

**IM.Sc - Optometry and Vision Science  
Entrance Examination- 2014**

Hall Ticket Number

Time : **2** hours  
marks: 100

Total

Please read the following instructions carefully before answering.

**Instructions**

1. This booklet has (11) 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 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. Which of the following salt is formed when nitric acid is neutralised using potassium hydroxide is.  
A) Potassium sulphate  
B) Potassium chloride  
C) Sodium nitrate  
D) Potassium nitrate
2. The function of tRNA is to  
A) Carry codons to the ribosomes  
B) Transport of amino acids for protein synthesis  
C) Translate RNA  
D) Transcribe the DNA code
3. The four main elements in the human body are  
A) Sulphur, nitrogen, oxygen and hydrogen  
B) Carbon, sulphur, nitrogen and hydrogen  
C) Carbon, nitrogen, oxygen and hydrogen  
D) Carbon, sulphur, oxygen and hydrogen
4. A well-defined collection such as rivers in India or the vowels in the English alphabet is regarded as belonging to a \_\_\_\_\_ in Mathematics.  
A) Set  
B) Distribution  
C) Dispersion  
D) Series
5. If A is a sub-set of B then which of the following statement is correct.

- A)  $A = \{1\ 3\ 5\}$  &  $B = \{1\ 8\ 9\ 6\ 2\ 4\}$   
 B)  $A = \{1\ 3\ 5\}$  &  $B = \{5\ 8\ 9\ 7\ 6\ 2\}$   
 C)  $A = \{1\ 3\ 5\}$  &  $B = \{1\ 8\ 9\ 5\ 3\ 7\}$   
 D)  $A = \{1\ 3\ 5\}$  &  $B = \{3\ 8\ 4\ 2\ 7\ 9\}$
6. Electromagnetic waves among the following that have the highest frequency is:  
 A) Gamma Rays  
 B) Ultraviolet light  
 C) Infra red light  
 D) Microwaves
7. A certain current on passing through a galvanometer produces a deflection of 100 divisions. When a shunt of one ohm is connected, the deflection reduces to 1 division. The galvanometer resistance is  
 A)  $100\ \Omega$   
 B)  $99\ \Omega$   
 C)  $10\ \Omega$   
 D)  $9.9\ \Omega$
8. A current of 5A is flowing at 220 V in the primary coil of a transformer. If the voltage produced in the secondary coil is 2200 V and 50% of power is lost, then the current in the secondary will be  
 A) 2.5 A  
 B) 5 A  
 C) 0.25 A  
 D) 0.5 A
9. Which of the following indicates fitness?  
 A) High resting pulse rate and short recovery time  
 B) Low resting pulse rate and short recovery time.  
 C) Low resting pulse rate and long recovery time  
 D) High resting pulse rate and long recovery time
10. Which of the metal shown has the highest density?  
 A) Iron  
 B) Calcium  
 C) Silver  
 D) Gold
11. Choose the correct pair  
 A) Amoebiasis: Fungi  
 B) Sore throat: bacterial infection  
 C) Malaria: Viral  
 D) Typhoid: Helminthes
12. An atom with more protons than electrons is called:  
 A) Molecule  
 B) Isotope  
 C) An anion  
 D) A cation
13. Ornithology is the study of:  
 A) Reptiles  
 B) Fishes  
 C) Birds  
 D) Amphibians
14. How many 3-digit numbers can be formed from the digits 1, 2, 3, 4 and 5 assuming that repetition of the digits is allowed?  
 A) 120  
 B) 150

