate to the CNS from bone marrow

13. The cell body of most neurons-

- A. Cannot divide in the adult
- B. Is the main site of protein synthesis in the neuron?
- C. Is the site of the cell nucleus
- D. contains synaptic vesicles

14. Most synaptic terminals of axons that form chemical synapses in the CNS contain-

- A. Synaptic vesicles
- B. Presynaptic densities
- C. Neurotransmitter (s)
- D. Rough endoplasmic reticulum

15. Na.K-ATPase-

- A. Utilizes ATP
- B. Acts as anion pump
- C. Maintains the gradients of Na and K ions across neuronal membranes
- D. Consumes more than 25% of cerebral energy production

16. In axoplasmic transport-

- A. Some macromolecules move away from the cell body at rates of several centimetres per day
- B. Mitochondria move along the axon
- C. Microtubules seem to be involved
- D. Some types of molecules move toward the cell body at rates of up to 300 mm per day

17. The brain stem includes-

- A. The mid brain (mesencephalon)
- B. Pons
- C. Medulla oblongata
- D. Telencephalon

18. A ganglion is defined as a-

- A. Part of the basal ganglia
- B. Group of nerve cell bodies within the hypothalamus
- C. Layer of similar cells in the cerebral cortex
- D. Group of nerve cell bodies outside the neuraxis

19. Neurotransmitters found in the brain stem include-

- A. Acetylcholine

- B. Norepinephrine
- C. Dopamine
- D. Serotonin

20. The cell layer around the central canal of the spinal cord-

- A. Is called the ventricular zone
- B. Is the same as the pia?
- C. Encloses cerebrospinal fluid
- D. Is called the marginal zone

21. Norepinephrine is found in the-

- A. Sympathetic nervous trunk
- B. Locus ceruleus
- C. Lateral tegmentum of the mid brain
- D. Neuromuscular junction

22. Glutamate-

- A. Is the transmitter at the neuromuscular junction?
- B. May be involved in excitotoxicity
- C. Is a major inhibitory transmitter in the CNS
- D. Is a major excitatory transmitter in the CNS

23. Decussations are-

- A. Aggregates of tracts
- B. Fiber bundles in a spinal nerve
- C. Horizontal connections crossing within the CNS from the dominant to nondominant side
- D. Vertical connections crossing within the CNS from left to right or vice versa

24. Inhibitory transmitters in the CNS include-

- A. Glutamate (presynaptic inhibition)
- B. GABA (presynaptic inhibition)
- C. Glutamate (postsynaptic inhibition)
- D. GABA (postsynaptic inhibition)

25. The neurotransmitter dopamine-

- A. Is produced by neurons that project from the substantia nigra to the caudate and putamen
- B. Mediates transmission at the neuromuscular junction
- C. Is depleted in Parkinson's disease
- D. Is the major excitatory transmitter in the CNS

PART 2

In the following questions, select the single best answer.

1. The lateral column of the spinal cord contains the

- A. lateral corticospinal tract
- B. direct corticospinal tract
- C. Lissauer's tract
- D. gracile tract

2. A sign of an upper-motor-neuron lesion in the spinal cord is

- A. severe muscle atrophy
- B. hyperactive deep tendon reflexes
- C. flaccid paralysis
- D. absence of pathologic reflexes
- E. absence of withdrawal responses

3. The following fiber systems in the spinal cord are ascending tracts except for the A. cuneate tract

- B. ventral spinocerebellar tract
- C. spinothalamic tract
- D. spinoreticular tract
- E. reticulospinal tract

4. Axons in the spinothalamic tracts decussate

- A. in the medullary decussation
- B. in the medullary lemniscus
- C. within the spinal cord, five to six segments above the level where they enter
- D. within the spinal cord, within one to two segments of the level where they enter
- E. in the medial lemniscus

5. The spinal subarachnoid space normally

- A. lies between the pachymeninx and the arachnoid
- B. lies between the pia and the arachnoid
- C. ends at the cauda equina
- D. communicates with the peritoneal space
- E. is adjacent to the vertebrae

6. The subclavian artery gives rise directly to the

- A. lumbar radicular artery
- B. great ventral radicular artery
- C. anterior spinal artery

D. vertebral artery

7. The dorsal nucleus (of Clarke) in the spinal cord

- A. receives contralateral input from dorsal root ganglia
- B. terminates at the L2 segment
- C. terminates in the midbrain
- D. terminates in the ipsilateral cerebellum
- E. receives fibers from the external cuneate nucleus

8. A patient complains of unsteadiness. Examination shows a marked diminution of position sense, vibration sense, and stereo gnosis of all extremities. He is unable to stand without wavering for more than a few seconds when his eyes are closed. There are no other abnormal findings. The lesion most likely involves the

- A. lateral columns of the spinal cord, bilaterally
- B. inferior cerebellar peduncles, bilaterally
- C. dorsal columns of the spinal cord, bilaterally
- D. spinothalamic tracts, bilaterally
- E. corticospinal tracts

TRUE OR FALSE

9. Fine-diameter dorsal root axons of L5 on one side terminate in the-

- A. Marginal layer of the ipsilateral dorsal horn
- B. Ipsilateral substantia gelatinosa
- C. Ipsilateral lamina V of the dorsal horn
- D. Ipsilateral dorsal nucleus (of Clarke)

10. Axons in the spinothalamic tract-

- A. Carry information about pain and temperature (lateral spinothalamic tract) and light touch (anterior spinothalamic tract)
- B. Carry information about pain (lateral spinothalamic tract) and temperature (anterior spinothalamic tract)
- C. Decussate within the spinal cord, within one or two segments of their origin
- D. Synapse in the gracile and cuneate nuclei

11. The dorsal spinocerebellar tract-

- A. Arises in the dorsal nucleus of Clarke and, above C8, in the accessory cuneate nucleus
- B. carries information arising in the muscle spindles, Golgi tendon organs, touch and pressure receptors
- C. Ascends to terminate in the cerebellar cortex
- D. Projects without synapses to the basal ganglia and cerebellum

12. Second-order neurons in the dorsal column system-

- A. Convey information about pain and temperature
- B. Cross within the lemniscal decussation

- C. Cross within the pyramidal decussation
- D. Convey well-localized sensations of fine touch, vibration, two-point discrimination, and proprioception

13. The following rules about dermatomes are correct-

- A. The C4 and T2 dermatomes are contiguous over the anterior trunk
- B. The nipple is at the level of C8
- C. The thumb, middle finger, and 5th digit are within the C6, C7, and C8 dermatomes, respectively
- D. The umbilicus is at the level of L2

14. Signs of upper-motor-neuron lesions include-

- A. Babinski's sign
- B. Hypoactive deep tendon reflexes and hyporeflexia
- C. Spastic paralysis
- D. Severe muscle atrophy

15. A-delta and C peripheral afferent fibers-

- A. Terminate in laminae I and II of the dorsal horn
- B. Convey the sensation of pain
- C. Terminate in lamina V of the dorsal horn
- D. Convey the sensation of light touch

16. The following are correct-

- A. The diaphragm is innervated via the C3 and C4 roots
- B. The deltoid and triceps are innervated via the C5 root
- C. The biceps are innervated via the C5 root
- D. The gastrocnemius is innervated via the L4 root

17. The long-term consequences of a left Hemisection of the spinal cord at mid thoracic level would include-

- A. Loss of voluntary movement of the left leg
- B. Loss of pain and temperature sensation in the right leg
- C. Diminished position and vibration sense in the left leg
- D. Diminished deep tendon reflexes in the left leg

18. The spinal nerve roots-

- A. Exit below the corresponding vertebral bodies in the cervical spine
- B. Exit above the corresponding vertebral bodies in the cervical spine
- C. Exit above the corresponding vertebral bodies in the lower spine
- D. Exit below the corresponding vertebral bodies in the lower spine

19. Gamma-efferent motor neurons-

- A. are located in the intermediate lateral cell column of the spinal cord
- B. Cause contraction of intrafusal muscle fibers
- C. Provide vasomotor control to blood vessels in muscles
- D. Are modulated by axons in the vestibular spinal tract

20. The dorsal column system of one side of the spinal cord-

- A. is essential for normal two-point discrimination on that side
- B. Arises from both dorsal root ganglion cells and dorsal horn neurons
- C. Synapses on neurons of the ipsilateral gracile and cuneate nuclei
- D. consists primarily of large, myelinated, rapidly conducting axons

21. Large-diameter dorsal root axons of one side of L5 terminate in the-

- A. Marginal layer of the ipsilateral dorsal horn
- B. Ipsilateral gracile nucleus
- C. Ipsilateral cuneate nucleus
- D. Ipsilateral dorsal nucleus (of Clarke)

22. The fibers carrying information from the spinal cord to the cerebellum-

- A. Can arise from Clarke's column cells (dorsal nucleus)
- B. Represent the contralateral body half in the dorsal spinocerebellar tract
- C. Can arise from cells of the external cuneate nucleus
- D. Are important elements in the conscious sensation of joint position

23. The intermediolateral gray column-

- A. contains preganglionic neurons for the autonomic nervous system
- B. is prominent in the thoracic region
- C. is prominent in upper lumbar regions
- D. is prominent in cervical regions

24. In adults-

- A. There is very little myelin in the spinal cord
- B. The dorsal columns and lateral columns are heavily myelinated
- C. The spinal cord terminates at the level of the S5 vertebrae
- D. The spinal cord terminates at the level of the L1 or L2 vertebra

25. In humans, the spinothalamic tract-

- A. Carries information from the ipsilateral side of the body
- B. Exhibits topographic organization
- C. Arises principally from neurons of the same side of the cord
- D. Mediates information about pain and temperature

PART 3

In the following questions, select the single best answer.

1. Examination of a patient revealed a drooping left eye lid, together with weakness of adduction and elevation of the left eye, loss of the pupillary light reflex in the left eye, and weakness of the limbs and lower facial muscles on the right side. A single lesion most likely to produce all these signs would be located in the

- A. medial region of the left pontomedullary junction
- B. basomedial region of the left cerebral peduncle
- C. superior region of the left mesencephalon

D. dorsolateral region of the medulla on the left side

E. periaqueductal gray matter on the left side

2. A neurologic syndrome is characterized by loss of pain and thermo sensitivity on the left side of the face and on the right side of the body from the neck down; partial paralysis of the soft palate, larynx, and pharynx on the left side; ataxia on the left side; and hiccupping. This syndrome could be expected from infarction in the territory of the A. basilar artery

B. right posterior inferior cerebellar artery

C. **left posterior inferior cerebellar artery**

D. right superior cerebellar artery

E. left superior cerebellar artery

3. Hemiplegia and sensory deficit on the right side of the body may be caused by infarction in the territory of the A. left middle cerebral artery

B. right anterior cerebral artery

C. left posterior cerebral artery

D. left superior cerebellar artery

E. anterior communicating artery

4. If the oculomotor nerve (III) is sectioned, each of the following may result except for

A. partial ptosis

B. abduction of the eye ball

C. dilation of the pupil

D. **impairment of lacrimal secretion**

E. paralysis of the ciliary muscle

5. Structures in the ventromedial regions of the medulla receive their blood supply from the

A. posterior spinal and superior cerebellar arteries

B. **vertebral and anterior spinal arteries**

C. posterior spinal and posterior cerebral arteries

D. posterior spinal and posterior inferior cerebellar arteries

E. posterior and anterior inferior cerebellar arteries

6. The efferent axons of the cerebellar cortex arise from

A. Golgi cells

B. vestigial nucleus cells

C. granule cells

D. **Purkinje cells**

E. pyramidal cells

7. A lesion in the nucleus of cranial nerve IV would produce a deficit in the

- A. upward gaze of the ipsilateral eye
- B. upward gaze of the contralateral eye
- C. downward gaze of the contralateral eye
- D. downward gaze of the ipsilateral eye

8. Sensory input for taste is carried by

- A. the vestibulocochlear (VIII) nerve
- B. the facial (VII) nerve for the entire tongue
- C. the facial (VII) and glossopharyngeal (IX) nerves for the anterior two-thirds and posterior one-third of the tongue, respectively
- D. the glossopharyngeal (IX) and vagus (X) nerves for the anterior two-thirds and posterior one-third of the tongue, respectively

9. In central facial paralysis resulting from damage of the facial (VII) nucleus there is

- A. paralysis of all ipsilateral facial muscles
- B. paralysis of all contralateral facial muscles
- C. paralysis of ipsilateral facial muscles except the buccinator
- D. paralysis of all contralateral muscles except the buccinator
- E. paralysis of contralateral facial muscles except the frontalis and orbicularis oculi

10. Within the internal capsule, descending motor fibers for the face

- A. are located in front of fibers for the arm, in the anterior part of the anterior limb
- B. are located posterior to the fibers for the leg, in the posterior half of the posterior limb
- C. are located in front of the fibers for the arm, in the anterior part of the posterior limb
- D. travel within the corticovestibular tract
- E. synapse in the capsular nucleus

11. Brodmann's area 4 corresponds to the

- A. primary motor cortex
- B. premotor cortex
- C. Brocas area
- D. primary sensory cortex
- E. striate cortex

12. In a stroke affecting the territory of the middle cerebral artery

- A. weakness and sensory loss are most severe in the contralateral leg
- B. weakness and sensory loss are most severe in the contralateral face and arm

- C. weakness and sensory loss are most severe in the ipsilateral leg
- D. weakness and sensory loss are most severe in the ipsilateral face and arm
- E. akinetic mutism is often seen

TRUE OR FALSE

13. Cortical area 17 –

- A. Is also termed the striate cortex
- B. Is involved in the processing of auditory stimuli
- C. Receives input from the lateral geniculate body
- D. Receives input from the medial geniculate body

14. within the cerebellum-

- A. Climbing fibers and mossy fibers carry afferent information
- B. Purkinje cells provide the primary output from the cerebellar cortex
- C. Purkinje cells project to the ipsilateral deep cerebellar nuclei
- D. Efferents from the deep cerebellar nuclei project to the contralateral red nucleus and thalamic nuclei

15. In a patient with a missile wound involving the left cerebral hemisphere, the following might be expected-

- A. Dense neglect of stimuli on the left side
- B. Hemiplegia involving the right arm and leg
- C. Hemiplegia involving the left arm and leg
- D. Aphasia

16. The striatum includes-

- A. The caudate nucleus
- B. The globus pallidus
- C. The putamen
- D. The substantia nigra

17. The ventroposterior medial nucleus of the thalamus-

- A. Receives axons from neurons located in the contralateral cuneate nucleus in the medulla
- B. Receives axons from neurons located in area 4 on the medial surface of the ipsilateral cerebral hemisphere
- C. Contains neurons that respond to olfactory stimuli applied ipsilaterally
- D. Contains neurons whose axons project to the somatosensory cortex of the ipsilateral cerebral hemisphere

18. A healthy 25-year-old man had an episode of blurred vision in the left eye that lasted 2 weeks and then resolved. Six months later he developed difficulty walking. Examination showed decreased visual acuity in the left eye, nystagmus, loss of vibratory sensation and position sense at the toes and knees bilaterally, and hyperactive deep tendon reflexes with a Babinski reflex on the right. Three years later, the man was admitted to the hospital

with dysarthria, intention tremor of the left arm, and urinary incontinence. The clinical features are consistent with-

- A. Myasthenia gravis
- B. A series of strokes
- C. A cerebellar tumor
- D. **Multiple sclerosis**

19. The vagus (X) nerve contains-

- A. **Visceral afferent fibers**
- B. **Visceral efferent fibers**
- C. **Branchial efferent fibers**
- D. Somatic efferent fibers

20. Lesions of the cerebral cortex on one side can result in a deficit in muscles innervated by the-

- A. **Contralateral spinal motor neurons**
- B. Ipsilateral spinal motor neurons
- C. **Contralateral facial (VII) nerve**
- D. Ipsilateral facial (VII) nerve

21. The trigeminal nuclear complex-

- A. **has somatic afferent components**
- B. **Participates in certain reflex responses of cranial muscles**
- C. **Has a branchial efferent component**
- D. Receives projections of axons coursing with nerve X

22. The solitary nucleus-

- A. Serves visceral functions, none of which are consciously perceived
- B. Gives rise to preganglionic parasympathetic axons
- C. Mediates pain arising from the heart during myocardial ischemia
- D. **Receives axons running with nerve VII**

23. Sensory nuclei of the thalamus include-

- A. **Lateral geniculate**
- B. Superior geniculate
- C. **Ventral posterior, lateral**
- D. Ventral anterior

24. Axon pathways that decussate before they terminate include the-

- A. Optic nerve (II) fibers from the temporal halves of the two retinas
- B. Gracile fasciculus
- C. Cuneate fasciculus
- D. **Olivocerebellar fibers**

25. A 55-year-old patient presented with an 8-month history of gradually progressive incoordination in the right arm and leg. Examination revealed Hypotonia and ataxia in the limbs on the right side. The most likely diagnosis is-

- A. A stroke
- B. **A tumor**
- C. in the left cerebellar hemisphere
- D. **in the right cerebellar hemisphere**

PART 4

In the following questions, select the single best answer.

1. A lesion of the right frontal cortex (area 8) produces

- A. double vision (diplopia)
- B. impaired gaze to the right
- C. **impaired gaze to the left**
- D. dilated pupils
- E. no disturbances of the ocular motor system

2. Axons in the optic nerve originate from

- A. rods and cones
- B. **retinal ganglion cells**
- C. amacrine cells
- D. all of the above

3. Meyers loop carries optic radiation fibers representing

- A. **the upper part of the contralateral visual field**
- B. the lower part of the contralateral visual field
- C. the upper part of the ipsilateral visual field
- D. the lower part of the ipsilateral visual field

4. Which of the following statements about the auditory system is not true?

- A. the lateral lemniscus carries information from both ears
- B. it has a major synaptic delay in the midbrain
- C. it has a major synaptic delay in the thalamus
- D. **it has a major synaptic delay in the inferior olivary nucleus**
- E. crossing fibers pass through the trapezoid body

5. The hippocampal formation consists of the

- A. dentate gyrus
- B. hippocampus
- C. subiculum

D. all of the above

6. Which of the following is not part of the Papez circuit?

A. hippocampus

B. mammillary bodies

C. posterior thalamic nuclei

D. cingulate gyrus

E. parahippocampal gyrus

7. Wernicke's aphasia is usually caused by

A. a lesion in the superior temporal gyrus

B. a lesion in the inferior temporal gyrus

C. a lesion in the inferior frontal gyrus of the dominant hemisphere

D. lesions in the midbrain

E. alcohol abuse

8. Which of the following statements about the globus pallidus is not true?

A. it is located adjacent to the internal capsule

B. it receives excitatory axons from the caudate and putamen

C. it is the major outflow nucleus of the corpus striatum

D. it sends inhibitory axons to the thalamus

9. In a patient with hemiparkinsonism (unilateral Parkinson's disease) affecting the right arm, a lesion is most likely in the

A. right subthalamic nucleus

B. left subthalamic nucleus

C. right substantia nigra

D. left substantia nigra

E. right globus pallidus

10. Complex cells in the visual cortex have receptive fields that

A. are smaller than the receptive fields of simple cells

B. respond to lines or edges with a specific orientation, only when presented at one location in the visual field

C. respond to lines or edges with a specific orientation, presented anywhere within the visual field

D. contain "on" or "off" centers

E. left globus pallidus

TRUE OR FALSE

11. Auditory stimuli normally cause impulses to pass through the-

- A. Trapezoid body
- B. Inferior olivary nucleus
- C. Medial geniculate nucleus
- D. Medial lemniscus

12. The principal neurotransmitter (s) released by synaptic terminals of sympathetic axons is/are-

- A. Epinephrine
- B. Norepinephrine
- C. Acetylcholine
- D. gamma-amino butyric acid

13. Alzheimer's disease is characterized by-

- A. Neurofibrillary tangles
- B. Loss of neurons in the basal fore brain (Meynert) nucleus
- C. Senile plaques
- D. Severe pathology in CA₁

14. Destruction of the lower cervical and upper thoracic ventral roots on the left side leads to-

- A. Dilated right pupil
- B. Constricted right pupil
- C. Dilated left pupil
- D. Constricted left pupil

15. After transection of the peripheral nerve, the-

- A. Axons and Schwann cells distal to the cut undergo degeneration and disappear
- B. Sensory axons distal to the cut survive, but motor axons degenerate
- C. Motor neurons whose axons were cut degenerate and disappear
- D. Surviving axons of the proximal stump will send out new growth cones to attempt regeneration

16. The Kluver-Bucy syndrome-

- A. Is characterized by hyperorality and hypersexuality
- B. Is characterized by psychic blindness and personality changes
- C. Is seen in patients with bilateral temporal lobe lesions
- D. Is seen in patients with lesions of the anterior thalamus

17. Pain sensation-

- A. Is carried in large myelinated (A-alpha) axons
- B. Is carried by small myelinated and unmyelinated (A-delta and C) axons
- C. Is carried upward in the dorsal columns of the spinal cord
- D. Is carried upward in the spinothalamic tract and spinoreticulothalamic system

18. Parasympathetic fibers are carried in-

- A. Cranial nerves III and VII
- B. Cranial nerves IX and X

- C. Sacral roots S2-4
- D. Thoracic roots T8-12

19. A 68-year-old teacher with hypertension complained of a severe headache and was taken to the hospital. Examination revealed that he could write normally but could not read. His speech was normal. The lesion (s) most likely involved the-

- A. Corpus callosum
- B. Brocas area
- C. Left visual cortex
- D. Left angular gyrus

20. In the patient described in question No.19-

- A. The left anterior cerebral artery was probably involved
- B. There was probably a right homonymous hemianopia
- C. The left middle cerebral artery was probably involved
- D. The left posterior cerebral artery was probably involved

21. The extra striate cortex-

- A. Is Brodmanns areas 18 and 19
- B. Receives input from area 17
- C. Is the visual association cortex
- D. Is the primary auditory cortex

22. The corticospinal tract passes through-

- A. The internal capsule
- B. The crus cerebri
- C. The pyramids of the medulla
- D. The lateral and anterior columns of the spinal cord

23. The homunculus in the motor cortex-

- A. Contains magnified representations of the face and hand
- B. Represents the face highest on the convexity of the hemisphere
- C. is located largely within the territory of the middle cerebral artery
- D. Gives rise to all of the axons that descend as the corticospinal tract

24. The optic chiasm-

- A. is located close to the pineal and is often compressed by pineal tumours
- B. is located close to the pituitary and is often compressed by pituitary tumours
- C. contains decussating axons that arise in the temporal halves of the retinas
- D. contains decussating axons that arise in the nasal halves of the retinas

25. A 54-year-old accountant, who worked until the day of his illness, was found on the floor, with a right hemiparesis (arm and face more severely affected than the leg) and severe aphasia. The diagnosis is most likely—

- A. a tumor involving the thalamus on the left
- B. a large tumor of the left cerebral hemisphere
- C. a stroke involving the right middle cerebral territory

- D. a stroke involving the right anterior cerebral territory
- E. a stroke **HUMAN ANATOMY: HEAD AND NECK**

1. Which of the following is NOT a bone of the neurocranium?

- (A) **Palatine bones**
- (B) Parietal bones
- (C) Sphenoid bones
- (D) Temporal bones
- (E) Ethmoid bone

2. Which of the following is NOT a bone of the facial skeleton?

- (A) Maxilla
- (B) Zygomatic bone
- (C) **Frontal bone**
- (D) Inferior nasal concha
- (E) Nasal bone

3. The metopic suture is a persistence of which of the following?

- (A) **Frontal suture**
- (B) Coronal suture
- (C) Sagittal suture
- (D) Lambdoid suture
- (E) Hypophyseal suture

4. The external occipital protuberance is also known as which of the following?

- (A) Nasion
- (B) **Inion**
- (C) Bregma
- (D) Pterion
- (E) Vertebra prominens

5. Which of the following best describes the landmark known as lambda?

- (A) **Point on calvaria at junction of sagittal and lambdoid sutures**
- (B) Point on calvaria at junction of sagittal and coronal sutures

- (C) Junction of the greater wing of the sphenoid, squamous temporal, frontal, and parietal bones
- (D) star-shaped landmark at junction of parietomastoid, occipitomastoid, and lambdoid sutures
- (E) Smooth prominence on frontal bone superior to root of nose

6. The superior point of the neurocranium in the midline is known as which of the following?

- (A) Pterion
- (B) Bregma
- (C) **Vertex**
- (D) Asterion
- (E) Nasion

7. Which of the following foramina is NOT in the middle cranial fossa?

- (A) Foramen rotundum
- (B) Foramen spinosum
- (C) Foramen lacerum
- (D) Groove of greater petrosal nerve
- (E) **Foramen magnum**

8. Which of the following foramina is located in the anterior cranial fossa?

- (A) **Foramen cecum**
- (B) Optic canals
- (C) Superior orbital fissures
- (D) Foramen ovale
- (E) Condylar canal

9. Which of the following foramina does NOT transmit emissary veins?

- (A) Foramen cecum
- (B) Condylar canal
- (C) Mastoid foramen
- (D) Parietal foramen
- (E) **Anterior ethmoidal foramina**

10. The superior orbital fissure transmits all of the following EXCEPT

- (A) Ophthalmic division of the trigeminal nerve
- (B) **Maxillary division of the trigeminal nerve**
- (C) Oculomotor nerve
- (D) Trochlear nerve
- (E) Abducens nerve

11. All of the following transmit an arterial branch to the meninges EXCEPT

- (A) Foramen ovale
- (B) **Foramen rotundum**
- (C) Groove of greater petrosal nerve
- (D) Jugular foramen
- (E) Mastoid foramen

12. The foramina in the cribriform plate transmit which of the following?

- (A) **Axons of olfactory cells**
- (B) Posterior ethmoidal arteries
- (C) Ophthalmic arteries
- (D) Dural veins
- (E) Sympathetic plexus

13. In addition to the optic nerves, the optic canals transmit which of the following?

- (A) Ophthalmic veins
- (B) Oculomotor nerve
- (C) Internal carotid artery (D) **Ophthalmic arteries**
- (E) Nerve branches to the meninges

14. The maxillary division of the trigeminal nerve is transmitted through which of the following?

- (A) **Foramen rotundum**
- (B) Foramen ovale
- (C) Superior orbital fissure
- (D) Foramen spinosum
- (E) Foramen lacerum

15. Which of the following transmits a nerve branch to the meninges?

(A) Foramen spinosum

(B) Mastoid foramen

(C) Jugular foramen

(D) Foramen magnum

(E) Foramen oval

16. The foramen magnum transmits all of the following EXCEPT

(A) medulla and meninges

(B) Vertebral arteries

(C) Spinal roots of the accessory nerve

(D) Dural veins

(E) Internal carotid artery

17. The jugular foramen transmits all of the following EXCEPT

(A) glossopharyngeal nerve

(B) Vagus nerve

(C) Accessory nerve

(D) Inferior petrosal and sigmoid sinuses

(E) Sympathetic plexus

18. Which of the following is NOT true regarding the buccinator?

(A) It is a muscle of mastication.

(B) It is innervated by the facial nerve.

(C) It presses the cheek against the molar teeth to assist in chewing.

(D) It expels air from the oral cavity.

(E) It draws the mouth to one side when acting unilaterally.

19. Which of the following is NOT a muscle of facial expression?

(A) Platysma

(B) Nasalis

(C) Frontal belly of occipitofrontalis

(D) Orbicularis oculi

(E) Temporalis

20. The mentalis does which of the following?

- (A) Elevates eyebrows and skin of forehead
- (B) Functions as a sphincter of oral opening
- (C) Elevates lip upper limb and dilates nostril
- (D) **Elevates and protrudes lower lip**
- (E) Draws ala of nose toward nasal septum

21. The orbicularis oculi is innervated by

- (A) Optic nerve
- (B) Oculomotor nerve
- (C) Trochlear nerve
- (D) Trigeminal nerve
- (E) **Facial nerve**

22. The facial nerve innervates all of the following EXCEPT

- (A) Procerus
- (B) Corrugator supercilii
- (C) **Masseter**
- (D) Depressor anguli oris
- (E) Zygomaticus major

23. All muscles of facial expression develop from which pharyngeal arch?

- (A) First arch
- (B) **Second arch**
- (C) Third arch
- (D) Fourth arch
- (E) Sixth arch

24. Which of the following does NOT insert on the angle of the mouth?

- (A) Platysma
- (B) Buccinator
- (C) Risorius
- (D) Zygomaticus major

(E) **Depressor septi**

25. In respect to the orbicularis oculi, which of the following is true?

- (A) Its orbital part delicately closes the eyelids in blinking.
- (B) Its palpebral part draws the eyelids medially so that tears may be drained.
- (C) Its lacrimal part tightly closes the eyelids in squinting.
- (D) **It is innervated by a zygomatic branch of the facial nerve.**
- (E) It takes origin from the skin of the margin of the orbit and the tarsal plate, and it inserts on the lacrimal bone, medial palpebral ligament, and medial orbital margin.

26. Which of the following cutaneous nerves is derived from the ophthalmic nerve?

- (A) **External nasal nerve**
- (B) Infra orbital nerve
- (C) Zygomatico temporal nerve
- (D) Zygomaticofacial nerve
- (E) Auriculotemporal nerve

27. Which of the following nerves arises by two roots that surround the middle meningeal artery?

- (A) **Auriculotemporal nerve**
- (B) Buccal nerve
- (C) Mental nerve
- (D) Zygomatico temporal nerve
- (E) Zygomatico facial nerve

28. Which of the following nerves is NOT correctly matched with its distribution?

- (A) Frontal nerve . . . skin of forehead, scalp, eyelid, and nose
- (B) Supraorbital nerve . . . skin of forehead as far as vertex
- (C) Supratrochlear . . . skin in middle of forehead
- (D) Infratrochlear . . . skin and conjunctiva of upper eyelid
- (E) **Lacrimal . . . skin on dorsum of nose**

29. Which of the following sequences of nerve branches is NOT correct?

- (A) Ophthalmic nerve . . . frontal nerve . . supraorbital nerve

(B) **Ophthalmic nerve . . . frontal nerve . . . infratrochlear nerve**

(C) Maxillary nerve . . . infraorbital nerve

(D) Mandibular nerve . . . auriculotemporal nerve

(E) Mandibular nerve . . . inferior alveolar nerve . . . mental nerve

30. Which of the following nerves is correctly described with respect to its course?

(A) The auriculotemporal travels from the anterior division of the mandibular nerve in the infratemporal fossa to reach the cheek.

(B) The buccal nerve travels from the posterior division of the mandibular nerve between the neck of the mandible and the external acoustic meatus.

(C) **The lacrimal nerve passes through the palpebral fascia of the upper eyelid near the lateral canthus of the eye.**

(D) The infratrochlear nerve passes superiorly on the medial surface of the supraorbital nerve.

(E) The supratrochlear nerve emerges through the supraorbital notch and divides into branches.

31. The lacrimal nerve innervates the lacrimal gland with fibers

(A) From the ophthalmic nerve

(B) **Borrowed via a communicating branch from the maxillary nerve**

(C) Borrowed from the mandibular nerve

(D) From the optic nerve

(E) From the sympathetic plexus

32. The maxillary nerve gives off branches to which of the following ganglia?

(A) Otic ganglion

(B) Ciliary ganglion

(C) Submandibular ganglion

(D) **Pterygopalatine ganglion**

(E) Geniculate ganglion

33. Which of the following is NOT a branch of the facial nerve?

(A) Temporal

(B) Zygomatic

(C) Buccal

(D) **Mental**

(E) Cervical

34. The temporal branch of CN VII does NOT innervate which of the following?

- (A) Auricularis superior
- (B) Auricularis anterior
- (C) Occipitofrontalis (frontal belly)
- (D) Orbicularis oculi (superior part)
- (E) **Orbicularis oculi (inferior part)**

35. Which of the following is true regarding the stylomastoid foramen?

- (A) It is located between the styloid and mastoid processes of the sphenoid bone.
- (B) CN V is transmitted through it.
- (C) Sensory nerves of the face travel through it.
- (D) **The stylomastoid branch of the posterior auricular artery travels through it.**
- (E) It is a common site of lesion for the glossopharyngeal nerve.

36. Which of the following is NOT a branch of the facial artery?

- (A) Inferior labial artery
- (B) Superior labial artery
- (C) Lateral nasal artery
- (D) Angular artery
- (E) **Retromandibular artery**

37. Which of the following is a branch of internal carotid artery?

- (A) **Supratrochlear artery**
- (B) Facial artery
- (C) Posterior auricular artery
- (D) Superficial temporal artery
- (E) Mental artery

38. Which of the following is NOT true?

- (A) The angular artery is distributed to the superior part of the cheek and lower eyelid.
- (B) The occipital artery is distributed to the scalp in the back of the head.
- (C) **The superficial temporal artery is distributed to the parotid gland and duct.**
- (D) The mental artery is distributed to facial muscles and skin of the chin.

(E) The Supratrochlear artery is distributed to the muscles and skin of the scalp.

39. Which of the following is NOT contained within the parotid gland?

- (A) Facial nerve
- (B) **Facial artery**
- (C) Retromandibular vein
- (D) Parotid lymph nodes
- (E) Branches of the facial nerve

40. Parasympathetic fibers from CN IX travel to the parotid gland via which of the following nerves?

- (A) **Auriculotemporal nerve**
- (B) Great auricular nerve
- (C) Directly from the glossopharyngeal nerve
- (D) External carotid nerve plexus
- (E) Retromandibular nerve

41. Parasympathetic fibers from CN IX synapse in which ganglion before traveling to the parotid gland? (A) **Otic ganglion**

- (B) Ciliary ganglion
- (C) Submandibular ganglion
- (D) Pterygopalatine ganglion
- (E) Trigeminal ganglion

42. Which of the following lists the layers of the scalp in the correct order?

- (A) Skin, connective tissue, auricular layer, loose connective tissue, pericranium
- (B) Skin, aponeurosis, connective tissue, loose connective tissue, pericranium
- (C) Skin, connective tissue, aponeurosis, loose connective tissue, paradural layer
- (D) **Skin, connective tissue, aponeurosis, loose connective tissue, pericranium**
- (E) Skin, cartilaginous layer, aponeurosis, loose connective tissue, pericranium

43. Which of the following descriptions is correct?

- (A) The superior sagittal sinus runs superior to the brain in the inferior free border of the cerebral falx and ends in the straight sinus.

- (B) The inferior sagittal sinus is formed by the union of the superior sagittal sinus and the great cerebral vein and ultimately joins the confluence of the sinuses.
- (C) The transverse sinuses follow S-shaped courses in the posterior cranial fossa and ultimately become the internal jugular veins.
- (D) The occipital sinus lies in the convex attached border of the cerebral falx, running from the crista galli to the internal occipital protuberance.
- (E) **The cavernous sinus is situated on each side of the sella turcica.**

44. The cavernous sinus receives blood from all of the following EXCEPT

(A) **Superior and inferior petrosal sinuses**

- (B) Superior ophthalmic veins
- (C) Inferior ophthalmic veins
- (D) Superficial middle cerebral vein
- (E) Sphenoparietal sinus

45. Which of the following nerves is NOT contained within the cavernous sinus?

(A) **Optic nerve**

- (B) Oculomotor nerve
- (C) Trochlear nerve
- (D) Trigeminal nerve (specifically the ophthalmic division)
- (E) Abducent nerve

46. Which of the following does NOT contribute to innervation of the dura – mater?

- (A) Ophthalmic division of the trigeminal nerve
- (B) Maxillary division of the trigeminal nerve
- (C) Mandibular division of the trigeminal nerve
- (D) **Facial nerve**
- (E) C1, C2, and C3

47. Which of the following is correct in respect to the brain?

- (A) The midbrain is composed of the epithalamus, dorsal thalamus, and hypothalamus and surrounds the third ventricle.
- (B) The pons is the rostral part of the brainstem and lies at the junction of the middle and posterior cranial fossae.

- (C) The diencephalon lies dorsal to the pons and medulla and ventral to the posterior part of the cerebrum, beneath the tentorium.
- (D) **The cavity of the medulla oblongata forms the inferior part of the fourth ventricle.**
- (E) The cerebrum occupies the middle and posterior cranial fossae and houses the third and fourth ventricles.

48. Which of the following correctly describes the flow of cerebrospinal fluid?

- (A) Lateral ventricles . . . cerebral aqueduct . . . 3rd ventricle . . . interventricular foramen . . . 4th ventricle . . . median and lateral apertures . . . subarachnoid space
- (B) **Lateral ventricles . . . interventricular foramen . . . 3rd ventricle . . . cerebral aqueduct . . . 4th ventricle . . . median and lateral apertures . . . subarachnoid space**
- (C) Lateral ventricles . . . interventricular foramen . . . 3rd ventricle . . . median and lateral apertures . . . 4th ventricle . . . cerebral aqueduct . . . subarachnoid space
- (D) Lateral ventricles . . . median and lateral apertures . . . 3rd ventricle . . . cerebral aqueduct . . . 4th ventricle . . . interventricular foramen . . . subarachnoid space
- (E) Lateral ventricles . . . straight sinus . . . 3rd ventricle . . . confluence of the sinuses . . . 4th ventricle . . . median and lateral apertures . . . subarachnoid space

49. Which of the following is true regarding the carotid canal?

- (A) The carotid canal is located in the inferior surface of the sphenoid bone in the middle cranial fossa.
- (B) Structures actually pass across rather than through the area of the carotid canal, which is an artifact in dry skulls and is actually closed by cartilage in life.
- (C) The carotid canal contains the internal carotid artery with associated parasympathetic nerves.
- (D) **The carotid canal contains the internal carotid venous plexus connecting the cavernous sinus and the internal jugular vein.**
- (E) The greater petrosal nerve enters behind and above the carotid canal and leaves anteriorly as the nerve of the pterygoid canal.

