

IM.Sc-Optometry & Vision Science
Entrance examination- 2015

Hall Ticket Number

Time : 2 hours

Total marks: 100

Please read the following instructions carefully before answering.

Instructions

1. This booklet has (22) pages. Please check thoroughly for all the pages.
2. Enter the Hall ticket number on the first page of this booklet as well as on the OMR sheet.
3. There is negative marking for PART A only. For each wrong answer 0.33 marks will be deducted.
4. There are two PARTS in the question paper – PART A (Question nos. 1-25) and PART B (Question nos. 26-100). In case of a tie, marks obtained in PART A will be considered for resolving the tie.
5. Calculators are not permitted

PART A

1. Single strand of a double stranded DNA fragment has 60 guanine bases and 30 adenine bases. What is the total number of deoxyribose sugar molecules found in a double stranded DNA fragment?
A. 180
B. 45
C. 90
D. 30

2. The series of events during protein synthesis is
 1. Bonds form between amino acids
 2. mRNA attaches to a ribosome
 3. codons and anti-codons link
 4. tRNA bring amino acids to the ribosome
 - A. 1,2,3,4
 - B. 2,3,4,1
 - C. 2,4,3,1
 - D. 4,2,1,3
3. Which of the following gas produced when cigarettes are smoked?
 - A. Nitrogen
 - B. Oxygen
 - C. Carbon monoxide
 - D. Carbon dioxide
4. These two substances are required to break down hydrogen peroxide by manganese dioxide?
 - A. Oxygen and water
 - B. Water and carbon dioxide
 - C. Water and carbon dioxide
 - D. Oxygen and food
5. A food chain always starts with a.....
 - A. carnivore
 - B. herbivore
 - C. predator
 - D. producer
6. The organ responsible for maintaining the electrolytic balance in body is:

- A. Urethra
 - B. Heart
 - C. Kidney
 - D. Liver
7. The Normality (N) of a 1Molar (M) H_2SO_4 is:
- A. 1
 - B. 2
 - C. 0.5
 - D. 4
8. The rate of change of displacement with time is known as:
- A. Speed
 - B. Motion
 - C. Velocity
 - D. Acceleration
9. The intersecting lines drawn on maps and globes are
- A. Symbols
 - B. Geographic Grids
 - C. scale
 - D. Dogstails
10. The largest glaciers are
- A. Continental Glaciers
 - B. Mountain Glaciers
 - C. Valley Glaciers
 - D. Piedmont Glaciers

11. The largest organ in body
- A. Heart
 - B. skin
 - C. lungs
 - D. Bones
12. Acrolcin test is positive for?
- A. Sugars and oils
 - B. Sugars and fats
 - C. Fibre and fats
 - D. Oils and fats.
13. Which one of the following statement is correct about sertoli cells also called as nurse cells?
- A. Found in adrenal cortex and secrete adrenaline
 - B. Found in ovaries and secrete progesterone
 - C. Found in pancreas and secrete cholecystokinin
 - D. Found in Seminiferous tubules and provide nutrition of germ cells
14. Which one of the following statements about morula in humans is correct?
- A. It has more cytoplasm and more DNA than an uncleaved zygote
 - B. It has almost equal quantity of cytoplasm as an uncleaved zygote but much more DNA
 - C. It has far less cytoplasm as well as less DNA than in an uncleaved zygote
 - D. It has more or less equal quantity of cytoplasm and DNA as in uncleaved zygote
15. Which of the Vitamins is also called as Tocoferol
- A. C
 - B. A
 - C. E
 - D. B

16. Contraction of the intercostal muscles and diaphragm cause the thoracic cavity to _____ and the air pressure in the lungs to _____
- A. Expand, increase
 - B. Expand, decrease
 - C. Contract, increase
 - D. Contract, decrease
17. Two identical tubes of yeast are growing in a sugar solution. One tube is sealed; one is left open to the air. The sealed tube will differ from the open one in that the yeast in the sealed tube will produce more
- A. Acetyl CoA.
 - B. ATP per glucose
 - C. Ethanol.
 - D. Lactic acid
18. Indirect immunofluorescence microscopy is used to stain cells for ATP synthase. Which of the following will then be fluorescent?
- A. Mitochondria
 - B. Nucleus and nuclear envelope
 - C. Cytoplasm
 - D. Golgi apparatus
19. Messenger ribonucleic acid (mRNA) differs from deoxyribonucleic acid (DNA) in that mRNA
- A. Contains ribose sugar.
 - B. Is single-stranded.
 - C. Contains thymine instead of uracil and is single-stranded
 - D. Contains ribose sugar and is single-stranded.

