C 41701 (Pages : 16) Name.....

Reg. No.....

P.G./INTEGRATED P.G. ENTRANCE EXAMINATION, APRIL 2023

INTEGRATED M.Sc. BIO-SCIENCE

Time : Two Hours Maximum : 400 Marks

Each question carries 4 marks.

1 mark will be deducted for each wrong answer.

Section A (Botany)

1. Under favorable condition slime molds form :

   (A) Protonema. (B) Plasmodium.

   (C) Mycelium. (D) Fruiting bodies.

2. Mannitol is the stored food in :

   (A) Chara. (B) Porphyra.

   (C) Fucus. (D) Gracilaria.

3. The protonema is a stage in the life cycle of :

   (A) Riccia. (B) Funaria.

   (C) All bryophytes. (D) Pinus.

4. Name the aestivation when sepals or petals in a whorl just touch one another at the margin without overlapping :

   (A) Twisted aestivation. (B) Valvate aestivation.

   (C) Imbricate aestivation. (D) Vexillary aestivation.

5. In monocotyledonous leaf, the guard cells :

   (A) Kidney shaped. (B) Dumbel shaped.

   (C) Columnar. (D) Rectangular.

6. Nuclear membrane is derived from :

(A) Endoplasmic reticulum. (B) Plasma membrane.

(C) Membrane of mitochondria. (D) Nucleoplasm.

7. In meiosis centromeres divide and chromatids separate during :

(A) Anaphase I. (B) Anaphase II.

(C) Metaphase I. (D) Prophase I.

8. The first stable compound in C4 plants is :

(A) Malic acid. (B) Oxalo acetic acid.

(C) Phophoglyceric acid. (D) Aspartic acid.

9. The number of ATP produced when a molecule of glucose undergoes fermentation is :

(A) 4. (B) 36.

(C) 2. (D) 38.

10. The universal natural auxin of plants is :

(A) IBA. (B) IAA.

(C) NAA. (D) Citric auxin.

11. Calcium is mainly a component of :

(A) Primary cell walls. (B) Secondary cell walls.

(C) Chlorophyll. (D) Middle lamella.

12. Plasmolysis occurs when the cell is placed in :

(A) Isotonic solution. (B) Hypotonic solution.

(C) Hypertonic solution. (D) Pure water.

13. Living mechanical tissue providing tensile strength is :

(A) Sclerenchyma. (B) Parenchyma.

(C) Collenchyma. (D) Sclereid.

14. In grafting, scion forms :

(A) Root system.
(B) Shoot system.
(C) Adventitious roots.
(D) All the three.

15. In angiosperm, how many microspore mother cells are required to produce 100 pollen grains :

(A) 25.
(B) 50.
(C) 100.
(D) 400.

16. Antipodal cells are present towards the :

(A) Micropylar region.
(B) Chalazal region.
(C) The egg.
(D) Central cell.

17. Which is the DNA unwinding protein ?

(A) DNA polymerase.
(B) Ligase.
(C) Endonuclease.
(D) Helicase.

18. Isotopes used for providing semi conservative replication of DNA are :

(A) N^{14} and P^{13}.
(B) N^{14} and C^{14}.
(C) N^{14} and N^{15}.
(D) C^{14} and P^{31}.

19. Locations or sites in the human DNA where single base DNA differences occurs are called :

(A) Repetitive DNA.
(B) VNTR.
(C) SNP.
(D) SSCP.

20. In MOET technology, cow is administered with :

(A) Progesterone hormone.
(B) Gonadotropic hormone.
(C) FSH.
(D) None of the above

21. A good producer of citric acid is :

(A) Aspergillus.
(B) Pseudomonas.
(C) Clostridium.
(D) Saccharomyces.

22. cDNA is :

(A) Formed by reverse transcriptase.

(B) Cloned DNA.

(C) Circular DNA.

(D) Recombination DNA.

23. A and B chains of insulin are linked by :

(A) Phosphodiester bond. (B) Hydrogen bond

(C) Glycosidic bond. (D) Disulphide bond.

