

P.G. ENTRANCE EXAMINATION, APRIL 2022

INTEGRATED M.Sc. BIOSCIENCE

Time : Two Hours

Maximum : 400 Marks

*Each question carries 4 marks.**1 mark will be deducted for each wrong answer.***Section A (Botany)**

1. Select the correct option from the following :
 - (a) Mule can reproduce.
 - (b) Worker bee undergoes reproduction to generate new progeny.
 - (c) Mule and worker bee do not reproduce.
 - (d) None of the above.
2. Insectivorous plants are principally :
 - (a) Autotrophic.
 - (b) Heterotrophic.
 - (c) Parasitic.
 - (d) Pathogenic.
3. In gymnosperm dominant phase is :
 - (a) Sporophyte.
 - (b) Saprophyte.
 - (c) Gametophyte.
 - (d) Haploid.
4. Pneumatophores are the roots for :
 - (a) Storing water.
 - (b) Asexual reproduction.
 - (c) Respiration.
 - (d) Sexual reproduction.
5. In grasses, the plant parts removed by the grazing herbivores regenerate due to the activity of :
 - (a) Intercalary meristem.
 - (b) Apical meristem.
 - (c) Lateral meristem.
 - (d) Vascular meristem.
6. The layer of vacuole is :
 - (a) Plasmalemma.
 - (b) Tonoplast.
 - (c) Sarcolemma.
 - (d) Cytoplasmic membrane.

Turn over

7. Dark reaction of photosynthesis occurs in :
- (a) Grana of chloroplast. (b) Stroma of chloroplast.
(c) Matrix of mitochondrion. (d) Cytoplasm.
8. Photo respiration is also known as :
- (a) C₂ cycle. (b) C₃ cycle.
(c) C₄ cycle. (d) C₁ cycle.
9. Number of carbon atoms available in Acetyl CoA is :
- (a) 6. (b) 4.
(c) 3. (d) 2.
10. Rosette habit of cabbage can be reversed by :
- (a) GA. (b) NAA
(c) AbA. (d) Cytokinins
11. One of the free-living, anaerobic nitrogen fixers is :
- (a) *Azotobacter*. (b) *Beijernickia*.
(c) *Rhodospirillum*. (d) *Rhizobium*.
12. Water lost by transpiration is :
- (a) Pure water.
(b) Rich in dissolved salts.
(c) Rich in dissolved minerals.
(d) Rich in dissolved glucose.
13. Cork cambium in dicot stem originates from :
- (a) Epidermis. (b) Endodermis.
(c) Outer cortex. (d) Pericycle.
14. Which is the vital link that ensures continuity of species between organisms of one generation and the next ?
- (a) Sexual reproduction. (b) Zygote.
(c) Embryo. (d) Fertilization.

15. Number of gametes produced by a male gametophyte of flowering plant is :
- (a) Four. (b) One.
(c) Three. (d) Two.
16. Pollination in Lotus is carried out by :
- (a) Wind. (b) Water.
(c) Insects. (d) All of the above.
17. Variable part of DNA molecule is :
- (a) Phosphate. (b) Sugar.
(c) Nitrogen base. (d) All of the above.
18. DNA replication is semiconservative as :
- (a) Only nonparent strand act as template.
(b) Both strands of new molecule are synthesized de nova.
(c) One of the strands in each new molecule is parental and the other is new.
(d) Daughter strands are dispersive.
19. Process used by Meselson and Stahl for studying semi conservative replication of DNA was :
- (a) Chromatography. (b) Density gradient centrifugation.
(c) Buoyant density centrifugation. (d) Centrifugation.
20. Meristem culture is practiced in horticulture to get :
- (a) Somaclonal variations. (b) Haploid plants.
(c) Virus free plants. (d) Slow growing cultures.
21. Which of the following is a plasmid :
- (a) Hind II. (b) pBR 322.
(c) EcoR I. (d) Both (a) and (c).
22. Bt in popular Bt-Cotton stands for :
- (a) Biotechnology. (b) *Bacillus tomentosa*.
(c) *Bacillus thuringiensis*. (d) Best type.

23. Humus is :
- (a) Completely decomposed organic matter.
 - (b) Partially decomposed organic matter.
 - (c) Partially decomposed inorganic matter.
 - (d) Completely decomposed inorganic matter.
24. A water body has high BOD indicating that water is :
- (a) Being contaminated with sewage.
 - (b) Being aerated.
 - (c) Receiving minerals.
 - (d) Atrophic.
25. Pyrimidine base present in RNA in place of thymine of DNA is :
- (a) Uracil.
 - (b) Adenine.
 - (c) Cytosine.
 - (d) Guanine.

