N-2

IM.Sc-Optometry & Vision Science

Entrance Examination- 2017

Hall Ticket Number | |

Time: 2 hours **Total marks: 100**

Please read the following instructions carefully before answering.

Instructions

1. **This booklet has (10) 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. **Objective type answers should be marked in the OMR sheet only.**
4. **There is negative marking only for PART A. For each wrong answer 0.33 marks will be deducted.**
5. **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.**
6. **Calculators are not permitted**

PART A

1. In a variety of garden peas, the allele for tall plants (T) is dominant over the allele for short plants (t). A cross between a tall plant and a short plant resulted in 50% of the offspring being short. What were the genotypes of the parents?
   A. Tt and tt B. Tt and Tt C. TT and Tt D. TT and tt

2. 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

3. Which of the metal shown has the highest density?
   A. Iron B. Calcium C. Silver D. Gold

4. Choose the correct pair
   A. Sore throat: bacterial infection B. Amoebiasis: Fungi
   B. Malaria: Viral D. Typhoid: Helminthes

5. Which of the following never contains in food chain?
   A. Consumer B. Habitats C. Herbivore D. Omnivore

6. Edward's syndrome is a form of trisomy at chromosome no.:
   A. 18 B. 21 C. 13 D. 11

7. To prepare 1 N solution of NaOH (Sodium Hydroxide) in 500 ml, you need
   A. 10 grams of NaOH B. 40 grams of NaOH
   C. 30 grams of NaOH D. 20 grams of NaOH

8. The process of destroying foreign particles entering into the body is known a
   A. Phagocytosis B. Haemolysis C. Exocytosis D. Catalysis

9. A glass rod 20 cm long is clamped at the middle. It is set into longitudinal vibration. If the emitted frequency is 400 Hz, the velocity of sound in glass will be
   A. 280 m/s B. 160 m/s C. 320 m/s D. 200 m/s

10. A ray of light is incident on the surface of separating two transparent medium at an angle 450 and is refracted in medium at an angle 300. Velocity of light in the medium will be
    A. 2.12x108 m/s B. 3.8x108 m/s C. 1.55x108 m/s D. 2.88x108 m/s

11. If red light and violet light rays are of local length fR and fV respectively then which one of the following is true
    A. $\mu R < \mu V$ B. $\mu R > \mu V$ C. $\mu R = \mu V$ D. $\mu R \geq \mu V$

12. The objective with large aperture are used in telescope for
    A. Reducing lens aberration B. Greater resolution
    C. Brighter image D. Reducing the cost

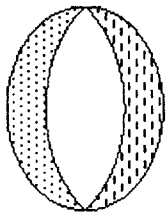
13. Which of the following does not show polarization?
    A. Transverse wave in gas B. Longitudinal wave in gas
    C. Both a and b D. None of the above

14. Which of the following phenomenon shows the transverse nature of light?
    A. Diffraction B. Polarization
    C. Interference D. Photo-electric effect

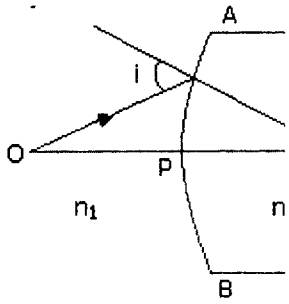
15. A point object is 15 cm above the surface of water ($\mu = 4/3$) in pond. A fish inside the water will observe the image to be at a point
    A. 20 cm above the surface of water
    B. 15 cm above the surface of water
    C. 20 cm below the surface of water
    D. 15 cm below the surface of water

16. The driver of a car travelling with speed 30m/s towards a hill sounds a horn of frequency 60 Hz. If the velocity of sound in air is 33 m/s, the frequency of the reflected sound as heard by the driver is
    A. 1260 Hz B. 1200 Hz C. 1600 Hz D. 1500 Hz