C) 130

D) 125

15. 0.5 mole of each of  $H_2$ ,  $SO_2$  and  $CH_4$  are kept in a container. A hole was made in the container. After 3 hours, the order of partial pressures in the container will be  
 A)  $p_{H_2} > p_{SO_2} > p_{CH_4}$   
 B)  $p_{H_2} > p_{CH_4} > p_{SO_2}$   
 C)  $p_{SO_2} > p_{H_2} > p_{CH_4}$   
 D)  $p_{SO_2} > p_{CH_4} > p_{H_2}$
16. The process of destroying foreign particles entering into the body is known as  
 A) Phagocytosis  
 B) Haemolysis  
 C) Exocytosis  
 D) Catalysis
17. Which of the following is true about collinear vectors  
 A)  $\vec{a}$  and  $-\vec{a}$  are collinear.  
 B) Two collinear vectors are always equal in magnitude  
 C) Two vectors having same magnitude are collinear.  
 D) Two collinear vectors having the same magnitude are equal.
18. Maintenance of hives of honeybees for the production of honey is called  
 A) Horticulture  
 B) Pisciculture  
 C) Poultry farming  
 D) Apiculture
19. +I effect is shown by  
 A)  $-NO_2$   
 B)  $-Cl$   
 C)  $-Br$   
 D)  $-CH_3$
20. Fat soluble vitamins are  
 A) Vit. C & Vit. B  
 B) Vit. B & Vit. D  
 C) Vit. C & Vit. E  
 D) Vit. D & Vit. E
21. What is acetyl-CoA split into in the Krebs cycle?  
 A) Hydrogen and Oxygen  
 B) Oxygen and Carbon  
 C) Carbon dioxide and hydrogen  
 D) Carbon and hydrogen
22. Populations are said to be allopatric when \_\_\_\_\_.  
 A) They are physically isolated by natural barriers  
 B) They live together and breed freely to produce viable offspring  
 C) They are isolated but often come together for breeding  
 D) None of the above
23. Pinus belongs to the class \_\_\_\_\_.  
 A) Gymnosperms  
 B) Cycadopsida  
 C) Coniferopsida  
 D) Sphenopsida

24. Osteomalacia is a deficiency disease of  
 A) Infants due to protein energy malnutrition  
 B) Adults due to protein energy malnutrition  
 C) Adults due to Vitamin D deficiency  
 D) Infants due to Vitamin K deficiency
25. Average inspiratory reserve volume is  
 A) 6000 mL to 8000 mL  
 B) 1000 mL to 1100 mL  
 C) 4000 mL to 6000 mL  
 D) 2500 mL to 3000 mL

### PART B

26. The following always happens in a chemical reaction  
 A) A color change occurs  
 B) A gas is given off  
 C) Heat energy is absorbed  
 D) A new substance is formed
27. One card is drawn from a well shuffled deck of 52 cards. Calculate the probability that the card will be a diamond.  
 A)  $\frac{1}{2}$       B)  $\frac{1}{3}$       C)  $\frac{1}{4}$       D)  $\frac{3}{4}$
28. Which of the following is the richest source of energy in our diet?  
 A) Proteins  
 B) Fats and oils  
 C) Carbohydrates  
 D) Fibre
29. The renal tubule begins with a double walled cup-like structure called  
 A) Glomerulus  
 B) Henle's loop  
 C) Bowman's capsule  
 D) Vasa recta
30. Which stain do we use for staining animal cells?  
 A) Iodine solution  
 B) Cell stain  
 C) Methylene blue  
 D) Ribena
31. Which one is not a symptom of diabetes:  
 A) Excess urination  
 B) Excessive thirst  
 C) Loss of weight  
 D) Night blindness
32. 0.023 g of sodium metal is reacted with 100 cm<sup>3</sup> of water. The pH of the resulting solution is \_\_\_\_\_.  
 A) 11      B) 10      C) 12      D) 9
33. Which one is not correct:  
 A) Insulin : Pancreas  
 B) Epinephrine: Adrenal  
 C) Prolactin : Pituitary  
 D) Oxytocin : Thyroid