50. Which of the following foramina is unpaired?

- (A) Foramen lacerum
- (B) Greater palatine foramen
- (C) **Foramen cecum**
- (D) Lesser palatine foramen
- (E) Pterygoid canal

51. The oculomotor nerve emerges between which two arteries of the cerebral arterial circle?

- (A) Posterior inferior cerebellar artery and anterior inferior cerebellar artery
- (B) Anterior inferior cerebellar artery and labyrinthine artery
- (C) Labyrinthine artery and superior cerebellar artery
- (D) **Superior cerebellar artery and posterior cerebral artery**
- (E) Posterior cerebral artery and middle cerebral artery

52. What nerve emerges between the labyrinthine artery and the anterior inferior cerebellar artery? (A) Optic

- (B) Trochlear
- (C) Trigeminal
- (D) **Abducent**
- (E) facial

53. Which artery is NOT a branch of the vertebral artery system?

- (A) Basilar
- (B) Posterior cerebral
- (C) Posterior communicating
- (D) Anterior spinal
- (E) **Ophthalmic**

54. Which of the following arteries is correctly matched with its distribution?

- (A) Anterior cerebral . . . temporal and occipital lobes of brain
- (B) Middle cerebral . . . inferior aspect of cerebral hemispheres and occipital lobe
- (C) **Middle meningeal . . . calvaria**
- (D) Posterior cerebral . . . brainstem and cerebellum
- (E) Basilar . . . optic tract, cerebral peduncle, internal capsule, and thalamus

55. Which of the following lists best describes the pathway of tears from the lacrimal glands to the nasal cavity?

- (A) **Lacrimal ducts . . . lacrimal lake . . . lacrimal canaliculi . . . lacrimal sac . . . nasolacrimal duct**
- (B) Lacrimal ducts . . . lacrimal sac . . . lacrimal canaliculi . . . lacrimal lake . . . nasolacrimal duct

(C) Lacrimal canaliculi . . . lacrimal lake . . . lacrimal ducts . . . lacrimal sac . . . nasolacrimal duct

(D) Lacrimal canaliculi . . . lacrimal sac . . . lacrimal ducts . . . lacrimal lake . . . nasolacrimal duct

(E) Lacrimal punctum . . . lacrimal lake . . . lacrimal papilla . . . lacrimal sac . . . nasolacrimal duct

56. Which of the following best describes the pathway of parasympathetic fibers to the lacrimal gland?

(A) **CN VII . . . greater petrosal nerve . . . nerve of the pterygoid canal . . . pterygopalatine ganglion . . . zygomatic branch of V2 . . . lacrimal branch of V1**

(B) CN IX . . . lesser petrosal nerve . . . nerve of the pterygoid canal . . . pterygopalatine ganglion . . . infraorbital branch of V2 . . . lacrimal branch of V1

(C) CN VII . . . greater petrosal nerve . . . optic ganglion . . . infraorbital branch of V2 . . . lacrimal branch of V1

(D) CN VII . . . deep petrosal nerve . . . nerve of the pterygoid canal . . . pterygopalatine ganglion . . . infratrochlear branch of V2 . . . lacrimal branch of V1

(E) CN V . . . ophthalmic branch of V1 . . . lacrimal branch of V1

57. Which of the following muscles does NOT take its origin from the common tendinous ring?

(A) Superior rectus

(B) Inferior rectus

(C) Lateral rectus

(D) Medial rectus

(E) **Superior oblique**

58. Which of the following muscles is NOT innervated by the oculomotor nerve?

(A) Levator palpebrae superioris

(B) **Lateral rectus**

(C) Medial rectus

(D) Inferior oblique

(E) Superior rectus

59. Which of the following muscles is NOT properly matched with its main action?

(A) Lateral rectus . . . abducts eyeball

- (B) Superior rectus . . . elevates, adducts, and rotates eyeball medially
- (C) Inferior rectus . . . depresses, adducts, and rotates eyeball medially
- (D) **Superior oblique . . . adducts, elevates, and rotates eyeball laterally** (E) Inferior oblique . . . abducts, elevates, and rotates eyeball laterally

60. Which of the following nerves is correctly matched with its distribution?

- (A) **Long ciliary . . . postsynaptic sympathetic fibers to the dilator pupillae**
- (B) Short ciliary . . . parasympathetic and sympathetic fibers to lens and cornea
- (C) Frontal . . . conjunctiva and lacrimal gland
- (D) **Infratrochlear . . . mucous membrane of sphenoidal and ethmoid sinuses** (E) Ethmoidal . . . conjunctiva and eyelids

61. Which of the following is true in respect to the ciliary ganglion?

- (A) Sympathetic fibers synapse in the ciliary ganglion.
- (B) **Afferent fibers from the iris and cornea pass through the ganglion.**
- (C) The ganglion is located between the optic nerve and medial rectus.
- (D) Parasympathetic fibers in the ganglion are derived from CN VII.
- (E) Parasympathetic fibers in the ganglion are distributed to the retina and lens.

62. Which of the following arteries is NOT a branch of the ophthalmic artery?

- (A) Supraorbital
- (B) Supratrochlear
- (C) Lacrimal
- (D) Anterior ethmoidal
- (E) **Infraorbital**

63. Which of the following arteries is correctly paired with its course and distribution? (A) Central artery of retina . . . runs adjacent to optic nerve, supplying rods and cones

- (B) Lacrimal artery . . . runs along medial rectus to supply lacrimal gland and frontal sinus
- (C) **Short posterior ciliaries . . . pierce sclera to supply choroid, rods, and cones**
- (D) Long posterior ciliaries . . . supplies lens and cornea
- (E) Posterior ethmoidal . . . supplies dorsal aspect of nose

64. Which of the following is NOT contained in the infratemporal fossa?

- (A) Parts of temporal, lateral pterygoid, and medial pterygoid muscles
- (B) Maxillary artery
- (C) Pterygoid venous plexus
- (D) Mandibular, inferior alveolar, buccal, and lingual nerves
- (E) **Pterygopalatine ganglion**

65. Which of the following muscles is NOT a muscle of mastication?

- (A) **Buccinator**
- (B) Temporalis
- (C) Medial pterygoid
- (D) Lateral pterygoid
- (E) Masseter

66. The muscles of mastication are associated with which brachial arch?

- (A) **First arch**
- (B) Second arch
- (C) Third arch
- (D) Fourth arch
- (E) Fifth arch

67. Which of the following depresses the mandible?

- (A) **Lateral pterygoid**
- (B) Medial pterygoid
- (C) Temporalis
- (D) Masseter
- (E) Mylohyoid

68. Which of the following is NOT a branch of the first (mandibular) part of the first part of the maxillary artery? (A) Deep auricular

- (B) Anterior tympanic
- (C) Middle meningeal and accessory meningeal
- (D) Inferior alveolar
- (E) **Descending palatine**

69. Which of the following is NOT a branch of the second (pterygoid) part of the maxillary artery?

- (A) Deep temporal
- (B) **Labyrinthine**
- (C) Pterygoid
- (D) Masseteric
- (E) Buccal

70. Which of the following branches of the third (pterygopalatine) part of the maxillary artery is correctly paired with its distribution?

- (A) infraorbital . . . maxillary molar and premolar teeth, lining of maxillary sinus, gingival
- (B) posterior superior alveolar . . . inferior eyelid, lacrimal sac, side of nose, superior lip
- (C) pharyngeal . . . maxillary gingiva, palatine glands, mucous membrane of roof of mouth
- (D) **artery of pterygoid canal . . . superior part of pharynx, auditory tube, tympanic cavity**
- (E) descending palatine . . . roof of pharynx, sphenoidal sinus, inferior part of auditory tube

71. Which of the following is NOT true in respect to the sphenopalatine artery?

- (A) It is the termination of the maxillary artery.
- (B) It supplies the lateral nasal wall.
- (C) It supplies the nasal septum.
- (D) It supplies the paranasal sinuses.
- (E) **It is transmitted through the incisive foramen.**

72. Which of the following is true in respect to the otic ganglion?

- (A) It is located in the infratemporal fossa just inferior to the foramen rotundum.
- (B) Presynaptic parasympathetic fibers in the ganglion are derived from the facial nerve.
- (C) **Postsynaptic parasympathetic fibers in the ganglion are destined for the parotid gland.**
- (D) Sympathetic fibers synapse in the ganglion before continuing on to sweat glands, erector pili muscles, and blood vessels.
- (E) The ganglion contains cell bodies for fibers of the trigeminal nerve.

73. Which nerve is NOT correctly matched with its distribution?

- (A) Lingual nerve . . . sensation from the anterior two-thirds of the tongue

- (B) Lingual nerve . . . sensation from floor of mouth and lingual gingivae
- (C) Chorda tympani nerve . . . taste fibers from anterior two-thirds of tongue
- (D) Chorda tympani nerve . . . secretomotor fibers to submandibular and sublingual glands

(E) Chorda tympani nerve . . . motor fibers to tensor tympani

74. The temporomandibular joint is what type of joint?

- (A) Fibrous joint
- (B) Cartilaginous joint
- (C) **Modified hinge-type synovial joint**
- (D) pivot-type synovial joint
- (E) saddle-type synovial joint

75. Which of the following is correct in respect to the hard palate?

- (A) **The hard palate is composed primarily of the maxillary bones.**
- (B) The incisive canal and foramen transmit the incisive nerves and greater palatine vessels.
- (C) The greater palatine foramen transmits the nasopalatine nerves and greater palatine nerve.
- (D) The lesser palatine foramina transmit the lesser palatine nerves but not the lesser palatine vessels.
- (E) The descending palatine artery is a branch of the internal carotid artery.

76. Which of the following palate muscles is NOT innervated by the cranial part of the accessory nerve through a pharyngeal branch of the vagus nerve via the pharyngeal plexus?

- (A) **Tensor veli palatini**
- (B) Levator veli palatini
- (C) Palatoglossus
- (D) Palatopharyngeus
- (E) Musculus uvulae

77. Which of the following is correctly matched with its action?

- (A) Musculus uvulae . . . pulls uvula inferiorly
- (B) Palatopharyngeus . . . pulls walls of pharynx inferiorly, posteriorly, and laterally during swallowing
- (C) Palatoglossus . . . depresses posterior part of tongue and draws soft palate away from tongue
- (D) Levator veli palatini . . . depresses soft palate during swallowing and yawning

(E) **Tensor veli palatini . . . opens auditory tube during swallowing and yawning**

78. Which of the following is NOT a type of lingual papilla?

- (A) Vallate papillae
- (B) Foliate papillae
- (C) **Bacilliform papillae**
- (D) Filiform papillae
- (E) Fungiform papillae

79. Which of the following muscles is NOT innervated by the hypoglossal nerve?

- (A) Genioglossus
- (B) Hyoglossus
- (C) Styloglossus
- (D) **Palatoglossus**
- (E) Intrinsic muscles of the tongue

80. Which of the following tongue muscles is correctly paired with its action?

- (A) Superior and inferior longitudinal . . . curls tip and sides of tongue and shortens tongue
- (B) Transverse . . . flattens and broadens tongue
- (C) Vertical . . . narrows and elongates tongue
- (D) Genioglossus and hyoglossus . . . elevates posterior part of tongue
- (E) **Palatoglossus . . . depresses and retracts tongue**

81. Which of the following is true in respect to innervation of the tongue?

- (A) The chorda tympani nerve innervates the mucosa of the anterior two-thirds of the tongue in respect to general sensation (touch and temperature).
- (B) **The chorda tympani nerve innervates the anterior two-thirds of the tongue in respect to special sensation (taste).**
- (C) The lingual nerve innervates the posterior one-third of the tongue in respect to general sensation (touch and temperature).
- (D) The lingual nerve innervates the posterior one-third of the tongue in respect to special sensation (taste).
- (E) The glossopharyngeal nerve innervates the area of the tongue just anterior to the epiglottis in respect to both general and special sensation.

82. How do parasympathetic and taste fibers from the chorda tympani reach their destination?

- (A) Via the lingual nerve, a branch of the mandibular division of the trigeminal nerve**
- (B) Via the lingual nerve, a branch of the glossopharyngeal nerve
- (C) Via the lingual nerve, a branch of the vagus nerve
- (D) Via intermingled fibers in the otic ganglion
- (E) Via the submandibular nerve, a branch of the hypoglossal nerve

83. Which of the following taste sensations is correctly paired with its tongue region?

- (A) Savoriness . . . posterior part
- (B) Sourness . . . apex
- (C) Bitterness . . . apex
- (D) Saltiness . . . lateral margins**
- (E) Sweetness . . . posterior part

84. Which of the following vessels is NOT correctly paired with its respective area of supply or drainage?

- (A) Dorsal lingual arteries . . . supply submandibular gland**
- (B) Deep lingual artery . . . supplies anterior tongue
- (C) Sublingual artery . . . supplies sublingual gland and floor of mouth
- (D) Dorsal lingual veins . . . accompany the lingual artery
- (E) Deep lingual veins . . . drain the apex of the tongue, joining the sublingual vein

85. Which of the following is NOT correct?

- (A) The parotid gland is supplied by branches of the external carotid and superficial temporal arteries.
- (B) The submandibular gland is supplied by the submental artery.
- (C) The submandibular gland is innervated by the parasympathetic fibers of the glossopharyngeal nerve that synapsed in the submandibular ganglion.**
- (D) The sublingual glands are supplied by the sublingual and submental arteries.
- (E) The sublingual glands are innervated by parasympathetic fibers of the facial nerve.

86. Which of the following is NOT an opening to the pterygopalatine fossa?

- (A) Pterygomaxillary fissure
- (B) Sphenopalatine foramen

- (C) Inferior orbital fissure
- (D) Foramen rotundum
- (E) **Foramen ovale**

87. Which of the following is NOT contained in the pterygopalatine fossa?

- (A) Third part of maxillary artery
- (B) Maxillary nerve
- (C) Nerve of the pterygoid canal
- (D) Pterygopalatine ganglion
- (E) **Optic nerve**

88. Which of the following foramina are NOT properly matched with the structures they transmit?

- (A) **Inferior orbital fissure . . . ophthalmic nerve, infraorbital vessels, orbital branches of pterygopalatine ganglion**
- (B) Infraorbital foramen and canal . . . infraorbital nerve and vessels
- (C) Palatovaginal canal (pharyngeal) canal . . . pharyngeal nerves from maxillary nerve and pterygopalatine ganglion and pharyngeal branch of maxillary artery
- (D) Zygomaticofacial foramen . . . zygomaticofacial nerve and vessels
- (E) Zygomaticotemporal foramen . . . zygomaticotemporal nerve and vessels

89. The nerve of the pterygoid canal is composed of which of the following?

- (A) Lesser petrosal nerve and deep petrosal nerve
- (B) **Greater petrosal nerve and deep petrosal nerve**
- (C) Greater petrosal nerve and lesser petrosal nerve
- (D) Maxillary nerve and deep petrosal nerve
- (E) Maxillary nerve and greater petrosal nerve

90. The nerve of the pterygoid canal does NOT innervate which of the following?

- (A) Lacrimal gland
- (B) Palatine glands
- (C) Mucosal glands of nasal cavity
- (D) Mucosal glands of upper pharynx
- (E) **Submandibular gland**

91. Which of the following paranasal sinuses communicates with the nasal cavity in the superior meatus?

(A) Posterior ethmoidal sinuses

(B) Frontal sinus

(C) Middle ethmoidal sinuses

(D) Sphenoidal sinus

(E) Maxillary sinus

92. Where does the nasolacrimal duct communicate with the nasal cavity?

(A) Superior meatus

(B) Middle meatus

(C) Inferior meatus

(D) Nasopharynx

(E) Sphenoidal sinus

93. Which of the following is a separate bone?

(A) Superior nasal concha

(B) Middle nasal concha

(C) Inferior nasal concha

(D) Crista galli

(E) Glabella

94. Which of the following does NOT supply the medial and lateral walls of the nasal cavity?

(A) Sphenopalatine artery

(B) Anterior and posterior ethmoidal arteries

(C) Greater palatine artery

(D) Infraorbital artery

(E) Superior labial artery

95. Which of the following does NOT innervate the nasal mucosa?

(A) Sphenopalatine nerve

(B) Nasopalatine nerve

(C) Greater palatine nerve

- (D) Anterior ethmoidal nerve
- (E) Posterior ethmoidal nerve

96. Which of the following is NOT correct regarding innervation of the ear?

- (A) The auricle is innervated by the great auricular nerve and auriculotemporal nerve.
- (B) The external surface of the tympanic membrane is innervated by the auriculotemporal nerve and even a small branch of the vagus.
- (C) The pharyngotympanic tube is innervated by the tympanic plexus (fibers from the facial and glossopharyngeal nerves).
- (D) The internal surface of the tympanic membrane is innervated by the glossopharyngeal nerve.
- (E) **Sensory cell bodies of the vestibulocochlear nerve are located in the Geniculate ganglion.**

97. Which of the following correctly describes a wall of the tympanic cavity and its underlying structure?

- (A) Tegmental roof . . . cochlea, contained in the promontory
- (B) **Floor . . . superior bulb of internal jugular vein**
- (C) Medial wall . . . dura mater of the middle cranial fossa
- (D) Anterior wall . . . mastoid cells and facial nerve
- (E) Posterior wall . . . carotid canal

98. Which of the following is NOT contained in the tympanic cavity?

- (A) Auditory ossicles
- (B) Tympanic plexus
- (C) Chorda tympani nerve
- (D) **Lesser petrosal nerve**
- (E) Stapedius and tensor tympani muscles

99. Which of the following is NOT true in respect to the pharyngotympanic tube?

- (A) **The salpingopharyngeus closes the tube.**
- (B) It opens posterior to the inferior meatus of the nasal cavity.
- (C) It equalizes pressure in the middle ear with atmospheric pressure.
- (D) The tensor veli palatini and levator velipalatini work together to open the tube.

- (E) It is supplied by the ascending pharyngeal artery, middle meningeal artery and artery of the pterygoid canal.

100. What innervates the tensor tympani?

- (A) Maxillary nerve
- (B) **Mandibular nerve**
- (C) Chorda tympani
- (D) Vestibulocochlear nerve
- (E) Vagus

101. Which of the following is true?

- (A) The malleus articulates with the stapes and is moved by the tensor tympani.
- (B) The round window is an opening in the medial wall of the tympanic cavity leading to the vestibule of the inner ear and is closed by the base of the stapes.
- (C) **The tensor tympani assist in preventing damage to the internal ear when one hears loud noises.**
- (D) The stapedius is innervated by the chorda tympani.
- (E) The stapedius pulls the stapes anteriorly and flattens its base, loosening the annular ligament and increasing oscillatory range.

102. Which of the following foramina is NOT correctly matched with its function?

- (A) Cochlear aqueduct . . . allows bonylabyrinth to communicate with subarachnoidspace; also contains labyrinthine vein
- (B) Aqueduct of the vestibule . . . transmits endolymphatic duct, an artery, and a vein
- (C) **Internal acoustic meatus . . . transmits vestibulocochlear nerve and vestibular artery**
- (D) Mastoid canaliculus . . . transmits auricular branch of the vagus
- (E) Tympanic canaliculus . . . tympanic branch of the glossopharyngeal nerve

103. Which of the following is true?

- (A) The cochlear labyrinth is composed of the utricle, the saccule, and three semicircular canals.
- (B) The membranous labyrinth contains perilymph.
- (C) The basilar membrane secures the cochlear duct to the spiral canal of the cochlea.
- (D) The spiral membrane forms the floor of the cochlear duct.
- (E) **The saccule is continuous with the cochlear duct through the ductus reuniens.**

104. Which of the following is NOT true in respect to typical cervical vertebrae?

- (A) They have short, bifid spinous processes.
- (B) The inferior facets of articular processes are directed inferoposteriorly, and superior facets are directed superoposteriorly.
- (C) **The transverse processes contain a foramen transversarium, which transmits the vertebral vein and artery except for C7, where it transmits only the vertebral artery.**
- (D) The vertebral foramen is large and triangular.
- (E) The vertebral body is small, with a concave superior surface and a convex inferior surface.

105. Which fascial layer is NOT correctly matched with the structures it encloses?

- (A) Superficial cervical fascia . . . platysma
- (B) Investing layer of deep cervical fascia . . . trapezius and sternocleidomastoid
- (C) **Pretracheal layer of deep cervical fascia . . . suprahyoid muscles**
- (D) Prevertebral layer of deep cervical fascia . . . longus colli, longus capitis, scalenes, deep cervical muscles
- (E) Carotid sheath . . . carotid arteries, internal jugular vein, and vagus

106. Which of the following is NOT a superior attachment of the trapezius?

- (A) **Lateral surface of mastoid process**
- (B) Medial third of superior nuchal line
- (C) External occipital protuberance
- (D) Ligamentum nuchae
- (E) Spinous processes of C7–T12

107. Which of the following is NOT correct in respect to the posterior triangle of the neck?

- (A) Its anterior boundary is formed by the posterior border of the SCM.
- (B) Its posterior boundary is formed by the anterior border of the trapezius.
- (C) Its inferior boundary is formed by the middle third of the clavicle.
- (D) **Its roof is formed by the platysma.**
- (E) Its floor is formed by the muscles covered by the prevertebral layer of deep cervical fascia.

108. The anterior triangle of the neck does NOT contain which of the following smaller triangles?

(A) Supraclavicular triangle

(B) Submandibular triangle

(C) Submental triangle

(D) Carotid triangle

(E) Muscular triangle

109. Which of the following muscles is NOT contained in the posterior cervical triangle?

(A) Splenius capitis

(B) Levator scapulae

(C) Middle scalene

(D) Posterior scalene

(E) Stylohyoid

110. Which of the following is a suprahyoid muscle?

(A) Mylohyoid

(B) Sternohyoid

(C) Omohyoid

(D) Sternothyroid

(E) Thyrohyoid

111. Which of the following is innervated by the trigeminal nerve?

(A) Mylohyoid

(B) Geniohyoid

(C) Stylohyoid

(D) Posterior belly of the digastric

(E) Thyrohyoid

112. Which of the following is NOT an anterior vertebral muscle?

(A) Longus colli

(B) Longus capitis

(C) Splenius capitis

(D) Rectus capitis anterior

(E) Rectus capitis lateralis

113. Of the following, which is innervated by the dorsal rami?

- (A) **Splenius capitis**
- (B) Levator scapulae
- (C) Posterior scalene
- (D) Middle scalene
- (E) Anterior scalene

114. Which of the following NEVER exists?

- (A) **Middle thyroid artery**
- (B) Middle thyroid vein
- (C) Thyroid artery
- (D) Parathyroid veins
- (E) Anterior jugular vein

115. Which of the following contains PAIRED laryngeal cartilages?

- (A) thyroid, cricoid, epiglottic
- (B) **Arytenoid, corniculate, cuneiform**
- (C) Arytenoid, cricoid, epiglottic
- (D) Corniculate, cricoid, cuneiform
- (E) Cuneiform, corniculate, epiglottic

116. Which of the following intrinsic laryngeal muscles is NOT innervated by the recurrent laryngeal nerve? (A) Transverse arytenoids

- (B) Oblique arytenoids
- (C) **Cricothyroid**
- (D) Posterior cricoarytenoid
- (E) Lateral cricoarytenoid

117. Which of the following is the primary tensor of the vocal fold?

- (A) **Cricothyroid**
- (B) Thyroarytenoid
- (C) Vocalis
- (D) Aryepiglottic

(E) Posterior cricoarytenoid

118. Which of the following abducts the vocal fold?

- (A) Vocalis
- (B) Transverse arytenoids
- (C) Oblique arytenoids
- (D) Thyroarytenoid
- (E) Posterior cricoarytenoid**

119. Which of the following is the sensory nerve of the larynx?

- (A) External laryngeal nerve
- (B) Recurrent laryngeal nerve
- (C) Internal laryngeal nerve**
- (D) Paratracheal nerve
- (E) Inferior thyroid nerve

120. Which of the following are commonly referred to as the adenoids?

- (A) Pharyngeal tonsils**
- (B) Submandibular glands**
- (C) Palatine tonsils**
- (D) Lingual tonsils**
- (E) Sublingual glands**

121. Which of the following is NOT innervated by the cranial root of the accessory nerve?

- (A) Middle constrictor
- (B) Inferior constrictor
- (C) Palatopharyngeus
- (D) Salpingopharyngeus
- (E) Stylopharyngeus**

122. Which of the following has an insertion on the pharyngeal tubercle of the occipital bone?

- (A) Superior constrictor**
- (B) Middle constrictor**
- (C) Palatopharyngeus**

(D) Salpingopharyngeus

(E) Stylopharyngeus

123. Which of the following passes through the gap between the superior constrictor and the skull?

(A) Tensor veli palatini

(B) Ascending palatine artery

(C) glossopharyngeal nerve

(D) Stylohyoid ligament

(E) Stylopharyngeus

124. Which of the following passes through the gap between the superior and middle constrictors?

(A) glossopharyngeal nerve

(B) Levator veli palatini

(C) Internal laryngeal nerve

(D) Superior laryngeal artery

(E) Superior laryngeal vein

125. Which of the following passes through the gap between the middle and inferior constrictors?

(A) Superior laryngeal artery

(B) Stylopharyngeus

(C) Vagus nerve

(D) Recurrent laryngeal nerve

(E) Inferior laryngeal artery

126. Which of the following passes through the gap inferior to the inferior constrictor?

(A) Vagus nerve

(B) Internal laryngeal nerve

(C) Superior laryngeal nerve

(D) Inferior laryngeal artery

(E) Superior laryngeal vein

127. Which of the following is correct?

(A) Le Fort I fracture: horizontal fracture of the maxillae

- (B) Le Fort I fracture: fracture through the maxillary sinuses, infraorbital foramina, lacrimals, and ethmoids
- (C) Le Fort II fracture: horizontal fracture through superior orbital fissures, ethmoid and nasal bones, and greater wings of the sphenoids
- (D) Le Fort III fracture: horizontal fracture of the maxillae
- (E) Le Fort III fracture: fracture through the maxillary sinuses, infraorbital foramina, lacrimals, and ethmoids

128. Which of the following is NOT present at birth?

- (A) Styloid process
- (B) **Mastoid process**
- (C) External occipital protuberance
- (D) Tympanic membrane
- (E) Clavicles

129. The inferior alveolar nerve is best blocked at which location for dental work?

- (A) Mental foramen
- (B) Greater palatine foramen
- (C) Less palatine foramen
- (D) **Mandibular foramen**
- (E) Lingual foramen

130. A lesion to the zygomatic branch of CN VII would cause which of the following?

- (A) The inability to empty food from the vestibule of the cheeks
- (B) A drooping corner of the mouth
- (C) A ringing in the ear
- (D) Paralysis of the muscles of mastication
- (E) **A drooping lower eyelid**

131. The facial veins make clinically important connections with the cavernous sinus through which veins? (A) Lingual veins

- (B) Trigeminal veins
- (C) **Superior ophthalmic veins**
- (D) Great cerebral vein
- (E) Meningeal veins

132. An epidural hematoma consists of blood from which vessel?

- (A) Middle meningeal artery**
- (B) Cerebral veins
- (C) Internal carotid artery
- (D) Circle of Willis
- (E) Vertebral artery

133. Cerebral compression is NOT attributed to which of the following?

- (A) Intracranial collections of blood
- (B) Obstruction of CSF flow
- (C) Intracranial tumors or abscesses
- (D) Edema of brain
- (E) Viral accumulation at blood-brain barrier**

134. Ptosis results from a lesion of which nerve?

- (A) Optic nerve
- (B) Oculomotor nerve**
- (C) Trochlear nerve
- (D) Trigeminal nerve
- (E) Abducens nerve

135. Horner syndrome is caused by a lesion of which of the following?

- (A) Oculomotor nerve
- (B) Trigeminal nerve
- (C) Facial nerve
- (D) Vagus nerve
- (E) Cervical sympathetic trunk**

136. Which of the following is NOT a symptom of Horner syndrome?

- (A) Pupillary constriction
- (B) Ptosis
- (C) Sinking in of one eye
- (D) Absence of sweating on face and neck
- (E) Lack of lacrimation**

137. A lesion of the hypoglossal nerve would result in which of the following?

- (A) Loss of taste on posterior one-third of tongue
- (B) Deviation of protruded tongue towardun affected side
- (C) **Deviation of protruded tongue toward affected side**
- (D) Inability to retract tongue
- (E) Loss of salivation

138. What type of injury or condition might cause a lesion to the olfactory tract? (A) Fracture involving optic canal

- (B) **Fracture of cribriform plate**
- (C) Intracerebral clot in occipital lobe of brain
- (D) Pituitary tumor
- (E) Epidural hematoma

139. Sagging of the soft palate, deviation of the uvula to the normal side, and hoarseness might be caused by a lesion to which nerve?

- (A) Facial nerve
- (B) glossopharyngeal nerve
- (C) **Vagus nerve**
- (D) Accessory nerve
- (E) Hypoglossal nerve

140. A superficial neck laceration might result in which abnormal finding?

- (A) **Paralysis of the scm and superior fibers of the trapezius, drooping of the shoulder**
- (B) Paralysis of the mylohyoid, anterior belly of the digastric, tensor tympani, and tensor veli palatini
- (C) Paralysis of the posterior belly of the digastric, stylohyoid, and stapedius
- (D) Anosmia
- (E) Tinnitus

141. The eye is turned down and out. What type and site of lesion do you expect?

- (A) Fracture of cribriform plate
- (B) Stretching of a nerve as it courses around the brainstem
- (C) Laceration or contusion in the parotid region

(D) **Pressure from herniating uncus on the nerve or fracture in the cavernous sinus** (E)

Acoustic **neuroma**

142. A laceration or contusion in the parotid region or a fracture of the temporal bone might damage which nerve? (A) Trigeminal nerve

(B) Abducens nerve

(C) **Facial nerve**

(D) glossopharyngeal nerve

(E) Vagus nerve

143. Which nerve might be damaged by a fracture involving the cavernous sinus?

(A) Olfactory tract

(B) Optic nerve

(C) **Abducens nerve**

(D) Facial nerve

(E) Vestibulocochlear nerve

144. The stylopharyngeus is associated with which brachial arch?

(A) first

(B) Second

(C) **Third**

(D) fourth

(E) sixth

145. The arytenoid and cricoid cartilages and laryngeal connective tissue are formed by what?

(A) **Lateral plate mesoderm**

(B) Paraxial mesoderm

(C) Neural crest

(D) Ectodermal placodes

(E) Endoderm

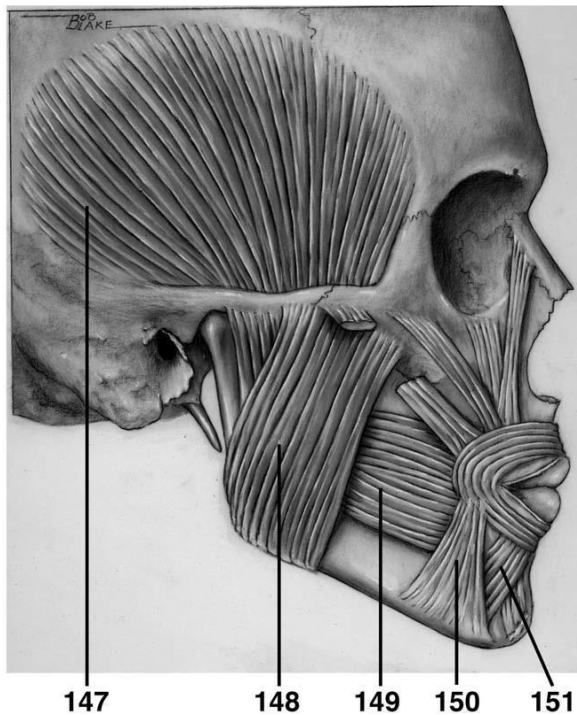
146. Which of the following prominences is NOT correctly paired with the structures formed from it?

(A) Frontonasal: forehead, bridge of nose

(B) Maxillary: lateral portion of upper lip

- (C) Medial nasal: philtrum of upper lip, crest and tip of nose
- (D) Lateral nasal: alae of nose
- (E) **Mandibular: cheeks**

DIRECTIONS (Questions 147 through 151): Identify the anatomical features indicated on the art below.



147. Temporalis

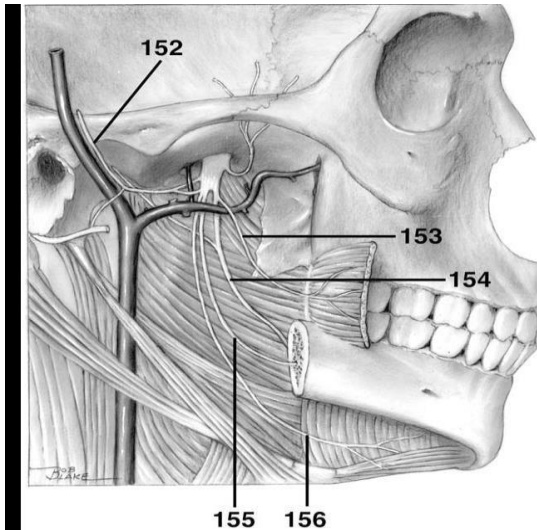
148. Masseter

149. Buccinator

150. Depressor anguli oris

151. Depressor labii inferioris

DIRECTIONS (Questions 152 through 156): Identify the anatomical features indicated on the art below.



152. Auriculotemporal nerve

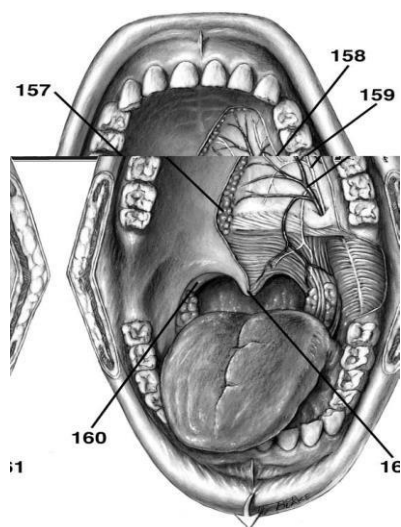
153. Buccal nerve

154. Lingual nerve

155. Inferior alveolar nerve

156. Mylohyoid nerve

DIRECTIONS (Questions 157 through 161): Identify the anatomical features indicated on the art below.



157. Palatine glands

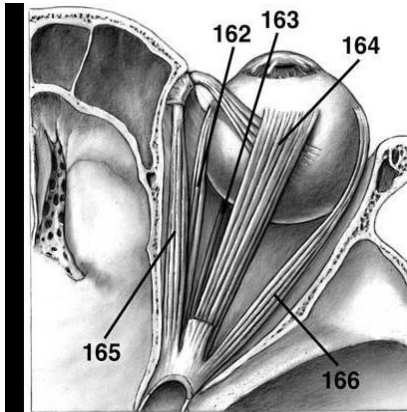
158. Greater palatine nerve

159. Greater palatine artery

160. Palatopharyngeal arch

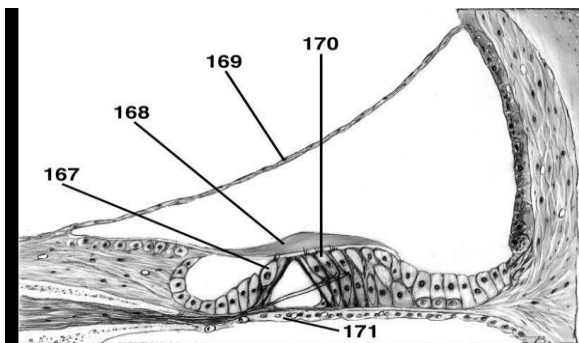
161. Uvula

DIRECTIONS (Questions 162 through 166): Identify the anatomical features indicated on the art below.



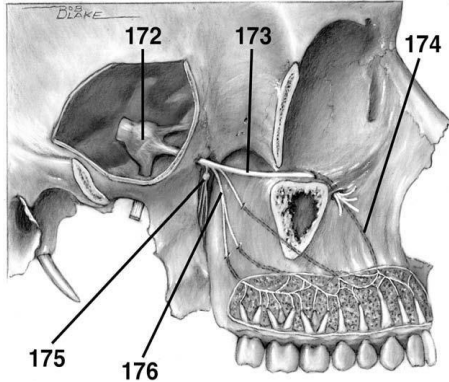
- 162.** Medial rectus
- 163.** Inferior rectus
- 164.** Superior rectus
- 165.** Superior oblique
- 166.** Lateral rectus

DIRECTIONS (Questions 167 through 171): Identify the anatomical features indicated on the art below.



- 167.** Inner hair cell
- 168.** Tectorial membrane
- 169.** Vestibular membrane
- 170.** Outer hair cell
- 171.** Basal membrane

DIRECTIONS (Questions 172 through 176): Identify the anatomical features indicated on the art below.



172. Trigeminal ganglion

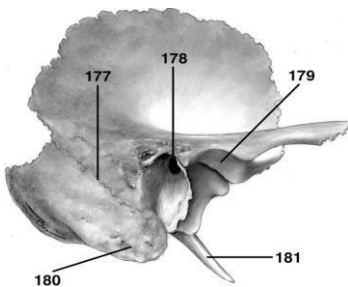
173. Maxillary nerve

174. Anterior superior alveolar nerve

175. Pterygopalatine ganglion

176. Posterior superior alveolar nerve

DIRECTIONS (Questions 177 through 181): Identify the anatomical features indicated on the art below.



177. Petrosquamous suture

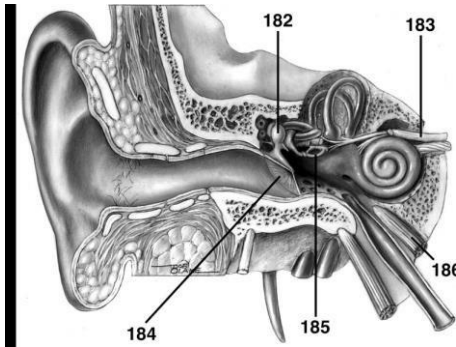
178. External acoustic meatus

179. Mandibular fossa

180. Mastoid process

181. Styloid process

DIRECTIONS (Questions 182 through 186): Identify the anatomical features indicated on the art below.



182. Head of malleus

183. Vestibular nerve

184. Tympanic membrane

185. Stapes

186. Tensor tympani

A DIFFERENT QUESTION SET HEAD AND NECK

1. One of the following is not derived from the neural crest:

- a. Pia mater.
- b. Arachnoid mater.
- c. **Dura mater.**
- d. Spinal ganglia.
- e. Schwann cells.

Answer

2. One of the following is not derived from the neural crest:

- a. Dorsal root ganglia.
- b. **Suprarenal cortex.**
- c. Geniculate ganglion of the facial nerve.
- d. Gracile tract.
- e. Sympathetic chain.

Answer

3. The 3rd ventricle is the cavity of the:

- a. Metencephalon.
- b. Myelencephalon.
- c. Mesencephalon.
- d. Telencephalon.
- e. **Diencephalon.**

4. The lateral ventricle communicates with the 3rd ventricle through:

- a. Aqueduct of Sylvius.
- b. Foramen of Magendie.
- c. **Foramen of Monro.**
- d. Foramen of Luschka.
- e. Central canal.

Answer

5. The presence of the following in the amniotic fluid indicates anencephaly:

- a. Glucose.
- b. Blood.
- c. Lymphocytes.
- d. **Alpha fetoprotein.**
- e. None of the above.

Answer

6. Failure of the neural tube to close causes:

- a. Hydrocephalus.
- b. **Anencephaly.**
- c. Meningocele.
- d. All of the above.
- e. None of the above.

Answer

7. Regarding spina bifida, one of the following is incorrect:

- a. **Usually occurs in the cervical region.**
- b. Spina bifida occulta is the commonest type.
- c. May be associated with meningocele.
- d. Is due to failure of fusion of the vertebral arches.

- e. The spinal cord may project through the defect.

Answer

8. Regarding the meningeal spaces:

- a. Extradural hemorrhage is usually arterial.
- b. Subdural hemorrhage is usually venous.
- c. Subarachnoid hemorrhage is usually arterial.
- d. All are correct.
- e. a and b only are correct

Answer

51. The inferior cerebellar peduncle contains all of the following EXCEPT:

- a. Dorsal spinocerebellar tract.
- b. Ventral spinocerebellar tract.
- c. Vestibulocerebellar tract.
- d. Olivocerebellar tract.
- e. Cuneocerebellar tract.

Answer

52. The commissural fibers of the brain include all of the following EXCEPT: a.

Corpus callosum.

- b. Cingulum.
- c. Anterior commissure.
- d. Posterior commissure.
- e. Hippocampal commissure.

Answer

53. Regarding the anterior limb of the internal capsule, all the statements are correct EXCEPT:

- a. Lies between head of the caudate nucleus and the lentiform nucleus.
- b. Contains the anterior thalamic radiation.
- c. Contains fibers from the anterior thalamic nucleus to the cingulate gyrus.

- d. Contains nonfrontopontine fibers.
- e. Supplied by branches of the anterior cerebral and middle cerebral arteries.

Answer

54. Regarding the spinal cord, all are correct EXCEPT:

- a. The spinal cord is the continuation of the medulla oblongata.
- b. The spinal cord ends at the level of L3 in the adult.
- c. In the adult, the dura mater ends at the level of S2 vertebra.
- d. The ventral 2/3 are supplied by the anterior spinal artery.
- e. The conus medullaris is fixed to the coccyx by the filum terminale.

Answer

55. The tract mediating unconscious proprioception from the upper limb to the cerebellum is:

- a. Gracile tract.
- b. Dorsal spinocerebellar tract.
- c. Ventral spinocerebellar tract.
- d. Cuneocerebellar tract.
- e. Lateral spinothalamic tract.

Answer

56. The following tract mediates pain and temperature sensations from the body:

a. Gracile tract.

- b. Ventral spinothalamic tract.
- c. Lateral spinothalamic tract.
- d. Ventral spinocerebellar tract.
- e. Dorsal spinocerebellar tract.

Answer

57. The superior cerebellar peduncle contains one of the following tracts:

- a. Dorsal spinocerebellar tract.
- b. Ventral spinocerebellar tract.
- c. Olivocerebellar tract.
- d. Cuneocerebellar tract.
- e. Pontocerebellar tract.

