

THE UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE

DEPARTMENTS OF ANATOMY AND PHYSIOLOGICAL SCIENCES
CAT3- July, 2017

NEUROSCIENCES

PGY 4110

DURATION:

THREE (2) HOURS

COMPUTER NO.:

[illegible]

INSTRUCTIONS TO CANDIDATES

1. Write your computer number the special MCQ answer sheet PROVIDED
2. Carefully follow the instructions pertaining to each section.

For questions 1 – 5, choose the correct answer from the following list. Each answer may be used once, more than once, or not at all

Anaesthetic	Partition Coefficient	MAC
A. Halothane	2.30	0.75
B. Enflurane	1.80	1.68
C. Nitrous oxide	0.47	105.00
D. Isoflurane	1.40	1.15

- Which anaesthetic has the fastest onset of action?
 - Halothane
 - Enflurane
 - Nitrous oxide
 - Isoflurane
- Which anaesthetic is the most potent?
 - Halothane
 - Enflurane
 - Nitrous oxide
 - Isoflurane
- Which inhalational general anaesthetic is a good analgesic at sub-anaesthetic doses?
 - Halothane
 - Enflurane
 - Nitrous oxide
 - Isoflurane
- Which inhalational general anaesthetic is associated with the highest incidence of hepatitis?
 - Halothane
 - Enflurane
 - Nitrous oxide
 - Isoflurane
- Which anaesthetic which should be avoided in patients with seizure disorders?
 - Halothane
 - Enflurane
 - Nitrous oxide
 - Isoflurane
- Which of these drugs would be the most preferable in countering psychosis induced by levodopa in the treatment of Parkinson's disease?
 - Haloperidol
 - Chlorpromazine
 - Fluphenazine
 - Clozapine
- Which of these local anaesthetics is most likely to cause allergic reactions?
 - Procaine
 - Bupivacaine
 - Lignocaine
 - Prilocaine

8. Name a local anaesthetic agent that causes vasoconstriction
- Lignocaine
 - Cocaine
 - Bupivacaine
 - Procaine
9. What is the drug of choice in the treatment of malignant hyperthermia?
- Diazepam
 - Baclofen
 - Dantrolene
 - Tubocurarine
10. What is the mechanism of anti-psychotic action of first generation anti-psychotic drugs (typical neuroleptic agents)?
- Serotonin 5-HT₂ receptor blockade
 - Serotonin reuptake blockade
 - Dopamine D₂ receptor activation
 - Dopamine D₂ receptor blockade
11. A patient who has been taking a benzodiazepine for a long time develops the following clinical features: restlessness, anxiety, orthostatic hypotension, generalized seizures, severe tremor, vivid hallucination, and psychosis. What could have happened?
- Benzodiazepine overdose
 - Drug interaction between the benzodiazepine and morphine
 - Interaction between the benzodiazepine and phenobarbital
 - Benzodiazepine withdrawal syndrome
12. Which of these anaesthetic agents produces dissociative anaesthesia?
- Thiopentone
 - Ketamine
 - Propofol
 - Etomidate
13. Which of these is not a pharmacological action of benzodiazepines?
- Muscle tremors
 - Muscle relaxation
 - Sedation
 - Anticonvulsant
14. Which of these anti-psychotic drugs is least likely to be associated with extrapyramidal effects?
- Chlorpromazine
 - Risperidone
 - Haloperidol
 - Fluphenazine
15. Which of the following is a competitive [non-depolarising] neuromuscular junction blocker?
- Tubocurarine
 - Suxamethonium
 - Benztropine
 - Diazepam

16. 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

17. 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

18. 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

19. 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

20. Which of the following is a potential adverse effect of clozapine?

- A. Cholestatic jaundice
- B. QT prolongation
- C. Galactorrhoea
- D. Agranulocytosis

21. Concerning local anaesthetics

- A. Amide local anaesthetics are more likely to cause allergic reactions compared to ester anaesthetics
- B. Amide local anaesthetics are metabolized in the liver
- C. Ester type local anaesthetics include lignocaine
- D. Bupivacaine is a short acting local anaesthetic

22. Which of the following anaesthetics would be most suitable in a patient with poor cardiovascular function

- A. Halothane
- B. Propofol
- C. Ketamine
- D. Thiopentone

23. Which of the following effects is least likely to be seen with non-toxic doses of amitriptyline?

- A. Anti-muscarinic
- B. Sedative
- C. Hypertension
- D. Arrhythmias

24. What is flumazenil?

- A. GABA receptor agonist
- B. GABA receptor antagonist
- C. Endorphin antagonist
- D. Serotonin antagonist

25. Which of the following can precipitate lithium toxicity when used concurrently?

- A. Phenytoin
- B. Frusemide
- C. Theophylline
- D. Morphine

26. Which of these anti-psychotic drugs is least likely to be associated with extrapyramidal effects?

- A. Chlorpromazine
- B. Risperidone
- C. Haloperidol
- D. Fluphenazine

27. Which of these classes of antidepressant drugs has the widest therapeutic margin?

- A. Tricyclic antidepressants
- B. Monoamine oxidase inhibitors
- C. Selective serotonin reuptake inhibitors
- D. All the above three classes have a narrow therapeutic index

28. 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

29. Which channel is opened by benzodiazepines in the CNS?

- A. Sodium channel
- B. Potassium channel
- C. Chloride channel
- D. Calcium channel