34. Which one of them is a monosaccharide:  
A) Sucrose      B) Lactose      C) Galactose      D) Maltose
35. A closed organ pipe and an open organ pipe of same length produce 2 beats/second while vibrating in their fundamental modes. The length of the open organ pipe is halved and that of closed pipe is doubled. Then, the number of beats produced per second while vibrating in the fundamental mode is \_\_\_\_\_.  
A) 8      B) 7      C) 2      D) 6
36. Excess Glucose is stored in animal tissues as  
A) Cellulose      B) Starch      C) Protein      D) Glycogen
37. Populations are said to be sympatric when \_\_\_\_\_.  
A) Two populations are physically isolated by natural barriers.  
B) Two populations live together and freely interbreed to produce sterile offspring.  
C) Two populations share the same environment but cannot interbreed.  
D) Two populations are isolated but occasionally come together to interbreed.
38. Trypsin is an enzyme those catalyses the breakdown of:  
A) Proteins      B) Carbohydrates  
C) Fats      D) Nucleotid
39. A radioactive sample  $S_1$  having the activity  $A_1$  has twice the number of nuclei as another sample  $S_2$  of activity  $A_2$ . If  $A_2 = 2A_1$ , then the ratio of half life of  $S_1$  to the half life of  $S_2$  is  
A) 0.25      B) 0.75      C) 4      D) 2
40. Hepatic portal system collects blood from  
A) Liver      B) Lungs      C) Kidney      D) Alimentary canal
41. Which one of the following DOES NOT involve coagulation?  
A) Formation of delta region  
B) Clotting of blood by the use of ferric chloride  
C) Peptization  
D) Treatment of drinking water by potash alum
42. The phenomenon of bending of light as it passes from one medium to another is known as:  
A) Refraction      B) Reflection  
C) Dispersion      D) Diffraction
43. Carbohydrates are composed of  
A) amino acids      B) nucleic acids  
C) monosaccharides      D) glycerol & fatty acids
44.  $10^{-6}$  M NaOH is diluted 100 times. The pH of the diluted base is

- A) Between 6 and 7  
B) Between 10 and 11  
C) Between 7 and 8  
D) Between 5 and 6
45. During exercise, there is an increased flow of blood to  
A) Brain  
B) Kidneys  
C) Skin  
D) Lungs
46. Reproduction in bacterial cells occurs by the sequence of events known as \_\_\_\_\_  
A) Binary Fission  
B) Mitosis  
C) Binary Fusion  
D) Budding
47. Bacteria growing in hot springs are known as:  
A) Halophiles  
B) Acidophiles  
C) Thermophiles  
D) Barophile
48. A fish in water (refractive index  $n$ ) looks at a bird vertically above in the air. If  $y$  is the height of the bird and  $x$  is the depth of the fish from the surface, then the distance of the bird as estimated by the fish is  
A)  $x + y \left(1 + \frac{1}{n}\right)$   
B)  $x + y \left(1 - \frac{1}{n}\right)$   
C)  $x + ny$   
D)  $x - ny$
49. Dihydrogen Monoxide is:  
A) A strong acid  
B) A strong base  
C) An explosive  
D) A good solvent
50. Facultative anaerobes can live with or without \_\_\_\_\_ gas  
A) Hydrogen  
B) Nitrogen  
C) Oxygen  
D) Carbon Dioxide
51. Polyploid derived from two different species is called  
A) Autopolyploid  
B) Triploid  
C) Allopolyploid  
D) Monoploid
52. An object under white light which reflects red light and absorbs the other six colours of the spectrum will appear the colour of:  
A) White  
B) Red-orange  
C) Red  
D) Blue-Purple
53. 30 degrees is equal to how many radians?  
A)  $\pi/3$   
B)  $\pi/6$   
C)  $\pi/4$   
D)  $\pi/2$
54. Which of the following never contains in food chain?  
A) Consumer  
B) Habitats