Section B (Zoology)

26. The unit of classification is :
- (a) Cell.
 - (b) Species.
 - (c) Genus.
 - (d) Taxon.
27. Which of the following is an example of radially symmetrical, acoelomate organism ?
- (a) Sycon.
 - (b) Aurelia
 - (c) Pleurobranchia.
 - (d) Planeria.
28. Find the odd one - *Chelone*, *Chameleon*, *Pteropus*, *Naja* .:
- (a) *Chelone*.
 - (b) *Chameleon*.
 - (c) *Pteropus*.
 - (d) *Naja*.
29. Cardiac muscles differ from skeletal muscles in that they _____.
- (a) Are striated.
 - (b) Utilize aerobic metabolism.
 - (c) Contain myofibrils.
 - (d) Contain intercalated discs.
30. Internal lining of trachea, oviduct, ureters is formed by _____.
- (a) Columnar epithelium.
 - (b) Ciliated epithelium.
 - (c) Stratified epithelium.
 - (d) Pseudo-stratified epithelium.

31. The universal recipient blood is lacking :
- (a) A-antigen. (b) B-antigen.
(c) Both antigen. (d) Both antibodies.
32. If we go to a hill station our :
- (a) Breathing rate will be increased and heart beat will be decreased.
(b) Breathing rate will be decreased and heart beat will be increased.
(c) Both will be increased.
(d) None of the above will happen.
33. The association in which either both or one of the species is beneficial while none is harmed, is _____.
- (a) Symbiosis. (b) Parasitism.
(c) Antagonism. (d) Neuteralism.
34. Which of the following is not matching with respect to their excretory organs ?
- (a) Planaria - Flame cells. (b) Starfish - Metaphridia.
(c) Earthworm - Nephridia. (d) Cockroach - Malpighian tubules.
35. The respiratory centre is located in the _____ part of our brain.
- a) Medulla oblongata. (b) Cerebrum.
(c) Cerebellum. (d) Hypothalamus.
36. Hormone that helps to control blood glucose levels is _____.
- (a) Prolactin. (b) Insulin.
(c) Melatonin. (d) Cortisol.
37. Smallest bone in our body is _____.
- (a) Stapes. (b) Incus.
(c) Ulna. (d) Carpels.
38. Which bond holds the primary structure of a protein together ?
- (a) Covalent bond. (b) Hydrogen bond.
(c) Peptide bond. (d) Ionic bond.

39. When a muscle contracts, exactly what structure get shorter ?
- (a) The fascicles of a muscle.
 - (b) The myosin molecules of a myofilament.
 - (c) The actin molecules of a myofilament.
 - (d) The sarcomere of a myofibril.
40. Which type of cell produces hydrochloric acid ?
- (a) Zymogen cell.
 - (b) Chief cell.
 - (c) Parietal cell.
 - (d) Beta cells.
41. Arrest of reproductive capacity in women with the arrest of menstrual cycle is :
- (a) Melanurea.
 - (b) Menopause.
 - (c) Myxodema.
 - (d) Hematurea.
42. Mating among close relations is referred as :
- (a) Cross breeding.
 - (b) Inbreeding.
 - (c) Line breeding.
 - (d) None of the above.
43. Turners syndrome is :
- (a) 44 + XO.
 - (b) 44 + XX.
 - (c) 44 + XY.
 - (d) 44 + XXY.
44. The famous book 'Origin of Species' was written by _____.
- (a) Hugo de Vries.
 - (b) Lamarck.
 - (c) Weismann.
 - (d) Charles Darwin.
45. As an outcome of the human genome project, _____ has the fewest number of genes ?
- (a) Chromosome 1.
 - (b) X chromosome.
 - (c) Y chromosome.
 - (d) 18th chromosome.
46. The causative organism of the disease filariasis is _____.
- (a) *Salmonella typhi*.
 - (b) *Wuchereria bancrofti*.
 - (c) *Plasmodium falciparum*.
 - (d) *Streptococcus pneumonia*.