20. Which of the following types of lipids are associated with the plasma membrane of eukaryotic but not prokaryotic cells?
- A. Glycolipids
 - B. Phosphoglycerides
 - C. Sphingolipids
 - D. Steroids
21. Which of the following is not a known function of any hormone?
- A. Regulates water balance in the body
 - B. Changes the amount of activity of enzymes
 - C. Promotes transcription of messenger RNA
 - D. Acts as a source of energy
22. In the nephron of the kidney, filtration occurs between
- A. Bowman's capsule and Henle's loop.
 - B. The glomerulus and Bowman's capsule.
 - C. The proximal tubule and Henle's loop.
 - D. Henle's loop and the vasa recta.
23. The muscle cells of the human heart are primarily nourished by
- A. Blood within the four chambers of the heart.
 - B. Fluid in the pericardial cavity.
 - C. The lymphatic system.
 - D. Blood delivered by the coronary arteries.
24. The neurotransmitter that signals skeletal muscle fibers to contract is
- A. Acetylcholine.
 - B. Glutamate.
 - C. Glutamine.
 - D. Noradrenaline

25. Embryonic induction is a process in which
- A. Embryonic tissues influence adjacent tissues to differentiate.
 - B. An unfertilized egg is induced to develop.
 - C. Genes are transferred from one developing tissue to another.
 - D. Resting potentials are induced in neurons of embryos.

PART B

26. Plants use which gas during respiration?
- A. starch
 - B. carbon dioxide
 - C. oxygen
 - D. water
27. Which of the following is a useless by-product of respiration for animals?
- A. oxygen
 - B. cellulose
 - C. cellulose
 - D. carbon dioxide
28. Acid solutions have a pH value of.....
- A. Equal to 7.
 - B. Between 5 and 9.
 - C. More than 7
 - D. Less than 7.
29. Which of the three substances are acidic?
- A. vinegar, baking soda and oven cleaner
 - B. bleach, baking soda and limewater
 - C. vinegar, Coke and lemonade
 - D. lime water, Coke and lemonade

30. What happens when water is added to an acid solution?

- A. The pH decreases and the acidity increases
- B. The pH rises and the acidity increases
- C. The pH rises and the acidity decreases.
- D. The pH decreases and the acidity decreases.

31. These two gases are responsible for causing acid rain

- A. Sulphur dioxide and nitrogen dioxide
- B. Nitrogen dioxide and carbon dioxide
- C. Carbon dioxide and oxygen
- D. Sulphur dioxide and carbon dioxide

32. In a precipitation reaction two solutions are mixed

- A. There is a color change
- B. A gas is formed
- C. An insoluble solid is formed
- D. Heat energy is given out

33. A catalyst is a substance which speeds up

- A. Reactions involving only liquids
- B. Reactions and is used up in the reaction
- C. Reactions and is not used up in the reaction
- D. Reactions involving only gases

34. A balanced diet consists of

- A. Proteins, carbohydrates and hydrocarbons
- B. Fats, proteins and carbohydrates.
- C. Fats, proteins and hydrocarbons
- D. Fats, carbohydrates and hydrocarbons