Answer

58. A lesion in the following cranial nerve causes dysphagia and hoarseness of voice:

a. Vagus nerve.

- b. Glossopharyngeal nerve.
- c. Hypoglossal nerve.
- d. Facial nerve.
- e. Spinal accessory nerve.

Answer

59. The crus cerebri of the midbrain contains all of the following fibers (tracts) EXCEPT:

- a. Frontopontine fibers.
- b. Non-frontopontine fibers.
- c. Corticospinal tract.
- d. Corticobulbar tract.
- e. **Medial lemniscus.**

Answer

60. Regarding the spinal nerves, one of the following is TRUE:

- a. C6 spinal nerve exits below C6 vertebra.
- b. **T6 spinal nerve exits below T6 vertebra.**
- c. The sacral nerve roots are shorter than the cervical nerve roots.
- d. The ventral nerve roots contain preganglionic autonomic fibers.
- e. The spinal nerves are 31 pairs.

Answer

61. Signs of Horner's syndrome include all of the following EXCEPT: a.

Ptosis.

- b. **Mydriasis.**
- c. Anhidrosis.
- d. Enophthalmos.
- e. Dry skin of the ipsilateral side of the face.

Answer

62. Hemisection in the cervical spinal cord may cause one of the following:

- a. Contralateral loss of proprioception from the lower limb.
- b. Contralateral flaccid weakness in the upper limb.
- c. Contralateral flaccid weakness in the lower limb.
- d. **Contralateral spinothalamic sensory loss in the trunk and lower limb.**
- e. Ipsilateral spinothalamic sensory loss in the upper limb.

Answer

63. Regarding the cerebral arteries, one of the following is INCORRECT:

- a. They are present in the subarachnoid space.
- b. **Occlusion of the right anterior cerebral artery may cause paralysis of the left upper limb.**
- c. The anterior cerebral artery courses in the callosal sulcus.
- d. The middle cerebral artery courses in the lateral sulcus.
- e. The posterior cerebral artery courses in the calcarine sulcus.

Answer

64. Regarding the corticospinal tract, one of the following is INCORRECT:

- a. It takes origin from both primary motor and general sensory areas.
- b. **It is supplied by the vertebrobasilar system throughout its course.**

- c. In the brainstem and the spinal cord, the cervical fibers are the most medial fibers.
- d. Descends in the middle 3/5 of the crus cerebri.
- e. Decussates in the lower part of the medulla.

Answer

65. One of the following statements is INCORRECT:

- a. Lesion in the premotor area 6 causes apraxia.
- b. Lesion in area 22 causes receptive aphasia.
- c. **Lesion in area 8 causes contralateral conjugate deviation of both eyes.**
- d. Irritative lesion in the uncus causes olfactory hallucination.
- e. Lesion in Brocas area in the dominant hemisphere causes motor aphasia.

Answer

66. Regarding the ventricular system, one of the following is INCORRECT:

- a. It contains choroids plexus that secrete the CSF.
- b. It represents the cavity of the neural tube.
- c. **It contains about 100 ml of CSF.**
- d. Obstruction of the aqueduct of Sylvius causes dilatation of the lateral and third ventricles.
- e. The lateral ventricle is the cavity of the cerebral hemisphere.

67. Accomodation-convergence reflex is mediated by all of the following EXCEPT: a.

Optic nerve and optic tract.

- b. **Pretectal nucleus.**
- c. Edinger-Westphal nucleus.
- d. Short ciliary nerves.
- e. Area 17.

Answer

68. Signs of upper motor neuron lesion include all of the following EXCEPT: a.

Spasticity.

- b. Hypertonia.
- c. Hyperreflexia.
- d. Babinski sign.
- e. **Fasciculations.**

Answer


69. Signs of lower motor neuron lesion include all of the following EXCEPT:

- a. Atrophy of muscles.
- b. Fibrillation.
- c. Flaccidity.
- d. **Clonus.**
- e. Hypotonia

Answer

70. Tract/s which is/are important for maintaining the upright posture include:

- a. Pontine (medial) reticulospinal tract.
- b. Lateral vestibulospinal tract.
- c. Medullary (lateral) reticulospinal tract.
- d. All of the above.
- e. **A and b only.**

Answer 


71. Typical features of medial medullary syndrome include:

- a. Ipsilateral loss of discriminative touch and kinesthesia.
- b. Contralateral deviation of the protruded tongue.
- c. **Contralateral hemiplegia.**
- d. All of the above.
- e. None of the above.




72. Typical features of lateral medullary syndrome include all of the following EXCEPT:

- a. Dysphagia.
- b. Ataxia.
- c. Vertigo.
- d. **Contralateral loss of pain and temperature sensation from the face.**
- e. Contralateral loss of pain and temperature sensation from the body

Answer 

73. Unconscious proprioception is mediated through:


- a. Dorsal spinocerebellar tract.
- b. Spino-olivary tract.
- c. Ventral spinocerebellar tract.
- d. **All of the above.**
- e. A and c only.

Answer 

74. The following nuclei project their axons to the cerebellum EXCEPT: a.

Red nucleus.

- b. Accessory cuneate nucleus.
- c. Arcuate nucleus.
- d. Clarke's nucleus.
- e. Inferior olivary nucleus.

Answer 

75. Regarding the thalamic radiations, all are correct EXCEPT:

- a. The anterior thalamic radiation connects nuclei of the limbic system with the cerebral cortex.

- b. The posterior thalamic radiation carries visual fibers to area 17.
- c. The inferior thalamic radiation carries auditory fibers to area 41 and 42.
- d. Lesion in the posterior thalamic radiation causes contralateral homonymous hemianopia.
- e. **Lesion in the inferior thalamic radiation causes contralateral loss of hearing.**

Answer

76. An upper motor neuron lesion is a lesion in the:

- a. Anterior horn cells of the spinal cord.
- b. Peripheral nerve.
- c. **Pyramidal and extrapyramidal tracts.**
- d. All of the above.
- e. None of the above.

Answer

77. A lower motor neuron lesion is a lesion in the:

- a. Anterior horn cells of the spinal cord.
- b. Peripheral nerve.
- c. Motor area of the cerebral hemisphere.
- d. All of the above.
- e. **A and b only.**

Answer

78. An upper motor neuron lesion can occur in any one of the following EXCEPT: a.

Internal capsule.

- b. Pyramid of the medulla.
- c. Crus cerebri of the midbrain.
- d. **Ventral nerve root of the spinal nerve.**
- e. Corticospinal tract.

Answer

79. In syringomyelia, all are correct EXCEPT:

- a. Bilateral loss of pain and temperature in the affected dermatomes.
- b. **Bilateral loss of touch sensation in the affected dermatomes.**
- c. Dilatation of the central canal.
- d. Destruction of the crossing fibers of the lateral spinothalamic tracts.
- e. Destruction of the crossing fibers of the ventral spinothalamic tracts.

Answer

80. Lesion in the gracile tract causes all of the following in the ipsilateral side EXCEPT:

- a. **Loss of sense of movement of the thumb.**
- b. Loss of sense of movement of the big toe.
- c. Loss of discriminative touch from the region of the umbilicus.
- d. Loss of sense of vibration over the medial malleolus.
- e. Loss of tactile localization over the front of the thigh.

Answer

81. In lesions of the left cuneate tract, one of the following is INCORRECT:

- a. Loss of sense of movement of the left shoulder joint.
- b. Loss of sense of flexion of the left index finger.
- c. **Loss of sense of movement of the right elbow joint.**
- d. Intact sense of extension of the right knee joint.
- e. Intact sense of pain from the left upper limb.

c

82. Clarke's nucleus transmits the following sensation:

- a. Pain and temperature sensation.
- b. Sense of movement of the upper limb to the cerebellum.
- c. Sense of movement of the upper limb to the cerebral hemisphere.
- d. **Sense of movement of the lower limb to the cerebellum.**
- e. Sense of movement of the lower limb to the cerebral hemisphere.

Answer

83. Lesion in the medial lemniscus causes:

- a. Contralateral loss of pain and temperature sensation.
- b. **Contralateral loss of sense of movement.**
- c. Ipsilateral loss of discriminative touch.
- d. Ipsilateral loss of pain and temperature sensation.
- e. Ipsilateral loss of sense of movement.

Answer

84. The hypoglossal nerve:

- a. Carries taste sensation from the posterior third of the tongue.
- b. Carries fibers from the 2nd and 3rd cervical nerves.
- c. Emerges between the olive and the inferior cerebellar peduncle.
- d. Supplies all the muscles of the tongue.
- e. **Its lesion causes deviation of the protruded tongue to the same side as the lesion.**

Answer

85. Concerning the trigeminal nuclei, one is CORRECT:

- a. The main sensory nucleus is located in the medulla oblongata.
- b. The spinal nucleus extends in the spinal cord till the 6th cervical segment.
- c. The main sensory nucleus conveys pain and temperature sensations from the face.
- d. **The mesencephalic nucleus conveys proprioceptive impulses from the muscles of mastication.**
- e. They project to the ventral posterior lateral nucleus of the thalamus.

Answer

86. Bitemporal hemianopia indicates a lesion in:

- a. Optic nerve.
- b. **Central part of the optic chiasma.**
- c. Peripheral part of the optic chiasma.

- d. Optic tract.
- e. Optic radiation.

Answer

87. Contralateral homonymous hemianopia indicates a lesion in all of the following EXCEPT:

- a. **Optic chiasma.**
- b. Optic tract.
- c. Lateral geniculate body.
- d. Optic radiation.
- e. Primary visual area.

Answer

88. A pituitary adenoma (tumor) may cause one of the following: a.

Blindness.

- b. Binasal hemianopia.
- c. **Bitemporal hemianopia.**
- d. Contralateral homonymous hemianopia.
- e. Contralateral homonymous hemianopia with macular sparing.

Answer

89. A vascular lesion of the primary visual area (17) may cause one of the following: a.

Blindness.

- b. Binasal hemianopia.
- c. Bitemporal hemianopia.
- d. Contralateral homonymous hemianopia.
- e. **Contralateral homonymous hemianopia with macular sparing.**

Answer

90. Constriction of the right pupil when light is directed at the left eye needs all of the following EXCEPT:

- a. Left optic nerve.
- b. Left pretectal nucleus.
- c. **Left optic radiation.**
- d. Right Edinger-Westphal nucleus.
- e. Optic chiasma.

Answer

91. Constriction of the right pupil when light is directed at the left eye needs all of the following EXCEPT:

- a. Left optic nerve.
- b. Left pretectal nucleus.
- c. Right oculomotor nerve.
- d. **Right optic nerve.**
- e. Right Edinger-Westphal nucleus.

Answer

92. Nucleus ambiguus gives fibers to all of the following nerves EXCEPT:

- a. Glossopharyngeal nerve.
- b. Vagus nerve.
- c. **Spinal accessory nerve.**
- d. Cranial accessory nerve.
- e. Recurrent laryngeal nerve.

Answer

93. Nucleus ambiguus supplies all of the following muscles EXCEPT:

- a. All muscles of the larynx.
- b. Stylopharyngeus muscle.
- c. Constrictor muscles of the pharynx.
- d. Palatoglossus muscle.
- e. **Tensor palati.**

Answer

94. Nucleus solitarius receives all of the following EXCEPT:

- a. Taste sensation from the anterior two thirds of the tongue via the chorda tympani.
- b. Taste sensation from the posterior third of the tongue via the glossopharyngeal nerve.
- c. Taste sensation from the epiglottis via the vagus nerve.
- d. **General sensation from the anterior two thirds of the tongue via the lingual nerve.**
- e. General sensation from the viscera supplied by the vagus nerve.

Answer

95. Regarding the parasympathetic nuclei of the brainstem, all are correct EXCEPT:

- a. The superior salivatory nucleus supplies the lacrimal gland.
- b. The superior salivatory nucleus supplies the submandibular salivary gland.
- c. Fibers from the superior salivatory nucleus relay in the sphenopalatine ganglion.
- d. The inferior salivatory nucleus supplies the parotid gland.
- e. **The Edinger-Westphal nucleus supplies the dilator pupillae muscle.**

Answer

96. Regarding the parasympathetic nuclei of the brainstem, all are correct EXCEPT:

- a. **The Edinger-Westphal nucleus is located in the midbrain opposite the inferior colliculus.**
- b. Fibers from Edinger-Westphal nucleus relay in the ciliary ganglion.
- c. The superior salivatory nucleus is located in the pons.
- d. The inferior salivatory nucleus is located in the medulla oblongata.
- e. The dorsal motor nucleus of the vagus is located in the medulla oblongata.

Answer

97. Regarding the parasympathetic nuclei of the brainstem, all are correct EXCEPT:

- a. Fibers from the inferior salivatory nucleus relay in the otic ganglion.
- b. **Fibers from the inferior salivatory nucleus pass through the deep petrosal nerve.**
- c. The Edinger-Westphal nucleus gives fibers to the oculomotor nerve.

- d. Fibers from the superior salivatory nucleus relay in the submandibular ganglion.
- e. The dorsal motor nucleus of the vagus is present in the floor of the 4th ventricle.

Answer

98. Regarding the facial nerve, all are correct EXCEPT:

- a. It supplies all muscles of the second pharyngeal arch.
- b. It exits from the cerebello-pontine angle.
- c. **Has motor nucleus that forms the facial colliculus.**
- d. Has parasympathetic fibers that relay in the sphenopalatine ganglion.
- e. Has sensory fibers that end in the nucleus solitarius.

Answer

99. Regarding the thalamic nuclei, all are correct EXCEPT:

- a. The anterior nucleus is part of the limbic system.
- b. The medial nucleus is connected with the prefrontal cortex (personality center).
- c. The ventral anterior nucleus is connected with the motor and premotor areas.
- d. The ventral posterior lateral nucleus receives the medial lemniscus.
- e. **The ventral posterior medial nucleus receives the spinal lemniscus.**

Answer

100. Regarding the medial geniculate body, all are correct EXCEPT:

- a. It receives auditory information from both ears but mainly from the opposite ear.
- b. **It receives auditory information from the superior colliculus.**
- c. It projects to the auditory area in the superior temporal gyrus.
- d. It projects through the sublenticular part of the internal capsule.
- e. A lesion causes bilateral diminution of hearing.

Answer

Mark **T** for the true and **F** for the false answers

1. The following are true:

- a. structure 1 is part of the ethmoid bone T
- b. falx cerebri is attached to 1 T
- c. structure 2 is part of the frontal bone F
- d. olfactory nerves pass through 2 T
- e. anterior ethmoidal nerve passes through 2 T

Answer

2. The following are true:

- a. the pituitary gland rests on 5 T
- b. the free margin of the tentorium cerebelli is attached to 4 T
- c. groove 8 is formed by internal carotid artery F
- d. groove 10 is formed by the internal jugular vein F
- e. groove 12 is formed by transverse venous sinus T

Groove 10 is formed by the sigmoid venous sinus.

3. The following are true about 3:

- a. it forms the upper border of the superior orbital fissure. T
- b. it is related to the sphenoparietal sinus. T
- c. it calcifies in membranous. T
- d. it separates the anterior from the middle cranial fossa. T
- e. it ends by the anterior clinoid process. T

Answer

4. Structures that passes through 6 include:

- a. middle meningeal artery F
- b. mandibular branch of the trigeminal nerve T
- c. internal carotid artery F
- d. lesser superficial petrosal nerve T
- e. facial nerve F

Answer

5. Structures passing through 11 include:

- a. vertebral artery F
- b. vagus nerve T
- c. glossopharyngeal nerve T
- d. hypoglossal nerve F
- e. internal jugular vein F

Answer

Answer all questions

Select the single correct answer

1. One of the following is not derived from the neural crest:

- a. Pia mater.
- b. Arachnoid mater.
- c. Dura mater.
- d. Spinal ganglia.
- e. Schwann cells.

c

2. One of the following is not derived from the neural crest:

- a. Dorsal root ganglia.
- b. Suprarenal cortex.
- c. Geniculate ganglion of the facial nerve.
- d. Gracile tract.
- e. Sympathetic chain.

b

3. The 3rd ventricle is the cavity of the:

- a. Metencephalon.
- b. Myelencephalon.
- c. Mesencephalon.
- d. Telencephalon.
- e. Diencephalon.

Answer

4. The lateral ventricle communicates with the 3rd ventricle through:

- a. Aqueduct of Sylvius.
- b. Foramen of Magendie.
- c. Foramen of Monroe.
- d. Foramen of Luschka.
- e. Central canal.

c

5. The presence of the following in the amniotic fluid indicates anencephaly:

- a. Glucose.
- b. Blood.
- c. Lymphocytes.
- d. Alpha fetoprotein.
- e. None of the above.

d

6. Failure of the neural tube to close causes:

- a. Hydrocephalus.
- b. Anencephaly.
- c. Meningocele.
- d. All of the above.
- e. None of the above.

b

7. Regarding spina bifida, one of the following is incorrect:

- a. Usually occurs in the cervical region.
- b. Spina bifida occulta is the commonest type.
- c. May be associated with meningocele.
- d. Is due to failure of fusion of the vertebral arches.
- e. The spinal cord may project through the defect.

a

8. Regarding the meningeal spaces:

- a. Extradural hemorrhage is usually arterial.
- b. Subdural hemorrhage is usually venous.
- c. Subarachnoid hemorrhage is usually arterial.
- d. All are correct.
- e. a and b only are correct

d

9. These nuclei are present in the floor of the 4th ventricle EXCEPT:

- a. Abducent nucleus.
- b. Facial nucleus in the facial colliculus.
- c. Dorsal motor nucleus of the vagus.
- d. Hypoglossal nucleus.
- e. Vestibular nuclei.

b

10. One of the following is INCORRECT:

- a. The superior cerebellar artery supplies the superior cerebellar peduncle.
- b. The anterior inferior cerebellar artery supplies the middle cerebellar peduncle.
- c. The posterior inferior cerebellar artery supplies the inferior cerebellar peduncle.
- d. The anterior inferior cerebellar artery supplies the choroid plexus of the 3rd ventricle.
- e. The posterior inferior cerebellar artery supplies the choroid plexus of the 4th ventricle.

d

11. The subarachnoid space:

- a. Contains the cerebrospinal fluid.
- b. Dilates in some areas to form the subarachnoid cisterns.
- c. Subarachnoid hemorrhage is usually due to rupture of superficial cerebral veins.
- d. All of the above are correct.
- e. A and B only are correct.

e

12. The subdural space:

- a. Contains the cerebrospinal fluid.
- b. Dilates in some areas to form the subarachnoid cisterns.
- c. Subdural hemorrhage is usually due to rupture of superficial cerebral veins.
- d. All of the above are correct.
- e. A and B only are correct.

c

13. The lateral ventricle is the cavity of the:

- a. Telencephalon.
- b. Diencephalon.
- c. Mesencephalon.
- d. Rhombencephalon.

e. None of the above.

a

14. The fourth ventricle is the cavity of the:

a. Telencephalon.

b. Diencephalon.

c. Mesencephalon.

d. Rhombencephalon.

e. None of the above.

d

15. Regarding the cerebellum, one of the following is INCORRECT:

a. It develops from the metencephalon.

b. The medullary center contains 4 deep cerebellar nuclei on each side.

c. The paleocerebellum is formed of the lateral zone of the cerebellar hemisphere.

d. The neocerebellum is connected with the cerebral cortex.

e. The flocculonodular lobe is connected with the vestibular system.

c

16. The central canal of the spinal cord opens out into the:

a. Subarachnoid space.

b. Lumbar cistern.

c. Sacral hiatus.

d. Third ventricle.

e. Fourth ventricle.

e

17. One of the following is a branch of the basilar artery:

a. Anterior inferior cerebellar artery.

- b. Posterior inferior cerebellar artery.
- c. Anterior spinal artery.
- d. Posterior spinal artery.
- e. Radicular arteries to the cervical part of the spinal cord.

a

18. Regarding the cerebellar arteries, one of the following is INCORRECT:

- a. The superior cerebellar artery supplies the superior cerebellar peduncle.
- b. The anterior inferior cerebellar artery supplies the middle cerebellar peduncle.
- c. The posterior inferior cerebellar artery supplies the inferior cerebellar peduncle.
- d. The anterior inferior cerebellar artery is a branch of the vertebral artery.
- e. The posterior inferior cerebellar artery may give the posterior spinal artery.

d

19. One of the following is a branch of the vertebral artery:

- a. Anterior cerebral artery.
- b. Anterior inferior cerebellar artery (AICA).
- c. Posterior inferior cerebellar artery (PICA).
- d. Superior cerebellar artery.
- e. Posterior cerebral artery.

c

20. The brainstem is formed of:

- a. Medulla oblongata.
- b. Midbrain.
- c. Pons.
- d. All of the above.
- e. None of the above.

d

21. The floor of the 4th ventricle is formed by the:

- a. Superior medullary velum.
- b. Inferior medullary velum.
- c. Cerebellum.
- d. Back of the medulla.
- e. None of the above.

d

22. The primary fissure of the cerebellum separates the:

- a. Superior surface from the inferior surface.
- b. Anterior lobe from the posterior lobe.
- c. Posterior lobe from the flocculonodular lobe.
- d. Paleocerebellum from the neocerebellum.
- e. None of the above.

b

23. The cerebellum is separated from the cerebral hemisphere by the:

- a. Falx cerebri.
- b. Falx cerebelli.
- c. Tentorium cerebelli.
- d. Galea aponeurotica.
- e. fourth ventricle.

c

24. The superior cerebellar peduncle connects the cerebellum with the:

- a. Restiform body.
- b. Inferior olive.
- c. Medulla.
- d. Midbrain.
- e. Pons.

d

25. The rhombencephalon is made up of the:

- a. Cerebrum and cerebellum.
- b. Cerebrum, cerebellum and pons.
- c. Cerebellum and thalamus.
- d. Spinal cord, medulla and cerebellum.
- e. Medulla, pons and cerebellum.

e

26. The medulla is supplied by all of the following EXCEPT:

- a. Anterior spinal artery.
- b. Posterior spinal artery.
- c. Anterior inferior cerebellar artery.
- d. Posterior inferior cerebellar artery.
- e. Branches from the vertebral artery.

c

27. Multipolar neurons usually contain axons:

- a. 1.
- b. 2.
- c. 3.
- d. 4.
- e. 5.

a

28. The medulla contains all the following features EXCEPT:

- a. Hypoglossal trigone.
- b. Clava.
- c. Area postrema.
- d. Facial colliculus.
- e. Pyramidal decussation.

d

29. The facial colliculus is formed by the:

- a. Facial nerve only.
- b. Facial nucleus only.

- c. Facial and vagus.
- d. Facial nerve and abducent nucleus.
- e. Facial and trigeminal.

d

30. The hypoglossal nerve exits from the:

- a. Anterior median fissure.
- b. Preolivary fissure.
- c. Postolivary fissure.
- d. Horizontal fissure.
- e. Cerebellopontine angle.

b

31. In the midbrain, one of the following is INCORRECT:

- a. The substantia nigra contains nerve cells that secrete dopamine.
- b. The superior colliculi are visual reflex centers.
- c. The inferior colliculi are auditory reflex centers.
- d. The inferior brachium connects the inferior colliculus with the lateral geniculate body.
- e. The aqueduct of Sylvius connects the third ventricle with the fourth ventricle.

d

32. One of the following is not present in the interpeduncular fossa:

- a. Tuber cinereum.
- b. Infundibulum of the pituitary gland.
- c. Mamillary bodies.
- d. Posterior perforated substance.
- e. Trochlear nerve.

e

33. The anterior cerebral artery supplies all of the following EXCEPT:

- a. Upper one inch of the parietal lobe.

- b. Medial surface of the frontal lobe.
- c. Anterior limb of the internal capsule.
- d. Anterior part of the corpus striatum.
- e. Occipital lobe.

e

34. One of the following cortical areas of the brain is present in the parietal lobe:

- a. Primary motor area (area 4).
- b. Primary auditory area (area 41, 42).
- c. Motor eye field area (area 8).
- d. Primary visual area (area 17).
- e. General sensory area (area 3, 1, 2).

e

35. This cortical area is present in the frontal lobe of the cerebral hemisphere:

- a. Gustatory (taste) area (area 43).
- b. Primary auditory area (areas 41 and 42).
- c. Primary visual area (area 17).
- d. Brocas area (motor speech area).
- e. Somatosensory association area (area 5 and 7).

d

36. Regarding the CSF, one of the following is INCORRECT:

- a. The main volume is present in the ventricles of the brain.
- b. The choroid plexus is the main site of production.
- c. The arachnoid villi and granulations are the main site of absorption (drainage).
- d. It reaches the subarachnoid space through the 3 foramina of the fourth ventricle.
- e. It protects the brain and spinal cord.

a

37. The epithalamus is formed of all of the following EXCEPT:

- a. Pineal gland.
- b. Habenular nucleus.
- c. Anterior commissure.
- d. Posterior commissure.
- e. Stria medullaris thalami.

c

38. The midbrain contains all of the following EXCEPT:

- a. Crus cerebri.
- b. Substantia nigra.
- c. Third ventricle.
- d. Oculomotor nerve nuclei.
- e. Trochlear nerve nucleus.

c

39. Regarding the cortical areas of the cerebral cortex, one is INCORRECT:

- a. All the motor areas are present in the frontal lobe.
- b. Brocas area is supplied b the middle cerebral artery.
- c. The primary visual area (area 17) is supplied by the posterior cerebral artery.
- d. The prefrontal cortex (frontal pole) contains the personality center.
- e. The auditory association area (area 22) lies in the middle temporal gyrus.

e

40. The lateral medullary syndrome is usually due to occlusion of the:

- a. Anterior spinal artery.
- b. Posterior spinal artery.
- c. Anterior inferior cerebellar artery.
- d. Posterior inferior cerebellar artery.
- e. Posterior cerebral artery.

d

41. The medial medullary syndrome is due to occlusion of the:

- a. Anterior cerebral artery.
- b. Middle cerebral artery.
- c. Posterior cerebral artery.
- d. Anterior spinal artery.
- e. Posterior spinal artery.

d

42. The epithalamus:

- a. Is part of the diencephalon.
- b. Contains a gland that secretes melatonin.
- c. Contains a nucleus that is part of the limbic system.
- d. All of the above are correct.
- e. a and b only are correct.

d

43. All of the following are correct EXCEPT:

- a. Area postrema is the vomiting center.
- b. The tuber cinereum of the interpeduncular fossa is part of the hypothalamus.
- c. The stria medullaris of the 4th ventricle are arcuatocerebellar fibers.
- d. The stria medullaris thalami is part of the limbic system and the epithalamus.
- e. Foramen of Megendie of the 4th ventricle is present in the superior medullary velum.

e

44. In the midbrain:

- a. The two superior colliculi are connected by the anterior commissure.
- b. The inferior brachium connects the inferior colliculus with the lateral geniculate body.

- c. The substantia nigra contains nerve cells that secrete noradrenaline.
- d. The posterior part (tectum) contains visual and auditory reflex centers.
- e. The trochlear nerve exits from the interpeduncular fossa medial to the crus cerebri.

a

45. Regarding the ventricular system, one of the following is INCORRECT:

- a. The ependymal lining contributes to the formation and circulation of the CSF.
- b. It represents the cavity of the neural tube.
- c. It contains about 30 ml of CSF.
- d. Obstruction of the aqueduct of Sylvius causes dilatation of all the ventricles.
- e. Communicates with subarachnoid space through foramina of Luschka and Megendie.

d

46. Nuclei of the limbic system include all of the following EXCEPT:

- a. Hippocampus.
- b. Amygdaloid nucleus.
- c. Mamillary body.
- d. Caudate nucleus.
- e. Anterior thalamic nucleus.

d

47. Language areas are located in all of the following EXCEPT:

- a. Supramarginal gyrus.
- b. Angular gyrus.
- c. Superior temporal gyrus.
- d. Middle frontal gyrus.
- e. Inferior frontal gyrus.

d

48. Association fibers include all of the following EXCEPT:

- a. Corpus callosum.
- b. Superior longitudinal fasciculus.
- c. Inferior longitudinal fasciculus.
- d. Cingulum.
- e. Fasciculus uncinatus.

a

49. Regarding Corpus callosum all of the following are correct EXCEPT:

- a. It connects similar cortical areas of the two hemispheres.
- b. It is supplied by the anterior cerebral artery.
- c. It is formed of association fibers.
- d. It transmits information between the 2 hemispheres.
- e. The posterior end is called the splenium.

c

50. One of the following arteries is not part of the circulus arteriosus:

- a. Anterior cerebral artery.
- b. Middle cerebral artery.
- c. Posterior cerebral artery.
- d. Anterior communicating artery.
- e. Posterior communicating artery.

b

51. The inferior cerebellar peduncle contains all of the following EXCEPT:

- a. Dorsal spinocerebellar tract.
- b. Ventral spinocerebellar tract.
- c. Vestibulocerebellar tract.

- d. Olivocerebellar tract.
- e. Cuneocerebellar tract.

b

52. The commissural fibers of the brain include all of the following EXCEPT:

- a. Corpus callosum.
- b. Cingulum.
- c. Anterior commissure.
- d. Posterior commissure.
- e. Hippocampal commissure.

b

53. Regarding the anterior limb of the internal capsule, all the statements are correct EXCEPT:

- a. Lies between head of the caudate nucleus and the lentiform nucleus.
- b. Contains the anterior thalamic radiation.
- c. Contains fibers from the anterior thalamic nucleus to the cingulate gyrus.
- d. Contains nonfrontopontine fibers.
- e. Supplied by branches of the anterior cerebral and middle cerebral arteries.

d

54. Regarding the spinal cord, all are correct EXCEPT:

- a. The spinal cord is the continuation of the medulla oblongata.
- b. The spinal cord ends at the level of L3 in the adult.
- c. In the adult, the dura mater ends at the level of S2 vertebra.
- d. The ventral 2/3 are supplied by the anterior spinal artery.
- e. The conus medullaris is fixed to the coccyx by the filum terminale.

b

55. The tract mediating unconscious proprioception from the upper limb to the cerebellum is:

- a. Gracile tract.
- b. Dorsal spinocerebellar tract.
- c. Ventral spinocerebellar tract.
- d. Cuneocerebellar tract.
- e. Lateral spinothalamic tract.

d

56. The following tract mediates pain and temperature sensations from the body:

- a. Gracile tract.
- b. Ventral spinothalamic tract.
- c. Lateral spinothalamic tract.
- d. Ventral spinocerebellar tract.
- e. Dorsal spinocerebellar tract.

c

57. The superior cerebellar peduncle contains one of the following tracts:

- a. Dorsal spinocerebellar tract.
- b. Ventral spinocerebellar tract.
- c. Olivocerebellar tract.
- d. Cuneocerebellar tract.
- e. Pontocerebellar tract.

b

58. A lesion in the following cranial nerve causes dysphagia and hoarseness of voice:

- a. Vagus nerve.
- b. Glossopharyngeal nerve.
- c. Hypoglossal nerve.
- d. Facial nerve.
- e. Spinal accessory nerve.

a

59. The crus cerebri of the midbrain contains all of the following fibers (tracts) EXCEPT:

- a. Frontopontine fibers.

- b. Non-frontopontine fibers.
- c. Corticospinal tract.
- d. Corticobulbar tract.
- e. Medial lemniscus.

e

60. Regarding the spinal nerves, one of the following is TRUE:

- a. C6 spinal nerve exits below C6 vertebra.
- b. T6 spinal nerve exits below T6 vertebra.
- c. The sacral nerve roots are shorter than the cervical nerve roots.
- d. The ventral nerve roots contain preganglionic autonomic fibers.
- e. The spinal nerves are 31 pairs.

b

61. Signs of Horner's syndrome include all of the following EXCEPT:

- a. Ptosis.
- b. Mydriasis.
- c. Anhidrosis.
- d. Enophthalmos.
- e. Dry skin of the ipsilateral side of the face.

b

62. Hemisection in the cervical spinal cord may cause one of the following:

- a. Contralateral loss of proprioception from the lower limb.
- b. Contralateral flaccid weakness in the upper limb.
- c. Contralateral flaccid weakness in the lower limb.
- d. Contralateral spinothalamic sensory loss in the trunk and lower limb.
- e. Ipsilateral spinothalamic sensory loss in the upper limb.

d

63. Regarding the cerebral arteries, one of the following is INCORRECT:

- a. They are present in the subarachnoid space.
- b. Occlusion of the right anterior cerebral artery may cause paralysis of the left upper limb.
- c. The anterior cerebral artery courses in the callosal sulcus.
- d. The middle cerebral artery courses in the lateral sulcus.
- e. The posterior cerebral artery courses in the calcarine sulcus.

b

64. Regarding the corticospinal tract, one of the following is INCORRECT:

- a. It takes origin from both primary motor and general sensory areas.
- b. It is supplied by the vertebrobasilar system throughout its course.
- c. In the brainstem and the spinal cord, the cervical fibers are the most medial fibers.
- d. Descends in the middle 3/5 of the crus cerebri.
- e. Decussates in the lower part of the medulla.

b

65. One of the following statements is INCORRECT:

- a. Lesion in the premotor area 6 causes apraxia.
- b. Lesion in area 22 causes receptive aphasia.
- c. Lesion in area 8 causes contralateral conjugate deviation of both eyes.
- d. Irritative lesion in the uncus causes olfactory hallucination.
- e. Lesion in Brocas area in the dominant hemisphere causes motor aphasia.

c

66. Regarding the ventricular system, one of the following is INCORRECT:

- a. It contains choroids plexus that secrete the CSF.
- b. It represents the cavity of the neural tube.
- c. It contains about 100 ml of CSF.

- d. Obstruction of the aqueduct of Sylvius causes dilatation of the lateral and third ventricles.
- e. The lateral ventricle is the cavity of the cerebral hemisphere.

c

67. Accomodation-convergence reflex is mediated by all of the following EXCEPT:

- a. Optic nerve and optic tract.
- b. Pretectal nucleus.
- c. Edinger-Westphal nucleus.
- d. Short ciliary nerves.
- e. Area 17.

b

68. Signs of upper motor neuron lesion include all of the following EXCEPT:

- a. Spasticity.
- b. Hypertonia.
- c. Hyperreflexia.
- d. Babinski sign.
- e. Fasciculations.

e

69. Signs of lower motor neuron lesion include all of the following EXCEPT:

- a. Atrophy of muscles.
- b. Fibrillation.
- c. Flaccidity.
- d. Clonus.
- e. Hypotonia

d

70. Tract/s which is/are important for maintaining the upright posture include:

- a. Pontine (medial) reticulospinal tract.
- b. Lateral vestibulospinal tract.

- c. Medullary (lateral) reticulospinal tract.
- d. All of the above.
- e. A and b only.

e

71. Typical features of medial medullary syndrome include:

- a. Ipsilateral loss of discriminative touch and kinesthesia.
- b. Contralateral deviation of the protruded tongue.
- c. Contralateral hemiplegia.
- d. All of the above.
- e. None of the above.

c

72. Typical features of lateral medullary syndrome include all of the following EXCEPT:

- a. Dysphagia.
- b. Ataxia.
- c. Vertigo.
- d. Contralateral loss of pain and temperature sensation from the face.
- e. Contralateral loss of pain and temperature sensation from the body

d

73. Unconscious proprioception is mediated through:

- a. Dorsal spinocerebellar tract.
- b. Spino-olivary tract.
- c. Ventral spinocerebellar tract.
- d. All of the above.
- e. A and c only.

d

74. The following nuclei project their axons to the cerebellum EXCEPT:

- a. Red nucleus.
- b. Accessory cuneate nucleus.

- c. Arcuate nucleus.
- d. Clarkes nucleus.
- e. Inferior olivary nucleus.

a

75. Regarding the thalamic radiations, all are correct EXCEPT:

- a. The anterior thalamic radiation connects nuclei of the limbic system with the cerebral cortex.
- b. The posterior thalamic radiation carries visual fibers to area 17.
- c. The inferior thalamic radiation carries auditory fibers to area 41 and 42.
- d. Lesion in the posterior thalamic radiation causes contralateral homonymous hemianopia.
- e. Lesion in the inferior thalamic radiation causes contralateral loss of hearing.

e

76. An upper motor neuron lesion is a lesion in the:

- a. Anterior horn cells of the spinal cord.
- b. Peripheral nerve.
- c. Pyramidal and extrapyramidal tracts.
- d. All of the above.
- e. None of the above.

c

77. A lower motor neuron lesion is a lesion in the:

- a. Anterior horn cells of the spinal cord.
- b. Peripheral nerve.
- c. Motor area of the cerebral hemisphere.
- d. All of the above.
- e. A and b only.

e

78. An upper motor neuron lesion can occur in any one of the following EXCEPT:

- a. Internal capsule.
- b. Pyramid of the medulla.
- c. Crus cerebri of the midbrain.
- d. Ventral nerve root of the spinal nerve.
- e. Corticospinal tract.

d

79. In syringomyelia, all are correct EXCEPT:

- a. Bilateral loss of pain and temperature in the affected dermatomes.
- b. Bilateral loss of touch sensation in the affected dermatomes.
- c. Dilatation of the central canal.
- d. Destruction of the crossing fibers of the lateral spinothalamic tracts.
- e. Destruction of the crossing fibers of the ventral spinothalamic tracts.

b

80. Lesion in the gracile tract causes all of the following in the ipsilateral side EXCEPT:

- a. Loss of sense of movement of the thumb.
- b. Loss of sense of movement of the big toe.
- c. Loss of discriminative touch from the region of the umbilicus.
- d. Loss of sense of vibration over the medial malleolus.
- e. Loss of tactile localization over the front of the thigh.

a

81. In lesions of the left cuneate tract, one of the following is INCORRECT:

- a. Loss of sense of movement of the left shoulder joint.
- b. Loss of sense of flexion of the left index finger.
- c. Loss of sense of movement of the right elbow joint.
- d. Intact sense of extension of the right knee joint.
- e. Intact sense of pain from the left upper limb.

c

82. Clarke's nucleus transmits the following sensation:

- a. Pain and temperature sensation.
- b. Sense of movement of the upper limb to the cerebellum.
- c. Sense of movement of the upper limb to the cerebral hemisphere.
- d. Sense of movement of the lower limb to the cerebellum.
- e. Sense of movement of the lower limb to the cerebral hemisphere.

d

83. Lesion in the medial lemniscus causes:

- a. Contralateral loss of pain and temperature sensation.
- b. Contralateral loss of sense of movement.
- c. Ipsilateral loss of discriminative touch.
- d. Ipsilateral loss of pain and temperature sensation.
- e. Ipsilateral loss of sense of movement.

b

84. The hypoglossal nerve:

- a. Carries taste sensation from the posterior third of the tongue.
- b. Carries fibers from the 2nd and 3rd cervical nerves.
- c. Emerges between the olive and the inferior cerebellar peduncle.
- d. Supplies all the muscles of the tongue.
- e. Its lesion causes deviation of the protruded tongue to the same side as the lesion.

e

85. Concerning the trigeminal nuclei, one is CORRECT:

- a. The main sensory nucleus is located in the medulla oblongata.
- b. The spinal nucleus extends in the spinal cord till the 6th cervical segment.
- c. The main sensory nucleus conveys pain and temperature sensations from the face.

- d. The mesencephalic nucleus conveys proprioceptive impulses from the muscles of mastication.
- e. They project to the ventral posterior lateral nucleus of the thalamus.

d

86. Bitemporal hemianopia indicates a lesion in:

- a. Optic nerve.
- b. Central part of the optic chiasma.
- c. Peripheral part of the optic chiasma.
- d. Optic tract.
- e. Optic radiation.

b

87. Contralateral homonymous hemianopia indicates a lesion in all of the following EXCEPT:

- a. Optic chiasma.
- b. Optic tract.
- c. Lateral geniculate body.
- d. Optic radiation.
- e. Primary visual area.

a

88. A pituitary adenoma (tumor) may cause one of the following:

- a. Blindness.
- b. Binasal hemianopia.
- c. Bitemporal hemianopia.
- d. Contralateral homonymous hemianopia.
- e. Contralateral homonymous hemianopia with macular sparing.

c

89. A vascular lesion of the primary visual area (17) may cause one of the following:

- a. Blindness.
- b. Binasal hemianopia.

