Roll No. .....

Question Booklet Number

O. M. R. Serial No.

M. Sc. (Biotechnology) (Fourth Semester)
(NEP) EXAMINATION, 2025-26
NEUROSCIENCES AND TECHNOLOGY

Paper Code							
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Questions Booklet Series
A

Time : 1:30 Hours] [*Maximum Marks : 75*

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.

2. The booklet contains 100 questions. Examinee is required to answer 75 questions in the OMR Answer-Sheet provided and not in the question booklet. All questions carry equal marks.

3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।

2. प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को 75 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। सभी प्रश्नों के अंक समान हैं।

3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।

(Remaining instructions on the last page) **(शेष निर्देश अन्तिम पृष्ठ पर)**

(Only for Rough Work)

1. What is the term for the difference in electrical charge between the inside and outside of a resting neuron ?

(A) Membrane resistance

(B) Threshold potential

(C) Synaptic potential

(D) Resting membrane potential

2. Which ion is most concentrated inside neurons at rest ?

(A) Chloride

(B) Calcium

(C) Potassium

(D) Sodium

3. What effect does the opening of voltage-gated sodium channels have on the membrane potential ?

(A) Inhibition

(B) Hyperpolarization

(C) Depolarization

(D) Repolarization

4. What is the approximate threshold potential required to initiate an action potential ?

(A) – 55 mV

(B) + 40 mV

(C) – 90 mV

(D) 0 mV

5. Nodes of Ranvier are gaps found in which structure ?

(A) Dendritic membrane

(B) Myelin sheath

(C) Axonal membrane

(D) Synaptic cleft

6. What is the term for synaptic weakening that occurs due to low-frequency stimulation ?

(A) Long-term potentiation

(B) Synaptic fatigue

(C) Neural inhibition

(D) Long-term depression

7. By which process do synaptic vesicles release neurotransmitters into the synaptic cleft ?

(A) Diffusion

(B) Active transport

(C) Exocytosis

(D) Osmosis

8. Which type of receptors are coupled to intracellular signaling cascades ?

(A) Nuclear receptors

(B) Voltage receptors

(C) Ionotropic receptors

(D) Metabotropic receptors

9. Inhibitory postsynaptic potentials (IPSPs) usually involve the entry of which ions into the neuron ?

(A) Chloride ions

(B) Potassium ions

(C) Calcium ions

(D) Sodium ions

10. What is the primary function of the enzyme acetylcholinesterase ?

(A) Produce acetylcholine

(B) Transport acetylcholine

(C) Store acetylcholine

(D) Destroy acetylcholine

11. What is the process by which newly formed memories are stabilized over time ?

(A) Encoding

(B) Consolidation

(C) Retrieval

(D) Rehearsal

12. Which brain region is primarily involved in working memory ?

(A) Cerebellum

(B) Prefrontal cortex

(C) Medulla

(D) Brainstem

13. Which type of memory is responsible for storing personal experiences ?

(A) Semantic memory

(B) Procedural memory

(C) Reflex memory

(D) Episodic memory

14. Long-term storage of motor skills is mainly associated with which brain structure ?

(A) Hypothalamus

(B) Cerebellum

(C) Amygdala

(D) Thalamus

15. Emotional memory formation is strongly associated with which brain structure ?

(A) Corpus callosum

(B) Medulla

(C) Amygdala

(D) Spinal cord

16. Which type of memory enables individuals to acquire and perform physical skills through repeated practice ?

(A) Remembering names and dates

(B) Emotional responses

(C) Learning motor skills

(D) Recalling childhood experiences

17. Which ion blocks NMDA receptors at resting membrane potential ?

(A) Sodium

(B) Calcium

(C) Potassium

(D) Magnesium

18. Activation of AMPA receptors results in the influx of which ions ?

(A) Chloride ions

(B) Magnesium ions

(C) Calcium ions

(D) Sodium ions

19. Structural changes in dendritic spines are primarily associated with which function ?

(A) Motor reflexes

(B) Hormone secretion

(C) Sensory perception

(D) Learning and memory

20. How is synaptic plasticity best defined ?

(A) Hormonal signaling

(B) Changes in synaptic strength

(C) Neural inhibition

(D) Permanent neuron death

21. Which neurotransmitter acts as the primary excitatory neurotransmitter in most synapses of the central nervous system (CNS) ?