35. Which type of substance is broken down during digestion into amino acids?
- A. Fats and oils.
 - B. Proteins.
 - C. Carbohydrates.
 - D. Fibre.
36. Haematology is the study of:
- A. Blood
 - B. Tissue
 - C. Bones
 - D. Muscles
37. The wavelength of visible light is measured in:
- A. Micrometers
 - B. Centimeters
 - C. Nanometers
 - D. Millimeters
38. The phenomenon of the change of the speed of light in air with the speed of light when it enters a substance (water, glass), is known as
- A. Refraction
 - B. Polarisation
 - C. Reflection
 - D. Dispersion
39. The power house of the cell is:
- A. Ribosomes
 - B. Endoplasmic Reticulum
 - C. Mitochondria
 - D. Nucleus

40. The organelle responsible for Photosynthesis is:
- A. Chloroplast
 - B. Cholrophyll
 - C. Vacuole
 - D. Mitochondria
41. Highest point on a transverse wave is:
- A. Amplitude
 - B. Trough
 - C. Wavelength
 - D. Crest
42. Bacteria that can grow under high salt concentrations are known as:
- A. Halophiles
 - B. Acidophiles
 - C. Thermophiles
 - D. Thermoacidophiles
43. Ordinary salt is sodium chloride. What is baking soda?
- A. Patassium permanganate
 - B. Potassium chloride
 - C. Sodium oxide
 - D. Sodium hydroxide
44. What is the percentage of water in the human body?
- A. 44%
 - B. 55%
 - C. 66%
 - D. 77%

45. Who developed the theory of relativity?
- A. Isaac Newton
 - B. Niels Bohr
 - C. Alfred Nobel
 - D. Albert Einstien
46. In a right-angled triangle, what is the longest side called?
- A. Hypotenuse
 - B. Pythagorean
 - C. Special right triangles
 - D. Equilateral
47. What natural phenomena are measured by the 'Richter scale'?
- A. Tsunamics
 - B. Earth Quake
 - C. Hurricanes
 - D. Wild Fire
48. Fibre in diet is useful to
- A. Add bulk to faeces
 - B. Prevent bulk to faeces
 - C. Both
 - D. All of the Above
49. Richest source of vitamin c is
- A. Mango
 - B. banana
 - C. Goose berry
 - D. Pine apple

50. The smallest bone is present in
- A. Nose
 - B. Ears
 - C. Eyes
 - D. Mouth
51. Milk sugar is
- A. Lactose
 - B. Fructose
 - C. Sucrose
 - D. Galactose
52. Conjunctivitis affects which part of our body?
- A. Ears
 - B. Nose
 - C. Mouth
 - D. Eyes
53. Which chromosomes are responsible for characteristics other than sex?
- A. Autosomes
 - B. Allosomes
 - C. Mesosomes
 - D. X and Y chromosomes
54. The process by which an amino acid loses its amino group is called?
- A. Deamination
 - B. Reamination
 - C. Both
 - D. All of the Above

55. What is the circulatory system?
- A. body's breathing system
 - B. The body's system of nerves
 - C. The body's food-processing system
 - D. The body's blood-transporting system
56. What part of the blood carries minerals, vitamins, sugar, and other foods to the body's cells?
- A. Plasma
 - B. Platelets
 - C. Red corpuscles
 - D. White corpuscles
57. How many major types of blood have scientists discovered?
- A. One: Type "O"
 - B. Two: White cells and red cells
 - C. Three: White cells, red cells and plasma
 - D. Four: Types A, B, AB, and O
58. Single most common cause of mental handicap worldwide is due to
- A. Iron deficiency
 - B. Iodine deficiency
 - C. Calcium deficiency
 - D. Zinc deficiency
59. What prevents food from going down the trachea?
- A. Tongue
 - B. Esophagus
 - C. Epiglottis
 - D. Glottis

60. If someone had an upper-respiratory infection, where might it be located?
- A. Lungs
 - B. Bronchioles
 - C. Larynx
 - D. Sinuses
61. A vector quantity is BEST described as having
- A. A direction only.
 - B. A magnitude only.
 - C. Units only.
 - D. A magnitude and a direction.
62. A magnifying glass is constructed when the lens is
- A. Converging and the object is located at twice the focal length.
 - B. Converging and the object is between the lens and the focal point.
 - C. Diverging and the object is at twice the focal length.
 - D. Diverging and the object is between the lens and the focal point.
63. How many seconds does it take a car traveling 4 m/s to increase its speed to 6 m/s if it has an acceleration of 2 m/s^2 ?
- A. 1
 - B. 2
 - C. 3
 - D. 4
64. The acceleration vector is always
- A. Parallel to the displacement vector.
 - B. Parallel to the velocity vector.
 - C. Parallel to the resultant force vector.
 - D. Perpendicular to the velocity vector