- c. Bitemporal hemianopia.
- d. Contralateral homonymous hemianopia.
- e. Contralateral homonymous hemianopia with macular sparing.

e

90. Constriction of the right pupil when light is directed at the left eye needs all of the following EXCEPT:

- a. Left optic nerve.
- b. Left pretectal nucleus.
- c. Left optic radiation.
- d. Right Edinger-Westphal nucleus.
- e. Optic chiasma.

c

91. Constriction of the right pupil when light is directed at the left eye needs all of the following EXCEPT:

- a. Left optic nerve.
- b. Left pretectal nucleus.
- c. Right oculomotor nerve.
- d. Right optic nerve.
- e. Right Edinger-Westphal nucleus.

d

92. Nucleus ambiguus gives fibers to all of the following nerves EXCEPT:

- a. Glossopharyngeal nerve.
- b. Vagus nerve.
- c. Spinal accessory nerve.
- d. Cranial accessory nerve.
- e. Recurrent laryngeal nerve.

c

93. Nucleus ambiguus supplies all of the following muscles EXCEPT:

- a. All muscles of the larynx.
- b. Stylopharyngeus muscle.

- c. Constrictor muscles of the pharynx.
- d. Palatoglossus muscle.
- e. Tensor palati.

e

94. Nucleus solitarius receives all of the following EXCEPT:

- a. Taste sensation from the anterior two thirds of the tongue via the chorda tympani.
- b. Taste sensation from the posterior third of the tongue via the glossopharyngeal nerve.
- c. Taste sensation from the epiglottis via the vagus nerve.
- d. General sensation from the anterior two thirds of the tongue via the lingual nerve.
- e. General sensation from the viscera supplied by the vagus nerve.

d

95. Regarding the parasympathetic nuclei of the brainstem, all are correct EXCEPT:

- a. The superior salivatory nucleus supplies the lacrimal gland.
- b. The superior salivatory nucleus supplies the submandibular salivary gland.
- c. Fibers from the superior salivatory nucleus relay in the sphenopalatine ganglion.
- d. The inferior salivatory nucleus supplies the parotid gland.
- e. The Edinger-Westphal nucleus supplies the dilator pupillae muscle.

e

96. Regarding the parasympathetic nuclei of the brainstem, all are correct EXCEPT:

- a. The Edinger-Westphal nucleus is located in the midbrain opposite the inferior colliculus.
- b. Fibers from Edinger-Westphal nucleus relay in the ciliary ganglion.
- c. The superior salivatory nucleus is located in the pons.

- d. The inferior salivatory nucleus is located in the medulla oblongata.
- e. The dorsal motor nucleus of the vagus is located in the medulla oblongata.

a

97. Regarding the parasympathetic nuclei of the brainstem, all are correct EXCEPT:

- a. Fibers from the inferior salivatory nucleus relay in the otic ganglion.
- b. Fibers from the inferior salivatory nucleus pass through the deep petrosal nerve.
- c. The Edinger-Westphal nucleus gives fibers to the oculomotor nerve.
- d. Fibers from the superior salivatory nucleus relay in the submandibular ganglion.
- e. The dorsal motor nucleus of the vagus is present in the floor of the 4th ventricle.

b

98. Regarding the facial nerve, all are correct EXCEPT:

- a. It supplies all muscles of the second pharyngeal arch.
- b. It exits from the cerebello-pontine angle.
- c. Has motor nucleus that forms the facial colliculus.
- d. Has parasympathetic fibers that relay in the sphenopalatine ganglion.
- e. Has sensory fibers that end in the nucleus solitarius.

c

99. Regarding the thalamic nuclei, all are correct EXCEPT:

- a. The anterior nucleus is part of the limbic system.
- b. The medial nucleus is connected with the prefrontal cortex (personality center).
- c. The ventral anterior nucleus is connected with the motor and premotor areas.
- d. The ventral posterior lateral nucleus receives the medial lemniscus.

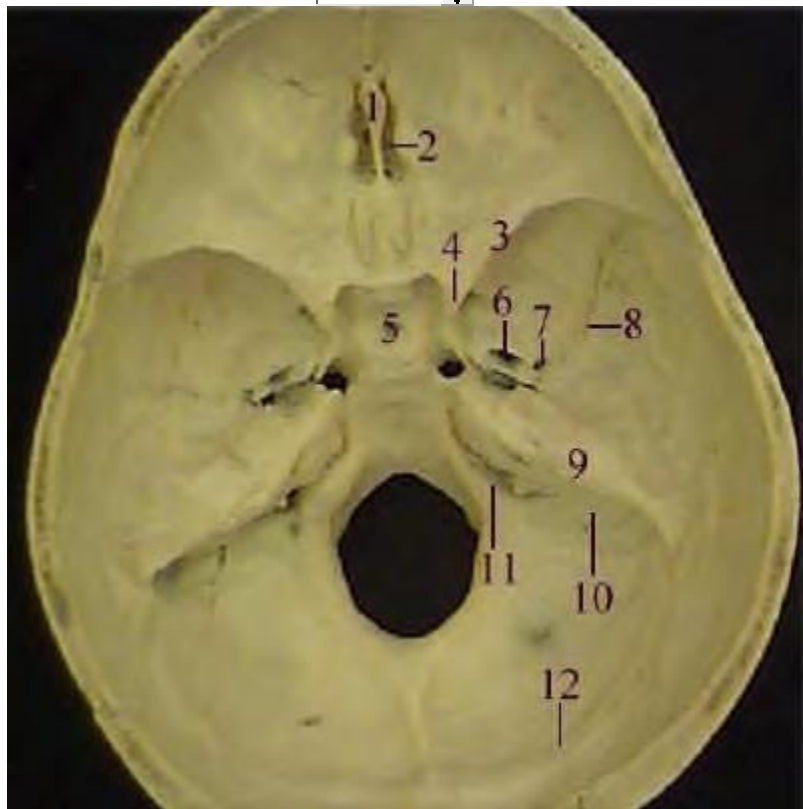
- e. The ventral posterior medial nucleus receives the spinal lemniscus.

e

100. Regarding the medial geniculate body, all are correct EXCEPT:

- a. It receives auditory information from both ears but mainly from the opposite ear.
- b. It receives auditory information from the superior colliculus.
- c. It projects to the auditory area in the superior temporal gyrus.
- d. It projects through the sublenticular part of the internal capsule.
- e. A lesion causes bilateral diminution of hearing.

b



1. The following are true:

- a. structure 1 is part of the ethmoid bone
- b. falx cerebri is attached to 1
- c. structure 2 is part part of the frontal bone

d. olfactory nerves pass through 2

e. anterior ethmoidal nerve passes through 2

a.T b.T c.F d.T e.T

2. The following are true:

a. the pituitary gland rests on 5

b. the free margin of the tentorium cerebelli is attached to 4

c. groove 8 is formed by internal carotid artery

d. groove 10 is formed by the internal jugular vein

e. groove 12 is formed by transverse venous sinus

a.T b.T c.F d.F e.T

3. The following are true about 3:

a. it forms the upper border of the superior orbital fissure.

b. it is related to the sphenoparietal sinus.

c. it calcifies in membranous.

d. it separates the anterior from the middle cranial fossa.

e. it ends by the anterior clinoid process.

a.T b.T c.T d.T e.T

4. Structures that passes through 6 include: a.
middle meningeal artery

b. mandibular branch of the trigeminal nerve

c. internal carotid artery

d. lesser superficial petrosal nerve

e. facial nerve

a.F b.T c.F d.T e.F

5. Structures passing through 11 include: a.
vertebral artery

b. vagus nerve

c. glossopharyngeal nerve

d. hypoglossal nerve

e. internal jugular vein

a.F b.T c.T d.F e.F

NEUROANATOMY EXAM QUESTIONS

LONG EASSYS

1. Formation and circulation of CSF and abnormalities in circulation
2. Origin and course of the facial nerve. Discuss also defects seen its injury
3. Formation and distribution of blood supply of the vertebral artery
4. Explain why patients with a thrombosis of the middle cerebral artery often present with homonymous hemianopia as well as hemiplegia and hemianesthesia.

SHORT EASSYS OR SHORT NOTES

1. Blood brain barrier
2. Internal capsule
3. Spinal bifida
4. Upper motor neuron lesion
5. Lumbar puncture
6. Histology of the retina

MCQ one correct answer

- 1) Which of the statement is Correct regarding the blood supply to brain: a.
Irreversible brain damage occurs if the blood flow is 50ml/100gm/min
b. The vertebral artery is always a branch of first part of subclavian artery
c. Cerebral blood flow is greater in the white matter than in the gray matter
d. The posterior cerebral artery supply most of the lateral surface of cerebral hemisphere
e. The anterior cerebral artery supply medial surface of the cerebral hemisphere to the parieto-occipital sulcus
- 2) Occlusion of the left middle cerebral artery can produce the following signs EXCEPT:
a. Ipsilateral deafness
b. Aphasia.
c. Contralateral hemiparesis and hemisensory loss of the face and arm.
d. Change in persentory.
e. Agraphia and alexia.

3) Which of the following statements regarding to the intracranial blood ressal is Correct:

- a. Posterior Communicating normally carry blood from the internal carotid to the posterior cerebral artery.
- b. Occlusion of the labyrinth in the artery can cause vertigo.
- c. The two Anterior Cerebral Artery may arise by a common stem.
- d. Bleeding from an aneurysm in the circle cause subdural hemorrhage.
- e. The anterior communications connect the anterior and middle cerebral arteries.

4) Which of the following statements regarding to the Anterior Choroidal Artery Correct:

- a. Branch of Anterior Cerebral Artery.
- b. It is of wide catbrier and hence rarely thrombosis.
- c. It anastomoses with the Posterior Choroidal Artery which is a branch of the middle Cerebral Artery.
- d. It supplies the hippocampus Formation.
- e. The thrombosis causes ipsilateral blindness because it supplies the optic nerve.

5) Which of the following statements regarding to the Posterior Cerebral Artery Correct:

- a. Its blockage can cause Contralateral Blindness.
- b. Its choroidal branch supplies the choroid plexus.
- c. Its central branches pass through the Posterior perforated substance to supply parts of thalamus and lentiform nucleus. d. It also supplies the choroid plexus.
- e. It is always a branch of the basilar artery.

6) The cortical branches of the Anterior Cerebral Artery can cause all EXCEPT:

- a. Contralateral Face weakness without sensory loss.
- b. Paralysis and sensory deficit of the contralateral leg.
- c. Behavioral and cognitive abnormalities.
- d. Memory and emotional disturbance.
- e. Disorder of sphincter control.

7. Which of the following structures pass between the infratemporal fossa and the pterygopalatine fossa through the pterygomaxillary fissure?

- A. posterior superior alveolar nerve
- B. maxillary nerve
- C. zygomatic nerve
- D. greater palatine nerve
- E. more than one of the above are correct

8. What type of ganglion is the pterygopalatine ganglion?

- A. sympathetic ganglion
- B. parasympathetic ganglion
- C. sensory ganglion
- D. somatic motor ganglion
- E. more than one of the above are correct

9. Athetosis type movements are often identified with a _____ lesion.

- A. Midbrain
- B. Basal ganglia
- C. Subthalamic
- D. Thalamus
- E. Cranial nerve VI

9. Changes in personality and judgment are often associated with a _____ lesion.

- A. Frontal lobe
- B. Parietal lobe
- C. Broca's area
- D. Wernicke's area
- E. Visual area

10. Changes in motor aphasia are often associated with a _____ lesion.

- A. Frontal lobe
- B. Parietal lobe
- C. Broca's area
- D. Wernicke's area
- E. Visual area

11. Changes in sensory aphasia are often associated with a _____ lesion.

- A. Frontal lobe
- B. Parietal lobe
- C. Broca's area
- D. Wernicke's area
- E. Visual area

12. Which of the following diseases has not been directly linked with Bell's palsy?

- A. AIDS

- B. Diabetes
 - C. Lyme disease
 - D. Alzheimer's disease
 - E. Shingles
13. Which of the following cervical nerve roots best corresponds with activation of the triceps muscle?
- A. C5
 - B. C6
 - C. C7
 - D. T2
 - E. T3
14. The trunks of the brachial plexus carry all of the following except:
- A. motor fibers
 - B. sensory fibers
 - C. sympathetic fibers
 - D. parasympathetic fibers
 - E. alpha fibers
15. Which of the following cranial nerves exits the brainstem via the preolivary sulcus?
- A. Abducens (VI)
 - B. Facial (VII)
 - C. Hypoglossal (XII)
 - D. Vagus (X)
 - E. Trigeminal (V)
16. Which of the following cranial nerves passes between the posterior cerebral artery and the superior cerebellar artery as it exits the brainstem?
- A. Abducens
 - B. Oculomotor
 - C. Optic
 - D. Trigeminal
 - E. Vestibulocochlear
17. Jerky and sudden random movements are often associated with a _____ lesion.
- A. Midbrain
 - B. Basal ganglia
 - C. Subthalamic
 - D. Thalamus
 - E. Frontal lobe

18. Which of the following arteries supplies Broca's area?
- A. ACA
 - B. MCA
 - C. PCA
 - D. Lateral striate
 - E. anterior communicating
19. Which of the following arteries if ruptured can cause an oculomotor palsy?
- A. ACA
 - B. MCA
 - C. PCA
 - D. Lateral striate
 - E. anterior communicating
20. Which of the following is not true concerning Brown-Sequard syndrome?
- A. Contralateral spinothalamic deficits
 - B. Ipsilateral spinothalamic deficits
 - C. Ipsilateral dorsal column deficits
 - D. Ipsilateral pyramidal tract deficits
 - E. loss of proprioception below the level of the lesion

TRUE/FLSE

1. The following structures are part of the diencephalon?
- (A) Caudate nucleus
 - (B) fornix
 - (C) Globus pallidus
 - (D) external capsule
 - (E) Thalamus
2. Which of the cranial nerves exits the midbrain?
- (A) CN I
 - (B) CN II
 - (C) CN III
 - (D) CN IV
 - (E) CN VI
3. Which part of the ventricular system contains choroid plexus?

- (A) Cerebral aqueduct
- (B) Frontal horn
- (C) Interventricular foramen
- (D) fourth ventricle
- (E) Third ventricle

4. A 50-year-old hypertensive woman complains of numbness and weakness in her left leg and foot. Which of the following arteries' occlusion can account for this complaint?

- (A) Anterior cerebral
- (B) Anterior choroidal
- (C) Interior carotid
- (D) Middle cerebral
- (E) Posterior

5. A 15-year-old boy is hit on the temple with a baseball and becomes unconscious. After About 10 minutes, he regains consciousness, but he soon becomes lethargic, and over the next 2 hours, he becomes stuporous. His pupils are unequal. Intracranial hemorrhage is suspected.

Which of the following arteries is most likely to be the source of the hemorrhage?

- (A) Anterior cerebral
- (B) Anterior communicating
- (C) Basilar
- (D) Middle cerebral
- (E) Middle meningeal

6. Which artery supplies the caudate and putamen and anterior limb of the internal capsule via the medial striate artery (of Heubner)?

- (A) Anterior cerebral
- (B) Anterior choroidal
- (C) Anterior communicating
- (D) Middle cerebral
- (E) Posterior communicating

7. Which artery supplies the cochlea?

- (A) Anterior inferior cerebellar

(B) Labyrinthine

(C) Pontine

(D) Posterior cerebral

(E) Superior cerebellar

8. A patient has the ability to stand with open eyes but falls with closed eyes. A lesion of which pathway is likely responsible for this symptom?

(A) Anterior spinocerebellar tract

(B) Anterior spinothalamic tract

(C) Lateral spinothalamic tract

(D) Posterior column syndrome

(E) Posterior spinocerebellar tract

9. Which of the following nerves innervates the auricle (pinna) of the external ear?

(A) V1

(B) C2

(C) V3

(D) III

(E) VIII

10. A six-year-old girl has brief, irregular contractions in her feet; symptoms are suspected to be a result of an untreated strep infection. What is the diagnosis?

(A) Chorea gravidarum

(B) Chorea major

(C) Ballism

(D) Hemiballism

(E) Sydenham chorea

CASE STUDY 1

A 7 year old girl was evaluated for recurring attacks of weakness, each lasting 2 to 3 hours. Her parents said they usually occurred after she rode her bicycle for long distances or ran around a lot with other children but that recently she had had one after simply eating two bananas. Laboratory tests showed normal serum electrolytes, normal thyroid function, and normal nerve conduction velocities.

- 1. What are the possible causes of weakness in this child?**
- 2. Normal muscle fibers fire sustained trains of action potentials in response to moderate depolarization by current injection. The patient's muscle fibers, obtained by biopsy, depolarized more than normal in response to a comparable stimulus, fired a brief burst of action potentials, and then became electrically inexcitable. Why might a depolarizing, normally excitatory stimulus cause a muscle (or neuronal) membrane to become electrically inexcitable?**
- 3. Why might exercise or eating bananas trigger such episodes?**

ANSWERS

1. Weakness implies probable malfunction of upper motor neurons, lower motor neurons, neuromuscular junctions, or muscles themselves.
2. Voltage-gated Na⁺ channels are the key substrate of action potentials, and blocking their activity makes muscle and neuronal membranes inexcitable. This patient's muscle membranes clearly contain a complement of such channels because they are able to fire bursts of action potentials. However, voltage-gated Na⁺ channels inactive after opening and are unavailable until the membrane repolarizes; hence, keeping Na⁺ channels in the inactivated state makes a membrane inexcitable. Patients with some forms of periodic paralysis have a relatively small percentage of mutant Na⁺ channels that inactivate abnormally slowly. After a burst of action potentials, they remain open, continue to depolarize the membrane, and prevent normal channels from deinactivating.
3. Increasing plasma K⁺ concentration from the normal resting value of about 4 mmol/L to 6-7 mmol/L is sufficient to cause the sequence of events described in answer 2.2. enough K⁺ is released from skeletal muscle during exercise to reach this value, and K⁺ -rich foods such as bananas, fruit juices, and avocados can do the same thing.

CASE STUDY 2

Seizures are the manifestation of periods of uncontrolled, rapid, synchroized firing of groups of cortical neurons, sometimes in localized areas (partial seizures) and sometimes in widespread areas in both hemispheres (generalized seizures). Most medications used to reduce the frequency of seizures do one or more of the following:

- a. Bind to voltage-gated Na⁺ channels and slow the rate at which they move from an inactivated state to the “resting” (deinactivated) state.
- b. Act at synapses that use GABA as a neurotransmitter, by enhancing the opening of GABA-gated ion channels, by blocking the reuptake of GABA from the synaptic cleft, or by blocking the enzymatic degradation of GABA.
- c. Block the type of voltage-gated Ca⁺⁺ channel that is prominent in thalamic neurons.

1. What might be the basis for the lowering of seizure frequency by each of these categories of drugs?

ANSWERS

- a. The duration of the absolute and relative refractory periods is largely determined by the rate at which voltage-gated Na⁺ channels deinactivate. Slightly slowing this rate would reduce the maximum firing frequency of neurons but have no effect on their low frequency behavior.
- b. GABA is the principal neurotransmitter mediating fast inhibitory transmission in the brain, so agents that enhance GABA transmission would generally reduce the excitability of neurons in the cortex (and elsewhere). This could be done by increasing the conductance of ligand-gated GABA receptors, or by making more GABA available.
- c. Some forms of epilepsy are characterized by rhythmic bursts of action potentials that arise from oscillatory interactions between the thalamus and the cortex. The thalamic contribution to the interaction is based on the slow waves produced by the opening of voltage-gated Ca⁺⁺ channels, so blocking these channels helps break the cycle.

CASE STUDY 3

A worried 22 year old woman arrived at her physician’s office complaining of numbness and tingling in her legs and difficulty seeing with her left eye. She said the problem had started that morning and gotten progressively worse throughout the day. She was found to have impaired position sense and moderate weakness in her right leg

although perception of pinprick there was normal. Position sense and strength were normal in her left leg, but she had difficulty perceiving pinprick there. Stroking the sole of her right foot caused dorsiflexion of the right big toe; when the sole of her left foot was stroked, she said it tickled and tried to withdraw the foot. Visual acuity of the right eye was 20/20. When she closed her right eye, she said everything looked fuzzy and dim, and visual acuity of that eye was 20/300. Both pupils were the same size; both constricted when light was shone into her right eye, and both dilated when the penlight was swung over to her left eye.

- 1. What could account for the problems in her right leg?**
- 2. What could account for the problems in her left leg?**
- 3. What could account for her visual problems?**
- 4. Is there any place in the nervous system where a single lesion could cause this collection of deficits?**
- 5. How could shining a light into one eye cause both pupils to dilate?**

ANSWERS

1. A selective deficit in position sense in the right leg is likely to indicate damage to the right fasciculus gracilis in the thoracic or upper lumbar spinal cord, or partial damage to the posterior column-medial lemniscus pathway at some level rostral to this. Weakness of the right leg, coupled with a Babinski sign, indicates damage to the corticospinal system. This could be damage on the right side of the thoracic or upper lumbar spinal cord (lateral corticospinal tract), partial damage at higher spinal levels on the right, or partial damage on the left above the pyramidal decussation.
2. A selective deficit in pain and temperature perception indicates damage to the anterolateral pathway on the right side of the thoracic or upper lumbar spinal cord, or partial damage at some higher CNS level.
3. A visual deficit confined to one eye indicates damage anterior to the optic chiasm (e.g. retina, optic, nerve).
4. The problems in this patient's legs can most easily be explained by damage on the right side of the thoracic or upper lumbar spinal cord. (Damage higher in the spinal cord would affect more than the legs. Damage in the brainstem or higher would affect only the contralateral side of the body). However, spinal cord damage would obviously not cause visual deficits, so multiple lesions must be involved in this case. This is a classic presentation of multiple sclerosis, in this case involving demyelinating plaques in the spinal cord and optic nerve.
5. Shining light in the normal eye causes both a direct and a consensual reflex, and both pupils constrict. Moving the light to the impaired eye decreases the

afferent input to the papillary light reflex, causing both pupils to constrict less (i.e. dilate). Moving a light back and forth between the eyes like this is called a swinging flashlight test, and pupillary dilation in response indicated an afferent pupillary defect.

CASE STUDY 4

A 71 year old hypertensive woman awoke one morning unable to move her right arm and leg. Her daughter, who lived next door, took her to the hospital, where she improved somewhat over the next several days. By the end of the week, her right leg was still so weak that she was unable to walk; she had increased knee-jerk and anklejerk reflexes on the right and a right Babinski sign. Her right arm had mostly recovered its strength, and her face was normal except for a slight drooping of the right side of her mouth. Her mental status was normal, as was sensation of all types. As the strength in her right arm improved, however, she noted that it had become extremely uncoordinated. She had marked ataxia, for example, when extending her right index finger from her nose to an examiner's finger and back, whether or not her eyes were open.

- 1. What might account for the remaining weakness in the patient's leg?**
- 2. What might account for the ataxia in the patient's arm?**
- 3. Can this pattern of deficits be explained by damage at one site in the nervous system?**

ANSWERS

1. Intact ability to repeat indicates damage outside the perisylvian language zone. Diminished fluency with mostly intact comprehension indicates anterior damage. This is transcortical motor aphasia.
2. Posterior continuation of the damage described in question 19.1 would cross the precentral and postcentral gyri in the region of the arm/hand representation.
3. This is a tough one. Occlusion of an artery leaving either the circle of Willis or the vertebrobasilar system causes damage that is typically worse in the territory fed by proximal parts of the artery (e.g. after middle cerebral artery occlusion, damage is worse in the perisylvian zone than farther away from the lateral sulcus). This is because other arteries can partially supply more peripheral parts of the territory through end-to-end anastomoses. The damage in contrast, seems to be near the area of overlap between middle cerebral and anterior cerebral arteries, in what is referred to as a watershed zone. Watershed infarcts can result from reduction in blood flow in multiple arteries at the same time, e.g. after cardiac arrest. This patient's left internal carotid artery was occluded, leading to reduced flow in the left ophthalmic, anterior cerebral, and middle cerebral arteries. The reduced flow in the anterior and middle cerebrals (either because of incomplete occlusion or coming from the circle of Willis) was able to save proximal parts of their territories from infarction, but the flow had run out before distal parts of the arteries were reached.

READING ASSIGNMENT

CEREBROVASCULAR

- Definition
- Types
- Symptoms
- Diagnosis
- Treatment
- Prevention

a.F b.T c.T d.F e.F

THE UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE
DEPARTMENT OF PHYSIOLOGICAL SCIENCES

PGY 412
CONTINUOUS ASSESSMENT TEST 1
30TH JANUARY, 2012

COMPUTER NO.:

TIME: 2½ HOURS

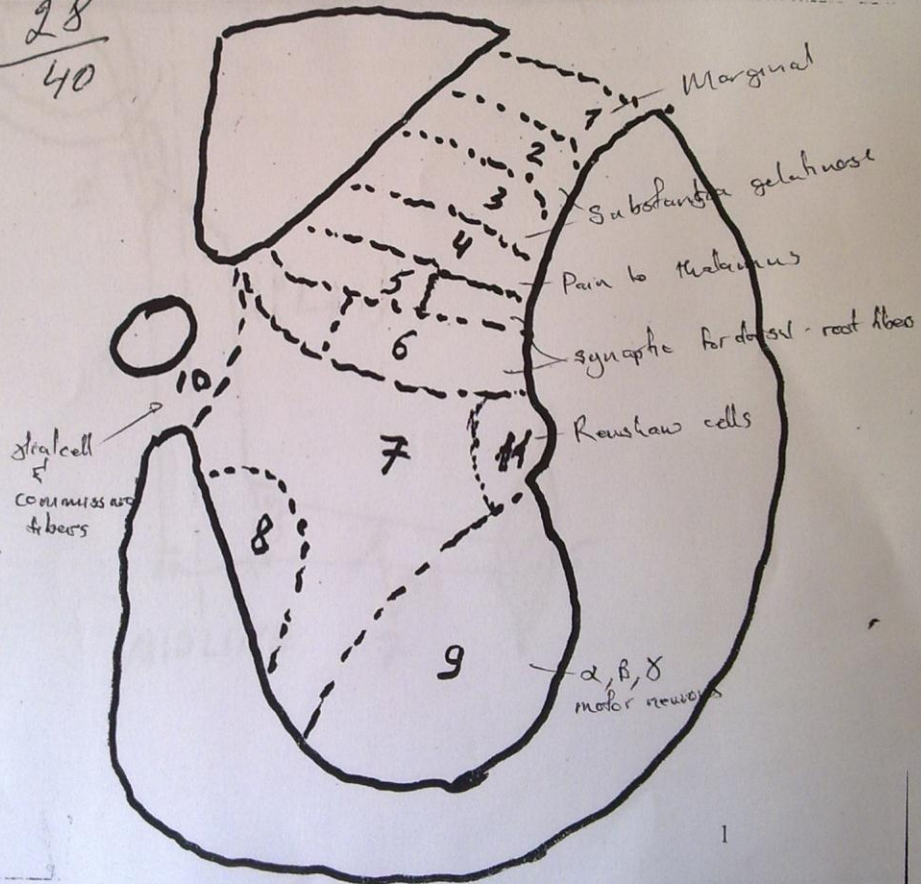
59%

SECTION A (40 MARKS)

1. In an essay form describe the Physiological functions of the layers of the spinal grey matter (20 Marks)

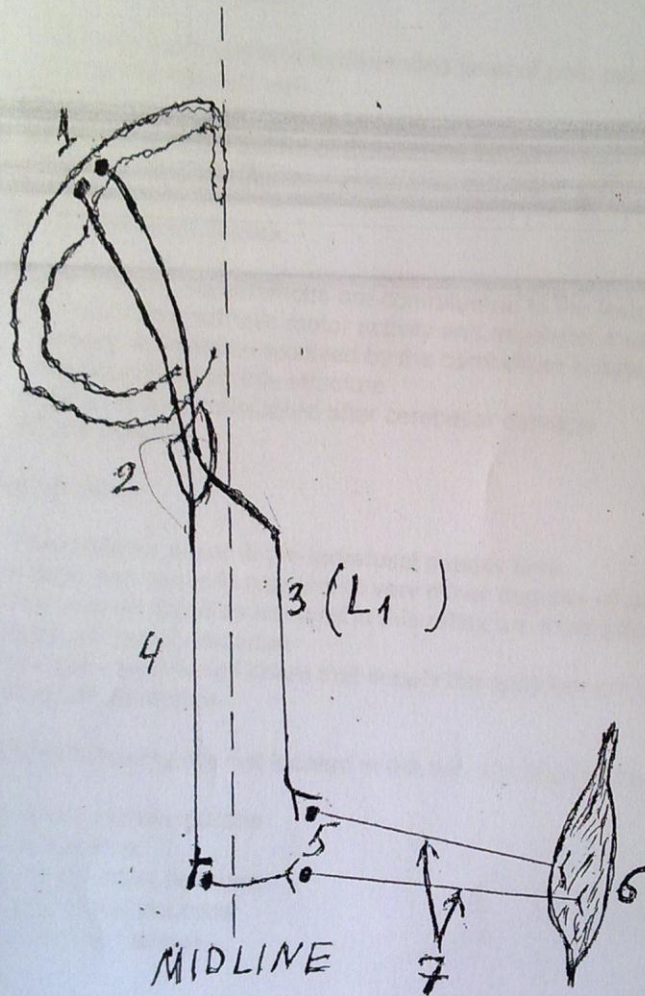
A $\frac{28}{40}$

Q1 $\frac{16}{20}$ Q2 $\frac{12}{20}$



Answer the following questions in an essay from (20 Marks)

- (a) Describe the tracts?
(b) Explain the Physiological role of these organizations.
(c) Explain the Physiological changes in function of transaction occurs at point 2 and 3.



Question 1-20 select the one that is the best in each case. Each question carries 1 mark.

1. Which of the following are not part of the analgesia system?
- (a) Periaqueductal gray matter
 - (b) Periventricular nuclei of the hypothalamus
 - (c) Raphe magnus nucleus
 - (d) Lateral spinothalamic tract
 - (e) A and C are correct
2. The dermatome rule is used:
- (a) Clinically by physicians to determine level of pain perception
 - (b) To explain referred pain
 - (c) To discern the slow pain response
 - (d) To determine the extent of Cutaneous tissue damage
 - (e) A and C are correct
3. Regarding Cerebellar Cortex:
- (a) After lesions, disturbances are contralateral to the lesion
 - (b) It coordinates somatic motor activity and regulates muscle tone
 - (c) Sensory information received by the cerebellum is acted upon at a conscious level by this structure
 - (d) Speech is rarely disrupted after cerebellar damage
 - (e) All are correct
4. The stretch reflex:
- (a) The receptor organ is the extrafusal muscle fibre
 - (b) It does not normally respond to very minor degrees of stretch
 - (c) The muscle spindles involved in this reflex are most plentiful in the large antigravity muscles
 - (d) The gamma-efferent fibres that supply the spindles are unmyelinated
 - (e) None of the above
5. Which of the following are not located in the anterior horn of the spinal cord?
- (a) Anterior motor neurons
 - (b) Interneurons
 - (c) Gamma motor neurons
 - (d) Alpha motor neurons
 - (e) None of the above

6. Which of the following functions are not attributable to the level of the spinal cord and/or lower brain?
- (a) Walking motions
 - (b) Reflex control of blood vessels
 - (c) Equilibrium
 - (d) Subconscious activities
 - (e) None of the above
7. The pyramidal tract:
- (a) Is composed solely of axons from pyramidal cells
 - (b) Is a crossed pathway
 - (c) Projects solely to the thalamus
 - (d) Originates from several areas of the cortex including area 4, frontal lobe, and the parietal lobe
 - (e) B and D are correct
8. The functions of the basal ganglia include:
- (a) The inhibition of muscle tone if they are all stimulated
 - (b) Coordinate fine movements of the digits
 - (c) The globus pallidus is not involved in setting background muscle tone
 - (d) The caudate nucleus and putamen inhibit gross motor movement
 - (e) B and D are correct
9. The primary motor cortex:
- (a) Receives no sensory input
 - (b) Is active in the adjustment of motor activity to current sensory input
 - (c) Is not necessary for fine motor movement
 - (d) Gives rise to the extrapyramidal tract
 - (e) Is localized only in the frontal lobe
10. The cell type that forms cerebrospinal fluid is the:
- (a) Ependymal cell
 - (b) Neuron
 - (c) Oligodendroglial cell
 - (d) Satellite cell
 - (e) Schwann cell
11. The sensation of high-frequency vibration is signaled by:
- (a) Golgi tendon organs
 - (b) Meissners corpuscles
 - (c) Muscle spindles
 - (d) Nociceptors
 - (e) Pacinian corpuscles

Raising the skin temperature to 52°C activates:

- (a) Meissner's corpuscles
- (b) Merkel's cell endings
- ☒ (c) Nociceptors
- (d) Pacinian corpuscles
- (e) Ruffini endings

13. An alpha-motoneuron that innervates a postural muscle such as the soleus muscle:

- (a) Is excited mono synaptically by Golgi tendon organ afferents
- (b) Forms endplates on 3 to 6 skeletal muscle fibers
- (c) Contributes to the patellar reflex
- ☒ (d) Belongs to a fast fatigable motor unit
- (e) Is inhibited disynaptic when the antagonist muscle is stretched

14. A lesion of which of the following structures may result in incoordination, reduced postural tone, and pendular phasic stretch reflexes?

- (a) Midbrain locomotor system
- (b) Motor cortex
- (c) Premotor cortex
- ☒ (d) Cerebellum
- (e) Superior colliculus

15. Which one of the following sensory systems uses unmyelinated fibers to convey information to the central nervous system (CNS)?

- (a) Proprioception
- (b) Vision
- (c) Vibration
- ☒ (d) Temperature
- (e) Pressure

16. Which one of the following statements about pain sensation is correct?

- (a) Painful sensations can be elicited by any sensory neuron if its firing frequency is high enough
- (b) Painful sensation arising from a particular area of the skin occur only when pain fibers from that area of the skin are stimulated
- (c) Cutting the anterolateral tract on both sides of the spinal cord will permanently eliminate painful sensations arising from skin region innervated by sensory neurons located below the site of the lesion
- (d) Pain fibers conduct impulses to the spinal cord and to skin regions surrounding the site of a painful stimulus
- ☒ (e) All the above are correct

17. Which one of the following statements best describes cold receptors?

- (a) Cold receptors produce a sensation of warmth when their firing frequency is very low
- (b) Sudden decreases in temperature always increase the firing frequency of cold receptors
- (c) Cold receptors are tonic receptors that slowly increase their firing rate when the temperature is decreased
- (d) Cold receptors do not fire at skin temperatures above body temperature
- (e) Cold receptors produce a sensation of pain when their firing frequency is very high

18. Which one of the receptors is responsible for monitoring the rate of muscle stretch?

- (a) Nuclear bag intrafusal fibers
- (b) Nuclear chain intrafusal fibers
- (c) Golgi tendon organs
- (d) Pacinian corpuscles
- (e) Ruffini corpuscles

19. This question concerns peripheral and central neurotransmitters and neuromodulators, which statement is most appropriate?

- (a) Noradrenaline is not found in neurons in the central nervous system
- (b) Glutamate is an inhibitory transmitter
- (c) The peptide substance P is found in peripheral motor nerve axons
- (d) Somatostatin, vasointestinal peptide and cholecystokinin are peptides which are found both in the gut and in neurons of the brain
- (e) GABA receptors are found in the peripheral tissues

20. The cerebrospinal fluid (CSF):

- (a) Has a higher concentration of glucose than blood
- (b) Contains more protein per unit volume than blood
- (c) Is formed at a rate that is proportional to the CSF pressure
- (d) Is absorbed at a rate that is proportional to the CSF pressure
- (e) Is removed largely through dural sleeves of the spinal nerve roots

110-120
↑ ↓
↓ 70
no filtration
not absorption
↑ 180

SECTION C

Questions 1 – 20 each consists of a stem and four statements. Write 'T' or 'F' if the statement is true/false respectively against the letter a, b, c, d, corresponding to the statement. Each question carries 2 marks. ¼ mark will be deducted for incorrect judgment.

1. The ankle jerk reflex is exaggerated:
F (a) When the muscles are voluntarily contracted
T (b) Immediately after complete spinal cord transaction at the cervical level
T (c) In extrapyramidal system disorders such as Parkinsonism
F (d) When cerebellar function is lost
2. Lower motor neuron disease:
F (a) Causes loss of voluntary movements but not of reflex movements
T (b) Causes eventual wasting of muscles concerned
T (c) Does not affect ventilation of the lungs
F (d) Is associated with involuntary twitching of small fasciculi in the affected muscles
3. Posterior damage in the spinal cord may impair:
F (a) The ability to stand steadily with the eyes closed
T (b) Touch sensation
T (c) The flexor plantar response to stimulation of the sole
T (d) Vibration sense
4. Sensory disturbance consisting of:
F (a) Pain, sensory loss and paraesthesiae in one leg suggests a spinal cord lesion
F (b) Loss of pain, temperature but not touch sensation suggests a lesion in the thalamus
T (c) Loss of all sensations in the skin region suggests a peripheral nerve or posterior root lesion
F (d) Loss of two-point discrimination but not touch sensation suggests a lesion in the thalamus
5. The cerebellum receives its information concerning muscle movement from the:
F (a) Cortex
T (b) Muscle spindles
T (c) Golgi tendon apparatus
F (d) Medulla

muscle spindle in a voluntary muscle is stimulated by:

- (a) ☐ Shortening of an antagonist muscle
- (b) ☐ Relaxation of the muscle when under load
- (c) ☐ Shortening of the extrafusal fibers of the muscle
- (d) ☐ Stimulation of the gamma efferents to the muscle spindle

7. Sensory nerves terminating in the grey matter of the spinal cord:

- (a) ☐ Elicit reflex responses
- (b) ☐ Enter the cord through the sensory roots
- (c) ☐ Enter the cord through the corticospinal tracts
- (d) ☐ Have facilitatory functions

8. The ascending tracts in the spinal cord:

- (a) ☐ The fasciculus gracilis and cuneatus contain fibres that mediate tactile discrimination
- (b) ☐ The lateral spinothalamic tract carries vibration and pressure modalities
- (c) ☐ The spinocerebellar tracts convey impulses from Golgi tendon organs
- (d) ☐ All afferent fibres cross the midline at some stage in the spinal cord

9. In the descending tracts in the spinal cord:

- (a) ☐ The lateral corticospinal tract extends laterally to the surface of the spinal cord
- (b) ☐ The vestibulospinal tract is a major crossed tract from the opposite vestibular nuclei
- (c) ☐ The vestibulospinal tract predominantly inhibits extensor motoneurons
- (d) ☐ Reticulospinal fibres are scattered throughout the anterior white columns

10. In the upper motor neurone lesion affecting one side of the body, the following abnormalities occur in the affected limb:

- (a) ☐ Wasting of muscles
- (b) ☐ Increased response to phasic stretch reflex
- (c) ☐ Greater weakness in the flexor muscles of the affected arm than extensors
- (d) ☐ Increased firing in the type of afferent fibres from the muscle

11. What are the results of unilateral damage to the cerebellum in man?

- (a) ☐ Disturbances of posture and disorganization of voluntary movement
- (b) ☐ Hemiplegia on the same side
- (c) ☐ Hemiplegia on the opposite side
- (d) ☐ Loss of sense of position on the same side of the body causing uncoordinated movements if the eyes are shut

Thermoperception:

- (a) ☐ The end organs of Krause and Ruffini subserve cold and heat
- (b) ☐ Thermoreceptors that respond to cold (cold spots) are more plentiful than those that respond to heat (hot spots)
- (c) ☐ Maximal discharge from 'hot spots' is between 40 and 45°C
- (d) ☐ Cold spots show a rapid discharge when the temperature exceeds 45°C

13. In the transmission of painful stimuli:

- (a) ☐ Pain receptors are polymodal in nature
- (b) ☐ Sharp, rapid, intense pain is carried by heavily myelinated fibres
- (c) ☐ Unmyelinated C fibres only carry slow, dull, diffuse, aching pain
- (d) ☐ Some pain fibres remain uncrossed in the spinal cord

14. In reflex actions:

- (a) ☐ The interval between the stimulus and the final effect is chiefly determined by the length of the afferent and efferent nerves
- (b) ☐ Spatial summation refers to simultaneous threshold stimulation of two or more nearby afferent nerves
- (c) ☐ Synapses are the first part of a reflex to become fatigued
- (d) ☐ Flexor reflexes are probably the most primitive of all reflexes

15. Volume and composition of cerebro-spinal fluid (CSF):

- (a) ☐ About half of the CSF is in the ventricles at any one time
- (b) ☐ CSF has similar composition to plasma except for protein
- (c) ☐ CSF protein levels are about half that in plasma
- (d) ☐ CSF glucose falls dramatically in tuberculous meningitis

16. The cerebro-spinal fluid:

- (a) ☐ Is formed by selective secretion by the cells of the choroid plexus
- (b) ☐ Acts as a supporting medium for the brain and spinal cord
- (c) ☐ Has a pressure higher than that of the blood in the superior sagittal sinus
- (d) ☐ Is defined as an extracellular fluid

17. The pyramidal system:

- (a) ☐ Destruction causes weakness and clumsiness
- (b) ☐ Has fibres which originate from the pre-motor area
- (c) ☐ Is also concerned with gross movements
- (d) ☐ Controls posture

18. General sensory pathways:

- (a) ☐ The anterior spinothalamic tracts transmit pain and crude touch
- (b) ☒ The pain receptors are free nerve endings
- (c) ☐ Information from the muscle spindle and golgi tendon organ does not reach consciousness
- (d) ☒ Both the spinothalamic and dorsal column pathways are highly discrete

19. Pain receptors in the gut and urinary tract may be stimulated by:

- (a) ☒ Distension
- (b) ☒ Inflammation of the wall
- (c) ☒ Acid fluid
- (d) ☒ Vigorous rhythmic contractions behind an obstruction

20. In which of the following tracts in the spinal cord do second-order sensory neurons with cell bodies in the dorsal horn ascend to more rostral spinal segments or to the brain?

