TOPIC: ANIMAL COORDINATION AND CONTROL
Time: 2 ½ hours
Attempt all questions in this paper

SECTION	MARKS
A	
B	
TOTAL	

SECTION A (40 MARKS)

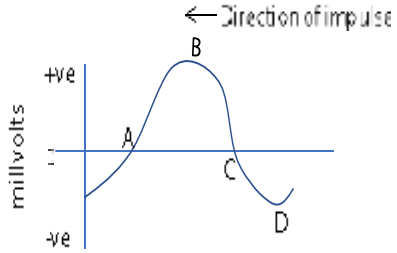
1. Onset of depolarization of an axon occurs when the axoplasm temporarily become
   A. more negative
   B. less negative
   C. more positive
   D. less positive
2. Wearing a coarse shirt causes a tickling sensation but the sensation disappears. Which of the following is not explanation of this observation?
   A. Supply of transmitter substances get exhausted
   B. The discharge of impulses at afferent nerve ceases
   C. The membrane surrounding the generator region becomes less permeable to sodium ions
   D. Generator potential falls below threshold values
3. Which of the following occurs when the axon is depolarized?
   A. Sodium enters the axon, potassium leave
   B. Both sodium and potassium ions leave the axon
   C. Potassium enter the axon and sodium leave
   D. Both sodium and potassium ions enter the axon
4. A person who walks unsteadily may have a defect in the
   A. Cerebrum
   B. Cerebellum
   C. Medulla oblongata
   D. Hypothalamus
5. Which one of the following describes the sodium-potassium pump?
   A. Active pumping potassium ion out of the axon and sodium ions into it.
   B. Equal concentration of the ions on either side of the axon when at rest
   C. Inability of the axon to absorb the two ions passively
   D. Active pumping sodium ion out of the axon and potassium ions into it.
6. Which one of the following is not a transmitter substance?
   A. Acetylcholine
   B. Cholinesterase
   C. Atropine
   D. Noradrenaline
7. The principle function of the autonomic nervous system is to
   A. Innervate the internal organs
   B. Control the contraction of skeletal muscles.
   C. Regulate and control the peripheral nervous system
   D. Transmit impulses from the brain to the central nervous system
8. Which of the following represent the correct order of events that occurs at the synapse during impulse transmission?
   A. Ca^{2+} ion influx, release of transmitter substances, depolarization
   B. Depolarization, release of transmitter substance, Ca^{2+} ion influx
   C. Release of transmitter substances, Ca^{2+} ion influx, depolarization
   D. Release of transmitter substances, depolarization, Ca^{2+} ion influx
9. A likely effect of inhibiting the action of acetylcholinesterase at a synapse is
   A. Cessation of impulse transmission
   B. Speeding up of impulse transmission
   C. Continuous impulse transmission
   D. Slowing down of impulse transmission
10. Myelinated axons of a frog conduct impulses three times less fast as those of the same diameter in rat because the
    A. Myelin sheath in axons of frogs are thinner
    B. Rats are endothermic
    C. Neuron of a frog have more synapses
    D. Frog lives in water which is cold
11. Increased permeability of the post synaptic membrane to allow chloride ion in, and potassium ions out of the cell causes
    A. Depolarization of the cell membrane
    B. Polarization of the membrane
    C. Excitation of the membrane
    D. Hyper polarization of the membrane
12. After an action potential, repolarization of the membrane begins by
    A. Entry of sodium into the cell
    B. Sodium ion diffusing out of the cell
    C. Entry of potassium ions into the cell
    D. Potassium ions diffusing out the cell
13. Which one of the following is the correct statement about a neuron membrane during resting potential?
    A. The inside of neuron membrane is negatively charged
    B. The Na^+, K^+ and Cl^- ions are evenly distributed on either side of the membrane
    C. The concentration of Na^+ ions is greater inside the membrane