17. A convex lens is made of 3 layers of glass of 3 different materials as in the figure. A point object is placed on its axis. The number of images of the object are:
    A. 1 B. 2 C. 3 D. 4



18. A point object O is kept at a distance of OP = u. The radius of curvature of the spherical surface APB is CP = R. The refractive indexes of the media are n1 and n2 which are as shown in the diagram. Then, a) if n1 > n2, image is virtual for all values of 'u' b) if n2 = 2n1, image is virtual when R > u. c) the image is real for all values of u, n1 and n2.
    Here, the correct statement/s is/are _____.
    A. Only a B. a, b and c
    C. Only b D. Both a and b



19. Two beams of red and violet colours are made to pass separately through a prism of A = 60°. In the minimum deviation position, the angle of refraction inside the prism will be
    A. Lesser for violet colour
    B. 30° for both the colours
    C. Greater for red colour
    D. Equal but not 30° for both the colours

20. A body weighs 50 grams in air and 40 grams in water. How much would it weigh in a liquid of specific gravity 1.5?
    A. 30 grams B. 35 grams C. 65 grams D. 45 grams

21. Blue colour of sea water is due to
    A. Interference of sunlight reflected from the water surface
    B. Scattering of sunlight by the water molecules
    C. Image of sky in water
    D. Refraction of sunlight

22. Hot water cools from 60°C to 50°C in the first 10 minutes and to 42°C in the next 10 minutes. Then the temperature of the surroundings is _____.
    A. 15°C B. 10°C C. 20°C D. 30°C

23. Three liquids of equal masses are taken in three identical cubical vessels A, B and C. Their densities are PA, PB and PC respectively. But PA < PB < PC. The force exerted by the liquid on the base of the cubical vessel is _____.
    A. The same in all the vessels B. Maximum in vessel A
    C. Maximum in vessel C D. Minimum in vessel C

24. What is the minimum thickness of a thin film required for constructive interference in the reflected light from it? Given, the refractive index of the film = 1.5, wavelength of the light incident on the film = 600 nm.
    A. 50 nm B. 200 nm C. 100 nm D. 300 nm

25. Two lenses have powers +D and -2D respectively. The power of combination is
    A. +3 D B. -D C. D D. -3D

PART B

26. Down's syndrome is an example of a chromosal abnormality called:
    A. Trisomy B. Monosomy C. Deletion D. Inversion

27. What is acetyle-CoA split into in the Krebs cycle?
    A. Hydrogen and Oxygen B. Oxygen and Carbon
    C. Carbon dioxide and hydrogen D. Carbon and hydrogen

28. A high white blood cell count could indicate
    A. Haemophilia B. Diabetes C. Anaemia D. Leukaemia

29. Which one of this is a useless by-product of photosynthesis in plants?
    A. Glucose B. Water C. Oxygen D. Carbon dioxide

30. The following stain is used for staining plant cells to view under the microscope
    A. Cell stain B. Iodine solution C. Biuret reagent D. Benedicts solution

31. 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

32. Why is a "saturated" fat called saturated fat?
    A. The fatty acid carbon chains are saturated with Hydrogen
    B. The fat is saturated with water
    C. The fatty acid chains can have more water added
    D. They saturate the body with fat when eaten

33. Which of the following is the richest source of energy in our diet?
    A. Proteins B. Fats and oils C. Carbohydrates D. Fibre

34. Which stain do we use for staining animal cells?
    A. Iodine solution B. Cell stain C. Methylene blue D. Ribena

35. Another name of Copper sulphate is:
    A. Green Vitriol B. Red vitriol C. Blue vitriol D. Black vitriol

36. Which of the following never contains in food chain?
    A. Consumer B. Habitats C. Herbivore D. Omnivore

37. Tobacco mosaic disease was the first eukaryotic disease recognized to be caused by:
    A. Bacteria B. Virus
    C. Genetic abnormalities D. Radiation