- (a) ☐ Ventral corticospinal tract
- (b) ☒ Lateral spinothalamic tract
- (c) ☒ Anterior vestibulospinal tract
- (d) ☒ Ventral spinothalamic tract

MCQ ANSWER SHEET

Computer No.

No.	ITEMS					No.	ITEMS				
	A	B	C	D	E		A	B	C	D	E
1	E					33	T	T	T	T	
2	B					34	F	F	T	T	
3	E					35	F	F	F	F	
4	E					36	T	T	F	F	
5	B					37	F	T	T	T	
6	D					38	F	T	F	T	
7	B					39	T	T	T	T	
8	D					40	F	T	T	T	
9	B										
10	A										
11	E										
12	C										
13	E										
14	D										
15	D										
16	E										
17	C										
18	C										
19	D										
20	C										
21	F	T	T	F							
22	F	F	T	T							
23	F	T	T	T							
24	F	T	T	T							
25	F	T	T	F							
26	F	F	T	T							
27	F	T	F	F							
28	T	F	T	F							
29	T	F	F	T							
30	T	F	F	F							
31	T	F	F	F							
32	F	T	T	F							

15

$$R = 74/2 = 37$$

$$W = 6/4 = 1.5$$

$$T = \frac{36}{51}$$

UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE

NEUROSCIENCE

NES410 CONTINUOUS ASSESSMENT TEST 1-2013

Date: 30th January 2013

Maximum Marks: 100

Time: 3 (Three) Hours

Computer No. 28010230

SECTION A

40 MARKS

Answer all the four questions

1. Describe physiology of neurotransmitters(NT) using the format below: (10)

Type of NTs	Place of Action	Physiological effect and mechanism of action

2. Describe the physiology of pain sensation (10)
3. Give a brief and concise account of the origin, course, distribution and functional components of the VII cranial nerve (10)
4. Describe the sensory nerve supply to the tongue (10)

SECTION B SHORT NOTES

20 MARKS

Write Short notes on All the four (4) questions

1. physiology of thermoreception
2. physiology of cerebrospinal fluid
3. otic ganglion
4. upper motor neuron lesion

SECTION C: MULTIPLE CHOICE QUESTIONS - ONE CORRECT ANSWER
40 MARKS

Give the answer of your choice. Each question carries 1 mark. No penalty for any wrong answer

The stretch reflex:

- ☒ A. the receptor organ is the extrafusal muscle fiber
- B. it does not normally respond to very minor degrees of stretch
- C. the muscle spindles involved in this reflex are most plentiful in the large antigravity muscles
- D. the gamma-efferent fibers that supply the spindles are unmyelinated
- E. none of the above

In spinal shock:

- A. the duration is a function of cerebral dominance
- B. bladder function is lost
- C. A and B are correct
- D. noxious stimuli applied to the skin after spinal transection evokes flexion response immediately
- ☒ E. all are correct

3. The dermatome rule is used:

- A. clinically by physicians to determine level of pain perception
- B. to explain referred pain
- C. to discern the slow pain response
- D. to determine the extent of cutaneous tissue damage
- ☒ E. A and C are correct

4. Which of the following is/are not part of the analgesia system?

- A. periaqueductal gray matter
- B. periventricular nuclei of the hypothalamus
- C. raphe magnus nucleus
- D. lateral spinothalamic tract
- ☒ E. A and C are correct

5. Which of the following functions are not attributable to the level of the spinal cord and / or lower brain

- A. walking motions
- B. reflex control of blood vessels
- C. equilibrium
- D. subconscious activities
- ✓ ☒ E. none of the above

6. Synaptic innervations of a number of cells by one fiber is an example of:

- A. convergence
- B. chronaxie
- ☒ C. rheobase
- D. divergence
- E. reverberation

Which is not a feature of the central nervous system in mammals?

- A. spinal cord
- B. cerebral cortex
- ☒ C. sympathetic post-synaptic neuron
- D. cerebellum
- E. brain stem

8. Which of the following is not located in the anterior horn of the spinal cord?

- A. anterior motor neurons ✓
- ☒ B. interneurons
- C. gamma motor neurons ✓
- D. alpha motor neurons ✓
- ☒ E. none of the above

9. More than half of the fibers descending and ascending the spinal cord:

- A. provide multisegmental reflex pathways
- B. are referred to as propriospinal fibers
- C. include pathways of reflex coordination of simultaneous movement of body parts
- ☒ D. are involved in nociception
- E. A, B, and C are correct

10. An alpha-motor neuron that innervates a postural muscle such as the soleus muscle:

- A. is excited monosynaptically by Golgi tendon organ afferents
- B. forms endplates on 3 to 6 skeletal muscles fibers
- C. contributes to the patellar reflex
- ☒ D. belongs to a fast fatigable motor unit
- E. is inhibited disynaptic when the antagonist muscle is stretched

11. Raising the skin temperature to 52°C activates:

- A. Meissner's corpuscles
- ☒ B. Merkel's cell endings
- C. nociceptors
- D. Pacinian corpuscles
- ☒ E. Ruffini endings

12. The sensation of high-frequency vibration is signaled by:

- A. Golgi tendon organs ✓
- B. Meissner's corpuscles ✓
- C. Muscles spindles ✓
- ☒ D. Nociceptors
- ☒ E. Pacinian corpuscles ✓

13. The cell type that forms cerebrospinal fluid is the:

- ☒ A. ependymal cell
- B. neuron
- C. oligodendroglial cell
- D. satellite cell
- E. astrocyte

4. The cerebrospinal fluid (CSF):
- A. has a higher concentration of glucose than blood
 - B. contains more protein per unit volume than blood
 - C. is formed at a rate that is proportional to the CSF pressure
 - ✓ ☒ D. is absorbed at a rate that is proportional to the CSF pressure
 - E. is removed largely through dural sleeves of the spinal nerves roots
15. An automobile accident causes an injury of the sciatic nerve. As a consequence of the injury, you would expect:
- A. death of all of the dorsal root ganglion cells whose axons were interrupted
 - ☒ B. release of antibodies to nerve growth factor from Schwann cells ensheathing the damaged axons
 - C. regrowth of the axons distal to the injury at a rate of 400mm/day
 - D. chromatolysis of motor neurons in the lumbosacral spinal cord
 - E. eventual complete restoration of sensory and motor function
16. Concerning the peripheral and central neurotransmitters and neuromodulators, which statement is most appropriate?
- A. noradrenaline is not found in neurons in the CNS
 - B. glutamate is an inhibitory transmitter
 - ✓ ☒ C. the peptide substance P is found in peripheral motor nerve axons
 - ☒ D. somatostatin, vasointestinal peptide and cholecystikinin are peptides which are found both in the gut and in neurons of the brain
 - E. GABA receptors are found in the peripheral tissues
17. Which one of the receptors is responsible for monitoring the rate of muscle stretch?
- A. nuclear bag intrafusal fibers
 - ✓ ☒ B. nuclear chain intrafusal fibers
 - ☒ C. Golgi tendon organs
 - D. Pacinian corpuscles
 - E. Ruffini endings
18. Which one of the following statements best describes cold receptors?
- A. cold receptors produce a sensation of warmth when their firing frequency is very low
 - ✓ ☒ B. sudden decrease in temperature always increases the firing frequency of cold receptors
 - C. cold receptors are tonic receptors that slowly increase their firing rate when the temperature is decreased
 - D. cold receptors do not fire at skin temperature above body temperature
 - E. cold receptors produce a sensation of pain when their firing frequency is very high
19. Which one of the following statements about pain sensation is correct?
- A. painful sensations can be elicited by any sensory neuron if its firing frequency is high enough
 - B. painful sensation arising from a particular area of the skin occurs only when pain fibers from that area of the skin are stimulated
 - ☒ C. cutting the anterolateral tract or both sides of the spinal cord will permanently eliminate painful sensations arising from skin region

- D. pain fibers conduct impulse to the spinal cord and to skin regions surrounding the site of a painful stimulus
- E. all the above are correct

Which one of the following sensory system uses unmyelinated fibers to convey information to the CNS?

- A. proprioception
- B. vision
- C. vibration
- D. temperature x
- E. pressure

Pain & Temperature

The styloid process of the temporal bone

- A develops from the second branchial pouch
- B is absent in a new born baby
- C is formed by endochondral ossification
- D has four muscles attached to it
- E the stylomandibular ligament has the origin as the process.

2. The parathyroid glands:

- A are usually four on each side x
- B develops from the endoderm of the second pharyngeal pouch
- C are exocrine in nature x
- D consist of cords of principal and oxyphil cells
- E shrivel and disappear in old age

23. The following are all features of the facial nerve in the petrous part of the temporal bone except:

- A the greater petrosal nerve
- B geniculate ganglion
- C nerve to stapedius
- D tympanic plexus
- E chorda tympani

24. The following foramina match with the structures that pass through them except:

- | | |
|------------------------|------------------------------|
| A stylomastoid foramen | - posterior auricular artery |
| B foramen of Vesalius | - emissary vein |
| C foramen spinosum | - middle meningeal artery |
| D foramen rotundum | - maxillary nerve |
| E jugular foramen | - hypoglossal nerve |

25. Concerning air sinuses

- A frontal sinuses are present at birth x
- B sphenoid sinus is not present at birth
- C the floor of the maxillary sinus overlies the second premolar tooth x
- D ethmoidal sinuses all have one common opening
- E the sinuses are all symmetrical.

26. The following statements regarding the thyroid cartilage are all true **except**:
- ☒ A. the thyroid laminae are medial to the piriform recesses
 - B. the sternothyroid muscle is attached to the oblique line
 - C. the thyrohyoid muscle is attached to the oblique line
 - D. the inferior constrictor muscle is attached to the oblique line
 - ☒ E. it ossifies in the elderly
27. The tongue:
- A. has lymphatics from its tip which drain into the preauricular lymph nodes
 - ☒ B. it starts to develop at about the fourth week
 - C. is retracted by genioglossus
 - D. is supplied by dorsal lingual arteries which are branches of the inferior alveolar artery
 - ☒ E. all of the above
28. The mandibular nerve:
- A. exits from the skull through the foramen rotundum
 - B. contains preganglionic fibres to the parotid gland
 - C. has an anterior division which is chiefly sensory in function
 - D. continues as the mylohyoid nerve
 - ☒ E. supplies the tensor tympani muscle
29. The cornea of the eyeball
- A. is adducted and elevated by the inferior rectus x
 - B. is medially rotated by the inferior oblique ✓
 - ☒ C. is supplied by the nasociliary nerve x
 - ☒ D. is abducted by the medial rectus ✓
 - E. is elevated and abducted by the superior oblique
30. Cerebrospinal fluid is formed in the:
- A. arachnoid granulations ✓
 - B. dural venous sinuses
 - C. subarachnoid space
 - ☒ D. choroid plexuses ✓
 - E. tela choroidea
31. Which part of the brain lies just inferior to the lower free edge of the falx cerebri?
- ☒ A. corpus callosum x
 - B. diencephalon x
 - C. tectum of the midbrain ✓
 - D. thalamus
 - E. cerebellum x
32. Preganglionic parasympathetic fibres to the lacrimal gland synapse in the:
- A. otic ganglion
 - ☒ B. ciliary ganglion
 - C. cervical ganglia x
 - ☒ D. pterygopalatine ganglion x
 - E. submandibular ganglion

3. Which of the following cranial nerves emerge from the pons?
A. oculo motor
☒ B. trigeminal
C. trochlear
D. vagus
E. hypoglossal
34. The inferior sagittal sinus:
A. flows backwards along the inferior border into the cavernous sinus
☒ B. joins the great cerebral vein (of Galen) to form the straight sinus
C. unites with the superior sagittal sinus at the confluence of sinuses
D. it receives a few cerebral veins from the lateral surface of the cerebral hemisphere
☒ E. A and C only
35. The opening of the nasolacrimal duct in the nasal cavity is located in the:
A. superior meatus
B. middle meatus
☒ C. inferior meatus
D. bulla ethmoidalis
E. hiatus semilunaris
36. The superior orbital fissure lies between the:
☒ A. lesser wing of the sphenoid and the orbital plate of the frontal bones
B. lateral pterygoid plate and ethmoid bones
C. maxillary and ethmoid bones
D. sphenoid and ethmoid bones
E. greater and lesser wings of the sphenoid
37. Regarding the structure of the tongue:
A. its musculature is mostly of the smooth type
B. fungiform papillae are more numerous than filiform papillae
☒ C. it is divided into the right and left halves by a median fibrous septum
D. circumvallate papillae are supplied by the lingual nerve
☒ E. none of the above
38. The tympanic nerve is a branch of the:-
A. facial nerve
☒ B. glossopharyngeal nerve
☒ C. maxillary division of the trigeminal nerve
D. mandibular division of the trigeminal nerve
E. vagus
39. The superior meatus communicates with the:
A. anterior ethmoidal air cells
☒ B. frontal air sinus
☒ C. posterior ethmoidal air cells
D. maxillary air sinus
E. all of the above

40. The recurrent laryngeal nerve is:
- A. mot or to the inferior constrictor muscle
 - B. mot or to the cricothyroid
 - C. sensory to all the mucous membrane of the larynx
 - D. secretomotor to the thyroid gland
 - ☒ E. the le ft nerve hooks around the arch of the aorta

END OF TEST

PROBABLE TEST 1 QUESTIONS NEUROSCIENCE

41. Adverse effects of chlorpromazine include
- A. Depression with suicidal risk
 - B. Parkinsonism
 - C. Cholestatic jaundice
 - D. Dermatitis
42. Drugs used in the management of generalized tonic-clonic seizure disorder include
- A. Chlorpromazine
 - B. Lithium
 - C. Ethosuximide
 - D. Phenytoin
43. Which of the following anti-psychotic drugs have high affinity for 5-HT₂ receptors?
- A. Chlorpromazine
 - B. Clozapine
 - C. Risperidone
 - D. Haloperidol
44. Which of the following drugs are used in the management of bipolar disorder?
- A. Lithium
 - B. Phenobarbital
 - C. Diazepam
 - D. Valproate
45. Benzodiazepines
- A. Are commonly used in the management of depression
 - B. Act at the GABA receptor
 - C. Tend to cause agitation and restlessness
 - D. Can worsen the seizure associated with alcohol withdrawal syndrome
46. Regarding hypnotics and anxiolytics
- A. Beta adrenoceptor antagonists act centrally to reduce anxiety

- B. The effects of zolpidem can be antagonized by flumazenil
- C. Antidepressants are rapidly acting anxiolytic drugs
- D. Chlormethiazole has low addictive potential

47. Tricyclic antidepressants

- A. Can be taken with monoamine oxidase inhibitors in patients showing poor therapeutic response
- B. Have a wide therapeutic index and safe in overdose
- C. Are commonly associated with weight loss
- D. Can cause severe hypertension in a patient taking food that is rich in tyramine

48. In psychotic disorders

- A. Positive symptoms tend to be refractory to treatment with first generation neuroleptics
- B. Atypical neuroleptics have a strong affinity for dopamine D2 receptors
- C. Risperidone is less likely to cause extrapyramidal symptoms compared to haloperidol
- D. Neuroleptic drugs with anti-muscarinic activity have the greatest potential for causing Parkinsonism

49. Which of the following anti-epileptic drugs is correctly matched with the stated adverse effect?

- A. Valproate: gingival hyperplasia
- B. Phenytoin: teratogenicity
- C. Carbamazepine: hyper-uricaemia
- D. Phenobarbital: learning impairment in children

50. Concerning fluoxetine

- A. Serotonin syndrome can result when given concurrently with a monoamine oxidase inhibitor
- B. Inhibits re-uptake of noradrenaline
- C. Is highly sedative
- D. Is useful in management of partial seizures

51. Drugs that are indicated in the management of absence seizures include

- A. Carbamazepine
- B. Phenytoin
- C. Clonazepam
- D. Valproate

52. Concerning management of Parkinsonism

- A. Levodopa is less associated with development of dyskinesias than bromocriptine FALSE
 - B. Bromocriptine is the drug of choice in Parkinsonism induced by anti-psychotic drugs FALSE
 - C. Catechol-O-methyl transferase inhibitors are indicated as add-on therapy in patients experiencing motor fluctuations on levodopa/carbidopa TRUE D. Amantadine worsens dyskinesias associated with levodopa
53. Concerning anxiolytics/sedatives/hypnotics, which of the following drugs are correctly matched to the statements given?
- A. Phenobarbital indicated for the treatment of sleep disorders
 - B. Zolpidem is also used in the management of muscle spasms
 - C. Buspirone has no hypnotic properties
 - D. Chlormethiazole can be used to suppress seizures that occur in alcohol withdrawal syndrome
54. Concerning benzodiazepines
- A. They inhibit gamma amino butyric acid activity
 - B. Short-acting benzodiazepines are the most appropriate for the management of alcohol withdrawal syndrome
 - C. Diazepam is the drug of choice for absence seizures
 - D. Benzodiazepines are effective as mood stabilisers in bipolar disorder
55. Which of the following statements are true concerning anxiolytic/sedative/hypnotic drugs?
- A. All benzodiazepines are lipid soluble
 - B. Buspirone is an effective anti-convulsant
 - C. Zolpidem is used in the management of short-term insomnia
 - D. Chlormethiazole is contraindicated in alcohol withdrawal syndrome
56. Which of the following drugs are correctly matched with the attached statement?
- A. Apomorphine: has anti-emetic properties
 - B. Selegiline: has been associated with rapid deterioration of Parkinson's disease
 - C. Carbidopa: inhibits DOPA decarboxylase in the periphery
 - D. Amantadine: can cause hallucinations
57. Drugs used in the treatment of insomnia include:
- A. Zolpidem
 - B. Phenobarbitone
 - C. Buspirone

- D. Nitrazepam
58. Clinical indications of barbiturates include:
- A. Anxiety disorders
 - B. Epilepsy
 - C. General anaesthesia
 - D. Insomnia
59. Drugs likely to increase the effects of benzodiazepines include:
- A. Ethanol
 - B. Cimetidine
 - C. Rifampicin
 - D. Flumazenil
60. Flumazenil:
- A. Blocks the actions of zolpidem
 - B. Blocks the actions of phenobarbital
 - C. Is a benzodiazepine antagonist
 - D. Can be used to treat benzodiazepine overdose
61. Concerning zolpidem:
- A. Is used in the management of epilepsy
 - B. Has higher risk of development of dependence compared to benzodiazepines
 - C. Risk of seizures limits its clinical use
 - D. It is used in relieving the muscle spasms of tetanus
62. Anti-seizure drugs that act by enhancing GABA-mediated neuronal inhibition include:
- A. Ethosuximide
 - B. Carbamazepine
 - C. Clonazepam
 - D. Phenobarbital
63. Which of these anti-epileptic drugs are used in the management of generalised tonic-clonic seizures?
- A. Carbamazepine
 - B. Lamotrigine
 - C. Ethosuximide
 - D. Phenytoin
64. Which of the following drugs are selective serotonin re-uptake inhibitors?
- A. Imipramine
 - B. Fluoxetine
 - C. Phe
nelzine

D. Isocarboxazid

65. The drugs that are effective for myoclonic seizures include:
- A. Carbamazepine
 - B. Phenytoin
 - C. Clonazepam
 - D. Valproate
66. Which of these drugs are effective in stopping generalised tonic-clonic status epilepticus?
- A. Valproate
 - B. Lorazepam
 - C. Phenytoin
 - D. Lamotrigine
67. Which of these are dose-related adverse effects of phenytoin?
- A. Ataxia
 - B. Hirsutism
 - C. Sedation
 - D. Hepatitis
68. Which of these drugs are recommended for the treatment of drug induced parkinsonism?
- A. Benztropine
 - B. Selegiline
 - C. Haloperidol
 - D. Levodopa
69. Indicate whether the statements given below are true or false
- A. Levodopa used effectively can control Parkinson's disease throughout a patient's life
 - B. Levodopa is the treatment of choice in Parkinsonism regardless of the cause
 - C. Dopamine receptor antagonists can reduce the motor symptoms of Huntington's chorea in some patients
 - D. Baclofen can be used to alleviate muscle spasm in cerebral vascular disorders
70. Concerning neuroleptic drugs
- A. All neuroleptic drugs are agonists on dopamine receptors
 - B. Clozapine has many extrapyramidal effects
 - C. Neuroleptic drugs increase prolactin secretion by stimulating dopamine receptors in the anterior pituitary

- D. Tardive dyskinesia, one of the motor adverse effects of neuroleptic drugs, usually declines as treatment progresses
71. Concerning tricyclic antidepressants
- A. They include imipramine and amitriptyline
 - B. They block the re-uptake of noradrenaline and serotonin
 - C. They have a wide therapeutic margin
 - D. Their unwanted effects include diarrhea and hypertension
72. Concerning mono-amine oxidase inhibitors
- A. Action on MAO-A, rather than MAO-B, is probably more important for antidepressant action
 - B. They commonly cause hypotension as a side effect
 - C. Can cause central nervous system stimulation and arousal
 - D. Have been associated with severe hypotension when taken with tyramine containing foods such as cheese
73. Which of the following drugs are used in the treatment of muscle spasms
- A. Baclofen
 - B. Diazepam
 - C. Chlormethiazole
 - D. Phenobarbital
74. Which of the following drugs are used in the treatment of insomnia?
- A. Thiopental
 - B. Zolpidem
 - C. Buspirone
 - D. Propranolol
75. Which of the following drugs do not have anti-convulsant effects?
- A. Flumazenil
 - B. Diazepam
 - C. Chlormethiazole
 - D. Buspirone
76. Which of the following drugs can induce Parkinsonism?
- A. Haloperidol
 - B. Diazepam
 - C. Bromocriptine
 - D. Amitriptyline

77. Which of the following drugs would be helpful in countering psychosis induced by levodopa in the treatment of Parkinson's disease?

- A. Haloperidol
- B. Clozapine
- C. Bromocriptine
- D. Amantadine

78. The spinal cord has

- (a) an outer covering of gray matter and an inner core of white matter.
- (b) an enlargement below that forms the conus medullaris.
- (c) anterior and posterior roots of a single spinal nerve attached to a single segment. (d) cells in the posterior gray horn that give rise to efferent fibers that supply skeletal muscles.
- (e) a central canal that is situated in the white commissure.

79. The medulla oblongata has

- (a) a tubular shape.
- (b) the fourth ventricle lying posterior to its lower part.
- (c) the midbrain directly continuous with its upper border.
- (d) no central canal in its lower part.
- (e) the spinal cord directly continuous with its lower end in the foramen magnum.

80. The midbrain has

- (a) a cavity called the cerebral aqueduct.
- (b) a large size.
- (c) no cerebrospinal fluid around it.
- (d) a cavity that opens above into the lateral ventricle. (e) a location in the middle cranial fossa of the skull.

81. The following statements concern the cerebellum:

- (a) It lies within the middle cranial fossa.
- (b) The cerebellar cortex is composed of white matter.
- (c) The vermis is the name given to that part joining the cerebellar hemispheres together.
- (d) The cerebellum lies anterior to the fourth ventricle.
- (e) The dentate nucleus is a mass of white matter found in each cerebellar hemisphere.

82. The following statements concern the cerebrum:

- (a) The cerebral hemispheres are separated by a fibrous septum called the tentorium cerebelli.
- (b) The bones of the vault of the skull are named from the lobes of the cerebral hemisphere over which they lie.
- (c) The corpus callosum is a mass of gray matter lying within each cerebral hemisphere. (d) The internal capsule is an important collection of nerve fibers, which has the caudate nucleus and the thalamus on its medial side and the lentiform nucleus on its lateral side.
- (e) The cavity present within each cerebral hemisphere is called the cerebral ventricle.

83. The following statements concern the peripheral nervous system:

- (a) There are ten pairs of cranial nerves.
- (b) There are eight pairs of cervical spinal nerves.
- (c) The posterior root of a spinal nerve contains many efferent motor nerve fibers. (d) A spinal nerve is formed by the union of an anterior and a posterior ramus in an intervertebral foramen.
- (e) A posterior root ganglion contains the cell bodies of autonomic nerve fibers leaving the spinal cord.

84. The following statements concern the central nervous system:

- (a) A CT brain scan cannot distinguish between white matter and gray matter.
- (b) The lateral ventricles are in direct communication with the fourth ventricle.
- (c) An MRI of the brain uses the magnetic properties of the hydrogen nucleus excited by radiofrequency radiation transmitted by a coil surrounding the patient's head. (d) Following trauma and sudden movement of the brain within the skull, the large arteries at the base of the brain are commonly torn.
- (e) The movement of the brain at the time of head injuries is unlikely to damage the small sixth cranial nerve.

85. The following statements concern the cerebrospinal fluid:

- (a) The cerebrospinal fluid in the central canal of the spinal cord is unable to enter the fourth ventricle.
- (b) With the patient in the recumbent position, the normal pressure is about 60 to 150 mm of water.
- (c) It plays only a minor role in the protection of the brain and spinal cord from traumatic injury.
- (d) Compression of the internal jugular veins in the neck lowers the cerebrospinal fluid pressure.

(e) The subdural space is filled with cerebrospinal fluid.

86. The following statements concern the vertebral levels and the spinal cord segmental levels:

- (a) The first lumbar vertebra lies opposite the L3-4 segments of the cord.
- (b) The third thoracic vertebra lies opposite the third thoracic spinal cord segment.
- (c) The fifth cervical vertebra lies opposite the seventh cervical spinal cord segment.
- (d) The eighth thoracic vertebra lies opposite the ninth thoracic spinal cord segment.
- (e) The third cervical vertebra lies opposite the fourth cervical spinal cord segment.

87. A 23-year-old woman was unconscious when admitted to the emergency department. While crossing the road, she had been hit on the side of the head by a bus. Within an hour, she was found to have a large doughlike swelling over the right temporal region. She also had signs of muscular paralysis on the left side of the body. A lateral radiograph of the skull showed a fracture line running downward and forward across the anterior inferior angle of the right parietal bone. Her coma deepened, and she died 5 hours after the accident.

88. Select the most likely cause of the swelling over the right temporal region in this patient.

- (a) Superficial bruising of the skin
- (b) Hemorrhage from a blood vessel in the temporalis muscle
- (c) Rupture of the right middle meningeal vessels
- (d) Edema of the skin
- (e) Hemorrhage from a blood vessel in the superficial fascia

89. Select the most likely cause of the muscular paralysis of the left side of the body in this patient.

- (a) Laceration of the right side of the cerebral hemisphere
- (b) Right-sided epidural hemorrhage
- (c) Left-sided epidural hemorrhage
- (d) Injury to the cerebral cortex on the left side of the brain
- (e) Injury to the right cerebellar hemisphere

90. The following statements concern the cell of origin of the tracts listed below:

- (a) The fasciculus cuneatus arises from the cells in the substantia gelatinosa.
- (b) The anterior spinal thalamic arises from the cells in posterior root ganglion.
- (c) The fasciculus gracilis arises from the cells in the nucleus dorsalis (Clarke's column).
- (d) The anterior spinocerebellar arises from the cells in the posterior root ganglion. (e) The lateral spinothalamic arises from the cells in the substantia gelatinosa.

91. The following statements concern the courses taken by the tracts listed below:

- (a) The fasciculus gracilis does not cross to the opposite side of the neural axis.
- (b) The spinotectal tract does not cross to the opposite side of the spinal cord.
- (c) The lateral spinothalamic tract does not cross to the opposite side of the spinal cord.
- (d) The posterior spinocerebellar tract does cross to the opposite side of the neural axis.
- (e) The anterior spinothalamic tract immediately crosses to the opposite side of the spinal cord.

92. The following statements concern the nucleus of termination of the tracts listed below:

- (a) The posterior white column tracts terminate in the inferior colliculus.
- (b) The spinoreticular tract terminates on the neurons of the hippocampus.
- (c) The spinotectal tract terminates in the inferior colliculus.
- (d) The anterior spinothalamic tract terminates in the ventral posterolateral nucleus of the thalamus.
- (e) The anterior spinocerebellar tract terminates in the dentatenucleus of the erebellum.

93. The following statements relate sensations with the appropriate nervous pathways:

- (a) Two-point tactile discrimination travels in the lateral spinothalamic tract.
- (b) Pain travels in the anterior spinothalamic tract.
- (c) Unconscious muscle joint sense travels in the anterior spinocerebellar tract.
- (d) Pressure travels in the posterior spinothalamic tract.
- (e) Vibration travels in the posterior spinocerebellar tract.

94. The following statements concern the anterior surface of the medulla oblongata:

- (a) The pyramids taper inferiorly and give rise to the decussation of the pyramids. (b) On each side of the midline, there is an ovoid swelling called the olive, which contains the corticospinal fibers.
- (c) The hypoglossal nerve emerges between the olive and the inferior cerebellar peduncle.
- (d) The vagus nerve emerges between the pyramid and the olive.

(e) The abducent nerve emerges between the pons and the midbrain.

95. The following general statements concern the medulla oblongata:

- (a) The caudal half of the floor of the fourth ventricle is formed by the rostral half of the medulla.
- (b) The central canal extends throughout the length of the medulla oblongata. (c) The nucleus gracilis is situated beneath the gracile tubercle on the anterior surface of the medulla.
- (d) The decussation of the medial lemnisci takes place in the rostral half of the medulla.
- (e) The cerebellum lies anterior to the medulla.

96. The following statements concern the interior of the lower part of the medulla:

- (a) The decussation of the pyramids represents the crossing over from one side of the medulla to the other of one-quarter of the corticospinal fibers.
- (b) The central canal of the spinal cord is not continuous upward into the medulla.
- (c) The substantia gelatinosa is not continuous with the nucleus of the spinal tract of the trigeminal nerve.
- (d) The medial lemniscus is formed by the anterior spinothalamic tract and the spinotectal tract.
- (e) The internal arcuate fibers emerge from the nucleus gracilis and nucleus cuneatus.

97. The following statements concern the interior of the upper part of the medulla:

- (a) The reticular formation consists of nerve fibers, and there are no nerve cells bodies
- (b) The nucleus ambiguus constitutes the motor nucleus of the vagus, cranial part of the accessory, and hypoglossal nerves.
- (c) Beneath the floor of the fourth ventricle are located the dorsal nucleus of the vagus and the vestibular nuclei.
- (d) The medial longitudinal fasciculus is a bundle of ascending fibers on each side of the midline.
- (e) The inferior cerebellar peduncle connects the pons to the cerebellum.

98. The following statements concern the Arnold-Chiari phenomenon:

- (a) It is an acquired anomaly.
- (b) The exits in the roof of the fourth ventricle may be blocked.
- (c) The cerebellum never herniates through the foramen magnum.
- (d) It is not associated with various forms of spina bifida. (e) It is safe to perform a spinal tap in this condition.

99. Concerning the Cerebellum

- a) Provides timing signals
- b) Motor learning
- c) Has an overall inhibitory output to the upper motor neurons
- d) Sends error signals to the rest of the cortex
- e) All the above are true

100. The Pyramidal system

- a) Made up of axons whose cell bodies are in the frontal lobe
- b) Corticospinal tract is an uncrossed pathway
- c) Corticobulbar fibres descend to the spinal cord
- d) Controls distal muscles
- e) None of the above is true

END OF TEST

The University of Zambia
School of Medicine
Department of Anatomy

Clinical and Applied Anatomy (AN 432) Test 1

Date: 04/01/2005
Time: 10:30 Hours:

Duration: 2 hours

$$34 + 12 + 6.5 + 6 + 7 = 65.5\%$$

Section A: Multiple Choice Questions (True or False) [50 marks]

Instructions: Kindly attempt all questions. Clearly mark 'T' for True and 'F' for false against all options. Please indicate your answers on the answer sheet provided. Half a mark will be deducted for each wrong answer; you are therefore advised **not to guess**.

1. The fibres of the optic pathway synapse in the following areas:

- ☒ F a) Ventral posterolateral nucleus of the thalamus.
- ☒ T b) Lateral geniculate nucleus of the thalamus.
- ☒ F c) Optic chiasm.
- ☒ F d) Inferior olive.
- ☒ F e) Inferior colliculus.

2. A pituitary tumour pressing on the optic chiasma would lead to the following visual field defects?

- ☒ F a) Right anopia.
- ☒ F b) Right hemianopia.
- ☒ F c) Homonymous hemianopia.
- ☒ T d) Bitemporal hemianopia.
- ☒ F e) Heteronymous hemianopia.

3. In which of the following areas do the fibres of the direct light reflex synapse?

- ☒ F a) Lateral geniculate nucleus.
- ☒ T b) Pretectal nucleus.
- ☒ T c) Edinger-Westphal nucleus.
- ☒ T d) Ciliary ganglion.
- ☒ F e) Inferior colliculus.

pretectal
↓
Westphal
↓
ciliary
↓
ciliary ganglion
↓
ciliary muscles

4. Concerning the eye and its pathways

- ☒ T a) The layer of retina furthest from the vitreous contains the rods and cones. *3 marks T*
- ☒ T b) The retinal cells that generate nerve impulses are the ganglion cells. *T*
- ☒ T c) The geniculo-calcarine tract is also known as the optic radiation. *T*

- Td) The primary sensory visual cortex is also known as striate cortex.
 Te) A lesion on the right occipital lobe results in a visual field defect in both eyes.

5. About the spinal cord:

- Fa) The spinal cord in the adult ends inferiorly at the level of the T12 vertebra.
 Fb) The cauda equina consists of a bundle of lumbar, sacral, and coccygeal spinal nerves and the filum terminale.
 Tc) Herniation of the intervertebral disc between the fifth and sixth cervical vertebrae will compress the sixth cervical nerve root.
 Fe) The subarachnoid space ends inferiorly in the adult at the level of S2-3.
 Fe) The subarachnoid space ends inferiorly in the adult at the level of the promontory of the sacrum.

6. Assuming the patient's eyesight is normal, in which neuroanatomy sites is there likely to be a lesion when the direct and consensual light reflexes are absent?

- Fa) Optic tract.
 Tb) Optic nerve.
 Tc) Oculomotor nerve.
 Td) Ciliary ganglion.
 Fe) Lateral geniculate body.

7. Concerning cranial nerves:

- Fa) Sensory innervation of the face at the tip of the nose is supplied by the maxillary division of the trigeminal nerve.
 Fb) A patient unable to taste sugar placed on the anterior part of the tongue has a lesion in the glossopharyngeal nerve.
 Tc) Bell's palsy refers to a lesion on the 7th cranial nerve.
 Fd) Exaggerated sensation to sound is usually due to a lesion in the vestibulocochlear nerve.
 Fe) The abducent nerve is likely to be affected in midbrain lesions.

8. A lesion of the lateral spinothalamic tract would lead to:

- Fa) Hyperreflexia.
 Fb) Muscle wasting.
 Tc) Loss of pain sensation on the ipsilateral side of the body.
 Fd) Loss of temperature sensation on the contralateral side of the body.
 Fe) Lack of coordination.

9. The dorsal columns of the spinal cord:

- Ta) Are synonymous with the fasciculi gracilis and cuneatus in the upper cord.
 Tb) Transmit proprioceptive fibres of the same side.
 Tc) Carry fibres for deep pressure and vibration sense.
 Fd) When damaged result in an upper motor neurone lesion.
 Fe) Are not affected in the Brown-Sequard syndrome.

10. Clinical anatomy of the vertebral column:

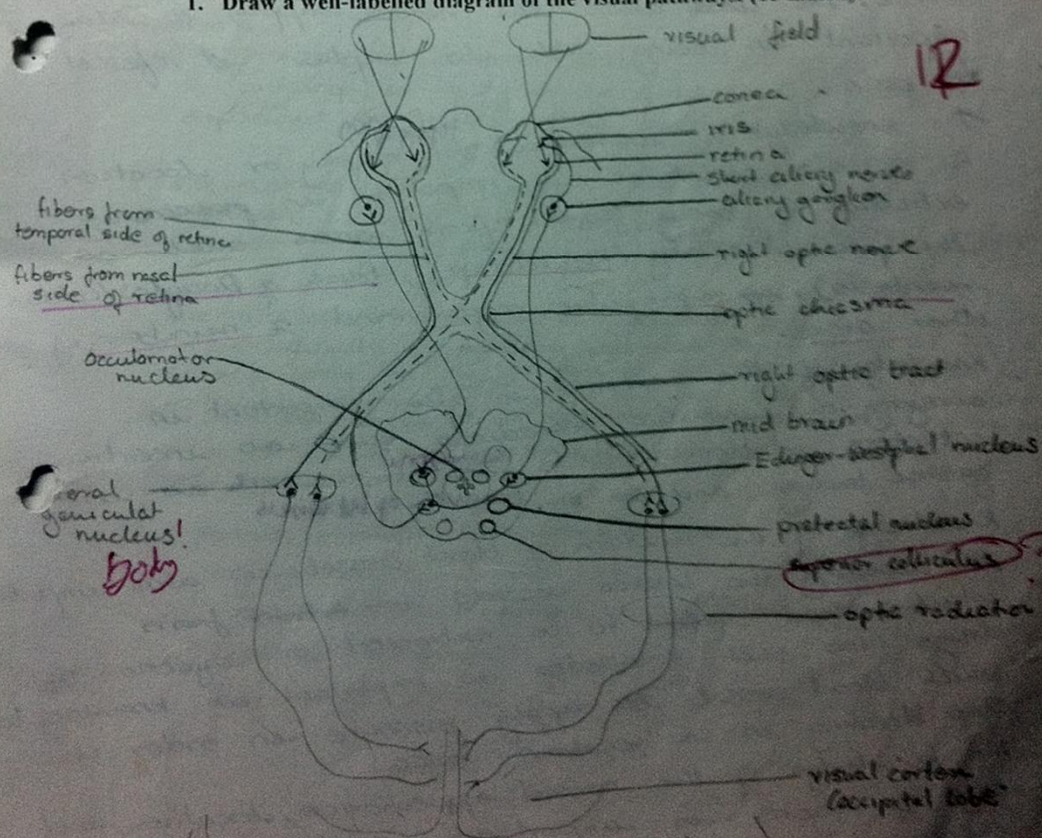
- Fa) During lumbar puncture the cerebrospinal fluid is tapped from the epidural space.