(A) Glycine

(B) Glutamate

(C) GABA

(D) Dopamine

22. Serotonin is synthesized from which amino acid precursor ?

(A) Phenylalanine

(B) Tryptophan

(C) Histidine

(D) Tyrosine

23. Dopamine plays an important role in which physiological function ?

(A) Blood clotting

(B) Digestion

(C) Movement control

(D) Oxygen transport

24. Glycine primarily functions as which of the following in the spinal cord ?

(A) Growth factor

(B) Excitatory transmitter

(C) Hormone

(D) Inhibitory transmitter in spinal cord

25. The neurotransmitter acetylcholine is primarily important for which function ?

(A) Vision
(B) Taste perception
(C) Neuromuscular transmission
(D) Hormone secretion

26. Reduced levels of serotonin are strongly associated with which condition ?

(A) Diabetes
(B) Hypertension
(C) Depression
(D) Epilepsy

27. Which of the following is considered a negative symptom of schizophrenia ?

(A) Social withdrawal
(B) Hallucinations
(C) Hyperactivity
(D) Delusions

28. Anxiety disorders are commonly treated with drugs that enhance the activity of which neurotransmitter ?

(A) GABA activity
(B) Acetylcholine
(C) Glutamate activity
(D) Dopamine

29. Post-traumatic stress disorder (PTSD) is primarily characterized by which of the following symptoms ?

(A) Motor paralysis
(B) Persistent fear and flashbacks
(C) Hearing impairment
(D) Memory loss only

30. Bipolar disorder involves disturbances in which of the following ?

(A) Parkinson's disease
(B) Epilepsy
(C) ALS
(D) Alzheimer's disease

31. Progressive degeneration of motor neurons leading to muscle weakness is characteristic of which disorder ?

(A) Alzheimer's disease
(B) Parkinson's disease
(C) ALS
(D) Epilepsy

32. Lewy bodies are most commonly associated with which neurological disorder ?

(A) Parkinson's disease
(B) Migraine
(C) Epilepsy
(D) Stroke

33. Neurofibrillary tangles observed in Alzheimer's disease are primarily composed of which protein ?

(A) Myelin
(B) Actin
(C) Tau protein
(D) Collagen

34. Progressive loss of motor neurons is a defining feature of which condition ?

(A) Stroke
(B) ALS
(C) Multiple sclerosis
(D) Migraine

35. Multiple sclerosis is characterized by an autoimmune attack on which structure ?

(A) Synapses
(B) Dendrites
(C) Axons
(D) Myelin

36. Rod photoreceptors are primarily responsible for which type of vision ?

(A) Color vision
(B) Motion detection
(C) Sound detection
(D) Dim-light vision

37. The fovea is characterized by a high density of which type of photoreceptor cells ?

(A) Ganglion cells
(B) Rods
(C) Cones
(D) Bipolar cells

38. The organ of Corti plays a key role in which sensory function ?

(A) Balance
(B) Taste detection
(C) Smell
(D) Sound transduction

39. The semicircular canals are responsible for detecting which type of movement ?

(A) Rotational movement
(B) Taste stimuli
(C) Linear acceleration
(D) Odors

40. Taste receptors detect chemicals that are dissolved in which substance ?

(A) Tears
(B) Blood
(C) Mucus
(D) Saliva

41. The brainstem, which controls vital functions such as breathing, heart rate, and basic reflexes, consists of which structures ?

(A) Midbrain, pons, medulla
(B) Thalamus only
(C) Cerebellum only
(D) Hypothalamus only

42. What is the primary function of the thalamus ?

(A) Memory center
(B) Sensory relay station
(C) Hormone gland
(D) Motor neuron

43. Which brain structure is mainly responsible for balance and coordination ?

(A) Amygdala

(B) Cerebellum

(C) Medulla

(D) Hypothalamus

44. The limbic system, which is involved in emotional processing and memory formation, primarily regulates which functions ?