65. The middle layer of the eye is called  
 A) Choroid  
 B) Retina  
 C) Sclera  
 D) Conjunctiva
66. 2 gm of a radioactive sample having half life of 15 days was synthesised on 1<sup>st</sup> Jan 2009. The amount of the sample left behind on 1<sup>st</sup> March, 2009 (including both the days)  
 A) 1 gm  
 B) 0.5 gm  
 C) 0 gm  
 D) 0.125 gm
67. The tympanic membrane is composed of  
 A) Connective tissue covered with skin outside and sebaceous gland inside  
 B) Connective tissue covered with skin outside and with mucus membrane inside  
 C) Connective tissue covered with skin outside and with ossicles inside  
 D) Connective tissue covered with skin outside and fine hair on the inside
68. First law of Thermodynamics equation is  
 A)  $\Delta Q = \Delta U - \Delta W$   
 B)  $\Delta Q = \Delta U + \Delta W$   
 C)  $\Delta Q = \Delta U / \Delta W$   
 D)  $\Delta Q = \Delta U * \Delta W$
69. Nosema bombycis which causes pebrine in silk worms is a  
 A) Virus  
 B) Bacterium  
 C) Protozoan  
 D) Fungus
70. A horizontal metal wire is carrying an electric current from the north to the south. Using a uniform magnetic field, it is to be prevented from falling under gravity. The direction of this magnetic field should be towards the \_\_\_\_\_.  
 A) East  
 B) West  
 C) North  
 D) South
71. When light passes through a medium with parallel sides the incident rays and the emergent ray are  
 A) Perpendicular  
 B) Elliptical  
 C) Parallel  
 D) Tangential
72. Pieces of plant tissue used in tissue culture is called  
 A) Explant  
 B) Somaclone  
 C) Inoculant  
 D) Clone
73. A prism displaces the image  
 A) Towards the base of the prism.  
 B) Further away from the observer.  
 C) Closer to the observer.  
 D) Towards the apex of the prism.
74. When the object point and image point can be interchanged without any effect on the light path then the two points are said to be  
 A) Conjugate points  
 B) Primary point  
 C) Secondary point  
 D) Image point

75. Palaeontologists unearthed a human skull during excavation. A small fragment of the scalp tissue was still attached to it. Only little DNA could be extracted from it. If the genes of the ancient man need to be analysed, the best way of getting sufficient amount of DNA from this extract is
- A) Subjecting the DNA to polymerase chain reaction
  - B) Subjecting the DNA to gel electrophoresis
  - C) Treating the DNA with restriction endonucleases
  - D) Hybridising the DNA with a DNA probe
76. The colour of a light depends on the?
- A) Speed of light
  - B) Wavelength of light
  - C) Intensity of light
  - D) Amplitude of light
77. A particle of mass  $m$  is hanging vertically by an ideal spring of force constant  $K$ . if the mass is made to oscillate vertically, its total energy is
- A) Maximum at extreme position
  - B) Maximum at mean position
  - C) Minimum at mean position
  - D) Same at all positions
78. The period of simple pendulum is doubled when
- A) Its length is doubled
  - B) Its length is halved
  - C) The length is made four times
  - D) Mass of the bob is doubled
79. A metal wire is subjected to a constant potential difference. When the temperature of the metal wire increases, the drift velocity of the electron in it
- A) Increases, thermal velocity of the electron decreases
  - B) Decreases, thermal velocity of the electron decreases
  - C) Increases, thermal velocity of the electron increases
  - D) Decreases, thermal velocity of the electron increases
80. Heat energy received by the earth from the sun is due to
- A) Convection
  - B) Radiation
  - C) Reflection of light
  - D) Transmission of light
81. Which one of the following is paramagnetic?
- A)  $N_2$
  - B) NO
  - C) CO
  - D)  $O_3$
82. Two stars A and B radiate maximum energy at  $3600^\circ A$  and  $3600^\circ A$  respectively. Then the ratio of absolute temperatures of A and B is
- A) 256: 81
  - B) 81: 256
  - C) 3: 4
  - D) 4: 3
83. Emissivity of perfectly black body is
- A) 1
  - B) 2
  - C) 5
  - D) 0