- T b) Spinal anaesthesia may be done by depositing anaesthetic drugs in the epidural space. 18/12
- T c) Lumbar puncture is usually done between L4 – L5 or L5 – S1. 24/12
- F d) "Whiplash" injury of the cervical spine denotes injury to the spinal cord.
- F e) Prolapse of the intervertebral disc is caused by malalignment of adjacent vertebral bodies.

Section B: Anatomical Bases (25 marks)

Instructions: Answer all questions that follow in the spaces provided. Each question in this section carries the marks indicated.

1. Draw a well-labelled diagram of the visual pathways. (15 marks).



2. Write short notes on the anatomical knowledge that causes success or failure in clinical practice (10 marks).

Anatomical knowledge is important in the success of failure in clinical practice. Certain knowledge in anatomy is very essential for clinical practitioners. This includes the following:

- The knowledge of the course and location of nerves is important in order to avoid injuring ~~the~~ to the nerves in surgery or in order to inject anaesthetic drugs near the ~~right~~ ^{right} ~~near~~ appropriate or desired nerve. The ~~loss~~ areas the nerves supply is also important in being able to explain a referred ~~set~~ pain.

The knowledge of anatomical ^{topography} ~~topography~~ or location of various structures is important in ~~practicing~~ extraction of body fluids from areas such as the pleural cavity (Pleural tap), Pouch of Douglas (Culdocentesis), suprapubic region and a number of other areas.

Knowledge of the anatomy is also important in carrying out invasive procedures such as inserting catheters in blood vessels, ^{nasogastric} ~~intubation~~, such as in gastric lavage, and so on. ^{Cannulation of bld vessels}

Knowledge of the location of blood vessels is also important in locating the ~~interior~~ vessels ~~in~~ ^{to} extract from which blood needs to be extracted or injection of drugs. Also such knowledge is important in knowing which blood vessel to apply pressure in order to stop bleeding in a certain area.

The knowledge of the normal appearance, location, and size of organs is important in detecting any changes that may indicate a pathology. This knowledge

Section C: Clinical Case (25 marks)

Instructions:

Study the clinical scenario provided below. With the aid of well-labelled diagram(s) discuss the relevant clinical anatomy in the space provided.

Case:

After a drinking spree a 24-year-old man decided to go swimming. He enthusiastically tried to reproduce a diving manoeuvre he had seen on TV during the highlights of the Olympic games. Unfortunately he dived into the shallow end of the pool. When landed he experienced excruciating pain in the neck. He also experienced difficulty in breathing and could not move his arms and legs. In addition he could not feel anything from the neck downwards.

Questions

- 1 What type of injury did this man sustain (1 mark)

He sustained an injury in the spinal cord, probably accompanied by displacement of vertebrae of the vertebral column.

- 2 What was the level of the lesion? (1 mark)

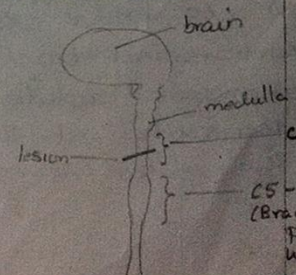
Between C1 and C4, that is in the cervical region.

- 3 Give two reasons to support your answer in 2 above (2 marks)

- His difficulty in breathing was due to a lesion in the region of the spinal cord, supplying the diaphragm.
- Inability to move his arms and legs can be due to a lesion above C4 also C2, C3 are responsible for cutaneous sensation in the upper limbs.

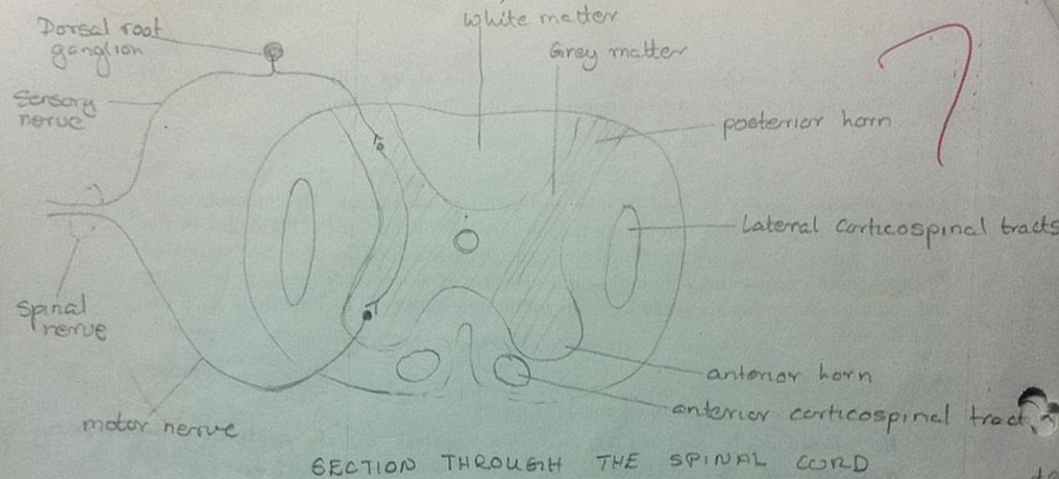
- 4 List any five signs you would see in the lower limbs if you examined the patient 2 weeks later (5 marks).

1. Spastic paralysis and weakness.
2. Exaggerated spinal reflexes.
3. Unco-ordinated movement in the limb muscles.
4. Loss of sensation.
5. Hypertonia in the muscles.



C3 & C5

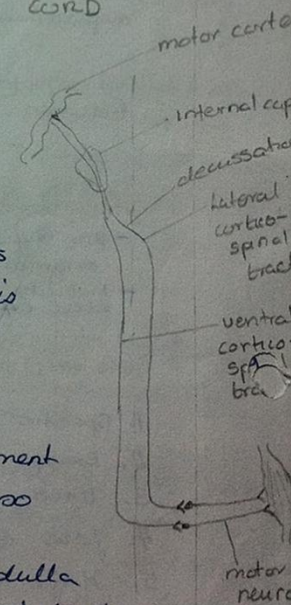
- 5 With the aid of a well-labelled diagram trace the main tracts responsible for the failure to move the limbs (15 marks)



SECTION THROUGH THE SPINAL CORD

The main tracts responsible for ~~movement~~ failure to move the limbs are the lateral corticospinal tracts and the ventral corticospinal tracts, these are pyramidal tracts. A lesion to these tracts results in an upper motor neuron lesion. This results in failure to move the limbs as impulses from the brain (^{motor} cortex) is not relayed through the spinal cord to the motor neurons that cause movement of muscles and ~~eventually~~ ^{consequently} movement so as to move the limbs. The lateral corticospinal tract decussates in the medulla oblongata while the ventral corticospinal tract decussates at the level of the spinal segment of the motor neurons they supply.

End of Test



The University of Zambia
School of Medicine

Test 1(2004/5)

AN 432: Clinical and Applied Anatomy

Computer Number: 99543826

Section A: Answer sheet

1.

A	B	C	D	E
F	T	F	F	F

2.

A	B	C	D	E
F	F	T	T	F

3.

A	B	C	D	E
F	T	T	T	F

4.

A	B	C	D	E
T	T	T	T	T

5.

A	B	C	D	E
F	T	T	T	F

6.

A	B	C	D	E
T	T	T	T	F

7.

A	B	C	D	E
F	F	T	T	F

8.

A	B	C	D	E
F	F	F	T	F

9.

A	B	C	D	E
T	T	T	F	F

10.

A	B	C	D	E
F	F	T	T	

$$39 - 5 = 34$$

Date: 21st November 2007
Attempt All Questions

Computer No. 21044961
Maximum Marks: 50
Time Allowed: 30 min

1. Define the following terms briefly and concisely:

10

1.1 ependyma

these are secretory cells lining the central cavity of the spinal cord and together with the choroid plexus they form

1.2 stria of Gennari

1.3 artery of cerebral hemorrhage

these are the branches of the middle cerebral artery which are also called Charcot's artery and are easily ruptured.

1.4 arachnoid granulation

is the structure of protruding processes of the dura mater which connect the subarachnoid space and superior sagittal sinus for drainage.

1.5 myelocoele

is the protrusion of the spinal cord due to failure or defects of vertebra.

2. Name the type of fibers seen in the CNS, giving examples of each

6

Multipolar fibres — motor neurone.

Unipolar fibres — sensory neurones.

3. Name the branches of the basilar artery in ascending order:

5

— Anterior inferior cerebellar A.

— Labyrinthine A.

— Pontine arteries

— Superior cerebellar A.

— Posterior cerebellar A.

4. Name the nerves that enter the tractus solitarius and name the type of stimuli carried by these nerves 5

① CN IX ✓

② CN X ✓

③ CN VII

— taste ✓

5. List 4 (four) features of an upper motor neuron lesion 4

hyperreflexia ✓

hypertonia ✓

Positive Babinski's test ✓

Disuse atrophy ✓

6. True or False Questions: Write T (True) or F (False) against each statement. 10
Warning: -1/2 mark will be deducted for any wrong answer.

6.1 The alar lamina of the developing neural tube gives rise to most of the efferent neurons of the spinal cord T

6.2 The oculomotor nerve contains both GSE and GVE T

6.3 In the development of the forebrain the basal lamina expands to form the cerebral hemispheres [F]

6.4 Auditory sensation is represented in the frontal lobe [F]

6.5 The hippocampus lies in the roof of the inferior horn of the lateral ventricle []

6.6 Facial colliculus is an elevation in the 4th ventricle due to the Facial nerve nucleus [F]

6.7 Blockage within the ventricular system produces communicating Hydrocephalus [T]

6.8 The pia mater extends with the dural sac to the level of S2 [F]

6.9 Pineal body is part of the epithalamus [T]

6.10 The greater part of the superior-lateral surface of the brain is supplied by the anterior cerebral artery []

7. Draw well-labelled diagram of the following. Use the paper provided: 10

7.1 Internal capsule showing its major tracts

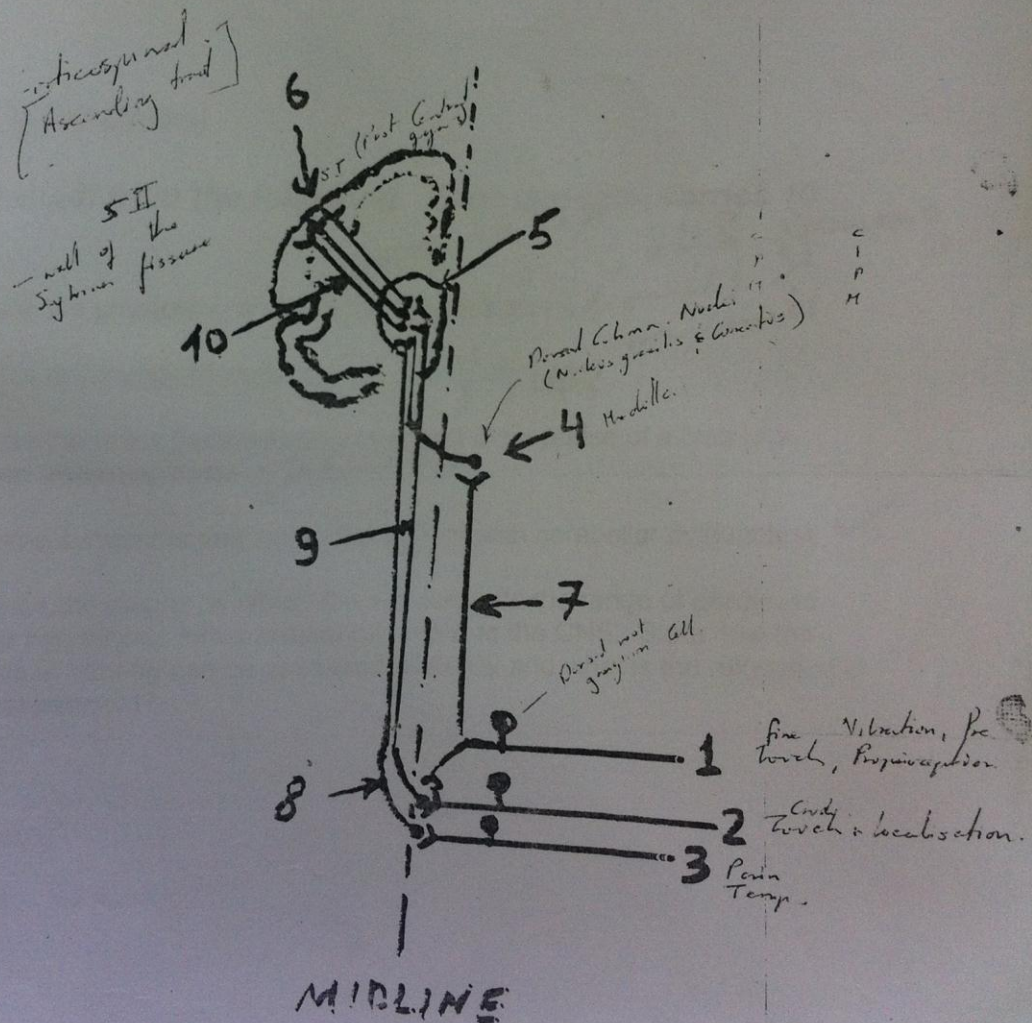
7.2 Pain pathways

End of Test

SECTION A (40 Marks)

Answer both questions. Each question carries 20 marks.

1. The diagram below shows a nervous pathway:
- Describe the physiological organisation of the pathways on the diagram with reference to the numbers indicated.
 - Describe the physiological significance of these pathways and the related subcortical and cortical areas.



2. Discuss the consequences of lesions in the following areas:

1. Basal ganglia ✓ (5 marks) *fast movement ✓*
2. Cerebellum ✓ (5 marks) *posture movement ✓*
3. internal capsule *✓* (5 marks) *✓*
stroke lesion
usually involves middle cerebral artery
give rise to hemiparesis on opposite side of the body
✓ stroke lesion typically is
4. Posterior pituitary (5 marks)

SECTION B (40 Marks)

Answer four (4) from the following. Each question carries 10 marks.

- ✓ 1. Discuss the physiology of the corticospinal tracts ✓ *pg 143*
- ✓ 2. Discuss physiology of visceral pain ✓ *pg 143*
- ✓ 3. Discuss the reflex mechanisms employed in response of a limb to a sudden disturbing force. ✓ *withdrawal reflex*
4. Describe symptoms and signs of a patient with cerebellar dysfunction. ✓
5. Describe the means by which the ear converts the range of perceived sound frequencies into a meaningful input to the CNS. State how the defects in hearing can be assessed clinically and what is the relevance of this assessment?

SECTION C (20 Marks)

Answer four (4) from the following. Each question carries 5 marks.

1. Autonomic functions of the hypothalamus ✓ ~~2~~ 2 3 7
- ✓ 2. Effects of cortical lesions ✓ X
3. Functions of the tympanic membrane and ossicles ✓ ①
- ✓ 4. Referred pain ✓ ✓ ✓ ②
5. Taste pathways. ✓ ✓ ✓ ③
Tactile ✓
Sol. taste ✓

SECTION A

Choose any Five (5) questions out of Seven (7). Each question carries 20 Marks. For all the questions selected, answer all the *PART (C)*s and the *WHOLE* of question six (6) in a separate answer booklet.

- ✓ 1. A patient presents to you with ataxia, intention tremor of hands during voluntary activity and speech defect. His voluntary movements are slow and feeble, and there is lack of coordination between protagonist and antagonist muscles.

In an essay form answer the following questions:

- (a) What is/are the organ(s) defects involved in this process? Briefly describe the anatomical structure of this organ. **(5 Marks)**
- (b) Discuss the physiological mechanism responsible for the stated symptoms. **(10 Marks)**
- (c) Name two drugs (from different groups) that can be used to treat the condition, and briefly describe their mechanisms of actions **(5 Marks)** ✓

- ✓ 2. Mr. Y, forty years of age, had a car accident and was rushed to ER. The patient was still conscious but he could not walk. The paralysis was found at the right hand and leg. On examination, hematoma was conspicuously found at the back of the neck. The patient could not sense any pain on his left side of the body from his leg to the base of his neck. His right eye was spotted to develop pupil constriction, ptosis and enophthalmus.

- (a) Where was the possible location of the patient's nerve lesion? **(5 Marks)**
- (b) Draw the a well-labelled diagram showing the possible damaged pathways **(5 Marks)**
- (c) Discuss the general anaesthetic drugs that you would recommend for induction and maintenance of general anaesthesia in this patient. Give reasons for your choice of drugs. List the major adverse effects of the drugs you have mentioned and explain the precautions that you would take during the administration of the drugs. **(10 Marks)** ✓

3. A patient that is examined by an ophthalmologist reveals the following symptoms: The pupil reflex is negative when the left eye is highlighted by a flashlight. The accommodative reflex is positive. When the patient sees approaching objects, the axis of his eyeballs becomes convergent and pupils constrict.
- Draw the a well-labelled diagram showing the possible damaged pathways **(5 Marks)**
 - Describe the physiology of visual accommodation **(5 Marks)**
 - With suitable examples, name two groups of drugs that affect pupillary response to light and visual accommodation. Describe the effects of these drugs on the pupil and describe how they affect accommodation. What are their mechanisms of action? Mention one ophthalmic clinical indication for each group of drug. **(10 Marks)**
4. A patient has paralysis of the facial muscle so that his mouth is retracted to the left. Both of his eyes can still be closed even though his right eye contraction has weakened. He has developed paralysis of his right hand but both of his legs can still be moved normally.
- Where was the possible location of the patient's lesion? **(5 Marks)**
 - Is this an UMN or LMN lesion? Explain why both of his eyes can still be closed **(5 Marks)**
 - Name three drugs (each from a different drug class) that can be used to relieve skeletal muscle spasticity in patients with spastic neurological disorders and describe their mechanisms of actions **(10 Marks)**
5. A 33 year old woman began to have episodes about 3 years ago in which loud sounds caused her eyes to twitch and made the outside world appear to rotate resulting in unsteadiness and loss of balance. Testing revealed that loud low-frequency sounds delivered to her right (but not left) ear caused a vertical torsional nystagmus. During the fast phase, her eyes moved downwards and rotated counter clockwise direction (as seen by others).
- Draw a well labelled diagram showing the major anatomical features of the vestibular labyrinth **(5 Marks)**
 - Explain the physiology of the vestibular function **(10 Marks)**
 - With suitable examples, name two groups of drugs that you could have used in the acute phase of this patient's disorder and explain how these drugs work in her condition **(5 marks)**

6. Seizures are the manifestation of periods of uncontrolled, rapid, synchronized firing of groups of cortical neurons, sometimes in localized areas (partial seizures) and sometimes in widespread areas in both hemispheres (generalized seizures). Most medications used to reduce the frequency of seizures do one or more of the following:
- Bind to voltage-gated Na^+ channels and slow the rate at which they move from an inactivated state to the "resting" (deinactivated) state.
 - Act at synapses that use GABA as a neurotransmitter, by enhancing the opening of GABA-gated ion channels, by blocking the reuptake of GABA from the synaptic cleft, or by blocking the enzymatic degradation of GABA.
 - Block the type of voltage-gated Ca^{++} channel that is prominent in thalamic neurons.
- (a) Give one example of a drug (other than valproate) that acts by each of the mechanisms mentioned above and mention one type of seizure disorder for which each drug is used. **(6 Marks)**
- (b) Mention two adverse effects (other than anorexia, nausea, vomiting, constipation or diarrhoea) for any of the two drugs you have mentioned in (a) above **(4 Marks)**
- (c) In form of a table classify central nervous system neurotransmitters, mentioning one major action mediated by each neurotransmitter **(10 Marks)**
7. A patient has been found with an infection that results in increased levels of prostaglandins E_2 that reaches the temperature regulatory sites in the anterior hypothalamus, raising the set point and causing fever.
- (a) Briefly outline the anatomic zones of the hypothalamus taking into account arrays of nuclei with distinctive patterns of connection **(5 Marks)**
- (b) Explain the physiology of the hypothalamus **(10 Marks)**
- (c) Dopamine is one of the hormones secreted from the hypothalamus. List three endocrine functions of dopamine. Name one drug that is a dopamine receptor agonist in the hypothalamus and give one endocrine clinical indication of this drug. **(5 marks)**

END OF EXAM

- (c) Sensory information received by the cerebellum is acted upon at a conscious level by this structure
 - (d) Speech is rarely disrupted after cerebellar damage (e) All are correct *
2. The dermatome rule is used:
- (a) Clinically by physicians to determine level of pain perception
 - (b) To explain referred pain *
 - (c) To discern the slow pain response
 - (d) To determine the extent of Cutaneous tissue damage
 - (e) A and C are correct
3. Which of the following are **not** part of the analgesia system?
- (a) Periaqueductal gray matter
 - (b) Periventricular nuclei of the hypothalamus
 - (c) Raphe magnus nucleus
 - (d) Lateral spinothalamic tract
 - (e) A and C are correct *
4. The stretch reflex:
- (a) The receptor organ is the extrafusal muscle fibre
 - (b) It does not normally respond to very minor degrees of stretch
 - (c) The muscle spindles involved in this reflex are most plentiful in the large antigravity muscles
 - (d) The gamma-efferent fibres that supply the spindles are unmyelinated
 - (e) None of the above *
5. The primary motor cortex:
- (a) Receives no sensory input
 - (b) Is active in the adjustment of motor activity to current sensory input *
 - (c) Is not necessary for fine motor movement
 - (d) Gives rise to the extrapyramidal tract
 - (e) Is localized only in the frontal lobe
6. The functions of the basal ganglia include:
- (a) The inhibition of muscle tone if they are all stimulated
 - (b) Coordinate fine movements of the digits
 - (c) The globus pallidus is not involved in setting background muscle tone
 - (d) The caudate nucleus and putamen inhibit gross motor movement (e) B and D are correct *
7. The pyramidal tract:
- (a) Is composed solely of axons from pyramidal cells
 - (b) Is a crossed pathway

- (c) Projects solely to the thalamus
 - (d) Originates from several areas of the cortex including area 4, frontal lobe, and the parietal lobe
 - (e) B and D are correct *
8. Which of the following functions are not attributable to the level of the spinal cord and/or lower brain?
- (a) Walking motions
 - (b) Reflex control of blood vessels
 - (c) Equilibrium
 - (d) Subconscious activities
 - (e) None of the above *
9. Which of the following are not located in the anterior horn of the spinal cord?
- (a) Anterior motor neurons
 - (b) Interneurons *
 - (c) Gamma motor neurons
 - (d) Alpha motor neurons
 - (e) None of the above
10. A lesion of which of the following structures may result in incoordination, reduced postural tone, and pendular phasic stretch reflexes?
- (a) Midbrain locomotor system
 - (b) Motor cortex
 - (c) Premotor cortex
 - (d) Cerebellum *
 - (e) Superior colliculus
11. An alpha- motoneuron that innervates a postural muscle such as the soleus muscle:
- (a) Is excited mono synaptically by Golgi tendon organ afferents
 - (b) Forms endplates on 3 to 6 skeletal muscle fibers
 - (c) Contributes to the patellar reflex
 - (d) Belongs to a fast fatigable motor unit
 - (e) Is inhibited disynaptic when the antagonist muscle is stretched *
12. Raising the skin temperature to 52°C activates:
- (a) Meissners corpuscles
 - (b) Merkel"s cell endings
 - (c) Nociceptors *
 - (d) Panician corpuscles
 - (e) Ruffini endings
13. The sensation of high-frequency vibration is signaled by:

- (a) Golgi tendon organs
 - (b) Meissners corpuscles
 - (c) Muscle spindles
 - (d) Nociceptors
 - (e) Pacinian corpuscles *
14. The cell type that forms cerebrospinal fluid is the:
- (a) Ependymal cell*
 - (b) Neuron
 - (c) Oligodendroglial cell
 - (d) Satellite cell
 - (e) Schwann cell
15. The cerebrospinal fluid (CSF):
- (a) Has a higher concentration of glucose than blood
 - (b) Contains more protein per unit volume than blood
 - (c) Is formed at a rate that is proportional to the CSF pressure
 - (d) Is absorbed at a rate that is proportional to the CSF pressure*
 - (e) Is removed largely through dural sleeves of the spinal nerve roots
16. This question concerns peripheral and central neurotransmitters and neuromodulators, which statement is most appropriate?
- (a) Noradrenaline is not found in neurons in the central nervous system
 - (b) Glutamate is an inhibitory transmitter
 - (c) The peptide substance P is found in peripheral motor nerve axons
 - (d) Somatostatin, vasointestinal peptide and cholecystokinin are peptides which are found both in the gut and in neurons of the brain*
 - (e) GABA receptors are found in the peripheral tissues
17. Which one of the receptors is responsible for monitoring the rate of muscle stretch?
- (a) Nuclear bag intrafusal fibers
 - (b) Nuclear chain intrafusal fibers*
 - (c) Golgi tendon organs
 - (d) Pacinian corpuscles
 - (e) Ruffinis corpuscles
18. Which one of the following statements best describes cold receptors?

- (a) Cold receptors produce a sensation of warmth when their firing frequency is very low
 - (b) Sudden decreases in temperature always increase the firing frequency *of cold receptors
 - (c) Cold receptors are tonic receptors that slowly increase their firing rate when the temperature is decreased
 - (d) Cold receptors do not fire at skin temperatures above body temperature
 - (e) Cold receptors produce a sensation of pain when their firing frequency is very high
19. Which one of the following statements about pain sensation is correct?
- (a) Painful sensations can be elicited by any sensory neuron if its firing frequency is high enough
 - (b) Painful sensation arising from a particular area of the skin occur only when pain fibers from that area of the skin are stimulated
 - (c) Cutting the anterolateral tract on both sides of the spinal cord will permanently eliminate painful sensations arising from skin region innervated by sensory neurons located below the site of the lesion
 - (d) Pain fibers conduct impulses to the spinal cord and to skin regions surrounding the site of a painful stimulus
 - (e) All the above are correct *
20. Which one of the following sensory systems uses unmyelinated fibers to convey information to the central nervous system (CNS)?
- (a) Proprioception
 - (b) Vision
 - (c) Vibration
 - (d) Temperature *
 - (e) Pressure
- 21) Which of the statement is Correct regarding the blood supply to brain:
- a. Irreversible brain damage occurs if the blood flow is 50ml/100gm/min
 - b. The vertebral artery is always a branch of first part of subclavian artery
 - c. Cerebral blood flow is greater in the white matter than in the gray matter
 - d. The posterior cerebral artery supply most of the lateral surface of cerebral hemisphere
 - e. The anterior cerebral artery supply medial surface of the cerebral hemisphere to the parieto-occipital sulcus *

22) Occlusion of the left middle cerebral artery can produce the following signs EXCEPT:

- a. Ipsilateral deafness
- b. Aphasia.*
- c. Contralateral hemiparesis and hemisensory loss of the face and arm.
- d. Change in personality.
- e. Agraphia and alexia.

23) Which of the following statements regarding the intracranial blood vessel is Correct:

- a. Posterior Communicating normally carry blood from the internal carotid to the posterior cerebral artery.
- b. Occlusion of the labyrinth in the artery can cause vertigo.*
- c. The two Anterior Cerebral Artery may arise by a common stem.
- d. Bleeding from an aneurysm in the circle cause subdural hemorrhage.
- e. The anterior communications connect the anterior and middle cerebral arteries.

24) Which of the following statements regarding to the Anterior Choroidal Artery Correct:

- a. Branch of Anterior Cerebral Artery.
- b. It is of wide caliber and hence rarely thrombosis.
- c. It anastomoses with the Posterior Choroidal Artery which is a branch of the middle Cerebral Artery.
- d. It supplies the hippocampus Formation.*
- e. The thrombosis causes ipsilateral blindness because it supplies the optic nerve.

25) Which of the following statements regarding to the Posterior Cerebral Artery Correct:

- a. Its blockage can cause Contralateral Blindness.
- b. Its choroidal branch supplies the choroid plexus.*
- c. Its central branches pass through the Posterior perforated substance to supply parts of thalamus and lentiform nucleus. d. It also supplies the choroid plexus.
- e. It is always a branch of the basilar artery.

26) The cortical branches of the Anterior Cerebral Artery can cause all EXCEPT:

- a. Contralateral Face weakness without sensory loss.*
- b. Paralysis and sensory deficit of the contralateral leg.
- c. Behavioral and cognitive abnormalities.
- d. Memory and emotional disturbance.
- e. Disorder of sphincter control.

27. Which of the following structures pass between the infratemporal fossa and the pterygopalatine fossa through the pterygomaxillary fissure?

- A. posterior superior alveolar nerve *
- B. maxillary nerve
- C. zygomatic nerve
- D. greater palatine nerve
- E. more than one of the above are correct

28. What type of ganglion is the pterygopalatine ganglion?

- A. sympathetic ganglion
- B. parasympathetic ganglion
- C. sensory ganglion
- D. somatic motor ganglion
- E. more than one of the above are correct *

29. Athetosis type movements are often identified with a _____ lesion.

- A. Midbrain
- B. Basal ganglia *
- C. Subthalamic
- D. Thalamus
- E. Cranial nerve VI

30. Changes in personality and judgment are often associated with a _____ lesion.

- A. Frontal lobe *
- B. Parietal lobe
- C. Broca's area
- D. Wernicke's area
- E. Visual area

31. Changes in motor aphasia are often associated with a _____ lesion.

- A. Frontal lobe
- B. Parietal lobe
- C. Broca's area *
- D. Wernicke's area
- E. Visual area

32. Changes in sensory aphasia are often associated with a _____ lesion.

- A. Frontal lobe
- B. Parietal lobe
- C. Broca's area
- D. Wernicke's area*
- E. Visual area

33. Which of the following diseases has not been directly linked with Bell's palsy?
- A. AIDS
 - B. Diabetes
 - C. Lyme disease
 - D. Alzheimer's disease*
 - E. Shingles
34. Which of the following cervical nerve roots best corresponds with activation of the triceps muscle?
- A. C5
 - B. C6
 - C. C7 *
 - D. T2
 - E. T3
35. The trunks of the brachial plexus carry all of the following except:
- A. motor fibers
 - B. sensory fibers
 - C. sympathetic fibers
 - D. parasympathetic fibers *
 - E. alpha fibers
36. Which of the following cranial nerves exits the brainstem via the preolivary sulcus?
- A. Abducens (VI)
 - B. Facial (VII)
 - C. Hypoglossal (XII)*
 - D. Vagus (X)
 - E. Trigeminal (V)
37. Which of the following cranial nerves passes between the posterior cerebral artery and the superior cerebellar artery as it exits the brainstem?
- A. Abducens
 - B. Oculomotor*
 - C. Optic
 - D. Trigeminal
 - E. Vestibulocochlear
38. Jerky and sudden random movements are often associated with a _____ lesion.
- A. Midbrain
 - B. Basal ganglia *
 - C. Subthalamic
 - D. Thalamus
 - E. Frontal lobe

39. Which of the following arteries supplies Broca's area?
- A. ACA
 - B. MCA*
 - C. PCA
 - D. Lateral striate
 - E. anterior communicating
40. Which of the following arteries if ruptured can cause an oculomotor palsy?
- A. ACA
 - B. MCA
 - C. PCA *
 - D. Lateral striate
 - E. anterior communicating
- 41 Which of the below mentioned opioid analgesic agent might produce anxiety, dysphoria and hallucinations
- A. Fentanyl
 - B. Pentazocine*
 - C. Methadone
 - D. Morphine
- 42 Opioid receptors are linked with
- A. Euphoria, analgesia, depression in respiration and physical dependence*
 - B. Mydriasis, spinal analgesia, sedation and physical dependence
 - C. Hallucinations, dysphoria, vasomotor and respiratory stimulation
 - D. Euphoria, analgesia, physical dependence and respiratory stimulation
- 43 The drug of choice for myoclonic seizures is:
- A. Phenobarbital
 - B. Carbamazepine
 - C. Phenytoin
 - D. Clonazepam*
- 44 A 20-year old patient presented with early pregnancy was admitted for Medical Termination of Pregnancy in day care facility. What will be the anaesthetic induction agent of choice?
- A. Thiopentone
 - B. Ketamine
 - C. Propofol *

D. Diazepam

- 45 A young boy undergoes eye surgery under day care anaesthesia with succinyl choline and propofol and after 8 hours he starts walking and develops muscle pain. What is the likely cause?
- A. Early mobilisation
 - B. Due to the effects of eye surgery
 - C. Succinyl choline *
 - D. Propofol
- 46 All of the following factors influence the rate of induction of anaesthesia with an inhaled anaesthetic EXCEPT:
- A. Aqueous solubility of the anaesthetic
 - B. Patient history of malignant hyperthermia *
 - C. Anaesthetic concentration in inspired air
 - D. Pulmonary blood flow rate
- 47 Which of these drugs is recommended for the treatment of drug induced Parkinsonism?
- A. Benztropine *
 - B. Selegiline
 - C. Haloperidol
 - D. Levodopa
- 48 Which of the following produces dissociative anaesthesia?
- A. Ketamine *
 - B. Propofol
 - C. Thiopentone
 - D. Enflurane
- 49 Which one of the following local anaesthetics is most likely to cause allergic reactions?
- A. Procaine *
 - B. Bupivacaine
 - C. Lignocaine
 - D. Mepivacaine
- 50 Which one of the following anti-bacterial agents should not be used with dtubocurarine?

- A. Norfloxacin
- B. Streptomycin *
- C. Doxycycline
- D. Cefotaxime

51 The pathophysiologic basis for antiparkinsonism therapy is:

- A. Selective loss of dopaminergic neurones*
- B. The loss of cholinergic neurones
- C. The loss of glutaminergic neurones
- D. Increased GABA activity

52 Thiopentone is a “short-lasting” barbiturate because

- A. It is metabolised rapidly by brain and liver
- B. It is rapidly distributed throughout the body *
- C. It is administered by intravenous injection
- D. It induces tachyphylaxis

53 Which of the following is a dopamine-receptor agonist?

- A. Metoclopramide B. Bromocryptine *
- C. Fluphenazine decanoate
- D. Amantidine

54 Phenytoin

- A. Has a wide therapeutic index
- B. Inhibits hepatic microsomal enzymes
- C. Exhibit first order elimination kinetics at high doses
- D. Exhibit zero order elimination kinetics at usual therapeutics doses *

55 Which of the following drugs is least likely to cause seizures?

- A. Amitriptyline *
- B. Lithium
- C. Pethidine
- D. Acetazolamide

56 Which of the following drugs would you recommend for absence seizures?

- A. Valproate *
- B. Phenobarbital

- C. Carbamazepine
- D. Gabapentin

57 Which of these opioid analgesics would you recommend for relieving the acute, severe pain of renal colic?

- A. Morphine
- B. Methadone
- C. Pethidine *
- D. Naltrexone

58 Which of these drugs is effective in stopping generalised tonic-clonic status epilepticus?

- A. Valproate
- B. Lorazepam *
- C. Ethosuximide
- D. Lamotrigine

59 Which of the following is a good choice to treat newly diagnosed generalized anxiety disorder in a patient who is a truck driver?

- A. Alprazolam
- B. Triazolam
- C. Buspirone *
- D. Trazodone

60 Which of the following is a potential adverse effect of clozapine?

- A. Cholestatic jaundice
- B. QT prolongation
- C. Galactorrhoea
- D. Agranulocytosis *

SECTION B. In question (61- 110) write down “T” or “F” if the statement is true or false against the letter (A, B,C, D& E) corresponding to the statement. Marks for wrong judgment will be deducted.