24. Age pyramids are of :

(A) Two types. (B) Three types.

(C) Four types. (D) Only one type

25. In which of the following will succession time be least?

(A) Newly created reservoir.

(B) Bare rock.

(C) Buried or cut forest.

(D) Newly cooled lava.

Section B (Zoology)

26. Resolving power of human eye is :

(A) 10 μ. (B) 100 μ.

(C) 1000 μ. (D) 1 μ.

27. "Many millions years ago the entire universe existed in the form of a single condensed mass of matter, which due to unknown reason, suddenly exploded." This came to be known as :

(A) Cosmozoic theory.

(B) Catastrophe theory.

(C) Bing Bang.

(D) Theory of spontaneous generation.

28. Chondrichthyes are characterized by following features except :

(A) Mouth is located ventrally.

(B) Presence of placoid scales.

(C) Notochord is persistent throughout life.

(D) Gills are covered by an operculum.

29. Which of the following tissue has least regenerative power ?

(A) Epithelial tissue. (B) Connective tissue.

(C) Muscular tissue. (D) Neural tissue.

30. Which of the following statement is not correct ?

(A) ATP is required for active transport.

(B) Movement of water by diffusion is called osmosis.

(C) ATP is not required for passive transport.

(D) Movement of molecules occurs against the concentration gradient in facilitated diffusion.

31. Sequence of bases found in a RNA segment is AUGCCA. Its complementary sequence in DNA is :

(A) UTCGGT. (B) TACGGT.

(C) TTCGGT. (D) TACGCT.

32. The succus entericus contains the following except :

(A) Maltase. (B) Dipeptidases.

(C) Lipases. (D) Hydrochloric acid.

33. If the CO_2 concentration in the blood increases, the breathing shall :

(A) Decrease. (B) Increase.

(C) Stop (D) No effect

34. The life of the erythrocytes in mammalian blood is about ———.

(A) 4 days. (B) 120 days.

(C) 180 days. (D) 160 days.

35. In man, urea is mainly produced in ———.

(A) Liver. (B) Kidney.

(C) Gall bladder. (D) Spleen.

36. Which of the following is connected by ligaments ?

(A) Muscles to the bone. (B) Cartilage to the bone.

(C) Tendons to the muscles. (D) Bone to the bone.

37. Gout, a common and complex form of arthritis indicates ———.

(A) The high level of sugar in the body.

(B) The high level of uric acid in the body.

(C) Low level of uric acid in the body

(D) Low level of sugar in the body.

38. Which of the following represents the correct pathway for reflex action ?

(A) Receptor → sensory nerve → motor nerve → spinal cord → muscle.

(B) Receptor → motor nerve → spinal cord → sensory nerve → muscle.

(C) Receptor → sensory nerve → spinal cord → muscle → motor neurons.

(D) Receptor → sensory nerve → spinal cord → motor nerve → muscle.

39. Which of the following STI is not caused by bacteria ?

(A) Genital herpes. (B) Chlamydia.

(C) Syphilis. (D) Gonorrhoea.

40. Parambikulam Tiger Reserve is located in ——— state.

(A) Tamil Nadu. (B) Karnataka.

(C) Telugana. (D) Kerala.

41. A disease caused by eating fish contaminated with industrial wastes containing mercury compounds is known as :

(A) Osteosclerosis. (B) Hashimoto disease.

(C) Bright's disease. (D) Minamata disease.

42. Which of the following statement is not correct with respect to Polymerase chain reaction ?

(A) PCR makes billions of copies of DNA fragment or gene.

(B) It requires DNA primers complementary to the 3' ends of both the strands.

(C) Thermostable Taq DNA polymerase is used for the synthesis of DNA.

(D) This Technique was developed by Watson and Crick.

43. Which of the following is not present in DNA ?

(A) Glycosidic bond. (B) Phosphodiester bond.

(C) Hydrogen bond. (D) Disulphide bond.

44. Spermatids are transformed into sperm by a process called ———.

(A) Spermatogenesis. (B) Gametogenesis..