(A) Emotions and memory

(B) Digestion

(C) Hearing

(D) Vision

45. Reflex actions are primarily coordinated by which part of the nervous system ?

(A) Cerebellum

(B) Hypothalamus

(C) Spinal cord

(D) Cortex

46. The autonomic nervous system (ANS) consists of which divisions ?

(A) Axons and dendrites

(B) Motor and sensory neurons

(C) Sympathetic and parasympathetic divisions

(D) Brain and spinal cord

47. Activation of which division of the autonomic nervous system results in an increased heart rate ?

(A) Somatic system

(B) Parasympathetic system

(C) Sympathetic system

(D) Enteric system

48. The vagus nerve is a major component of which division of the nervous system ?

(A) Somatic system

(B) Sympathetic system

(C) Sensory system

(D) Parasympathetic system

49. Which neurotransmitter is primarily released by the parasympathetic nervous system ?

(A) Dopamine

(B) Glutamate

(C) Glycine

(D) Acetylcholine

50. Which neurotransmitter is commonly released at target organs by the sympathetic nervous system ?

(A) Norepinephrine

(B) Serotonin

(C) GABA

(D) Glycine

51. Schwann cells are responsible for producing myelin in which part of the nervous system ?

(A) Cerebellum

(B) PNS

(C) Brainstem

(D) CNS

52. Astrocytes help maintain synaptic function by regulating which of the following ?

(A) Hormone synthesis

(B) Blood glucose

(C) Bone growth

(D) Neurotransmitter uptake

53. Microglia act as the primary defense cells in the central nervous system and mainly function as what type of cells ?

(A) Immune cells

(B) Sensory cells

(C) Structural cells

(D) Hormone cells

54. Oligodendrocytes form myelin sheaths around axons in the central nervous system and have the ability to myelinate :

(A) Motor neurons only

(B) One axon only

(C) Multiple CNS axons

(D) Sensory neurons only

55. Satellite cells surround neurons in which location ?

(A) Peripheral ganglia

(B) Brainstem

(C) Retina

(D) CNS

56. Tight junctions in the blood-brain barrier (BBB) are primarily formed by which type of cells ?

(A) Microglia

(B) Endothelial cells

(C) Astrocytes

(D) Oligodendrocytes

57. The blood-brain barrier protects the brain by restricting harmful substances while allowing essential molecules to pass. It prevents the entry of which of the following ?

(A) Glucose

(B) Oxygen

(C) Many toxins

(D) Carbon dioxide

58. Lipid-soluble molecules cross the blood-brain barrier mainly by which process ?

(A) Diffusion

(B) Active transport

(C) Osmosis

(D) Endocytosis

59. Transport proteins in the blood-brain barrier regulate the entry of which substances ?

(A) Water only

(B) Nutrients

(C) Hormones only

(D) None of the above

60. The structural support of the blood-brain barrier is provided by surrounding glial components, particularly which structure ?

(A) Synapses

(B) Astrocyte end-feet

(C) Dendrites

(D) Axons

61. The soma is the main cell body of a neuron and contains essential organelles, including which of the following ?

(A) Nucleus

(B) Synaptic vesicles

(C) Myelin sheath

(D) Nodes

62. The axon hillock serves as the site of which process ?

(A) Action potential initiation

(B) Hormone release

(C) Synapse formation

(D) Neurotransmitter storage

63. Myelin increases the speed of nerve conduction by which mechanism ?

(A) Reducing synapses

(B) Insulating axons

(C) Increasing ion channels everywhere

(D) Increasing neuron size

64. Axonal transport primarily utilizes which components ?

(A) DNA replication

(B) Microtubules and motor proteins

(C) Hormones

(D) Ribosomes

65. Retrograde transport refers to the movement of materials in which direction ?

(A) Into dendrites

(B) Outside neuron

(C) Toward axon terminal

(D) Toward cell body

66. The all-or-none law applies to which of the following ?

(A) Hormones

(B) Reflexes

(C) Action potentials

(D) Synaptic potentials

67. The refractory period prevents which of the following ?

(A) Hormone secretion

(B) Muscle contraction

(C) Backward propagation of impulses

(D) Neurotransmitter release

68. Local potentials differ from action potentials in that they :

(A) Occur in axons only

(B) Follow all-or-none law

(C) Are graded

(D) Travel long distances

69. Summation of excitatory postsynaptic potentials (EPSPs) occurs mainly at which site ?

(A) Axon hillock

(B) Dendritic spine

(C) Nodes of Ranvier

(D) Synaptic cleft

70. Temporal summation refers to which of the following ?

(A) Rapid signals from one synapse

(B) Multiple signals arriving simultaneously

(C) Signals from many neurons

(D) Hormonal signals

71. The frontal lobe is primarily associated with which function ?

(A) Decision making

(B) Hearing

(C) Balance

(D) Vision

72. The occipital lobe is responsible for processing which type of information ?

(A) Taste

(B) Vision

(C) Touch

(D) Hearing

73. The temporal lobe is primarily involved in processing auditory information and is responsible for which function ?

(A) Balance

(B) Vision

(C) Hearing

(D) Smell

74. The parietal lobe plays a key role in integrating sensory inputs from the body and is mainly responsible for which function ?

(A) Vision

(B) Hearing

(C) Smell

(D) Somatosensory information

75. Broca's area is responsible for controlling which function ?

(A) Balance
(B) Memory
(C) Speech production
(D) Vision

76. Circadian rhythms are regulated by which structure ?

(A) Hippocampus
(B) Cerebellum
(C) Amygdala
(D) Suprachiasmatic nucleus

77. Melatonin is secreted by which gland ?

(A) Pituitary gland
(B) Pineal gland
(C) Thyroid gland
(D) Adrenal gland

78. The reticular formation is primarily involved in regulating which function ?

(A) Vision
(B) Taste
(C) Arousal and wakefulness
(D) Smell

79. Dopamine pathways involved in addiction include which pathway ?

(A) Optic pathway
(B) Vestibular pathway
(C) Mesolimbic pathway
(D) Corticospinal pathway

80. The corpus callosum connects which structures ?

(A) Two hemispheres of brain
(B) Retina and cortex
(C) Brain and spinal cord
(D) Cerebellum and brainstem

81. Which structure is the largest part of the brain ?

(A) Cerebellum
(B) Brainstem
(C) Thalamus
(D) Cerebrum

82. The pons plays an important role in regulating which function ?

(A) Breathing
(B) Memory
(C) Taste
(D) Vision

83. The medulla oblongata regulates essential life-sustaining activities such as breathing and heart rate, and primarily controls which functions ?