65. A satellite of mass 200kg completes a circular orbit of the Earth in 120 minutes. A 400 kg satellite is then put into orbit at the same height above the Earth. Which of the following represents the time, in minutes, for the 400 kg satellite to complete a circular orbit?
- A. 60
 - B. 120
 - C. 180
 - D. 240
66. A ball is thrown horizontally at 20m/s from the top of a building and strikes the level ground 50 m from the building. Approximately how many meters high is the roof of the building?
- A. 12.5 m
 - B. 24.5 m
 - C. 31 m
 - D. 50 m
67. In a vacuum, radio waves, microwaves, and x-rays all have the same
- A. Period.
 - B. Frequency.
 - C. Wavelength.
 - D. Speed
68. A thin lens produces a virtual image which is smaller than the object. It must be that the
- A. Object must be inside the focal point of a converging lens.
 - B. Object must be outside the focal point of a converging lens.
 - C. Lens must be a diverging lens.
 - D. Object must be infinitely far from a converging lens.

69. The Kelvin temperature of an ideal gas is proportional to the average
- A. Momentum of a molecule in the gas.
 - B. Angular momentum of a molecule in the gas.
 - C. Kinetic energy of a molecule in the gas.
 - D. Net force on a molecule in the gas.
70. Water boils at 100°C at sea level at atmospheric pressure. At higher pressure, water will boil at
- A. Higher temperature.
 - B. Lower temperature.
 - C. 100°C
 - D. 0°C
71. A 12-volt battery with an internal resistance of $1\text{-}\Omega$ resistor. Which of the following is the current in amperes that flows in the circuit?
- A. 4
 - B. 3
 - C. 9
 - D. 12
72. A long straight horizontal wire with a current in it produces a magnetic field that
- A. Points radially away from the wire.
 - B. Has the same magnitude at all locations.
 - C. Points in the same direction above and below the wire.
 - D. At any point is perpendicular to the plane containing that point and the wire
73. As red light goes from the air into water at an angle of incidence of 40° , which of the following necessarily remains constant?
- A. Wavelength of the light
 - B. Speed of the light
 - C. Polarization of the light
 - D. Frequency of the light

74. What is the focal length in cm of a lens that produces an image 30 cm behind it when the object is placed 6 cm in front of it?
- A. 7.5
 - B. 36
 - C. 5.0
 - D. 24
75. The perimeter of a square is 20. Which of the following represents the area?
- A. 5
 - B. 10
 - C. 20
 - D. 25
76. Express the product $(2x + 5y)^2$ in simple form.
- A. $4x^2 + 25y^2$
 - B. $4x^2 + 20xy + 25y^2$
 - C. $4x^2 + 10y + 25y^2$
 - D. $4x^2 - 20xy + 25y^2$
77. A rectangular room is 3 meters wide, 4 meters long and 2 meters high. How far is it from the northeast corner at the floor to the southwest corner at the ceiling?
- A. $\sqrt{29}$ meters
 - B. $\sqrt{11}$ meters
 - C. $\sqrt{9}$ meters
 - D. 9 METERS
78. A bowl contains 7 green and 3 red marbles. What is the probability that two marbles selected at random from this bowl without replacement are both red?
- A. 1/15
 - B. 9/100
 - C. 21/100
 - D. 47/90

79. The numbers (1,2,3,6) have an average (arithmetic mean) of 3 and a variance of 3.5.

What is the average (arithmetic mean) and variance of the set of numbers (3,6,9,18)?

