THE UNIVERSITY OF ZAMBIA

SCHOOL OF MEDICINE

DEPARTMENTS OF ANATOMY AND PHYSIOLOGICAL SCIENCES
NOVEMBER 2020

PGY 4110

NEUROSCIENCES CAT2

DURATION: **TWO (2) HOURS**

COMPUTER NO.: ....

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INSTRUCTIONS TO CANDIDATES

1. **Write your computer number on the question paper and Special MCQ answer sheet provided**

2. Carefully follow the instructions pertaining to each section.

SECTION A. Questions 1-25.Provide the option of either True or False for each statement A-D in the questions provided. Each full question carries 2 marks. ¼ mark will be deducted for a wrong judgement so avoid guessing, rather leave it blank if not sure.

1. Otoliths are mainly involved in sensing

FFFT

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

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

FTFT

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

3. What are the results of unilateral damage to the cerebellum in man

TFFT

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

4. 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?

FTFT

(a) Ventral corticospinal tract
(b) Lateral spinothalamic tract
(c) Anterior vestibulospinal tract
(d) Ventral spinothalamic tract

5. General sensory pathways:

FTFF

(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

6. The pyramidal system:

TTTF

(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

TFFT

7. 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

TFTF

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. Lower motor neuron disease:

FTFT

(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 fasciluli in the affected muscles

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

(a) Cortex
(b) Muscle spindles
(c) Golgi tendon apparatus
(d) Medulla

TTTT

11. 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

TFTF

12. 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

FFFT

13. 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

FTFF

14. The basilar membrane: FTTT

(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

15. Poor balance is more likely when there is:

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

16. In long sightedness:

FTTF
(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

17. Interruption of the visual pathway in the:

(a) Left optic tract causes blindness in the right visual field TFTF
(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

18. The lateral lobe of cerebellum (neocerebellum):

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

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

(a) The precentral gyrus of the frontal lobe and motor activity TFTF
(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

20. 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 FFTF
(d) Looking for a low frequency hearing loss

21. Regarding sound energy: FTFF

(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

22. Regarding vestibular function: TFTF

(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

23. Visual acuity is greatest in: FTFF

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

24. The functions of the limbic system include: TTTT

(a) Reulation of sexual behavioUr in the males
(b) Expression of fear
(c) Olfaction
(d) Temperature regulation

25. In unilateral vestibular disease typical features include: TTTT

(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

SECTION B-Select One Best Answer in this section. Questions 1-40.

1. What are neuroleptic drugs?
   a. Drugs used to treat dementia
   b. Drugs used to treat psychosis
   c. Drugs used to treat brain tumors
   d. Drugs used to treat brain cancer

B

2. The following are adverse effects of antipsychotic drugs except
   a. Postural hypotension
   b. Sedation
   c. Anti-muscarinic effects
   d. hypoprolactinaemia

D
(HYPER)

3. All of the following are drugs used in the treatment of psychosis except
   a. Risperidone
   b. Succinylcholine
   c. Pimozide
   d. Sulpiride

B

4. The atypical antipsychotic drugs work on all of the following receptors to produce their desired effect except
   a. 5-HT2 receptors
   b. D3 receptors
   c. D1 receptors
   d. D2 receptors

B

5. Cholinesterase inhibitors are used in the treatment of dementias where they produce all of the following except;
   a. Slowing the accumulation of intracellular calcium.
   b. Increase the levels of acetylcholine in the brain
   c. Gastrointestinal effects
   d. Produces dose related adverse effects

A

6. Lithium is used in the treatment of all of the following except
   (a) Bipolar disorder
   (b) Epilepsy
   (c) Acute mania
   (d) Prophylaxis of resistant recurrent depression

B

7. During the process of general anaesthesia, what drugs are used to reduce bronchial and salivary secretions?

C

(a) Non-depolarizing muscle relaxants
(b) Inhalational anaesthetics
(c) anti-muscarinic drugs
(d) Neuroleptanalgesia

8. The rate of systemic absorption of local anaesthetics is affected by all of the following except

A

(a) Pharmacodynamics properties
(b) Concentration of the solution
(c) Vascularity of the area
(d) Pharmacokinetic properties

9. The techniques of local anaesthesia will include all of the following except

B

(a) Epidural anaesthesia
(b) Neuroleptanalgesia
(c) Intravenous regional anaesthesia
(d) Infiltration

10. All of the following are used in treatment of the maniac phase of affective disorders except

D

(a) Lithium
(b) Carbamazepine
(c) Olanzapine
(d) Nortriptyline

11. Which of the following drugs that is used to treat bipolar depression is called ***a mood stabilizing agent***

D

(a) Memantine
(b) Amitriptyline
(c) Moclobemide
(d) Valproate

12. Which of the following drugs will show interaction with 'cheese containing foods' causing severe hypertension

A (MAO INHIBITORS)

(a) Phenelzine
(b) Reboxetine
(c) Mirtazapine
(d) Fluvoxamine

13. Which statement about the drugs that are used in the treatment of dementia is true
    (a) These drugs are used to cure the underlying cause of dementia
    (b) These drugs are used to treat the cognitive and behavioral symptoms of dementia
    (c) They are used to cure dementia
    (d) They are drugs that are meant to prevent the cause of dementia