30. Which of the following drugs should be avoided in patients on monoamine oxidase inhibitors?

- A. Nitrous oxide
- B. Pethidine
- C. Amphetamine
- D. Phenylephrine

31. Hemisection of the spinal cord (Brown-Sequard syndrome) most often results in signs below the lesion best described as:

- a. ipsilateral paralysis and contralateral loss of pain and temperature
- b. ipsilateral paralysis and contralateral loss of light touch and position sense
- c. contralateral paralysis and ipsilateral loss of pain and temperature
- d. contralateral paralysis and ipsilateral loss of light touch and position sense
- e. contralateral paralysis and bilateral loss of pain and temperature

32. Choroid plexus can usually be found in:

- a. anterior (frontal) horn of lateral ventricle
- b. inferior (temporal) horn of lateral ventricle
- c. floor of the third ventricle
- d. floor of the fourth ventricle
- e. cauda equine

33. Primary sensory cortex is located in

- a. Lateral occipital lobe
- b. Parietal lobe
- c. Precentral gyrus
- d. Cingulate gyrus
- e. Frontal eye fields

34. The olfactory bulb

- a. Projects to sensory cortex through V ANL of the thalamus
- b. Projects to sensory cortex through VPLNPM of the thalamus
- c. Projects to the solitary tract so that smell and taste can be combined
- d. Receives cholinergic innervation from the nucleus of the diagonal band
- e. Shares a type of myelin with the oculomotor nerve

35. Impairment of position sense would be most likely to come from

- a. lesion of the ventral root
- b. lesion of the dorsal horn
- c. lesion of the posterior funiculus of the cord
- d. lesion of the lateral funiculus of the cord
- e. lesion of the anterior funiculus of the cord

36. Linear acceleration is transduced in the:

- a) Cupula
- b) Cristae
- c) Maculae
- d) Organ of Corti
- e) Scarpa's ganglion

37. Which of the following is correct regarding vestibular nuclei?

- a) There are six
- b) They are located beneath the floor of the third ventricle
- c) They receive afferent fibers from the spinal ganglion
- d) They project only to the cerebellum
- e) They are connected to the 3rd, 4th, and 6th cranial nerve nuclei by the medial longitudinal fasciculus

38. Association areas of cerebral cortex receive inputs from

- a. Relay nuclei of the thalamus
- b. Association areas of the thalamus
- c. Nucleus basalis of Meynert
- d. multiple cortical areas
- e. None of the above

39. 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 spinothalamic tracts convey impulses from Golgi tendon organs
- (d) All afferent fibres cross the midline at some stage in the spinal cord
- e) All the above

40. 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

41. 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

47. In the inner ear:

- a. At rest inside a hair cell is about +150mV compared to endolymph
- b. The electrolyte composition of endolymph is similar to intracellular fluid
- c. During sound transmission only individual basilar fibers vibrate
- d. The shortest fibres of the basilar membrane are at the apex
- e. A and B are correct

48. A patient has no reaction of the pupil to light. Which muscle is damaged?

- a. Oculomotor muscle
- b. Ciliary muscle
- c. Dilators pupillae muscle
- d. Sphincter pupillae muscle
- e. A and B correct

49. Which 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

50. 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 sacculus and utricle
- (d) A nodding movement of head is detected by the semicircular canals
- (e) A and D are correct

51. Relay stations for taste are:

- a. Accessory nucleus
- b. Inferior colliculus
- c. Nucleus tractus solitarius
- d. Superior Colliculus
- e. All are correct

58. 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

59. The vestibular ocular reflex (VOR) depends on all of the following EXCEPT:

- a) trochlear nucleus
- b) medial longitudinal fasciculus
- c) nystagmus
- d) Superior vestibular nucleus
- e) lateral vestibular nucleus

60. Which descending vestibular pathway is ipsilateral and reaches sacral levels of the spinal cord?

- a) lateral vestibular pathway
- b) medial vestibular pathway
- c) medial longitudinal fasciculus
- d) trapezoid body
- e) Anterior corticospinal tract

Section B

In this section write down "T" or "F" if the statement is true or false against the letter (A, B, C, D) corresponding to the statement. Marks for wrong judgment will be deducted.

61. 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

62. 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

63. 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

64. 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

65. 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

66. 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

67. 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

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. 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

70. 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

71. 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

72. 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

73. Otoliths are mainly involved in the detection of:

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

74. 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

75. In the vestibular apparatus

- a) The fluid in the vestibular apparatus is separate from that in the scala media
- b) The vestibular nerve originates in bipolar neurons in the internal auditory meatus
- c) Linear acceleration is chiefly sensed by the semicircular canals
- d) A nodding movement of the head is detected by the semicircular canals

76. In the inner ear

- a) The perilymph is virtually identical with CSF
- b) The electrolyte composition of endolymph is very similar to ECF
- c) The shortest fibers of the basilar membrane are at the apex
- d) During sound transmission only individual basilar fibres vibrate

77. Regarding Sound Energy

- a) Pitch reflects the pressure attained with each sound wave
- b) Humans can hear over a range of 40-20000Hz
- c) Loudness is more accurately expressed in bels than phonics
- d) The bels scale is logarithmic. Usually expressed in decibels (dBs)

78. Taste

- a) Most taste fibres eventually end up in the opposite post-central gyrus
- b) Substances have to be dissolved in order to stimulate taste buds
- c) The sensation of bitterness is mainly detected around the tip of the tongue
- d) The taste receptor cell is modified nerve cell