(C) Spermiogenesis. (D) Oogenesis.

45. Which of the following statement is correct with respect to colour blindness and haemophilia ?

(A) Colour blindness is sex linked recessive disease and haemophilia is autosomal recessive disease.

(B) Colour blindness is autosomal recessive disease and haemophilia is sex linked recessive disease.

(C) Both are sex linked recessive disease.

(D) Both are autosomal dominant disease.

46. The hormones which play important roles in maintaining blood glucose level are :

(A) Glucagon and insulin. (B) Cholecystokinin and insulin.

(C) Glucagon and cholecysokinin. (D) Adrenalin and insulin.

47. Silverfish is a :

(A) Small fish found in fresh water.
(B) Small, primitive, wingless insect.
(C) Small marine mollusc.
(D) Small annelid worm.

48. Which of the following is a heritable disease ?

(A) Chicken pox.
(B) Leprosy.
(C) Cholera.
(D) Alkaptonuria.

49. In India one horned Rhinoceros are found in ———.

(A) Kaziranga National park of Assam.
(B) Gir forests of Gujarat.
(C) Jim Corbet National park.
(D) Muthumalai Tiger Reserve.

50. Sudden heritable change is called :

(A) Recombination.
(B) Transduction.
(C) Mutation.
(D) Meiosis.

Section C (Chemistry)

51. The acid used in lead storage cells is :

(A) Phosphoric acid.
(B) Nitric acid.
(C) Sulphuric acid.
(D) Hydrochloric acid.

52. Which is the lightest gas ?

(A) Nitrogen.
(B) Helium.
(C) Oxygen.
(D) Hydrogen.

53. Which of the following is most basic ?

(A) Na_2O.
(B) BaO.
(C) As_2O_3.
(D) Al_2O_3.

54. Which of the following has zero dipole moment ?

(A) Cis - 2- butene.
(B) Trans - 2- butene.
(C) 1- butene.
(D) 2- methyl - 1- propene

55. A hydrocarbon reacts with hypochlorous acid to give 2- chloroethanol. The hydrocarbon is :

(A) Ethylene. (B) Methane.

(C) Ethane. (D) Acetylene.

56. The species containing the shortest O – O bond length is :

(A) O_2. (B) O_2^+.

(C) O_2^{2-}. (D) O_2^-.

57. The oxide that gives hydrogen peroxide on treatment with dilute acid is :

(A) PbO_2. (B) Na_2O_2.

(C) MnO_2. (D) TiO_2.

58. Which of the following is not a reducing sugar ?

(A) Glucose. (B) Lactose.

(C) Sucrose. (D) Maltose.

59. The nature of an aqueous solution of $FeCl_2$ is :

(A) Acidic. (B) Basic.

(C) Amphoteric. (D) Nuetral.

60. Green Vitriol is :

(A) $FeSO_4.7H_2O$. (B) $ZnSO_4.7H_2O$.

(C) $CaSO_4.\ 2H_2O$. (D) $CuSO_4.\ 5H_2O$.

61. At Cathode the electrolysis of aqueous Na_2SO_4 gives :

(A) Na. (B) H_2.

(C) SO_3. (D) SO_2.

62. Faraday's laws of electrolysis are related to the :

(A) Atomic number of Cations. (B) Atomic number of anions.

(C) Equivalent mass of products. (D) Speed of cations.

63. The correct formula for Plaster of Paris is :

(A) $CaSO_4 . 2H_2O$.
(B) $CaSO_4$.
(C) $CaSO_4 . 1/2H_2O$.
(D) $CaSO_4 . H_2O$.

64. The colloidal sols are purified by :

(A) Peptization.
(B) Coagulation.
(C) Dialysis.
(D) Flocculation.

65. Which of the following is an electrophile ?

(A) H_2O.
(B) NH_3.
(C) $AlCl_3$.
(D) $C_2H_5NH_2$.

66. Which one among the following sols is hydrophobic ?

(A) Gum.
(B) Gelatin.
(C) Starch.
(D) Sulphur.