D. The concentration of K^+ is greater outside the membrane

14. Cones have better visual acuity than rods because cones
    A. have little retinal convergence
    B. are more sensitive to light
    C. connect with a single optic fibre
    D. are more concentrated at the fovea
15. Which one of the following is true of what occurs at the excitatory synapse when impulse arrives?
    A. chloride channels close
    B. receptor site close
    C. post synaptic membrane becomes impermeable to calcium ions
    D. Sodium ion channels open
16. In the mammalian eye, rods have a poorer visual acuity than cones because they are
    A. fewer in number
    B. smaller in size
    C. connected to more than one optic nerve
    D. less sensitive to light
17. Staying in a dark room for a long tine increases the sensitivity of the eye to light because photochemical pigment is
    A. Not broken down
    B. Formed faster than they are broken down
    C. Destroyed
    D. Not synthesized
18. Which one of the following is the correct state of the structures in the mammalian eye during accommodation for far objects?

	Ciliary muscle	Suspensory ligament	Curvature of the lens
A	Relaxed	Taut	Decreased
B	Contracted	Taut	Increased
C	Relaxer	Relaxed	Decreased
D	Contracted	Relaxed	Increased

19. Which of the vestibular apparatus responds to vertical movement of the head?
    A. Vestibular canal
    B. Saccule
    C. Utricle
    D. Semi-circular canal
20. Arthropods have a lower visual acuity compared to vertebrate because
    A. The ommatidia are less sensitive to light than rods and cones
    B. Compound eyes contain fewer rods and cones
    C. The ommatidia are big and only few are packed in an equal area
    D. Ommatidia contain photochemical pigments which are less readily bleached.
21. Which of the following does not contribute to the short reaction time in insects?
    A. Large size of ommatidia
    B. High flicker fusion frequencies
    C. Rapid transmission of impulses
    D. Large coverage of the head by compound eye
22. Loud and low-pitched sound is caused by sound waves of
    A. Large amplitude and high frequency.
    B. Low frequency and large amplitude.
    C. high frequency and small amplitude.
    D. small amplitude and low frequency
23. Which of the following applies to the cones of the retina? They
    A. show visual acuity
    B. perceive dim light
    C. show much retinal coverage
    D. contain rhodopsin pigment
24. Excellence in detection of movement at the lateral edges of the visual field is attributed to
    A. rods and cones
    B. rods only
    C. cones only
    D. compound eyes
25. Which one of the following is correct about the sympathetic nervous system?
    A. Nerve endings produce noradrenaline
    B. Preganglionic fibres are long and post ganglionic fibres are short
    C. Nerve endings produce acetylcholine
    D. Ganglia are embedded in the walls of the effector
26. The figure below shows changes in electrical potentials in an axon membrane when an impulse is transmitted.



At which stage of the electrical potential marked, is the axon most permeable to sodium?

27. Impulse crosses a synapse by means of
    A. Sodium ions
    B. Potassium ions
    C. Calcium ions
    D. Neurotransmitter chemicals
28. Which one of the following is caused by a high concentration of sodium ions outside the neuron?
    A. Production of successive action potentials
    B. Excitation of the neuron
    C. Inhibition of the release of the transmitter substance
    D. Polarization of the neuron
29. Which one of the following does not happen when an impulse reaches a synapse?
    A. Facilitating passage of subsequent impulses
    B. Being blocked
    C. Being reversed
    D. Inhibiting passage of subsequent impulses
30. Injection of thyroxine into laboratory mammal would cause
    A. Oxygen consumption to increase
    B. Metabolic rate to decrease
    C. Conversion of glucose into glycogen
    D. Thyroid gland to become more active