B

14. All of the following drugs are used in the treatment of dementias except
    (a) Antidepressants
    (b) Ant seizure drugs
    (c) Anxiolytic drugs
    (d) Anaesthetic drugs

C

15. Manic episodes of bipolar disorder may be treated using
    (a) Lamotrogine
    (b) Donezepil
    (c) Galantamine
    (d) NSAIDs

A

16. The following are the common clinical uses of antidepressant drugs except
    (a) Anxiety disorders
    (b) Neuropathic pain
    (c) Bipolar depression
    (d) Schizophrenia

RESEARCH
BETWEEN A OR D

17. The following are all indicated to use in the treatment of demetia except
    (a) Benzodiazepines
    (b) Memantine
    (c) Rivastigmine
    (d) Clozapine

A

18. Which of the following antipsychotic drugs are effective in relieving both the positive and negative effects of schizophrenia
    (a) Haloperidol
    (b) Chlorpromazine
    (c) Risperidone
    (d) Fluphenazine

C

19. All the following statements are true about antidepressant drugs except
    (a) These have delayed therapeutic efficacy
    (b) These have similar therapeutic efficacy
    (c) Patients may respond differently to different antidepressant drugs

D

(d) Selection of which antidepressant drug to use is not affected by co-morbidities

20. Which of the following drugs has hepatotoxicity as a side effect
(a) Donezepil
(b) Rivastigmine,
(c) Galantamine
(d) Tacrine

D

21. What are the most common adverse effects of CNS cholinesterase inhibitors
(a) Dizziness and confusion
(b) Nausea and diarrhea
(c) Dry mouth and blurred vision
(d) Anxiety and sexual dysfunction

B

22. Mono-amine oxidase inhibitors are used in treatment of depression, what are the most common adverse effects of these drugs
(a) Headache, CNS excitement, and postural hypotension
(b) Headache, nausea and vomiting
(c) Dry mouth, blurred vision and constipation
(d) Thirst, nausea and vomiting

A

23. The use of diuretics during lithium treatment is contraindicated because
(a) It increases the renal clearance of lithium causing under-dosage
(b) Increases renal reabsorption of lithium causing toxicity
(c) It preserves water in the body causing swelling
(d) It prevents loss of sodium thus preserving water

B

24. Which of the following is a second generation psychotic drug
(a) Haloperidol
(b) Clopentixol
(c) Risperidone
(d) Chropromazine

C

25. What are the common unwanted effects of antipsychotic drugs
(a) Weight gain, hypotension and sedation
(b) Dizziness, headache and confusion
(c) Nausea, diarrhea and Dizziness
(d) Drowsiness, dizziness and ataxia

A

26. Tricyclic anti-depressants are contraindicated in all of the following except
(a) Recent myocardial infarction
(b) Manic phase
(c) Renal disease
(d) Seizure disorders

C

27. All of the following are inhalation anaesthetics except
(a) Nitrous oxide
(b) Halothane
(c) sevoflurane
(d) propofol

D

28. Which of the following drugs can be used for both induction and maintainance of anaesthesia
(a) Etomidate
(b) Propofol
(c) Thiopental sodium
(d) Suxamethonium

B

29. Which of the following anaesthetics should be avoided in cases with high intracranial pressure
(a) Halothane
(b) Propofol
(c) Ketamine
(d) Thiopental sodium

C

30. The following is true of Pharmacology except:
A. Fetal hydantoin syndrome characterized by cleft lip and palate
B. Gingival hyperplasia
C. Decreases the efficacy of oral contraceptives
D. It is safe in pregnancy

D

31. A 28-year-old man presented with elevated mood, rapid speech, muscle twitching, and dilated pupils. He kept on scratching himself repeatedly because he stated that "bugs are crawling under my skin." Vital signs were blood pressure 170/ 105, heart rate 120 bpm, respirations 20/ min. After a short time, stereotyped behaviour developed accompanied by paranoid delusions, but the man remained oriented and alert. Which of the following drugs most likely caused the patient's syndrome?
A. Marijuana
B. LSD
C. Cocaine
D. Ethanol

C

32. The mother of a 16-year-old boy noticed a change in her son's behaviour. When he returned home in the evening after meeting with his friends, he was always very hungry, despite having eaten his dinner. He always appeared happy, would find everything amusing, and laughed a lot. Occasionally, his eyes would be rather red. In the morning he was reluctant to go to school and did not appear to care whether he did well or not. A drug with which of the following mechanisms of action was he most likely abusing?
A. Activation of cannabinoid receptors
B. Blockade of norepinephrine reuptake
C. Activation of serotonin receptors
D. Activation of μ (mu) opioid receptors E. Blockade of dopaminergic receptors

A

33. An 18-year-old girl who had never used recreational drugs joined in smoking multiple marijuana cigarettes at a party. Which of the following signs and symptoms did the girl most likely experience just after smoking?
A. Increased heart rate
B. Depressive mood
C. Hyperalgesia
D. Improved memory