61. The ankle jerk reflex is exaggerated:
- (a) When the muscles are voluntarily contracted F
 - (b) Immediately after complete spinal cord transaction at the cervical level T
 - (c) In extrapyramidal system disorders such as Parkinsonism T
 - (d) When cerebellar function is lost F
62. Sensory disturbance consisting of:
- (a) Pain, sensory loss and paraesthesiae in one leg suggests a spinal cord lesion F
 - (b) Loss of pain, temperature but not touch sensation suggests a lesion in the thalamus F
 - (c) Loss of all sensations in the skin region suggests a peripheral nerve or posterior root lesion T
 - (d) Loss of two-point discrimination but not touch sensation suggests a lesion in the thalamus F
63. Posterior damage in the spinal cord may impair:
- (a) The ability to stand steadily with the eyes closed F
 - (b) Touch sensation T
 - (c) The flexor plantar response to stimulation of the sole T
 - (d) Vibration sense T
64. Lower motor neuron disease:
- (a) Causes loss of voluntary movements but not of reflex movements F
 - (b) Causes eventual wasting of muscles concerned T
 - (c) Does not affect ventilation of the lungs T
 - (d) Is associated with involuntary twitching of small fasciculi in the affected muscles F

65. The cerebellum receives its information concerning muscle movement from the:
- (a) Cortex F
 - (b) Muscle spindles T
 - (c) Golgi tendon apparatus T
 - (d) Medulla T
66. In the descending tracts in the spinal cord:
- (a) The lateral corticospinal tract extends laterally to the surface of the spinal cord T
 - (b) The vestibulospinal tract is a major crossed tract from the opposite vestibular nuclei F
 - (c) The vestibulospinal tract predominantly inhibits extensor motorneurons F
 - (d) Reticulospinal fibres are scattered throughout the anterior white columns T
67. The ascending tracts in the spinal cord:
- (a) The fasciculus gracilis and cuneatus contain fibres that mediate tactile discrimination T
 - (b) The lateral spinothalamic tract carries vibration and pressure modalities F
 - (c) The spinocerebellar tracts convey impulses from Golgi tendon organs T
 - (d) All afferent fibres cross the midline at some stage in the spinal cord F
68. Sensory nerves terminating in the grey matter of the spinal cord:
- (a) Elicit reflex responses F
 - (b) Enter the cord through the sensory roots T
 - (c) Enter the cord through the corticospinal tracts F
 - (d) Have facilitatory functions F
69. The primary sensory endings of a muscle spindle in a voluntary muscle is stimulated by:
- (a) Shortening of an antagonist muscle F
 - (b) Relaxation of the muscle when under load F
 - (c) Shortening of the extrafusal fibers of the muscle F

- (d) Stimulation of the gamma efferents to the muscle spindle T
70. In which of the following tracts in the spinal cord do second-order sensory neurons with cell bodies in the dorsal horn ascend to more rostral spinal segments or to the brain?
- | | |
|---------------------------------|----|
| (a) Ventral corticospinal tract | 26 |
| (b) Lateral spinothalamic tract | 26 |
| (d) Ventral spinothalamic tract | 26 |
- (c) Anterior vestibulospinal tract T
71. Pain receptors in the gut and urinary tract may be stimulated by:
- (a) Distension T
- (b) Inflammation of the wall T
- (c) Acid fluid T
- (d) Vigorous rhythmic contractions behind an obstruction T
72. General sensory pathways:
- (a) The anterior spinothalamic tracts transmit pain and crude touch F
- (b) The pain receptors are free nerve endings T
- (c) Information from the muscle spindle and golgi tendon organ does not reach consciousness F
- (d) Both the spinothalamic and dorsal column pathways are highly discrete T
73. The pyramidal system:
- (a) Destruction causes weakness and clumsiness F
- (b) Has fibres which originate from the pre-motor area T
- (c) Is also concerned with gross movements T
- (d) Controls posture T
74. Volume and composition of cerebro-spinal fluid (CSF):
- (a) About half of the CSF is in the ventricles at any one time F
- (b) CSF has similar composition to plasma except for protein F
- (c) CSF protein levels are about half that in plasma F
- (d) CSF glucose falls dramatically in tuberculous meningitis F
75. In reflex actions:
- (a) The interval between the stimulus and the final effect is chiefly determined by the length of the afferent and efferent nerves F

- (b) Spatial summation refers to simultaneous threshold stimulation of two or more nearby afferent nerves F
- (c) Synapses are the first part of a reflex to become fatigued T
- (d) Flexor reflexes are probably the most primitive of all reflexes T

76. In the transmission of painful stimuli:

- (a) Pain receptors are polymodal in nature T
- (b) Sharp, rapid, intense pain is carried by heavily myelinated fibres T
- (c) Unmyelinated C fibres only carry slow, dull, diffuse, aching pain T (d) Some pain fibres remain uncrossed in the spinal cord T

77. Thermoperception:

- (a) The end organs of Krause and Ruffini subserve cold and heat F
- (b) Thermoreceptors that respond to cold (cold spots) are more plentiful than those that respond to heat (hot spots) T
- (c) Maximal discharge from „hot spots“ is between 40 and 45°C T
- (d) Cold spots show a rapid discharge when the temperature exceeds 45°C T

78. In the upper motor neurone lesion affecting one side of the body, the following abnormalities occur in the affected limb:

- a) Wasting of muscles F
- b) Increased response to phasic stretch reflex T
- c) Greater weakness in the flexor muscles of the affected arm than extensors T
- d) Increased firing in the type of afferent fibres from the muscle T

79. What are the results of unilateral damage to the cerebellum in man

- a) Disturbances of posture and disorganization of voluntary movement T
- b) Hemiplegia on the same side F
- c) Hemiplegia on the opposite side F
- d) Loss of sense of position on the same side of the body causing uncoordinated movements if the eyes are shut T

80 Drugs used in the treatment of insomnia include:

- A. Zolpidem T
- B. Phenobarbitone F
- C. Buspirone T
- D. Nitrazepam F

81 Drugs likely to increase the effects of benzodiazepines include:

- A. Ethanol T
- B. Cimetidine F
- C. Rifampicin T
- D. Flumazenil F

82 Flumazenil:

- A. Blocks the actions of zolpidem T
- B. Blocks the actions of phenobarbital F
- C. Is a benzodiazepine antagonist T
- D. Is used as a muscle relaxant F

83 Concerning zolpidem:

- A. Is used in the management of epilepsy F
- B. Has higher risk of development of dependence compared to benzodiazepines F
- C. Risk of seizures limits its clinical use F
- D. Is agonist on benzodiazepine receptors T

84 Anti-seizure drugs that act by enhancing GABA-mediated neuronal inhibition include:

- A. Ethosuximide F
- B. Carbamazepine F
- C. Clonazepam T
- D. Phenobarbital T

85 Anti-seizure drugs that have an inhibitory effect on T-type calcium channels in the thalamic neurones include:

- A. Carbamazepine F
- B. Lamotrigine F
- C. Ethosuximide T
- D. Valproate T

86 Which of these drugs are used in the management of absence seizures?

- A. Valproate T
- B. Carbamazepine F
- C. Ethosuximide T
- D. Tiagabine F

87 Features of amitriptyline overdose may include:

- A. Cardiac arrhythmias T
- B. Respiratory depression T
- C. Seizures T
- D. Hypotension T

88 Which of these are dose-related adverse effects of phenytoin?

- A. Mental confusion F
- B. Hirsutism T
- C. Sedation T
- D. Hepatitis F

89 Which of these anti-seizure drugs induce hepatic microsomal enzymes?

- A. Carbamazepine T
- B. Valproate F
- C. Clonazepam F
- D. Phenytoin T

90 Pethidine:

- A. Causes less miosis than morphine T
- B. Is metabolised to active substances with analgesic properties F
- C. Has a longer duration of action than morphine F
- D. Possesses atropine-like activity F

91 Concerning tardive dyskinesia:

- A. The condition can be caused by haloperidol T
- B. Is due to hypersensitivity of dopamine receptors T
- C. Anticholinergic drugs are a useful therapy F
- D. The lesion is in the cerebellum F

92 Which of the following drugs are hepatotoxic?

- A. Valproate T
- B. Isoflurane T
- C. Halothane T
- D. Chlorpromazine T

93 In patients on monoamine oxidase inhibitors, avoid:

- A. Nitrous oxide F
- B. Pethidine T
- C. Amphetamine T

D. Phenylephrine T

94 Carbamazepine

- A. Is an anticonvulsant T
- B. Induces liver enzymes T
- C. Is a benzodiazepine F
- D. Is used to treat trigeminal neuralgia T

95 Side effects of chlorpromazine include:

- A. Diarrhoea T
- B. Parkinsonism T
- C. Postural hypotension T
- D. Bradycardia F

96 When levodopa is used to treat Parkinson's disease it

- A. Has useful anti-emetic activity F
- B. May be combined with carbidopa to reduce peripheral metabolism of levodopa T
- C. Is converted into a false transmitter F
- D. Can cause psychotic behaviour T

97 The following drugs by affecting dopaminergic mechanisms can have the actions indicated

- A. Neuroleptics can induce acute dyskinesias T
- B. Reserpine can alleviate the symptoms of Parkinson's disease F
- C. Chlorpromazine can bring about tardive dyskinesias T
- D. Haloperidol can be used to treat tardive dyskinesias F

98 Blockade of dopamine receptors:

- A. Can be an effective treatment for psychotic conditions T
- B. Is an effective treatment of depression F
- C. Can cause a Parkinson-like syndrome T
- D. Can lead to infertility T

99. Clinical uses of barbiturates include:

- A. Anxiolysis T
- B. Management of epilepsy T
- C. General anaesthesia T
- D. Sleep induction T

100. The following structures are part of the diencephalon?

- (A)** Caudate nucleus
- (B)** fornix
- (C)** Globus pallidus
- (D)** external capsule **(E)** Thalamus T

101. Which of the cranial nerves exits the midbrain?

- (A)** CN I
- (B)** CN II
- (C)** CN III
- (D)** CN IV
- (E)** CN VI T

102. Which part of the ventricular system contains choroid plexus?

- (A)** Cerebral aqueduct
- (B)** Frontal horn T
- (C)** Interventricular foramen T
- (D)** fourth ventricle T
- (E)** Third ventricle T

103. A 50-year-old hypertensive woman complains of numbness and weakness in her left leg and foot. Which of the following arteries"occlusion can account for this complaint?

- (A)** Anterior cerebral T
- (B)** Anterior choroidal
- (C)** Interior carotid
- (D)** Middle cerebral
- (E)** Posterior

104. A 15-year-old boy is hit on the temple with a baseball and becomes unconscious. After

About 10 minutes, he regains consciousness, but he soon becomes lethargic, and over the next 2hours, he becomes stuporous. His pupils are unequal. Intracranial hemorrhage is suspected.

Which of the following arteries is most likely to be the source of the hemorrhage?

- (A)** Anterior cerebral
- (B)** Anterior communicating
- (C)** Basilar
- (D)** Middle cerebral
- (E)** Middle meningealT

105. Which artery supplies the caudate and putamen and anterior limb of the internal capsulevia the medial striate artery (of Heubner)?

- (A) Anterior cerebral T
- (B) Anterior choroidal
- (C) Anterior communicating
- (D) Middle cerebral
- (E) Posterior communicating

106. Which artery supplies the cochlea?

- (A) Anterior inferior cerebellar
- (B) Labyrinthine T
- (C) Pontine
- (D) Posterior cerebral
- (E) Superior cerebellar

107 A patient has the ability to stand with open eyes but falls with closed eyes. A lesion of which pathway is likely responsible for this symptom?

- (A) Anterior spinocerebellar tract T
- (B) Anterior spinothalamic tract
- (C) Lateral spinothalamic tract
- (D) Posterior column syndrome
- (E) Posterior spinocerebellar tract

108. Which of the following nerves innervates the auricle (pinna) of the external ear?

- (A) V1 (B) C2 (C) V3 T (D) III
- (E) VIII

109. A six-year-old girl has brief, irregular contractions in her feet; symptoms are suspected to be a result of an untreated strep infection. What is the diagnosis?

- (A) Chorea gravidarum
- (B) Chorea major
- (C) Ballism
- (D) Hemiballism
- (E) Sydenham chorea T

110. Otoliths are mainly involved in sensing

- A) Sound amplitude and frequency
- B) Angular velocity and acceleration
- C) Linear velocity
- D) Linear acceleration T
- E) None of the above

END OF EXAMS

THE UNIVERSITY OF ZAMBIA

SCHOOL OF MEDICINE

DEPARTMENTS OF ANATOMY AND PHYSIOLOGICAL SCIENCES
UNIVERSITY EXAMINATIONS – JULY, 2016

NEUROSCIENCES

PGY 4110

PAPER 1

DURATION:

THREE (3) HOURS

COMPUTER NO.: 12026913

[illegible]

INSTRUCTIONS TO CANDIDATES

1. Write your computer number on ALL the answer booklets.
2. Carefully follow the instructions pertaining to each section.

ANSWER EACH SECTION IN A SEPARATE ANSWER BOOKLET

Section A. Answer both questions in this section. Each question carries 20marks.

1. You have just graduated your 4th year with a Bachelor of Science in Human Biology (BSc.HB) and now in 5th year doing your first rotation in the Department of Paediatrics and Child Health at the University Teaching Hospital (UTH). Your consultant paediatrician asks you to look at Xelesi Zulu (picture below), a 3 month old infant, who is a referral from Chipata General Hospital (CGH), Eastern Zambia. She has been brought by her mother and admitted in ward AO1 with a complaint of an enlarging head for the past 2 months. [20]



- a. The consultant points at you to state any 3 important signs you can identify in Xelesi [3]
- b. He further tells you that Xelesi suffers from a condition that arises from abnormal excessive accumulation of cerebrospinal fluid (CSF) in the ventricular system of the brain causing increased intracranial pressure (ICP).
- Name the condition that Xelesi has [1]
 - Mention any 2 congenital and 2 acquired causes of this condition [4]
 - Anatomically, briefly describe the flow of CSF in the ventricular system [10]
- c. The consultant concludes by stating that surgery is the practical modality of treating this condition. State the two surgical methods currently available for Xelesi. [2]

2. Celia is a 32-year-old woman who had no medical problems. One day while shopping in a department store, she was admiring a dress while walking and did not notice a clothing rack rapidly being pushed in her direction. Because she was not paying attention to what was in front of her, she collided with the clothing rack, hitting her face. She immediately noticed pain in her nose and forehead. Because her nose was bleeding, she was taken to the emergency room, where skull x-rays were performed, which revealed a small fracture in the cribriform plate that was too small for any therapy. She was sent home with pain medications and told to return if there were any further sequelae.

Two weeks later, after the swelling and bleeding had subsided somewhat, while eating dinner at a restaurant, Celia noted that she was unable to smell the food. This continued with subsequent meals, so she consulted a neurologist who tested her sense of smell with several substances including coffee grounds. He concluded that her anosmia (inability to smell) was a result of her head trauma and appeared to exist on both sides of her nose.

- a. Briefly describe the physiology of smell. 10marks
- b) With the aid of a diagram show the central olfactory pathway and the various projections to the different cortical areas. 10marks

Section B. Each question carries (20 marks). Answer both questions in this section.

1. List the pharmacological effects and clinical uses of the following drugs:

- A. Dronabinol
- B. Amphetamine
- C. Sumatriptan
- D. Risperidone

[Write 5 – 10 sentences on each drug]

2. Describe the mechanisms leading to the following in the vestibular apparatus of the inner ear.

- A. Rotational acceleration. 10marks
- B. Linear acceleration. 10marks

Section C (20 marks). Answer any 4 questions out of 6

- 1. Discuss the clinical features and drug management of ethanol withdrawal syndrome [10 – 20 sentences] – 10 marks
- 2. i. Discuss the drug management of convulsive status epilepticus [5 – 10 - Lorazepam sentences] – 5 marks
- ii. Pharmacological properties and clinical uses of benzodiazepines [5 – 10 sentences] – 5 marks

3. Discuss the function of the corticospinal and corticobulbar tracts in skilled voluntary movement. 10marks
4. Discuss the Physiology of the hypothalamus . 10marks
5. About the ear [10]
 - a. What is the name given to inflammation of the middle ear? [1]
 - b. The internal ear is made of the bony labyrinth and the membranous labyrinth. List the parts that make:
 - I. Bony labyrinth [3]
 - II. Membranous labyrinth [4]
 - c. Name the receptors in the ear for: [2]
 - I. Hearing
 - II. Balance
6. Arterial circle of Willis. Label the numbered arteries 1-10

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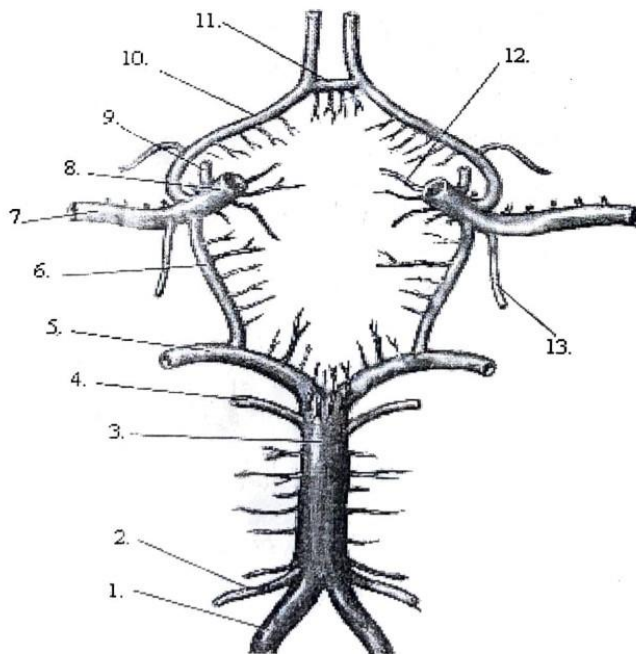
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SECTION A- ANSWER BOTH QUESTIONS IN THIS SECTION.

Each question carries 30marks.

1. A 68-year-old right handed man was referred for neurologic evaluation of tremor. The patient had first noted tremor of the right hand when driving and holding a newspaper approximately 2 years previously. Initially, tremor seemed to be intermittent, but gradually progressed to be present continuously throughout the day. Two glasses of wine in the evening could reduce but not stop his tremor in his nondominant hand. He also had chronic right shoulder pain for 6 months duration for which his primary physician ordered a shoulder x-ray, which was read as normal. Despite these symptoms, he did not feel that he was functionally impaired in any way. Upon further questioning, he reported mild difficulty getting up from the low chair in his house and had both chronic constipation and erectile dysfunction for at least 5 years. He denied noticing any change in his sense of smell, but his wife stated that he often commented that her cooking was less flavourful. His wife had begun to sleep in the guest room due to the patient hitting her in his sleep.

His neurologic examination was remarkable for a 'poker face' and soft voice, a delay in right shoulder shrug and mild cogwheel rigidity in the right arm that was only noticeable with voluntary movement of the opposite hand. His posture was slightly stooped and he walked with decreased right swing and a more pronounced pronation/supination tremor in the right wrist.

- i) What is the most likely diagnosis for this patient? Elucidate all the possible symptoms this patient is presenting with to support your diagnosis (10 marks)
- ii) Briefly describe the pathophysiology of this disorder with reference to normal Basal ganglia functions (10marks)
- iii) Suggest treatment of this disorder, highlighting the mechanism of action of the drug. (10marks)

2. A 33year old woman began to have episodes about 3years ago in which loud sounds caused her eyes to twitch and made the outside world appear to rotate resulting in unsteadiness and loss of balance. Neurological testing revealed that loud low-frequency sounds delivered to her right (but not left) ear caused vertical torsional nystagmus. During the fast phase, her eyes moved downwards and rotated counter clockwise direction (as seen by others)
- Draw a well-labeled cross diagram showing the major anatomical features of the vestibular labyrinth(10marks)
 - Explain the Physiological mechanism behind rotational acceleration (10marks)
 - With suitable examples, name two groups of drugs that you could have used in the acute phase of her condition and explain how these drugs work. (10marks)

SECTION B. ATTEMPT 2 OUT OF 3 QUESTIONS FROM EACH SUBSECTION Each subsection should be in a separate answer booklet .Each question carries 10marks

Sub Section 1

- In form of a table outline the signs and symptoms of Upper motor neuron syndromes and Lower Motor neuron syndromes (10marks)
- Briefly describe the difference between Implicit and explicit memory citing examples and brain areas involved in each.(10marks)
- With the aid of a well labeled diagram describe the physiology of the medial lemniscus system in the sensory transduction of most of the general senses

Sub Section 2

- With appropriate examples, describe the mechanisms of action of anti-seizure drugs (10marks)
 - Outline the drug management of ethanol withdrawal syndrome [5 marks]
List the pharmacodynamic adverse effects of first generation anti-psychotic (neuroleptic) drugs [5 marks]
 - Discuss antidepressants under the following headings
 - Classification (1mark)
 - Mechanism of Action (3marks)
 - Side effects (3marks)
 - Precautions (1 mark)
 - Uses (2 marks)
- 20-16

One Minute

THE UNIVERSITY OF ZAMBIA

SCHOOL OF MEDICINE

SEMESTER II EXAMINATION

DECEMBER 1999

HUMAN PHYSIOLOGY

PGY 412

PAPER I

TIME: 3 Hrs

Computer No.: 94103421

INSTRUCTIONS TO THE CANDIDATES

1. Write your computer number on all the answer sheet used.

SECTION A

Answer both questions in essay form. Each question carries 25 marks

JML
A patient comes to you six months after a road traffic accident. He has lost motor function in the left leg and muscles in this leg are in spastic condition. There is no tactile sensation but pain and temperature sensations are present. The right leg is moving actively and has tactile sensation but there is no pain and temperature sensation:

- (a) State the clinical condition
- (b) Describe the physiological mechanisms of this condition in an essay form

Vertex of skull

2. In a Weber test the patient hears better with the left ear than with the right ear. In the Rinne's test vibration in air is not heard after bone conduction in the same ear. With the right ear he hears vibration in air after bone conduction is over.

- (a) Is this normal?
- (b) Discuss the physiological basis of these tests?
- (c) What is the explanation in this case?

SECTION B

Answer two (2) from the following. Each question carries 15 marks.

- 1. Describe a method for measuring BMR in man. What factors affect it?
- 2. Describe the role of the cerebellum on movement.
- 3. Cortical representation of the cutaneous and visceral sensation

SECTION C

Write short notes on any four (4). Each question carries 5 marks

- 1. Referred pain and dermatomal rule ✓
- 2. Auditory cortex
- 3. Effects of labyrinthectomy
- 4. Mechanism of decerebrate rigidity
- 5. Motor neurone lesion

***** END OF EXAMINATION *****

SECTION A (80 Marks)

In the following questions (1 – 40) write "T" or "F" if the statement is true/false respectively against the letters a, b, c, d corresponding to the statement.

Each question carries 2 marks, ¼ mark will be deducted for incorrect or absence judgment.

1. The Cerebrospinal Fluid (CSF)
 - T a) Has a nutritive role for the brain cells
 - F b) Forms an hydraulic cushion, almost halving the virtual weight of the brain
 - T c) Helps maintain a constant intracranial pressure
 - F d) Has a similar composition to blood plasma and interstitial fluid
2. On the secretion and absorption of cerebrospinal fluid (CSF)
 - T a) CSF is actively secreted by the capillary of the brain
 - T b) There are tight junctions between the ependymal cells that line the choroids plexuses
 - F c) Secretes approximately 650 ml daily
 - F d) Secretion and absorption depend on arterial blood pressure
3. In the ascending tracts in the spinal cord:
 - F a) The fasciculus gracilis and cuneatus contain fibers that mediate pain and temperature senses *Fine touch and proprioceptors*
 - F b) The lateral spinothalamic tract carries pressure and vibration
 - T c) The spinocerebellar tracts convey impulses from proprioceptors
 - F d) All afferent fibres cross the midline at the same level in the spinal cord
4. Descending tracts reaches the spinal cord includes:
 - F a) Cerebellar spinal tract
 - T b) Pyramidal tract
 - F c) Pallidumspinal tract
 - T d) Rubrospinal tract
5. General sensation:
 - T a) Fine touch is transmitted in the dorsal columns
 - F b) The precentral gyrus of the brain is a main sensory area
 - T c) The postcentral gyrus of the brain is a main sensory area
 - F d) All general sensory tracts synapse in the hypothalamus
6. More than half of the fibers descending and ascending pathways of the spinal cord:
 - F a) Are involved in pain senses
 - T b) Provide multisegmental reflex pathways
 - F c) Are referred to as propriospinal fibers
 - T d) Includes pathways for reflex coordination of simultaneous movement of the body parts

7. Which of the following are not located in the anterior horn of the spinal cord?
- ☒ a) Alpha motor neurons
 - ☒ b) Interneurons
 - ☒ c) Gamma motor neurons
 - ☒ d) Renshaw's cell neurons
8. Pain:
- ☒ a) Pain receptors respond only to mechanical irritation
 - ☒ b) Unmyelinated C fibers carry sharp pain *slow pain*
 - ☒ c) Pain senses is developed in newborn
 - ☒ d) All pain fibers crossed in the spinal cord
9. In the sensation of pain:
- ☒ a) The pain sensation associated with stimuli that leads to tissue damage is referred to as nociception
 - ☒ b) The pain stimulation has also effects to the touch receptors
 - ☒ c) The relationship between heat transfer to skin and pain response is curvilinear
 - ☒ d) The pain sensation associated with stimulation of the proprioceptors
10. The pyramidal tract:
- ☒ a) Originates from several parts of the cortex, including area 4, frontal, parietal and occipital lobes
 - ☒ b) Is a completely crossed pathway
 - ☒ c) Projects solely to the thalamus
 - ☒ d) Originates from Purkinje cells
11. Sensory nervous terminating in the gray matter of the spinal cord
- ☒ a) Enter the cord through the Corticospinal tracts
 - ☒ b) Enter the cord through the sensory anterior horn *dorsal*
 - ☒ c) Enter the cord through the sensory dorsal horn
 - ☒ d) Have facilitatory effects
12. After injury to the spinal cord:
- ☒ a) A lesion of C₄₋₆ can cause respiratory arrest
 - ☒ b) Spinal transection is much more serious in the lumbar than in the cervical cord
 - ☒ c) There is ipsilateral retention of pain in lateral hemisection of the cord
 - ☒ d) Autonomic reflexes are the first to return after spinal shock
13. The stretch reflex:
- ☒ a) The receptor organ is the extrafusal muscle fibre
 - ☒ b) The gamma efferent fibres that supply the spindles are myelinated
 - ☒ c) The muscle spindles involved in the stretch reflex are most plentiful in the extremities
 - ☒ d) It does normally respond to very minor degrees of stretch.

14. A typical neuron can be characterized accordingly:
- ☒ a) It consists of two parts -- dendrites and the axon
 - ☒ b) The dendrites are not electrically excitable and cannot generate an action potential
 - ☒ c) The axon is not electrically excitable and cannot generate an action potential
 - d) The synaptic afferent fibers are located on the axonic process which is the cell's input zone
15. Which of the following is a characteristic of spinal cord gray matter organization?
- ☒ a) Contains interneurons only
 - ☒ b) Possesses several million nervous per segment of the spinal cord
 - ☒ c) Include pathways for reflex coordination from basal ganglia
 - ☒ d) Contains interneurons and anterior motor neurons
16. A patient after trauma of the head has asthenia, muscular dystonia, and imbalance of the body. Which part of CNS can be damaged?
- ☒ a) Nucleus rubor
 - ☒ b) Substantia nigra
 - ☒ c) Cerebellum
 - ☒ d) Formation reticularis
17. About senses pathways in spinal cord:
- ☒ a) Dorsal column brings information about pain and temperature
 - ☒ b) Dorsal column brings information about touch and pressure
 - ☒ c) Ventral column brings information about pain and temperature
 - ☒ d) Ventral column brings information about proprioception
18. The sensation of high – frequency vibration involves:
- ☒ a) Golgi tendon organs
 - b) Meissner's corpuscles
 - ☒ c) Naked endings between cells
 - ☒ d) Pacinian corpuscles
19. In the functioning of sensory nerve endings:
- ☒ a) Free nerve endings are found innervation visceral structures
 - ☒ b) Free nerve endings are found in the muscles
 - ☒ c) Meissner's corpuscles are embedded in onion – like layers of connective tissue found in ligaments
 - ☒ d) End bulbs of Krause are responsible for temperature reception (Pressure)
20. Transmitters in somatic peripheral nervous system:
- ☒ a) Acetylcholine
 - ☒ b) Noradrenaline
 - ☒ c) Glycine
 - ☒ d) Adrenaline

21. Glomerular filtration rate:

- ☐ a) Is the amount of urine formed per unit time usually per minute ☐
- ☐ b) Can be measured by using the clearance of any substance ☐
- ☒ c) Is about 125 mls per minute ☐
- ☒ d) Is uniform in all the glomeruli ☐

22. Countercurrent mechanisms:

- ☒ a) The loops of Henle are countercurrent multiplier ☐
- ☒ b) The vasa recta are countercurrent exchangers ☐
- ☒ c) The vasa recta help to maintain the hypertonicity ☐
- ☒ d) The final concentration of urine is determined by levels of ADH with the help of the countercurrent mechanisms ☐

23. Acidification of urine:

- ☐ a) The tubular cells secrete H^+ from the extracellular fluid ☐
- ☒ b) There is reabsorption of bicarbonate mostly in this form ☐
- ☒ c) H^+ secretion decrease the secretion of K^+ ☐
- ☒ d) The limiting pH is not rapidly reached because of the presence of buffers in the filtrate ☐

24. The glomerular:

- ☐ a) Capillary pressure is normally similar to that in other systemic capillaries ☐
- ☐ b) Afferent arteriole offer more resistance to blood flow than the efferent arterioles ☐
- ☐ c) Capillaries are more permeable to water than most other capillaries in the body ☐
- ☒ d) Capillary blood sodium, potassium ratio is same as that found in glomerular filtrate ☐

25. Renal tubes normally reabsorb:

- ☒ a) A volume of water every hour greater than plasma volume ☐
- ☒ b) All the bicarbonate that is filtered when the kidneys are producing an acid urine ☐
- ☒ c) More chloride than potassium per unit time ☐
- ☒ d) Amino acids and plasma protein ☐

26. In the Nephron:

- ☒ a) Fluid in the tip of the loop of Henle is hypertonic with respect to glomerular filtrate ☐
- ☒ b) Glomerular filtrate is hyper tonic with respect to the fluid in the distal convoluted tubule ☐
- ☒ c) Antidiuretic hormone (ADH) causes the fluid in the collecting ducts to become hypertonic with respect to that in the proximal convoluted tubule ☐
- ☐ d) The fluid at the end of the proximal convoluted tubule is hypertonic with respect to glomerular filtrate ☐

27. Clearance:

- ☒ a) Is the amount of plasma filtered by the glomerulus per minute ☒
- ☒ b) Of inulin is about 125 ml/min ☒
- ☒ c) Is a measurement which can only be made using inulin ☒
- ☒ d) Measurement depends on indirect Ficks' principle ☒

28. Concentration of urine by the kidney is dependent on:

- ☒ a) The loops of Henle ☒
- ☒ b) Vaso recta ☒
- ☒ c) Vaso pressin ☒
- ☒ d) Aldosteron ☒

29. Renal blood flow:

- ☒ a) Is about 25% of cardiac output ☒
- ☒ b) May be increased by vasomotor activity ☒
- ☒ c) May be reduced by pyrogens ☒
- ☒ d) May be increased by rennin ☒

30. The kidney release hormones or hormone-like agents:

- ☒ a) In response to a decrease in renal pressure and renal hypoxia ☒
- ☒ b) That indirectly facilitates the releases of aldosterone ☒
- ☒ c) That facilitates phosphate absorption from intestines ☒
- ☒ d) That facilitates the production of erythrocytes ☒

31. In the kidney, glucose:

- ☒ a) Is freely filtered but actively reabsorbed in the distal tubule ☒
- ☒ b) Absorption facilitates absorption of sodium as well ☒
- ☒ c) Show a transport maximum of 375 mg/min in males ☒
- ☒ d) Expected renal threshold is 300/dl of blood ☒

32. Substances normally completely reabsorbed:

- ☒ a) Glucose ☒
- ☒ b) Amino acids ☒
- ☒ c) Sodium ☒
- ☒ d) calcium ☒

33. To say that a substance is T_m - limited implies:

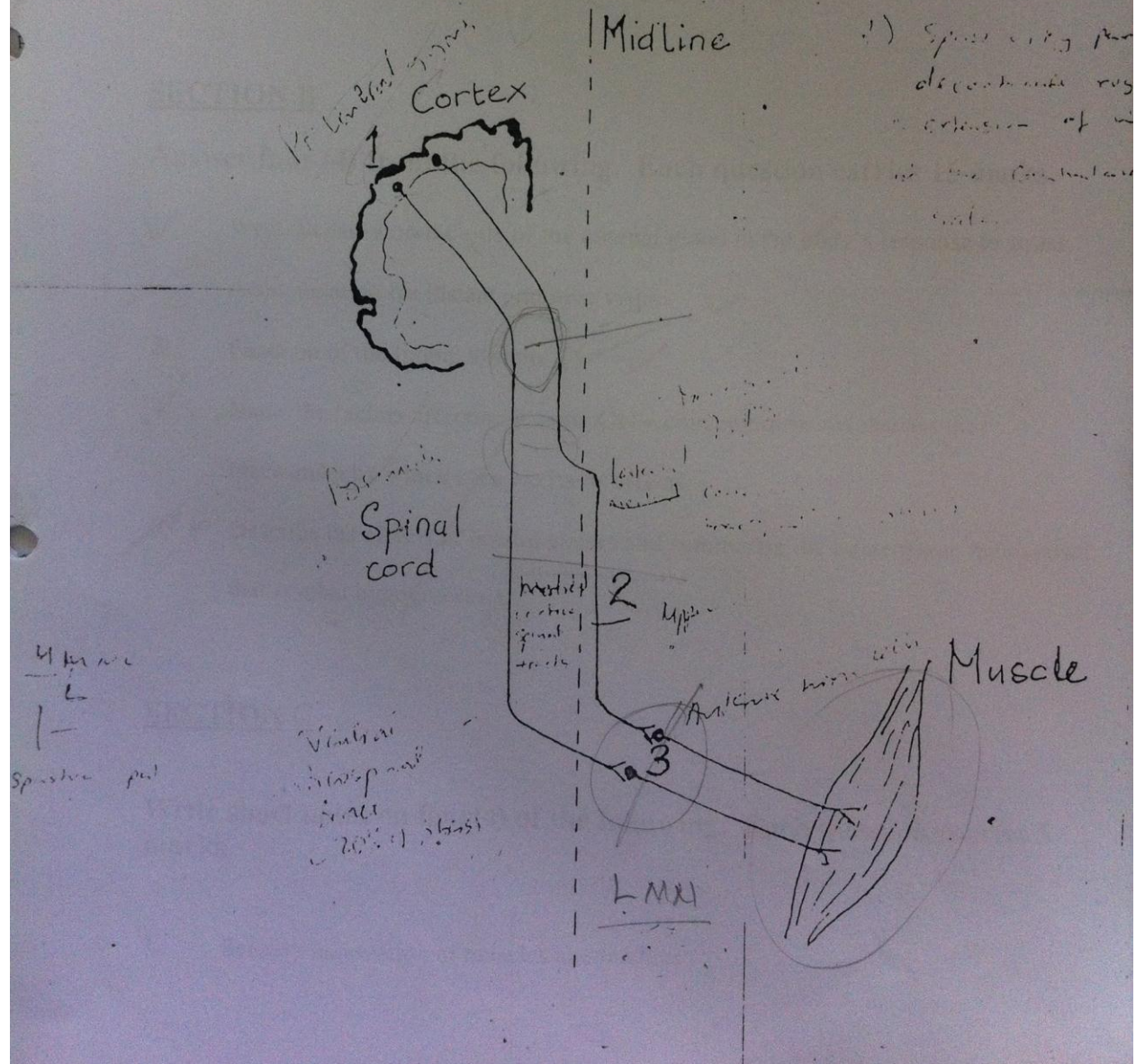
- ☒ a) That there is no tubular maximum for reabsorption ☒
- ☒ b) That there is no tubular maximum for secretion ☒
- ☒ c) That there is no active secretion ☒
- ☒ d) That there is no active reabsorption ☒

- F
34. Substances are removed from the tubular fluid by:
- ☐ a) Active transport
 - ☒ b) Endocytosis F
 - ☐ c) Passive diffusion
 - ☐ d) Osmosis
35. Factors affecting the glomerular filtration rate include:
- ☒ a) Changes in renal blood flow
 - ☒ b) Changes in concentration of plasma proteins
 - ☒ c) Urethral obstruction
 - ☒ d) Diseases that destroy glomeruli
36. Glomerular filtration pressure:
- ☒ a) Can be raised if the efferent arteriole is constricted
 - ☒ b) Can be decreased by a fall in systolic pressure
 - ☒ c) Is stabilized by changes in renal vascular resistance
 - ☒ d) Decreases with afferent arteriolar constriction
37. The following are statements about renal tubules:
- ☒ a) The permeability of collecting tubule to water is under the control of aldosterone
 - ☒ b) The fluid entering the distal convoluted tubule is hypotonic with respect to plasma
 - ☒ c) The walls of the ascending limb of the loop of Henle are freely permeable to water
 - ☒ d) At the top of the loop of Henle in the renal medulla, the osmolarity of the tubular contents is several times that of the glomerular filtrate
38. Voluntary micturition:
- ☒ a) Depends on the integrity of lumbar spinal reflex arc
 - ☒ b) Is not possible after sensory denervation of the bladder
 - ☒ c) Involves stimulation of the detrusor muscle in the bladder by autonomic sympathetic nerves
 - ☒ d) Is inhibited during ejaculation
39. Renal blood flow falls:
- ☒ a) Gradually from the inner medulla to the outer cortex per unit weight of tissue
 - ☒ b) After moderate haemorrhage
 - ☒ c) During emotional stress
 - ☒ d) About 10% when arterial pressure falls 10% below normal
40. Consequences of cutting the sympathetic nerves to the bladder include:
- ☒ a) Retention of urine
 - ☒ b) Loss of pain sensation in the bladder
 - ☒ c) Infertility in the male
 - ☒ d) Dilatation of the external sphincter of the bladder

Section A

There are two questions in this section. Answer both questions in essay form.

1. Study the diagram below and
 - i) Describe and explain the physiological organization
 - ii) Explain what happens if this organization is broken at points 1, 2 and 3. (20 marks)



2. Miss Nyambe aged 13 years, had had symptoms of hypethroidism all her life. She complained that a lump in her neck recently got worse. Examination showed that her thyroid gland was grossly enlarged. Her plasma hormone concentration are given below.

Free T₄: 47 pmol/l (0.002 μg/dl)
TSH: 15 mU/l (2.40 μU/dl)

What biochemical abnormalities might account for the hyperthyroidism?

How would you test your suggestions? Explain your reasoning throughout. (15 marks)

SECTION B

Answer four (4) from the following. Each question carries 15 marks.

- ✓ 1. Write an essay on the role of the adrenal gland in the body's response to stress.
2. Accommodation for distant and near vision ✓
3. Function of the limbic system ✓
4. Name the factors affecting plasma Ca⁺⁺ concentration and discuss the mechanism by which each exerts its effects.
5. ✓ Describe the effects of insulin excess and summarise the homeostatic mechanism that combat hypoglycemia.

SECTION C

Write short notes on four(4) of the following. Each question carries 5 marks.

1. Sensory innervation of muscles and tendons

2. Somatotopic representation in motor cortex
3. Feedback mechanism of gonadotrophins in the female
4. Physiological mechanisms of the thyroid hormone actions
5. Physiology of the parasympathetic division of the nervous system.

lamina 1 → Spinothalamic tract

2+3 → Substantia gelatinosa of Rolando - lateral spinothalamic

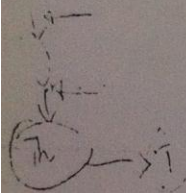
4 → main sensory nucleus - ventral spinothalamic tract -

5+6 → Clarke's nucleus → spinocerebellar tracts

7+8 → Autonomic nerves

9 → lower and upper motor neurons

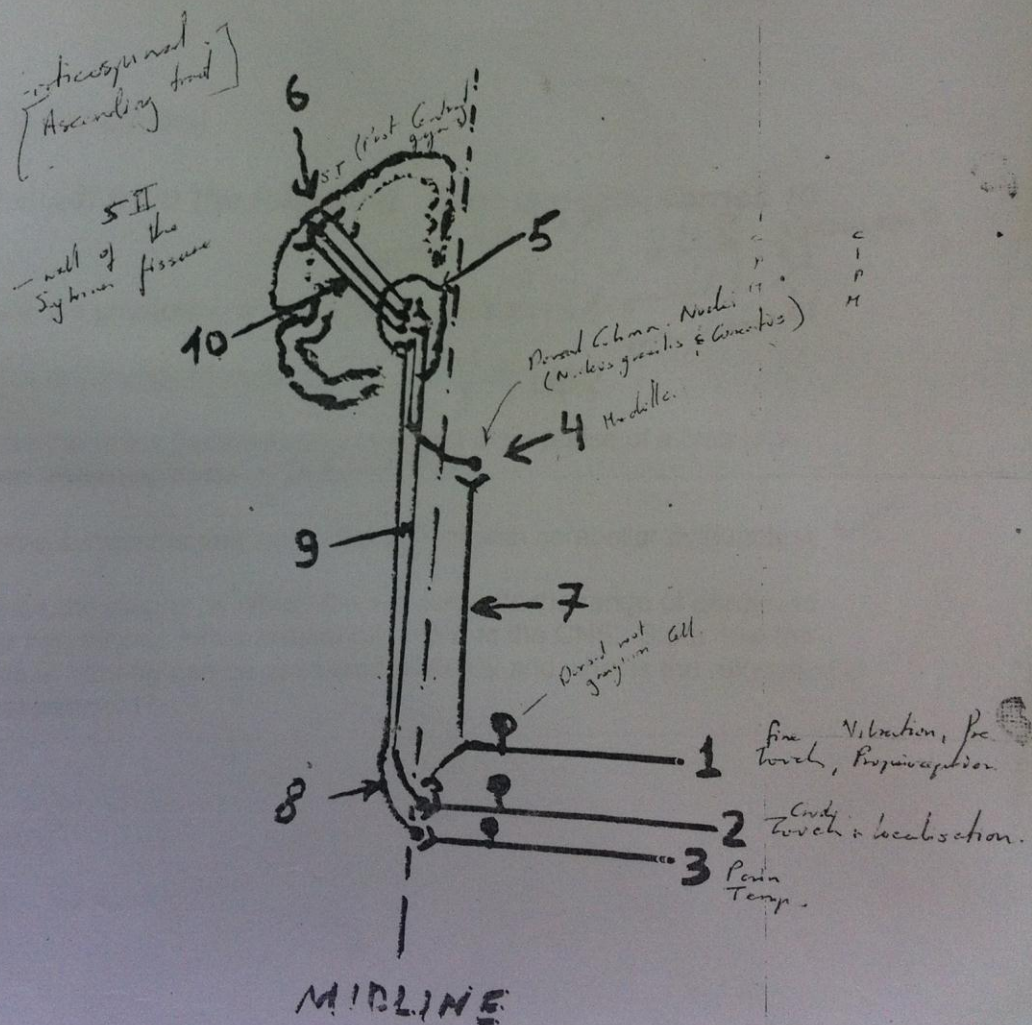
10 → glial cells + commissural fibres



SECTION A (40 Marks)

Answer both questions. Each question carries 20 marks.

1. The diagram below shows a nervous pathway:
 - (i) Describe the physiological organisation of the pathways on the diagram with reference to the numbers indicated.
 - (ii) Describe the physiological significance of these pathways and the related subcortical and cortical areas.