84. 5 moles of  $\text{SO}_2$  and 5 moles of  $\text{O}_2$  are allowed to react. At equilibrium, it was found that 60% of  $\text{SO}_2$  is used up. If the partial pressure of the equilibrium mixture is one atmosphere. The partial pressure of  $\text{O}_2$  is  
 A) 0.21 atm      B) 0.41 atm      C) 0.82 atm      D) 0.52 atm
85. When a sound wave of frequency 300 Hz passes through a medium, the maximum displacement of a particle of the medium is 0.1 cm. the maximum velocity of the particle is equal to  
 A) 60 p cm/s      B) 30 p cm/s      C) 30 cm/s      D) 60 cm/s
86. A mass of 10 kg is suspended from a spring balance. It is pulled aside by a horizontal string so that it makes an angle of  $60^\circ$  with the vertical. The new reading of the balance is  
 A) 20Kg.wt      B) 10 Kg.wt  
 C)  $10\sqrt{3}$  Kg.wt      D)  $20\sqrt{3}$  Kg.wt
87. Which of the following statements is wrong  
 A) Sound travels in a straight line  
 B) Sound travels as waves  
 C) Sound is a form of energy  
 D) Sound travels faster in vacuum than in air
88. Ovule integument gets transformed into  
 A) Seed      B) Fruit wall      C) Seed coat      D) Cotyledons
89. Which one of these is NOT TRUE for benzene?  
 A) It forms only one type of monosubstituted product  
 B) There are three carbon-carbon single bonds and three carbon-carbon double bonds  
 C) Heat of hydrogenation of benzene is less than the theoretical value  
 D) The bond angle between carbon-carbon bonds is  $120^\circ$
90. In the  $\text{H}_2$  atom the electron circulates around the nucleus in a path of radius  $5.1 \times 10^{-11}$  m at a frequency  $\nu = 6.8 \times 10^{15}$  rev/sec. The value of current produced  
 A)  $1.1 \times 10^{-2}$  amp      B)  $1.1 \times 10^{-3}$   
 C)  $1.2 \times 10^{-2}$  amp      D)  $1.2 \times 10^{-3}$  amp
91. In the above mentioned question, what is the magnetic dipole moment produced by the electron?  
 A)  $9.0 \times 10^{-32}$  amp-m<sup>2</sup>      B)  $9.0 \times 10^{-23}$  amp-m<sup>2</sup>  
 C)  $9.0 \times 10^{-2}$  amp-m<sup>2</sup>      D)  $9.0 \times 10^{-25}$  amp-m<sup>2</sup>
92. What is the Coulomb force that one charge exerts on another charge if other charger is brought near by  
 A) Nil      B) Minimum      C) Maximum      D) None of the above

93. If the distance between two charge are doubled the Coulomb force between them will be :

- A) Half      B) Doubled      C) Four times      D) One fourth

94. If the vectors  $(i + 2j + 4k)$  and  $5i$  represent the two sides of a triangle, area of the triangle is:

- A)  $10j-5k$       B)  $10j + 5k$   
 C)  $j+10k$       D)  $j-10k$

95. What is the nominal and maximum magnification power of a 5 cm focal length lens?

- A) 5X, 6X      B) 6X, 5X      C) 2.5X, 3X      D) 3 X, 2.5 X

96. In case of Triple product of vector A, B, C which one is correct for  $(A \times B) \cdot C = 0$

- A).  $(B \times C) \cdot A$       B)  $(C \times A \times B)$   
 C)  $(C \times B) \cdot A$       D)  $(A \times C) \cdot B$

97. When product of the two vectors A and B is  $A \times B = 0$ , it means that two vectors are:

- A) Collinear      B) Non Collinear      C) Scalar      D) None of the above

98. Water in a river moves east at 6 km/hr, and a boat heads north at 8 km/ hrs with respect to water. The velocity of the boat is:

- A) 5.29 km/hr      B) 14 km/hr      C) 10 km/hr      D) 2 km/hr

99. Yellow light has a wavelength of 590 nm. If the speed of light is  $3 \times 10^8$  m/sec. what is the frequency of the light

- A)  $6 \times 10^{14}$  Hz      B)  $5.08 \times 10^{14}$  Hz      C)  $6 \times 10^{13}$  Hz      D)  $5.08 \times 10^{13}$  Hz

100. In case of a simple pendulum, if length of the chord is made 4 times, the time period of new pendulum

- A) Remains same      B) Becomes half      C) Become double      D) Becomes 4 times