38. The maximum number of hydrogen bonds that a molecule of water can have is
    A. 1 B. 2 C. 3 D. 4

39. Which of the following molecules functions to transfer information from the nucleus to the cytoplasm?
    A. DNA B. RNA C. Proteins D. Lipids

40. The overall reaction for photosynthesis is:
    A. $6CO2 + 6H2O + energy \rightarrow C3H6O3 + 6O2$
    B. $3CO2 + 6H2O + energy \rightarrow C6H12O6 + 6O2$
    C. $6CO2 + 6H2O + energy \rightarrow C6H12O6 + 6O2$
    D. $6CO2 + 3H2O + energy \rightarrow C6H12O6 + 6O2$

41. Which one of them is a monosaccharide:
    A. Sucrose B. Lactose C. Fructose D. Maltose

42. A rare bleeding disorder in which blood doesn't clot normally known as
    A. Haemophilia B. Diabetes C. Anaemia D. Leukaemia

43. Light wave length 5000 angstrom falls on a sensitive plate with photoelectric work function of 1.9 eV. The maximum Kinetic energy of the photo electron emitted will be
    A. 1.16 Ev B. 2.38 eV C. 0.58 eV D. 2.98 eV

44. A wave of frequency 500 Hz has a velocity of 350m/s. The distance between two nearest points, if the wave is 60o out of phase will be approximately
A.70 cm B. 0.7 cm C. 12.0 cm D. 120 cm

45. If the critical angle for total internal reflection from a medium to vacuum is 300. Then velocity of light in the medium is
A. 1.5x10 8 m/s B. 2x10 8 m/s C. 3x10 8 m/s D. 0.75x10 8 m/s

46. Energy of simple harmonic motion depends upon
A. 1/ω2 B. ω C. a2 D. 1 / a2

47. The ratio of minimum deviation from thin prim with respect to air when dipped in water will be $\mu g = 3/2$, $\mu w = 3/4$
A. 1/3 B. ¼ C. ½ D. 1/8

48. A source of sound is travelling with a velocity 40 Km/he towards an observer and emits sound of frequency 200 Hz. If velocity of sound is 1220 Km/hr, then the apparent frequency heard by an observer is
A. 207 B. 198 C. 195 D. 208

49. Which of the following is the highest electro negativity?
A. Na B. Cl C. K D. B

50. 50 ml of 0.1M HCl and 50ml of 0.2M NaOH are mixed. The resulting solution pH is___
A. 1.3 B. 4.2 C. 12.70 D. 11.70

51. Which of the following reactions is correct for the first order of reaction? (K = rate constant, r= rate of reaction, c= concentration of reactant.)
A. K= r x c2 B. K= r x c C. K= c/r D. K = r/c

52. Radiation with maximum frequency are is
A. X rays B. Radio waves C. UV rays D. IR rays

53. What is the weight (in grams) of Na2 CO3 (molar mass =106) present in 250 mL of its 0.2M solution
A. 0.53 B. 5.3 C. 1.06 D. 10.6

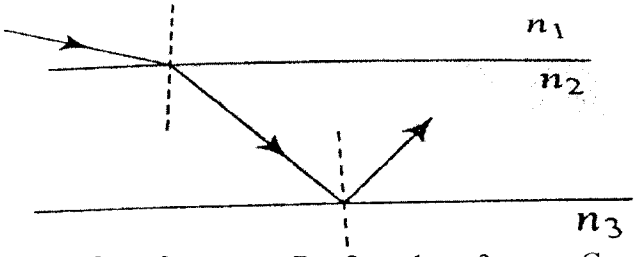
54. Antiblood clotting drug which prevents heart attack is
A. Acetyl salicylic acid B. 4 hydroxy acetanilide
C. P- nitrophenol D. N-(ethyoxy phenyl) Acetamide

55. Viscosity liquid increases due to
A. Increase in temperature B. Strong attraction forces
C. Color of the liquid D. Odour of the liquid

56. Molecular weight of sucrose(C12H22O11)_____
A. 342 B. 182 C. 45 D. None

57. Radioactive material 'X' has half-life of 2 minutes. Starting with 2 gram of radioactive material how much is left over at the end of 10 minutes.
A. 1.0g B. 1/16g C. 1/32g D. 1/8g

58. Light travelling through the three transparent substances and follows the path as shown in figure. Arrange the indices of refraction in order from smallest to largest. Note that the total internal reflection does occur on the bottom surface of the medium 2.