A

34. A 22-year-old man complaining of muscle aches, nausea, and anxiety, reported that he was a heroin addict and that he had been smoking phencyclidine occasionally for the past 6 months. He was sweating, hyperventilating, hyperthermic, high blood pressure, and tachycardia. His pupils were dilated. Which of the following types of drugs would be most appropriate to provide immediate relief to this patient?
A. 5-HT receptor agonist
B. Mu receptor agonist
C. Glutamate receptor antagonist
D. GABA receptor agonist

D

35. A 17-year-old girl who had never used drugs decided to join in with her friends who were smoking drugged cigarettes. In the first 5 minutes, she experienced euphoria, uncontrollable laughter, depersonalization, and sharpened vision. Her concentration became difficult, and she noticed that her heart was "pounding." Her friends noted reddening of her conjunctiva but no change in pupil diameter. Which of the following drugs most likely caused the girl's symptoms?
A. Cannabis
B. Cocaine
C. Heroin
D. LSD

A

36. A 40-year-old female alcoholic was admitted to an alcohol rehabilitation center because she was determined to quit the habit. A drug was given to facilitate avoidance from ethanol dependence, based on research suggesting that compulsive alcohol drinking is influenced by opiate receptor activity. Which of the following drugs was most likely administered?
A. Clonidine

C

B. Disulfiram
C. Naltrexone
D. Methadone

37. A 28-year-old polydrug user self-injected a drug approximately 45 minutes prior to admission. Vital signs were blood pressure 100/ 50, heart rate 95 bpm, respirations 5/ min. Physical examination showed cyanosis and pinpoint pupils. Which of the following drugs did the woman most likely take?
A. Amphetamine
B. Heroin
C. Cocaine
D. Diazepam

B

38. A 41-year-old man decided to stop smoking cigarettes and asked his family physician about a possible withdrawal syndrome. He had been smoking two packs of cigarettes daily for 24 years. Which of the following are the withdrawal symptoms the man was most likely to experience?
A. Irritability and restlessness
B. Euphoria and elation
C. Tachycardia and hypertension
D. Decreased appetite and weight loss

A

39. A 48-year-old woman became agitated and visibly tremulous 1 day after being admitted to the hospital for elective surgery. Which of the following statements most likely explains the reason for the patient's behaviour?
A. Benzodiazepine medication given before surgery
B. Depressive episode triggered by the operation
C. Ethanol withdrawal
D. Opioid medication given before surgery

C

40. A 24-year old man, who had started smoking marijuana 5 years ago, had been smoking 5 to 10 marijuana cigarettes daily and occasionally self-injecting pure hashish oil. The man was most likely at increased risk of which of the following adverse events?
A. Death from parenteral injection of hashish oil
B. Death from acute cannabis withdrawal
C. Colon cancer
D. Driving or work accidents

A

SECTION C

(Match the statement in column A with the answer in Column C)

A. Types of seizures

Types of Seizure (A)	Answer	Name of seizures (C)
1. Types of partial seizures	B	A. Tonic-clonic, Absence and Myoclonic
2. Types of general seizures	A	B. Simple and Complex
3. Grand mal seizures	D	C. Another name for absence seizures
4. Petit mal seizures	C	D. Another name for tonic-clonic seizures

B. Treatment of epilepsy and seizures.

Drug	Answers	Mechanism of Action or indication
1. Phenytoin	A	A. Inhibition of axonal sodium channels to produce membrane stabilization
2. Valproic Acid (VA)	C	B. Treatment of status epilepticus
C. Benzodiazepines; Diazepam and lorazepam	B	C. Inhibition of axonal sodium channels; inhibition of T-type calcium channels; inhibition of GABA transaminase
D. Ethosuximide	D	D. Drug of choice for treating absence seizures

C. Drugs Abuse

Description of drug	Answer	Drug
1. Drug sometimes used to decrease alcohol craving in alcoholics	D	A. Ethanol
2. Drug that mainly increases nonvascular release of	B	B. Amphetamine

dopamine from dopaminergic neurons		
3. Elimination of this drug follows mainly zero-order kinetics	A	C. Naloxone
4. Drug is used in heroin detoxification programs	C	D. Buprenorphine

SECTION D- 20marks

1. **Very short notes ((Answer should be no more than 1 sentence.)**

A. What is the most common seizure type? (2 marks)
B. What type of seizure most commonly presents during childhood? (2 marks)
C. What is status epilepticus? (2 marks)
D. Overdose or abrupt withdrawal of antiepileptic drugs may cause what adverse effect? (2 marks)
E. How do phenytoin and carbamazepine decrease the efficacy of oral contraceptives? (2 marks)

2. **Short notes-**

A. Write short notes on the mechanism of action of antidepressant (5 marks)
B. Write short notes on the general treatment of dementia (5 marks)

END OF CAT2

1 A) Tonic clinic
B) Absence Seizures
C) Having 2 or more seizures within 5 minutes without retain of consciousness or having a seizure that last for as long as 5 minutes
D) Relapse Seizures
E) They are P450 enzyme inducers, therefore they increase the degradation of oral contraceptives ,making them less effective