2. Discuss the consequences of lesions in the following areas:

1. Basal ganglia ✓ (5 marks) *fast movement ✓*
2. Cerebellum ✓ (5 marks) *posture movement ✓*
3. Internal capsule *✓ VCN lesion* (5 marks) *- usually vascular (middle cerebral artery) - give rise to hemiplegia on opposite 1/2 of the body
VCN lesion / sensory*
4. Posterior pituitary (5 marks)

SECTION B (40 Marks)

Answer four (4) from the following. Each question carries 10 marks.

- ✓ 1. Discuss the physiology of the corticospinal tracts ✓ *pg 143*
- ✓ 2. Discuss physiology of visceral pain ✓ *pg 143*
- ✓ 3. Discuss the reflex mechanisms employed in response of a limb to a sudden disturbing force. ✓ *withdrawal reflex*
4. Describe symptoms and signs of a patient with cerebellar dysfunction. ✓
5. Describe the means by which the ear converts the range of perceived sound frequencies into a meaningful input to the CNS. State how the defects in hearing can be assessed clinically and what is the relevance of this assessment?

SECTION C (20 Marks)

Answer four (4) from the following. Each question carries 5 marks.

1. Autonomic functions of the hypothalamus ✓ ~~2~~ 3 7
- ✓ 2. Effects of cortical lesions ✓ X
3. Functions of the tympanic membrane and ossicles ✓ ①
- ✓ 4. Referred pain ✓ ✓ ~~Trachea~~ ✓ ②
5. Taste pathways. ✓ ✓ ~~Trachea~~ ✓ ③

19. Estradiol:

- ☐ a) Increases basal body temperature
- ☐ b) Produces a thick, inelastic cervical mucus
- ☐ c) Inhibits bone resorption
- ☐ d) Decreases progesterone receptors
- ☐ e) Increases the glycogen content and tortuosity of endometrial glands.

20. Which of the following statements regarding hormone actions during pregnancy is correct?

- ☐ a) Human chorionic somatomammotropin (human placental lactogen) increases maternal responsiveness to insulin
- ☐ b) Progesterone increases uterine contractility
- ☒ c) Prolactin increases milk secretion
- ☐ d) Human chorionic gonadotropin stimulates progesterone secretion by the corpus luteum
- ☐ e) Estriol increases the firmness and tension of the pelvic ligaments to prevent rapid uterine expansion.

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- ☐ a) Rods are depolarized when light strikes the outer segment
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- ☐ e) Rods are most concentrated in the fovea.

22. In a patient subjected to surgical replacement of the abdominal aorta, the arterial circulation of the spinal cord is compromised, resulting in damage to the white matter of the lateral and anterior funiculi, but not of the posterior funiculi at the level of T4. What functional deficit would be expected?

- ☐ a) Ataxic gait
- ☐ b) Cannot recognise numbers written on the toes
- ☐ c) Failure to detect the vibrations of a tuning fork placed on the ankle
- ☒ d) Inability to distinguish between warm and cold on the feet
- ☐ e) Weakness of the arms.

23. A(n) _____ of which of the following structures may result in incoordination, reduced postural tone and pendular phasic stretch reflexes

- ☐ a) Midbrain locomotor system **F**
- ☒ b) Motor cortex **F**
- ☐ c) Premotor cortex **F**
- ☒ d) Cerebellum **T**
- ☐ e) Superior colliculus **F**

24. An automobile accident causes an injury of the sciatic nerve. As a consequence of the injury, you would expect:

- ☐ a) Death of all of the dorsal root ganglion cells whose axons were interrupted **F**
- ☒ b) Release of antibodies to nerve growth factor from Schwann cells ensheathing damaged axons **F**
- ☐ c) Regrowth of the axons distal to the injury at a rate of 400 mm/day **F**
- ☐ d) Chromatolysis of motoneurons in the lumbosacral spinal cord **F**
- ☐ e) Eventual complete restoration of sensory and motor function.

25. The cerebro spinal fluid (CSF)

- ☐ a) Has a higher concentration of glucose than blood **F**
- ☐ b) Contains more protein per unit volume than blood
- ☒ c) is formed at a rate that is proportional to the CSF pressure
- ☒ d) Is absorbed at a rate that is proportional to the CSF pressure
- ☐ e) Is removed largely through dural sleeves of the spinal nerve roots

26. The sensation of high-frequency vibration is signaled by

- ☐ a) Golgi tendon organs
- ☐ b) Meissner's corpuscles **(low frequency)**
- ☐ c) Muscle spindles
- ☐ d) Nociceptors
- ☒ e) Pacinian corpuscles.

27. Raising the skin temperature to 52°C activates

- ☐ a) Meissner's corpuscles
- ☐ b) Merkel cell endings
- ☒ c) Nociceptors
- ☐ d) Pacinian corpuscles
- ☐ e) Ruffini endings.

28. The rate and magnitude of muscle stretch are encoded by:

- ☐ a) Ruffin endings
- ☐ b) Pacinian corpuscles
- ☒ c) Muscle spindles
- ☐ d) Meissner's corpuscle
- ☐ e) Golgi tendon organs.

29. An alpha-motoneuron that innervates a postural muscle, such as the soleus muscle

- ☒ a) Is excited monosynaptically by Golgi tendon organ afferents
- ☐ b) Forms end plates on 3 to 6 skeletal muscle fibers
- ☐ c) Contributes to the patellar reflex
- ☐ d) Belongs to a fast fatigable motor unit
- ☐ e) Is inhibited disynaptically when the antagonist muscle is stretched.

30. A stroke affecting which of the following sites may cause conjugate deviation of the eyes toward the side of the lesion?

- ☐ a) Basal ganglia
- ☒ b) Cerebellum
- ☐ c) Frontal eye fields
- ☐ d) Horizontal gaze centre
- ☐ e) Motor cortex.

In questions 31 to 95 answer True (T) or False (F). Each question carries two (2) marks. A $\frac{1}{4}$ mark will be deducted to an incorrect judgement.

31. Intracellular mechanisms of hormones

- ☐ a) Thyroid hormones act via nuclear receptors to decrease transcription of selected mRNAs
- ☐ b) Insulin increases tyrosine kinase activity of cytoplasmic portion of transmembrane receptors
- ☐ c) Angiotensin II activates phospholipase C of diacylglycerol and inositol phosphates
- ☐ d) Atrial natriuretic peptide (ANP) increases cyclic GMP in cells.

54. Normal parturition depends on:

- ☒ a) An abrupt fall in placental secretion of oestrogen and progesterone
- ☒ b) Release of oxytocin from the posterior pituitary gland
- c) Activation of beta adrenoceptors in uterine muscle
- d) Innervation of the uterus.

55. In this question answer true or false according to the statement

- ☒ a) A complete lesion of the right facial (VIIth cranial nerve) causes more widespread paralysis of facial muscles than does a lesion affecting all the fibres projecting from the left motor cortex to the face
- ☒ b) The gag reflex (contraction of the pharynx elicited by touching its walls) may be absent following damage to the glossopharyngeal (IXth cranial) nerve.
- ☒ c) All the motor fibres of the vagus (Xth cranial) nerve are part of the autonomic nervous system, innervating glands, smooth and cardiac muscle
- ☒ d) Weakness in turning the head to the right and shrugging the left shoulder could be due to damage to the left accessory (XIth cranial) nerve.

56. Sudden complete loss of parathyroid function

- ☒ a) leads to skeletal muscle spasms ☒
- ☒ b) May be fatal in the absence of therapy to raise the level of ionized calcium ☒
- ☒ c) Causes haemorrhagic disease due to lack of calcium for haemostasis ☒
- ☒ d) May be treated short term by slow intravenous injection of calcium ions. ☒

57. Adrenocorticotropic hormone (ACTH) secretion increases

- ☒ a) When the median eminence of the hypothalamus is stimulated ☒
- ☒ b) When aldosterone blood level falls ☒
- ☒ c) When cortisol blood levels fall ☒
- ☒ d) In bursts during the night as the normal hour of waking approaches. ☒

58. These statements concern peripheral central factors that determine the appreciation and intensity of pain

- ☒ a) Nerve section leads to a permanent loss of pain sensation
- ☒ b) Lesions to the thalamus can produce raised thresholds for pain

- ☒ c) Lesions of the frontal lobes of the cerebral cortex alter a person's attitude to pain rather than the intensity of the pain.
- ☒ d) The groups of naturally occurring peptides known as endorphins and enkephalins influence pain transmission in the CNS.

59. This question is concerned with the major tracts that originate in particular areas of brain and that descend the spinal cord to determine motor output.

- ☒ a) The axons of the pyramidal tract neurones synapse directly with spinal motoneurones.
- ☐ b) Complete section of the pyramids in the medulla results in a permanent loss of precision in the performance of motor tasks.
- ☐ c) The vestibulospinal tract to the lumbar spinal cord controls extensor rather than flexor motoneurone output.
- ☒ d) Most tectospinal tract neurones control motoneurones that are used to achieve orientation of the head on the body.

60. ~~Interruption of the visual pathway in the~~

- ☒ a) Left optic tract causes blindness in the right visual field (right homonymous hemianopia)
- ☒ b) Optic chiasma causes blindness in the nasal half of each visual field (binasal hemianopia)
- ☒ c) Left optic radiation causes loss of vision to the right
- ☒ d) Occipital cortex causes loss of the light reflex.

61. Squinting (strabismus) may result from

- ☐ a) Poor vision in one eye in childhood
- ☒ b) A refractive error in childhood
- ☒ c) Damage to the internal capsule
- ☒ d) Damage to the cerebellum.

62. Impairment of the sense of smell

- ☒ a) May be confined to certain odours only
- ☒ b) Is likely after thalamic damage
- ☒ c) Can be caused by inflammation of the nasal mucosa
- ☒ d) Is a recognized effect of temporal lobe turnover.

63. In longsightedness (hypermetropia)

- ☒ a) Objects at infinity cannot be focused sharply on the retina
- ☒ b) Objects at the usual near point are focused behind the retina

- b) Inferior colliculus
- c) Nucleus tractus solitarius
- d) Superior colliculus

70. Signs of brain stem death include:

- ☒ a) Unconsciousness ✓
- ☒ b) Loss of pupillary reflex to light ✓
- ☒ c) Loss of tendon jerks reflexes in the arms and legs
- ☒ d) Loss of respiratory response to CO₂ in the absence of hypoxia.

71. Increased intracranial pressure may cause:

- ☒ a) Cranial enlargement in children
- ☒ b) Squinting and loss of smell in children
- ☒ c) An increase in cerebral blood flow
- ☒ d) Arterial hypertension.

72. In the area of skin supplied by a peripheral nerve, following transection of the nerve:

- ☒ a) Touch sensation is lost but pain sensation remains
- ☒ b) Pain and temperature sensation are lost but touch remains
- ☒ c) Sensation remains normal
- ☒ d) All types of sensations are lost

73. Muscle tone is reduced by:

- ☒ a) Curare-like drugs ✓
- ☒ b) Lower motor neurone lesions
- ☒ c) Upper motor neurone lesions
- ☒ d) Cerebellar lesions. ✓

74. The potentials for the smell generated by stimulation are:

- ☒ a) Free nerve endings of n. trigeminus
- ☒ b) Limbic system
- ☒ c) Nucleus tractus solitarius
- ☒ d) Epithellum situated in the nasal cavity

75. ~~Which of the following does afferent acoustic impulses pass through?~~

- a) Cochlea, lateral lemniscus, accessory nucleus, medial geniculate nucleus, primary acoustic cortex

- b) Cochlea, anteroventral nucleus, lateral lemniscus, superior olive, primary acoustic cortex. F
- c) Cochlea, anteroventral and postcentral nuclei, dorsal cochlear nucleus, superior olive, accessory nucleus, lateral lemniscus, inferior colliculus, medial geniculate nucleus, primary acoustic cortex. T
- d) Cochlear, dorsal cochlear nucleus, superior olive, anteroventral and postventral nuclei, accessory nucleus, inferior colliculus, lateral lemniscus, primary acoustic cortex. F

76. The left lateral geniculate nucleus receives inputs from:

- a) The left eye only. F
- b) The right eye only. F
- c) The left ear only. F
- d) The right ear only. F

77. Tractus vestibulospinalis and tractus reticulospinalis medialis:

- F a) Stimulate the alpha- and gamma- fibers of the flexor muscles.
- T b) Stimulate the alpha and gamma- fibers of the extensors muscles.
- F c) Inhibit the flexor muscles.
- F d) Inhibit the extensors muscles.

The olfactory system can detect:

- F a) 20-40 distinct odours
- T b) Differences in odour between isomers of the same substance
- T c) The direction from which an odour comes
- F d) Odours better in old than in young people.

79. Posterior column damage in the spinal cord may impair

- T a) Vibration sense
- F b) Pain sensation
- T c) Touch sensation
- T d) The ability to stand steady with eyes closed.

80. Aphasia:

- F a) Is an impairment of language skills without motor paralysis, loss of hearing or vision.
- F b) Implies impairment of consciousness
- F c) Is called sensory aphasia if the patient does not understand the meaning of the words he hears, sees and uses
- F d) Usually results from right-sided cortical damage.

81. Disease of extrapyramidal motor system in Parkinsonism causes:

- ☒ a) Tremor which is more obvious when the patient is performing skilled movements.
- ☐ b) Muscle paralysis
- ☒ c) Increased muscle tone throughout the range of passive movement
- ☐ d) An unusual gait with small fast regular steps.

82. Spasm of digital vessels in the hands in response to cold may be relieved by:

- ☒ a) Cutting sympathetic nerves to the hand
- ☒ b) Stimulating parasympathetic nerves to the hand
- ☒ c) Alpha - adrenoreceptor blockade
- ☐ d) β -adrenoreceptor agonists.

83. Delta wave activity in the electroencephalogram

- ☐ a) Is low in frequency and amplitude
- ☐ b) Suggests that the patient is alert and concentrating
- ☐ c) When unilateral suggests a brain abnormality
- ☐ d) Is a feature of petit mal epilepsy.

84. About the ciliary:

- ☒ a) It is one of the most vascular tissues in the body
- ☒ b) It helps to maintain the intraocular pressure
- ☐ c) The pupillary margin of the iris is the thinnest part of the iris
- ☒ d) The iris is well supplied with sensory branches of the trigeminal nerve.

85. Visual acuity is:

- ☐ a) A measure of the sensitivity of the retina to light
- ☐ b) Greater in a person with 6/12 (0,5) vision than in one with 6/9 (0,75)
- ☒ c) Greater using central than using peripheral vision
- ☐ d) Greater in normal than in color-blind people.

86. Otoliths are mainly involved in sensing:

- ☐ a) Sound amplitude and frequency
- ☐ b) Angular velocity and acceleration

- ☒ c) Linear acceleration
- ☐ d) Sound intensity

87. Hearing loss is best diagnosed as either conductive or sensorineural by:

- ☐ a) Testing vestibular function
- ☐ b) Comparing air and bone conduction thresholds
- ☒ c) Looking at the tympanic membrane with an otoscope
- ☐ d) Looking for a low frequency hearing loss.

88. Colour blindness:

- ☐ a) The eye tends to be longer than average from the lens to retina
- ☒ b) A convex lens is required to correct the refractive error
- ☐ c) Close vision is affected more than distance vision
- ☐ d) A circular object tends to appear oval.

89. Impairment of visual acuity in bright light can be explained by:

- ☒ a) Random light scattering when there is deficient pigmentation of the eye due to albinism
- ☒ b) Random light scattering when there is asymmetrical corneal curvature due to astigmatism
- ☐ c) Random light scattering in cornea when there is Vitamin A deficiency
- ☐ d) Impairment of rod function when there is a Vitamin A deficiency.

90. Bulging of the optic disc into vitreous humor is caused by:

- ☒ a) Raised intraocular pressure
- ☒ b) Blockade of absorption of the aqueous humor
- ☐ c) A rise in intracranial pressure
- ☐ d) Inflammation of the optic nerve.

91. There are three main visual pigments:

- ☒ a) In the normal human retina
- ☐ b) Colour blindness is found more commonly in females than in males.
- ☒ c) The convergence of several cones into a cone-bipolar cell reduces visual acuity
- ☐ d) Lateral inhibition in the retina increases contrast in the visual field.

92. The tympanic membrane

- ☒ a) Modifies the frequencies of sound waves impinging on the ear

- Quarta
- ☒ b) Stops vibrating almost immediately after the sound stops
 - ☒ c) Bulges outward when the pharyngo-tympenic tube is blocked
 - ☒ d) Transmits sound more than 80% less efficiently when the membrane is perforated.

93. Regarding the autonomic nervous system:

- ☒ a) It is purely a motor system
- ☒ b) Nuclei of origin of the sympathetic system are in the dorsal and sacral regions of the spinal cord
- ☐ c) One presynaptic sympathetic fibre synapses with one postsynaptic one
- ☒ d) The postsynaptic transmitter of the sympathetic fibres is released in discrete quanta at the nerve endings.

94. Atropine causes

- ☐ a) Paralysis of accommodation for near vision in the eye
- ☐ b) Constriction of the pupil
- ☐ c) Difficulty with micturition
- ☐ d) Constriction of the bronchi.

95. Lower motor neurone disease

- ☒ a) Causes loss of voluntary movements but not of reflex movements
- ☒ b) Is a later stage of upper motor neurone disease
- ☒ c) Causes eventual wasting of the muscles concerned
- ☒ d) Is associated with involuntary twitchings of small fasciculi in the affected muscles.

PLIZ WHEN YOU DONE

SLIP IT IN

KELVIN

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- b) Cannot recognise numbers written on the toes.
- c) Failure to detect the vibrations of a tuning fork placed on the ankle.
- d) Inability to distinguish between warm and cold on the feet.
- ☒ e) Weakness of the arms.

23. A lesion of which of the following structures may result in incoordination, reduced postural tone and pendular phasic stretch reflexes?

- ☒ a) Midbrain locomotor system.
- b) Motor cortex.
- c) Premotor cortex.
- ☒ d) Cerebellum.
- e) Superior colliculus.

24. An automobile accident causes an injury of the sciatic nerve. As a consequence of the injury, you would expect:

- ☒ a) Death of all of the dorsal root ganglion cells whose axons were interrupted.
- b) Release of antibodies to nerve growth factor from Schwann cells ensheathing damaged axons.
- c) Regrowth of the axons distal to the injury at a rate of 400 mm/day.
- d) Chromatolysis of motoneurons in the lumbosacral spinal cord.
- ☒ e) Eventual complete restoration of sensory and motor function.

25. The cerebro spinal fluid (CSF)

- ☒ a) Has a higher concentration of glucose than blood.
- b) Contains more protein per unit volume than blood.
- ☒ c) Is formed at a rate that is proportional to the CSF pressure.
- d) Is absorbed at a rate that is proportional to the CSF pressure.
- ☒ e) Is removed largely through dural sleeves of the spinal nerve roots.

26. The sensation of high-frequency vibration is signaled by

- ☒ a) Golgi tendon organs.
- b) Meissner's corpuscles.
- c) Muscle spindles.
- d) Nociceptors.
- ☒ e) Pacinian corpuscles.

27. Raising the skin temperature to 52°C activates

- ☒ a) Meissner's corpuscles.
- b) Merkel cell endings.
- c) Nociceptors.
- d) Pacinian corpuscles.
- ☒ e) Ruffini endings.

28. The rate and magnitude of muscle stretch are encoded by:

- ☐ a) Ruffin endings
- ☐ b) Pacinian corpuscles
- ☒ c) Muscle spindles
- ☐ d) Meissner's corpuscle
- ☐ e) Golgi tendon organs

29. An alpha-motoneuron that innervates a postural muscle, such as the soleus muscle

- ☐ a) Is excited monosynaptically by Golgi tendon organ afferents
- ☐ b) Forms end plates on 3 to 6 skeletal muscle fibers
- ☐ c) Contributes to the patellar reflex
- ☐ d) Belongs to a fast fatigable motor unit
- ☒ e) Is inhibited disinaptically when the antagonist muscle is stretched.

30. A stroke affecting which of the following sites may cause conjugate deviation of the eyes toward the side of the lesion?

- ☐ a) Basal ganglia
- ☐ b) Cerebellum
- ☐ c) Frontal eye fields
- ☐ d) Horizontal gaze centre
- ☒ e) Motor cortex

In questions 31 to 95 answer True (T) or False (F). Each question carries two (2) marks. A ¼ mark will be deducted to an incorrect judgement

31. Intracellular mechanisms of hormones

- ☒ a) Thyroid hormones act via nuclear receptors to decrease transcription of selected mRNAs
- ☐ b) Insulin increases tyrosine kinase activity of cytoplasmic portion of transmembrane receptors
- ☐ c) Angiotensin II activates phospholipase C of diacylglycerol and inositol phosphates
- ☐ d) Atrial natriuretic peptide (ANP) increases cyclic GMP in cells.

d) Maternal parathormone secretion.

32. Normal parturition depends on:

- ☐ a) An abrupt fall in placental secretion of oestrogen and progesterone
- ☐ b) Release of oxytocin from the posterior pituitary gland
- ☐ c) Activation of beta adrenoceptors in uterine muscle
- ☒ d) Innervation of the uterus.

33. In this question answer true or false according to the statement

- ☒ a) A complete lesion of the right facial (VIIth cranial nerve) causes more widespread paralysis of facial muscles than does a lesion affecting all the fibres projecting from the left motor cortex to the face
- ☐ b) The gag reflex (contraction of the pharynx elicited by touching its walls) may be absent following damage to the glossopharyngeal (IXth cranial) nerve.
- ☐ c) All the motor fibres of the vagus (Xth cranial) nerve are part of the autonomic nervous system, innervating glands, smooth and cardiac muscle
- ☐ d) Weakness in turning the head to the right and shrugging the left shoulder could be due to damage to the left accessory (XIth cranial) nerve.

34. Sudden complete loss of parathyroid function

- ☐ a) Leads to skeletal muscle spasms
- ☐ b) May be fatal in the absence of therapy to raise the level of ionized calcium
- ☐ c) Causes haemorrhagic disease due to lack of calcium for haemostasis.
- ☒ d) May be treated short term by slow intravenous injection of calcium ions.

35. Adrenocorticotrophic hormone (ACTH) secretion increases

- ☐ a) When the median eminence of the hypothalamus is stimulated
- ☐ b) When aldosterone blood level falls
- ☐ c) When cortisol blood levels fall
- ☒ d) In bursts during the night as the normal hour of waking approaches.

58. These statements concern peripheral central factors that determine the appreciation and intensity of pain

- ☒ a) Nerve section leads to a permanent loss of pain sensation
- ☐ b) Lesions to the thalamus can produce raised thresholds for pain

- c) Lesions of the frontal lobes of the cerebral cortex alter a person's attitude to pain rather than the intensity of the pain.
- d) The groups of naturally occurring peptides known as endorphins and enkephalins influence pain transmission in the CNS.

59. This question is concerned with the major tracts that originate in particular areas of the brain and that descend the spinal cord to determine motor output.

- a) The axons of the pyramidal tract neurones synapse directly with spinal motoneurons
- b) Complete section of the pyramids in the medulla results in a permanent loss of precision in the performance of motor tasks
- c) The vestibulospinal tract to the lumbar spinal cord controls extensor rather than flexor motoneurone output
- d) Most tectospinal tract neurones control motoneurons that are used to achieve orientation of the head on the body.

60. Interruption of the visual pathway in the

- a) Left optic tract causes blindness in the right visual field (right homonymous hemianopia)
- b) Optic chiasma causes blindness in the nasal half of each visual field (bilateral hemianopia)
- c) Left optic radiation causes loss of vision to the right
- d) Occipital cortex causes loss of the light reflex.

61. Squinting (strabismus) may result from

- a) Poor vision in one eye in childhood
- b) A refractive error in childhood
- c) Damage to the internal capsule
- d) Damage to the cerebellum.

62. Impairment of the sense of smell

- a) May be confined to certain odours only
- b) Is likely after thalamic damage
- c) Can be caused by inflammation of the nasal mucosa
- d) Is a recognized effect of temporal lobe turnover.

63. In long-sightedness (hypermetropia)

- a) Objects at infinity cannot be focused sharply on the retina. F
- b) Objects at the usual near point are focused behind the retina. T

- b) Inferior colliculus
- c) Nucleus tractus solitarius
- d) Superior colliculus.

70. Signs of brain stem death include:

- a) Unconsciousness
- b) Loss of pupillary reflex to light
- c) Loss of tendon jerks reflexes in the arms and legs
- d) Loss of respiratory response to CO₂ in the absence of hypoxia.

71. Increased intracranial pressure may cause:

- a) Cranial enlargement in children
- b) Squinting and loss of smell in children
- c) An increase in cerebral blood flow
- d) Arterial hypertension.

72. In the area of skin supplied by a peripheral nerve, following transection of the nerve:

- a) Touch sensation is lost but pain sensation remains
- b) Pain and temperature sensation are lost but touch remains
- c) Sensation remains normal
- d) All types of sensations are lost

73. Muscle tone is reduced by:

- a) Curare-like drugs
- b) Lower motor neurone lesions
- c) Upper motor neurone lesions
- d) Cerebellar lesions.

74. The potentials for the smell generated by stimulation are:

- a) Free nerve endings of n. trigeminus
- b) Limbic system
- c) Nucleus tractus solitarius
- d) Epithelium situated in the nasal cavity

75. In which sequences does afferent acoustic impulses pass on CNS?

- F a) Cochlea, lateral lemniscus, accessory nucleus, medial geniculate nucleus, primary acoustic cortex. F

- F b) Cochlea, anteroventral nucleus, lateral lemniscus, superior olive, primary acoustic cortex. ☒ F
- T c) Cochlea, anteroventral and postcentral nuclei, dorsal cochlear nucleus, superior olive, accessory nucleus, lateral lemniscus, inferior colliculus, medial geniculate nucleus, primary acoustic cortex. ☒ T
- F d) Cochlear, dorsal cochlear nucleus, superior olive, anteroventral and postventral nuclei, accessory nucleus, inferior colliculus, lateral lemniscus, primary acoustic cortex. ☒ F

76. The contralateral geniculate nucleus receives inputs from:

- F a) The left eye only ☒ F
- F b) The right eye only ☒ F
- F c) The left ear only ☒ F
- T d) The right ear only. ☒ T

77. Tractus vestibulospinalis and tractus reticulospinalis medialis:

- F a) Stimulate the alpha- and gamma- fibers of the flexor muscles ☒ F
- T b) Stimulate the alpha and gamma- fibers of the extensors muscles ☒ T
- F c) Inhibit the flexor muscles ☒ F
- F d) Inhibit the extensors muscles. ☒ F

78. The olfactory system can detect:

- F a) 20-40 distinct odours ☒ F
- T b) Differences in odour between isomers of the same substance ☒ T
- T c) The direction from which an odour comes ☒ T
- F d) Odours better in old than in young people. ☒ F

79. Posterior column damage in the spinal cord may impair

- T a) Vibration sense ☒ T
- F b) Pain sensation ☒ F
- T c) Touch sensation ☒ T
- F d) The ability to stand steady with eyes closed. ☒ F

80. Aphasia:

- F a) Is an impairment of language skills without motor paralysis, loss of hearing or vision. ☒ F
- F b) Implies impairment of consciousness ☒ F
- T c) Is called sensory aphasia if the patient does not understand the meaning of the words he hears, sees and uses ☒ T
- F d) Usually results from right-sided cortical damage. ☒ F

81. Disease of extrapyramidal motor system in Parkinsonism causes:

- a) Tremor which is more obvious when the patient is performing skilled movements. ☒ a
- b) Muscle paralysis ☒ b
- c) Increased muscle tone throughout the range of passive movement ☒ c
- d) An unusual gait with small fast regular steps. ☒ d

82. Spasm of digital vessels in the hands in response to cold may be relieved by:

- a) Cutting sympathetic nerves to the hand ☒ a
- b) Stimulating parasympathetic nerves to the hand ☒ b
- c) Alpha - adrenoreceptor blockade ☒ c
- d) β -adrenoreceptor agonists. ☒ d

83. Delta wave activity in the electroencephalogram

- a) Is low in frequency and amplitude ☒ a
- b) Suggests that the patient is alert and concentrating ☒ b
- c) When unilateral suggests a brain abnormality ☒ c
- d) Is a feature of petit mal epilepsy. ☒ d

84. About the choroid

- a) It is one of the most vascular tissues in the body ☒ a
- b) It helps to maintain the intraocular pressure ☒ b
- c) The peripheral margin of the iris is the thinnest part of the iris ☒ c
- d) The iris is well supplied with sensory branches of the trigeminal nerve. ☒ d

85. Visual acuity is:

- a) A measure of the sensitivity of the retina to light ☒ a
- b) Greater in a person with 6/12(0.5) vision than in one with 6/9 (0.75) ☒ b
- c) Greater using central than using peripheral vision ☒ c
- d) Greater in normal than in color-blind people. ☒ d

86. Orients are mainly involved in sensing:

- a) Sound amplitude and frequency ☒ a
- b) Angular velocity and acceleration ☒ b

- c) Linear acceleration
- d) Sound intensity

87. Hearing loss is best diagnosed as either conductive or sensorineural by:

- a) Testing vestibular function
- b) Comparing air and bone conduction thresholds
- c) Looking at the tympanic membrane with an otoscope
- d) Looking for a low frequency hearing loss.

88. Colour blindness:

- a) The eye tends to be longer than average from the lens to retina
- b) A convex lens is required to correct the refractive error
- c) Close vision is affected more than distance vision
- d) A circular object tends to appear oval.

89. Impairment of visual acuity in bright light can be explained by:

- a) Random light scattering when there is deficient pigmentation of the eye due to albinism
- b) Random light scattering when there is asymmetrical corneal curvature due to astigmatism
- c) Random light scattering in cornea when there is Vitamin A deficiency
- d) Impairment of rod function when there is a Vitamin A deficiency.

90. Bulging of the optic disc into vitreous humor is caused by:

- a) Raised intraocular pressure
- b) Blockade of absorption of the aqueous humor
- c) A rise in intracranial pressure
- d) Inflammation of the optic nerve.

91. There are three main visual pigments:

- a) In the normal human retina
- b) Colour blindness is found more commonly in females than in males
- c) The convergence of several cones into a cone-bipolar cell reduces visual acuity
- d) Lateral inhibition in the retina increases contrast in the visual field.

92. The tympanic membrane

- a) Modifies the frequencies of sound waves impinging on the ear

- b) Stops vibrating almost immediately after the sound stops.
- c) Bulges outward when the pharyngo-tympanic tube is blocked
- d) Transmits sound more than 80% less efficiently when the membrane is perforated.

93. Regarding the autonomic nervous system:

- a) It is purely a motor system
- b) Nuclei of origin of the sympathetic system are in the dorsal and sacral regions of the spinal cord
- c) One presynaptic sympathetic fibre synapses with one postsynaptic one
- d) The postsynaptic transmitter of the sympathetic fibres is released in discrete quanta at the nerve endings.

94. Atropine causes

- a) Paralysis of accommodation for near vision in the eye
- b) Constriction of the pupil
- c) Difficulty with micturition
- d) Constriction of the bronchi.

95. Lower motor neurone disease

- a) Causes loss of voluntary movements but not of reflex movements
- b) Is a later stage of upper motor neurone disease
- c) Causes eventual wasting of the muscles concerned
- d) Is associated with involuntary twitchings of small fasciculi in the affected muscles.

11. The ovaries
- (a) Begin to develop ova at puberty when acted on by FSH
 - (b) Are required for cyclical menstrual activity
 - (c) Cease to respond to FSH after menopause
 - (d) Secrete hormones which constrict uterine vessels
12. Human spermatozoa:
- (a) Contain 23 chromosomes
 - (b) Have enzymes in their heads which aid penetration of the ovum
 - (c) Are motile in the seminiferous tubules
 - (d) Are stored mainly in the seminal vesicles
13. Adrenaline secretion from the adrenal glands increases the:
- (a) Blood glucose level
 - (b) Blood free fatty acid level
 - (c) Blood flow to skeletal muscle
 - (d) Release of renin in the kidneys
14. Aldosterone secretion is increased by an increase in plasma:
- (a) Volume
 - (b) Osmolality
 - (c) Potassium concentration
 - (d) Renin concentration.

THE UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE
SEMESTER II EXAMINATION

JANUARY 2001
HUMAN PHYSIOLOGY
PGY 412

PAPER I

TIME: 3 Hours

COMPUTER NO: -----

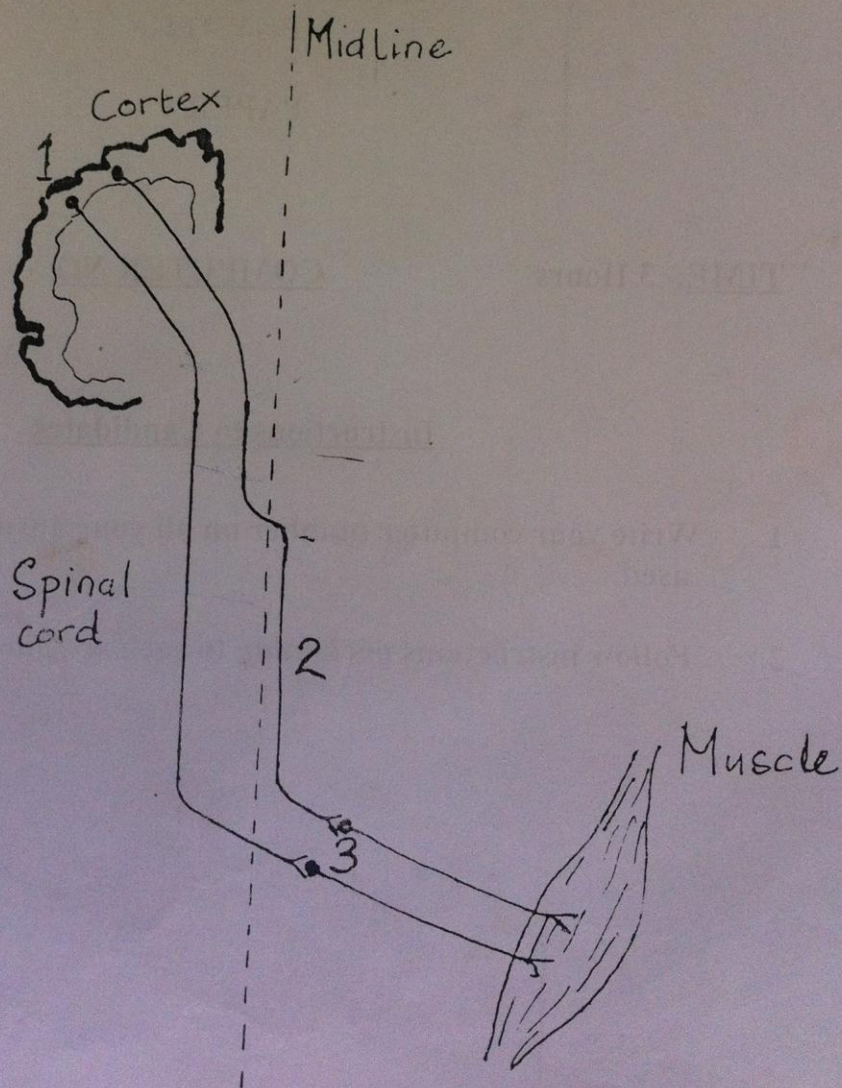
Instructions to Candidates

1. Write your computer number on all your answer sheets used.
2. Follow instructions pertaining to each section

Section A

There are two questions in this section. Answer both questions in essay form.

1. Study the diagram below and
 - i) Describe and explain the physiological organization
 - ii) Explain what happens if this organization is broken at points 1, 2 and 3. (20 marks)



In a Weber test the patient hears better with the left ear than with the right ear. In the Rinne's test vibration in air is not heard after bone conduction in the same ear. With the right ear he hears vibration in air after bone conduction is over.

- (a) Is this normal?
- (b) Discuss the physiological basis of these tests?
- (c) What is the explanation of this case?

order
right prob

SECTION B

Answer two (2) from the following. Each question carries 15 marks.

1. Describe a method for measuring BMR in man. What factors affect it?
2. Describe the role of the cerebellum on movement
3. Cortical representation of the cutaneous and visceral sensation

SECTION C

Write short notes on any four (4). Each question carries 5 marks

1. Referred pain and dermatomal rule
2. ~~Reflex~~
3. Effects of labyrinthectomy
4. Mechanism of decerebrate rigidity
5. * Motor neurone lesion

• Balance Affected

***** END OF EXAMINATION *****

2. Miss Nyambe aged 13 years, had had symptoms of hypethroidism all her life. She complained that a lump in her neck recently got worse. Examination showed that her thyroid gland was grossly enlarged. Her plasma hormone concentration are given below.

Free T₄: 47 pmol/l

TSH: 15mU/l

What biochemical abnormalities might account for the hyperthyroidism?

How would you test your suggestions? Explain your reasoning throughout. (15 marks)

SECTION B

Answer four (4) from the following. Each question carries 15 marks.

- ① Write an essay on the role of the adrenal gland in the body's response to stress.
- ② Accomodation for distant and near vision ✓
- ③ Function of the limbic system ✓
- ✓ 4. Name the factors affecting plasma Ca⁺⁺ concentration and discuss the mechanism by which each exerts its effects.
- 5. Describe the effects of insulin ~~excess~~ and summarise the homeostatic mechanism that combat hypoglycemia.

SECTION C

Write short notes on four(4) of the following. Each question carries 5 marks.

- ✓ ① Sensory innervation of muscles and tendons

- 2. Somatotopic representation in motor cortex ✓
- 3. Feedback mechanism of gonadotrophins in the female ✓
- ④. Physiological mechanisms of the thyroid hormone actions ✓
- ⑤. Physiology of the parasympathetic division of the nervous system. ✓

THE UNIVERSITY OF ZAMBIA
UNIVERSITY EXAMINATION - DECEMBER 1998

PGY 412 HUMAN PHYSIOLOGY PAPER I

Time: Three Hours

Computer No. 94187312

INSTRUCTIONS

- (a) Write down your computer number on ALL your answer sheets
- (b) Answer all sections
- (c) Follow clearly instructions given for each section

SECTION A

ANSWER BOTH THE FOLLOWING QUESTIONS IN SEPARATE ANSWER BOOKS. (EACH QUESTION CARRIES 20 MARKS)

1 (a) Describe how you would test:

- (i) the stretch reflex
- (ii) the pupillary light reflex
- (iii) the corneal reflex

(b) Explain the physiological basis of each of these responses

(c) What would be the significance of:

- (i) an exaggerated knee jerk reflex
- (ii) no change in size of pupil after shining a light onto the eye

2. A young man presented to the casualty ward with the following signs after a traffic accident:

- (i) ✗ no movement of his left leg
- (ii) ✗ lack of discriminatory and joint sensation on the left leg
- (iii) ✗ lack of pain and temperature sensation in his right leg

(a) Suggest the site of lesion and

(b) Explain the physiological basis of this condition

SECTION B

WRITE YOUR ANSWERS IN SEPARATE ANSWER BOOKS

CHOOSE 3 TOPICS from THIS SECTION. Each question carries 15 marks.

1. ☒ Discuss the biological role of the glucocorticoids and the factors involved in controlling their plasma levels.
2. ☒ Discuss the role of the cerebellum in the control of movements ✓ [45]
3. ☒ The hypothalamus is an important integrating centre for a number of involuntary processes. Discuss using four (4) important functions.
4. ☒ Give an account of the way in which the auditory system operates to perform a simple frequency discrimination. At what position in the auditory pathway would a lesion be most likely to produce a unilateral hearing loss?

SECTION C

WRITE SHORT NOTES ON ALL OF THE FOLLOWING. Each question carries 5 marks.

1. ☒ Actions of mineral corticoids
2. ☒ The importance of gamma efferent neurones [20]
3. ☒ Effects of Vitamin A deficiency on vision
4. ☒ Referred pain