A.1< n2 < n3 B. n2 < n1 < n3 C. n1 < n3 < n2 D. n3 < n1 < n2

59. Angle of minimum deviation is equal to the angle of prism A of an equilateral glass prism. The angle of incidence at which minimum deviation will be obtained is
A. 60° B. 30° C. 45° D.$\sin^{-1} 2/3$

60. The absolute coefficient of expansion of a liquid is 7 times that the volume coefficient of expansion of the vessel. Then the ratio of absolute and apparent expansion of the liquid
A. 7/6 B. 1/7 C. 6/7 D. 2/7

61. A sonometer wire 100cm in length has fundamental frequency of 330 Hz.The velocity of propagation of transverse waves along the wire is
A. 330 m/s B. 660 m/s C. 115 m/s D. 990 m/s

62. A hole is made at the bottom of a tank filled with water (density=103kg/m3). If the total pressure at the bottom of the tank is 3atm (1 atm =105 N/m2), then the velocity of efflux is
A. √200 m/s B. √400 m/s C. √600 m/s D. √500 m/s

63. An inclined track ends in a circular loop of radius "r". From what height on the track a particle should be released so that it completes that loop in the vertical plane.
A. 5r/2 B. 2r/5 C. 5r/4 D. 4r/5

64. When a capillary tube is dipped in water vertically, water raises to height of 10mm. The tube is now titled and makes an angle of 600 with vertical. Now length of water column in tube is
A. 10mm B. 5mm C. 20mm D. 40mm

65. Two equi- convex lenses of each of radius 20mm and refractive index 1.5 are placed in contact. If water of refractive index 1.33 is placed in between lenses. The focal length of the combined lens system is
A. 15cm, convex B. 15cm, concave
C. 7.5mm, convex D. 7.5mm concave

66. When a longitudinal wave is produced in a medium, the displacement of the particle of the medium makes an angle with the direction of propagation equal to
A. 0 or 180 B. 450 C. 900 D. None

67. Number of ATP and GTP required for the synthesis of polypeptide chain with 100 amino acids
A. 100 ATP & 200 GTP B. 100 ATP & 100 GTP
C. 100 ATP & 199 GTP D. 99 ATP & 199 GTP

68. Number of oxidations and no of reduced "H" acceptors formed respectively in the 3rd step of aerobic respiration for a glucose is
A. 3 & 6 B. 5 & 10 C. 6 & 12 D. 4 & 8

69. The seed material used for mushroom production are called _____
A. Compost B. Spawn C. Hymenium D. Basidiocarp

70. Insulin is a polymer of
A. Fructose B. Glucose C. Cellulose D. Sucrose

71. Cyclosporin A and Statin are produced from the following respectively.
A. Bacteria, Bacteria B. Fungus, Yeast
C. Bacteria, Fungus D. Fungus, Bacteria

72. Specialized adventitious roots produced by parasitic plants to draw nutrients from host are
A. Sucker B. Haustoria C. Bulbils D. Hooks

73. ----------is a competitive inhibitor for kreb's cycle enzyme succinic dehydrogenase
A. Maleic acid B. Acetic acid C. Malonic acid D. Benzoic acid