31. A mother, who lacked milk in her breasts at the birth of her baby was diagonized to have a brain damage. Which of the following parts of the brain is most likely to have been affected?
    A. Posterior lobe of the pituitary gland
    B. Pineal body
    C. Anterior lobe of pituitary gland
    D. Cerebrum
32. The myelin sheath and the diameter of the axon of a neuron are important in that they
    A. Enable impulses to be transmitted from one node of Ranvier to another
    B. Increase the speed at which impulses are transmitted
    C. Maintain a constant strength of each impulse
    D. Allow quick exchange of ions
33. Which one of the following is correct about the refractory period in an axon of a nerve fibre?
    A. Inhibitory postsynaptic potentials are generated
    B. Voltage activated sodium channel open
    C. The axon cannot transmit impulses
    D. The axon can transmit impulses at higher voltage
34. Which one of the following occurs when the axon membrane depolarizes?
    A. Sodium ions enter the axon and potassium ion leave
    B. Both sodium and potassium ions leave the axon
    C. Potassium ions enter the axon and sodium ion leave
    D. Both sodium and potassium ion enter the axon
35. Which one of the following would be the best indicator that a cell is responding to a hormone?
    A. High concentration of cyclic AMP
    B. Low concentration of AMP in cell
    C. Low concentration of adenyl cyclase in the cell
    D. High amount of ATP in the cell
36. An individual with vocal cords that have lost elasticity is likely to produce sound that is
    A. high pitched
    B. loud
    C. low pitched
    D. shaky
37. Which of the following describes the pigment within the rod cells?
    A. Breaks down easily on illumination
    B. Requires high light intensity to be activated
    C. Is not readily resynthesized after breakdown
    D. Is capable of color reception.
38. Mutual inhibition in the compound eye of insect is to
    A. Increase color vision
    B. Increase brightness of light in the eye
    C. Increase the contrast in light intensities between adjacent ommatidia
    D. Reduce the intensities of light into the eye
39. Inability to see clearly immediately one enters a dark room from bright light could be due to
    A. Denatured rod
    B. Denature cones
    C. Rhodopsin being resynthesized
    D. ATP molecules being resynthesized
40. Which one of the following features make cones to have better visual acuity than rods?
    A. Each cone is connected to a single optic nerve fiber
    B. Cones are more sensitive to light
    C. Cones are connected to more than one optic nerve fiber
    D. Cones have high retinal convergence

SECTION B (60MARKS)

41. (a) In the space provided below, draw and label the parts of an axo-dendritic synapse. (5marks)

(b) When an action potential arrives at the synapse, calcium ions enters the neuron through presynaptic membrane.
(i) Explain how the calcium ions enter the neuron. (02marks)

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(ii) Describe the events which occur as a result of the entry of the calcium ions to cause depolarization of the post synaptic membrane. (03marks)

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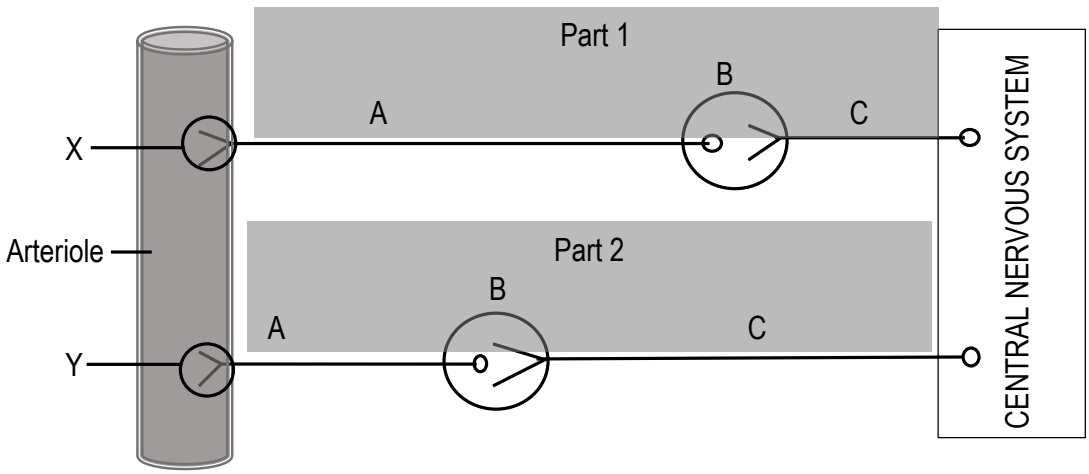
42. The figure below shows the peripheral nervous system that links the central nervous system to the internal tissues like a blood vessel. Study it carefully and use it to answer questions that follow.