- A. 9, 31.5
- B. 3, 10.5
- C. 3, 31.5
- D. 6, 7.5

80. Right triangle ABC with right angle at C and $AB = 6$, $BC = 3$, find AC.

- A. 3
- B. 6
- C. 27
- D. $3\sqrt{3}$

81. If $\sqrt{x-25} = 7 - 5$, then which of the following is the value of x?

- A. 4
- B. 27
- C. 29
- D. 49

82. What part of an hour is 6 seconds?

- A. $1/600$
- B. $1/10$
- C. $1/360$
- D. $1/60$

83. If $2x + y = 7$ and $x - 4y = 4$, then x equals which of the following?

- A. $1/9$
- B. $7/16$
- C. $11/9$
- D. $32/9$

84. Sperm are unable to fertilize an egg until they undergo capacitation in the
- A. Vagina.
 - B. Oviduct.
 - C. Prostate.
 - D. Epididymis.
85. Mendel's law of segregation reflects the fact that
- A. Linkage never occurs in peas.
 - B. Alleles segregate differently in males and females.
 - C. Each member of an allelic pair of genes enters a separate cell during meiosis.
 - D. During the course of development, DNA becomes segregated in the nucleus, RNA in the cytoplasm.
86. Carbon dioxide passes from tissues to blood to lungs by
- A. Diffusing from a region of high concentration to an area of lesser concentration.
 - B. Diffusing from a region of lower to one of higher concentration.
 - C. Active transport.
 - D. Irreversibly binding hemoglobin.
87. A plant kept in the dark will not be able to produce glucose because light is necessary
- A. For the oxidation of glucose.
 - B. To excite electrons in the CO₂ molecules.
 - C. For activating enzymes necessary for converting CO₂ to glucose.
 - D. For sufficient ATP and reduced NADP to be available to synthesize glucose from CO₂.
88. The pitch of a sound wave is related to its
- A. Frequency
 - B. Amplitude
 - C. Velocity
 - D. Beats

89. The polymer containing an amide group is

- A. Polythene
- B. Nylon
- C. Polystyrene
- D. Terylene

90. One of the constituents of the german silver is

- A. Ag
- B. Cu
- C. Mg
- D. Al

91. In Flowering plants, the site of perception of light /dark duration is

- A. Floral meristem
- B. Stem
- C. Leaves
- D. Shoot apex

92. Skin color in man is an example of

- A. Sex linked inheritance
- B. Polygenic inheritance
- C. Multiple allelism
- D. Pleiotrophy

93. Malaria is transmitted by which type of mosquito

- A. Culex mosquito
- B. Anopheles mosquito
- C. Aedes mosquito
- D. None of the above

94. Emulsified fats are digested by
- A. Gastric juice and intestinal juice
 - B. Pancreatic juice and intestinal juice
 - C. Bile juice and intestinal juice
 - D. Pancreatic juice and bile juice
95. In the life cycle of *ascaris lumbricoides* rhabditiform larva undergoes 2nd and 3rd moldings in
- A. Small intestine
 - B. Liver
 - C. Heart
 - D. Alveoli of lungs
96. Among the following inert gas elements, the element that shows highest chemical reactivity is -
- A. Ne
 - B. Xe
 - C. Ar
 - D. He
97. Which one of the following sets of vitamins is fat soluble
- A. A, B1, K, E
 - B. A, C, K, B6
 - C. D, B1, B6, E
 - D. A, D, E, K
98. Which of the following pairs of structures have similarity of function?
- A. Adrenal cortex and sympathetic nervous system
 - B. Adrenal cortex and parasympathetic nervous system
 - C. Adrenal medulla and parasympathetic nervous system
 - D. Adrenal medulla and sympathetic nervous system

99. In which of these kingdoms are the organisms entirely heterotrophic?

- A. Protista and Fungi
- B. Plantae and Fungi
- C. Animalia and Fungi
- D. Protista and Animalia

100. During the synthesis of a polypeptide the completed polypeptide is released when the

- A. Ribosome reaches a termination anticodon.
- B. Ribosome reaches a termination codon.
- C. tRNAs are depleted.
- D. Amino acids are depleted.