74. In C4 pathway the primary CO2 acceptor is
A. RuBP B. PEP C. NADP D. ATP

75. Fusion of two nuclei is known as
A. Plasmogamy B. Karyogamy C. Fertilization D. Karyokinesis

76. Plasmotomy occurs in
A. Plasmodium B. Opalina C. Aceneta D. Polystomella

77. The characters shared by a pair of organism, inherited from a common ancestor are called
A. Homologous characters B. Analogous characters
C. Non-heritable characters D. Specific characters

78. Malignant tumors of epithelial cells is
A. Carcinoma B. Sarcoma C. Lymphoma D. Leukaemia

79. Cartilage surrounded by a fibrous connective tissue sheath is called
A. Perichetium B. Epichondrium C. Perichondrium D. Chondroblast

80. During transverse binary fission of paramecium, the macronucleus divides by
A. Mitosis B. Karyokinesis C. Cytokinesis D. Amitosis

81. Sickle-cell anemia is caused by mutation in
A. Haemoglobin A B. Haemoglobin S
C. Haemoglobin B D. Haemoglobin F

82. The white fatty substance that coats the axons to increase signal speed is
A. Myelin B. Microfibrils C. Dendrites D. Adipocytes

83. When the parasympathetic system is stimulated, when neurotransmitter is released.
A. Acetylcholine B. Norepinephrine C. Epinephrine D. Dopamine

84. Medical test used for diagnosis of Typhoid is_____
A. ELISA B. ESR C. PCR D. Widal

85. If a and b are positive real numbers, then (a0 - 3b0)5 =
A. 0 B. 1 C. -32 D. 32

86. Which inequality describes the situation: "length L is at most 45 cm".
A. L= 45 cm B. L > 45 cm C. L ≥ 45 cm D. L ≤ 45 cm

87. The lines y = 2x and 2y = - x are
A. Parallel B. Perpendicular C. Horizontal D. Vertical

88. Which of the following is ALWAYS true?
A. A function is not a relation B. Every function is a relation
C. Every relation is a function D. A relation is not a function

89. What comes next in the sequence: 2, 4, 10, 28, ___ ?
A. 64 B. 70 C. 76 D. 82

90. If x = −1, then what is the value of the function?
A. $f(x) = x^3 + 4x + 12$ B. 7
C. 11 D. 13

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91. What is average (Arithmetic Mean) of the numbers: 2, 4, 5, 0, 9, 10, and 12?
A. 5 B. 6 C. 7 D. 8

92. A 30 gm bullet initially travelling at 120 m/s penetrates 12 cm into a wooden block. The average force exerted by the wooden block is
A. 1800N B. 2000N C. 2200N D. 2850N

93. The logic behind NOR gate is that which gives:
A. High output when both inputs are high B. Low output when both inputs are low
C. High outputs when both inputs are low D. None of these

94. Displacement x of a particle moving along a straight line in a time t is given by x=a0 + (a1.t1) + (a2t2). The acceleration of the particle is:
A. 4a2 B. 2a2 C. 2a1 D. a2

95. In a p-type semiconductor, germanium can be doped with:
A. Aluminium B. Boron C. Gallium D. All of these

96. Substances in which the magnetic moment of a single atom is not zero is called as
A. Ferrimagnetism B. paramagnetism C. ferromagnetism D. diamagnetism

97. A body of mass 10kg and velocity 10m/s collides with a stationary body of mass 5kg. After collision both bodies stick to each other, velocity of bodies after collision will be
A. 0.3m/s B. 6 m/s C. 0.45 m/s D. 6.667 m/s

98. A body starts from rest and travels 120 cm in the 8th second. The acceleration of the body is:
A. 1.02 m/s2 B. 0.34 m/s2 C. 0.18 m/s2 D. 0.16 m/s2

99. The dot product of two vectors of magnitude 3 and 5, if the angle between them is 600 is:
A. 5.2 B. 7.5 C. 8.4 D. 8.6

100. The velocity of an electron in the innermost orbit of an atom is:
A. Highest B. Lowest C. Cannot say D. zero