67. Half life of a radioactive substance that disintegrates by 75 % in 60 minutes will be :

(A) 1/0.693.
(B) $(0.693)^2$.
(C) 0.693.
(D) $(0.693)^{1/2}$.

68. HCOOH reacts with con. H_2SO_4 to produce :

(A) CO.
(B) CO_2.
(C) NO.
(D) NO_2.

69. Which of the following will show geometrical isomerism ?

(A) 1 - Butene.
(B) 1, 2 - dibromo but -1- ene.
(C) Propene.
(D) Isopropylene.

70. Most reactive halide towards SN1 reaction is :

(A) *n* - Butyl Chloride.
(B) Sec - Butyl Chloride.
(C) Tert - Butyl Chloride.
(D) Allyl Chloride.

71. The intermediate involved in Reimer - Tiemann reaction is :

(A) Carbocation. (B) Carbanion.

(C) Carbene. (D) Free radical

72. Which of the following ions exhibits the highest magnetic moment ?

(A) Cu^{2+}. (B) Ti^{3+}.

(C) Ni^{2+}. (D) Mn^{2+}.

73. Which of the following will dissolve in $NaHCO_3$?

(A) CH_3CHO. (B) C_2H_5OH.

(C) CH_3COOH. (D) CH_3COCH_3.

74. The maximum number of valency shown by Nitrogen and Phosphorus is :

(A) 3 and 5. (B) 4 and 5.

(C) 5 and 5. (D) 5 and 3.

75. When acetaldehyde is reacted with $LiAlH_4$ what is the product formed ?

(A) CH_3COOH. (B) CH_3CH_2OH.

(C) CH_3OH. (D) HCOOH.

Section D (Physics)

76. Two cars of masses m_1 and m_2 move in circles of radius r_1 and r_2 respectively. If they complete the circle in equal time the ratio of their angular speeds is :

(A) m_1/m_2. (B) r_1/r_2.

(C) m_1r_1/m_2r_2 (D) 1.

77. Two equal masses are attached to the two ends of a spring of spring constant k The masses are pulled out symmetrically to stretch the spring by a length x over its natural length. The work done by the spring on each mass is :

(A) $1/2\ kx^2$.

(B) $-1/2\ kx^2$.

(C) $1/4\ kx^2$.

(D) $-1/4\ kx^2$.

78. A particle moves in the $x-y$ plane according to the equation $r = (i + 2j)$ A coswt. The motion of the particle is not :

(A) On a straight-line.

(B) On an ellipse.

(C) Periodic.

(D) Simple harmonic.

79. When you speak to your friend which of the following parameters have a unique value in the sound produced ?

(A) Frequency.

(B) Wavelength.

(C) Amplitude.

(D) Wave velocity.

80. If a charged particle enters a magnetic field such that its velocity is perpendicular to the field the trajectory of the particle would be :

(A) Straight line.

(B) Circular.

(C) Elliptical.

(D) Helical.

81. Three particles of charge 20 μCare placed at the vertices of an equilateral triangle ABC of side 1 m. If the whole system is at rest in an inertial frame the resultant force on charge at A is :

(A) Zero.

(B) 3.6 N.

(C) $3.6\sqrt{3}$ N.

(D) 7.2 N.

82. Two coherent sources of different intensities send waves which interfere. The ratio of maximum intensity to minimum intensity is 25. The intensities of the sources are in the ratio :

(A) 25 : 1.

(B) 5 : 1.

(C) 9 : 4.

(D) 625 : 1.

83. When Neils Bohr shook hand with Werner Heisenberg what kind of force did they exert ?

(A) Gravitational. (B) Weak.

(C) Strong. (D) Electromagnetic.

84. The energies E_1 and E_2 of two radiations are 25eV and 50eV respectively. The relation between their wavelengths will be :

(A) $\lambda_1 = \lambda_2$. (B) $\lambda_1 = 2\lambda_2$.