(a) Name the structures labelled: (1½marks)

A

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B

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C

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(b) Giving two reasons in each case, identify the parts of the peripheral nervous system marked as: (4marks)

Part 1.....

Reasons:

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Part 2.....

Reasons:

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(c) (i) Identify the neurotransmitter substances that are involved in impulse transmission at regions: (1½marks)

B.....X.....Y.....

(d) What is the effect of these two parts on the blood pressure? (3marks)

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43. Transmission of an impulse travels along the length of the neuron.

(a) Draw a graph to illustrate the changes in a localized area of neuron over time after an impulse has been initiated. Label the x – and y axes appropriately. (4marks)

(b) Explain how the neuron is changing at each phase of your graph. (4marks)

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(c) Explain how the impulse is propagated along the neuron. (2marks)

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44. (a) Giving relevant examples, state three classifications of hormones basing on the chemical composition. (3marks)

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(b) Explain the mechanism that hormone on the target cell via the following pathways.

(i) Cell membrane reception (3marks)

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(ii) Intracellular reception (4marks)

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45. (a) In the space provided below, draw and label the section of the cochlea that shows the three canals and two membranes and the organ of corti. (4marks)

(b) Explain how the organ of corti works to transduce sound waves. (3marks)

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(c) How is the cochlea adapted to perform its function? (3marks)

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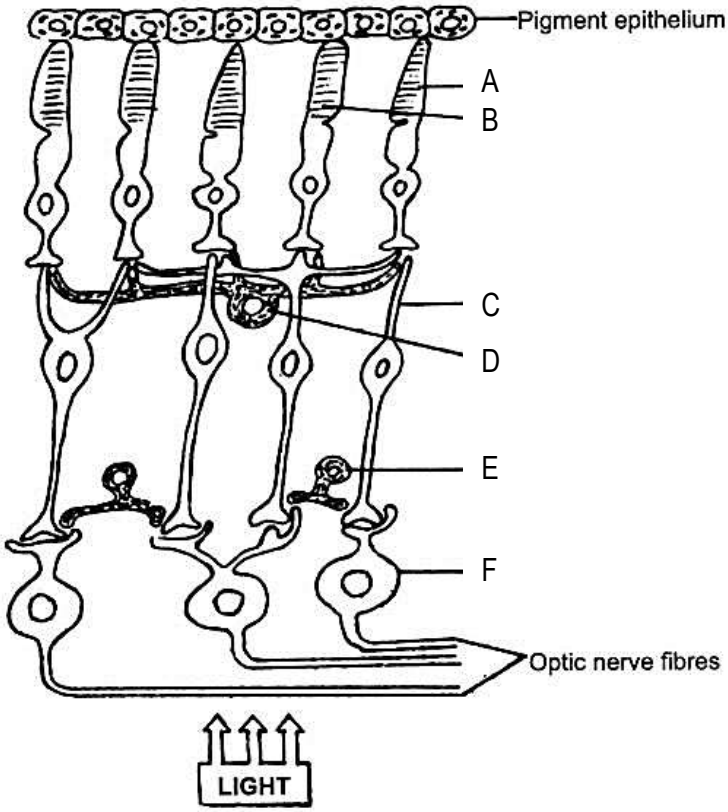
46. The figure below shows part of the retina. Use it to answer questions that follow.



(a) (i) State two structural differences between cell A and B. (2marks)

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(ii) What is the significance in the different ways through which cells A and B connect with cell C. (2marks)

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(b) Explain the role of cells C and F in vision. (2marks)

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(c) Briefly describe the formation of an impulse in the optic nerve fibres. (4marks)

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END