(A) Vital autonomic functions
(B) Vision
(C) Hearing
(D) Smell

84. The hypothalamus serves as a link between which systems ?

(A) Vision and hearing

(B) Brain and spinal cord

(C) Taste and smell

(D) Nervous and endocrine systems

85. The pituitary gland is often referred to as which of the following ?

(A) Master endocrine gland

(B) Sensory gland

(C) Digestive gland

(D) Immune gland

86. The hippocampus is essential for which function ?

(A) Hearing

(B) Vision

(C) Memory formation

(D) Taste

87. The amygdala is involved in emotional processing, particularly fear and memory- related responses, and primarily processes which function ?

(A) Emotions

(B) Vision

(C) Balance

(D) Taste

88. The cerebellum is primarily responsible for regulating which function ?

(A) Motor coordination

(B) Hormones

(C) Vision

(D) Taste

89. The optic nerve carries signals from which structure to the brain ?

(A) Ear to brain

(B) Retina to brain

(C) Nose to brain

(D) Brain to retina

90. The vestibular system is primarily responsible for controlling which function ?

(A) Hearing

(B) Balance

(C) Taste

(D) Vision

91. The spinal cord typically ends at approximately which vertebral level ?

(A) S5

(B) T12

(C) L1-L2 vertebra

(D) C1

92. The meninges consist of how many protective layers ?

(A) Two layers

(B) One layer

(C) Three protective layers

(D) Four layers

93. Cerebrospinal fluid (CSF) is primarily produced by which structure ?

(A) Neurons

(B) Astrocytes

(C) Axons

(D) Choroid plexus

94. What are the main functions of cerebrospinal fluid (CSF) ?

(A) Protection and nutrient transport

(B) Blood filtration

(C) Hormone production

(D) Oxygen transport

95. Brain ventricles are filled with which substance ?

(A) Blood

(B) CSF

(C) Lymph

(D) Plasma

96. The third ventricle is located in which part of the brain ?

(A) Diencephalon

(B) Spinal cord

(C) Medulla

(D) Cerebellum

97. The fourth ventricle is continuous with which structure ?

(A) Retina

(B) Central canal

(C) Pituitary

(D) Cochlea

98. The central canal runs through which structure ?

(A) Cortex

(B) Brainstem

(C) Spinal cord

(D) Cerebellum

99. Gray matter mainly consists of which components ?

(A) Myelinated axons

(B) Neuron cell bodies

(C) Hormones

(D) Blood vessels

100. White matter mainly consists of which components ?

(A) Synaptic vesicles

(B) Myelinated axons

(C) Dendrites

(D) Neuron nuclei

(Only for Rough Work)

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the correct answer and mark the same in the OMR Answer-Sheet as per the direction :

Example :

Question :

Q. 1 (A) ● (C) (D)
Q. 2 (A) (B) ● (D)
Q. 3 (A) ● (C) (D)

Illegible answers with cutting and over-writing or half filled circle will be cancelled.

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.
6. All answers are to be given on OMR Answer Sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.
7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.
8. After the completion of the examination candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.
9. There will be no negative marking.
10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.
11. To bring and use of log-book, calculator, pager and cellular phone in examination hall is prohibited.
12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

Impt. : On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is any discrepancy in the question Booklet, then after showing it to the invigilator, get another question Booklet of the same series.

4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर—A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से सही उत्तर छाँटना है। उत्तर को OMR आन्सर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

उदाहरण :

प्रश्न :

प्रश्न 1 (A) ● (C) (D)
प्रश्न 2 (A) (B) ● (D)
प्रश्न 3 (A) ● (C) (D)

अपठनीय उत्तर या ऐसे उत्तर जिन्हें काटा या बदला गया है, या गोले में आधा भरकर दिया गया, उन्हें निरस्त कर दिया जाएगा।

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
6. सभी उत्तर केवल ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
7. ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।
8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।
9. निगेटिव मार्किंग नहीं है।
10. कोई भी रफ कार्य, प्रश्न-पुस्तिका के अन्त में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
11. परीक्षा-कक्ष में लॉग-बुक, कैलकुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।
12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

महत्वपूर्ण : प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।