(C) $\lambda_1 = 4\lambda_2$. (D) $\lambda_1 = ½\lambda_2$.

85. The total number of electrons in an atom with following quantum numbers $n = 4$ and $m_s = -1/2$ is :

(A) 16. (B) 32.

(C) 12. (D) 8,.

86. The half-life of a radioactive nuclide is 20 hrs. What fraction of original activity will remain after 40 hrs ?

(A) 1/2. (B) 1/4.

(C) 1/8. (D) 0.

87. A satellite is revolving very close to a planet of density ρ. The time period of revolution of satellite is :

(A) $\sqrt{\frac{3\pi\rho}{G}}$. (B) $\sqrt{\frac{3\pi}{2\rho G}}$.

(C) $\sqrt{\frac{3\pi}{\rho G}}$. (D) $\sqrt{\frac{3\pi G}{\rho}}$.

88. An ideal Carnot engine extracts100 J from a heat source and dumps 40 J to a heat sink at 300 K. The temperature of heat source is :

(A) 600 K. (B) 700 K.

(C) 650 K. (D) 750 K.

89. If Young's double slit apparatus is immersed in water :

(A) Fringe width increases. (B) Fringe width decreases.

(C) Fringe width remains same. (D) Fringes become less intense.

90. If a monochromatic source of light operating at 200W emits 4×10^{20} photons per second, the colour of light emitted will be :

(A) Red. (B) Green.

(C) Violet. (D) Yellow.

Section E (Mathematics)

91. Suppose $A_1, A_2, \ldots A_{20}$ are 20 sets each having 6 elements and $B_1, B_2, \ldots B_n$ are n sets with 5 elements each. Let $S = \bigcup_{i=1}^{20} A_i \bigcup_{j=1}^{n} B_j$ and each elements of S belongs to exactly 12 of the A_i's and exactly 15 of B_j's. Then n is equal to :

(A) 20. (B) 30.

(C) 35. (D) 40.

92. The straight line which is parallel to x – axis and crosses the curve $y = \sqrt{x}$ at an angle of 45° is :

(A) $x = \frac{1}{4}$. (B) $y = \frac{1}{4}$.

(C) $y = \frac{1}{2}$. (D) $y = 1$.

93. If $\sec\theta - \tan\theta = \frac{a+1}{a-1}$, then $\cos\theta =$

(A) $\frac{a^2-1}{a^2+1}$. (B) $\frac{a^2+1}{a^2-1}$.

(C) $\frac{2a}{a^2+1}$. (D) $\frac{2a}{a^2-1}$.

94. A 5ft tall man finds that the angle of elevation of the top of a 25 *ft* high pillar and the angle of depression of its base are complementary angles. The distance of the man from the pillar is :

(A) 20 *ft.* (B) $10\sqrt{3}$ *ft.*

(C) 10 *ft.* (D) 12 *ft.*

95. The sum of integers from 1 to 100, that are divisible by 2 or 5 is :

(A) 3000. (B) 3010.

(C) 3150. (D 3050 .

96. On a new year day every student of a class sends a card to every other student. The postman delivers 650 cards. The number of students in the class are :

(A) 24. (B) 25.

(C) 26. (D) 30.

97. The acute angle between the planes $2x - y + z = 6$ and $x + y + 2z = 3$ is :

(A) 45°. (B) 60°

(C) 30°. (D) 75°.

98. The probability that a leap year should have 52 Tuesdays is :

(A) $\frac{1}{7}$. (B) $\frac{3}{7}$.

(C) $\frac{2}{7}$. (D) $\frac{5}{7}$.

99. $\lim_{x \to 0} \frac{e^{x^2} - \cos x}{x^2}$ is equal to :

(A) $\frac{3}{2}$.

(B) $\frac{2}{3}$.

(C) $\frac{1}{2}$.

(D) 0.

100. A stone thrown vertically upwards satisfies the equation $S = 80t - 16t^2$. The time required to reach the maximum height is :

(A) 2.5 sec.

(B) 3.5 sec.

(C) 4 sec.

(D) 4.5 sec