47. Abundant antibodies present in colostrums are _____.
- (a) IgA. (b) IgM.
(c) IgE. (d) IgG.
48. Which of the following is not a nitrogen fixing bacteria ?
- (a) Rhizobium. (b) Azospirillum.
(c) Azobacter. (d) Mycobacterium.
49. Which of the following vitamins is necessary for blood clotting ?
- (a) E. (b) A.
(c) K. (d) C.
50. The dental formula of man is :
- (a) 2/2, 2/2, 3/3, 3/3. (b) 2/2, 1/1, 2/2, 3/3.
(c) 2/2, 1/1, 3/3, 2/2. (d) 2/2, 1/1, 2/2, 2/2.
51. Fluorine is the best oxidizing agent because :
- (a) Highest electron affinity. (b) Highest $E^\circ_{\text{reduction}}$.
(c) Highest $E^\circ_{\text{oxidation}}$. (d) Lowest electron affinity.

Section C (Chemistry)

52. The quantity of electricity required to liberate 112cm^3 of hydrogen at STP from acidified water is :
- (a) 965C. (b) 1 Farady.
(c) 0.1F. (d) 96500C.
53. The catalyst used in hydrogenation of oil is :
- (a) Iron. (b) Platinum.
(c) Nickel. (d) Tungsten.
54. The forces of association in physical adsorption are :
- (a) Ionic. (b) Covalent.
(c) Vander Waal's. (d) H - Bonding.

Turn over

55. Which among the following is a chiral molecule ?
- (a) CH_3Cl . (b) CH_2Cl_2 .
(c) CHBr_3 . (d) CHClBrI .
56. The homolytic fission of hydrocarbon results in the formation of :
- (a) Carbonium ions. (b) Free radicals.
(c) Carbanions. (d) Carbenes.
57. The structure of H_2O_2 is :
- (a) Planar. (b) Non-Planar.
(c) Spherical. (d) Linear.
58. HCOOH reacts with conc. H_2SO_4 to produce :
- (a) CO . (b) CO_2 .
(c) NO . (d) SO_2 .
59. The type of hybridization in water molecule is :
- (a) dsp^2 . (b) sp^2 .
(c) sp^3 . (d) sp .
60. The number of unpaired electrons in Zn^{2+} :
- (a) 3. (b) 1.
(c) 0. (d) 5.
61. Which of the following cannot show linkage isomerism ?
- (a) NO . (b) SCN^- .
(c) CN^- . (d) NH_3 .
62. The most stable oxidation state of Fe is :
- (a) +2. (b) -2.
(c) +3. (d) -3.
63. The conjugate acid of CH_3NH_2 is.
- (a) CH_3OH . (b) NH_2 .
(c) CH_3NH_3^+ . (d) CH_3NH^- .

64. Which of the following has $p\pi - d\pi$ bonding ?
- (a) NO_3^- . (b) SO_3^{2-} .
(c) BO_3^{3-} . (d) CO_3^{2-} .
65. Enzymes are made up of :
- (a) Edible proteins.
(b) Proteins with specific structure.
(c) Nitrogen containing carbohydrates
(d) Carbohydrates.
66. Spectrum of Li^{2+} is similar to that of :
- (a) H. (b) He.
(c) Be. (d) Ne.
67. Bell metal is an alloy of :
- (a) Fe and Ni. (b) Cu and Sn.
(c) Cu and Zn. (d) Cu and Ni.
68. Addition of Grignard reagent to an aldehyde or ketone gives an :
- (a) Alcohol. (b) Ether.
(c) Ester. (d) Dimer.
69. The quantum numbers $n = 2, l = 1$ represent :
- (a) 1s orbital. (b) 2p orbital.
(c) 3d orbital. (d) 2s orbital.
70. When a solute is present in trace quantities the following expression is used :
- (a) Gram per million. (b) Milligram percent.
(c) Nanogram percent. (d) Parts per million.
71. Air at sea level is dense. This is a practical implication of :
- (a) Boyle's law. (b) Charle's law.
(c) Avogadro's law. (d) Dalton's law.
72. Which compound does not dissolve in hot dil. HNO_3 ?
- (a) HgS . (b) CuS .
(c) PbS . (d) CdS .

73. The presence of 3 unpaired electrons in N atom can be explained by :
- (a) Hund's rule. (b) Pauli's exclusion principle
(c) Aufbau principle. (d) Uncertainty principle.
74. The energy that opposes the dissolution of a solvent is :
- (a) Hydration energy. (b) Lattice energy.
(c) Internal energy. (d) Bond energy.
75. Function of AlCl_3 in Friedel Craft's reaction is to :
- (a) Produce nucleophile. (b) Make a new bond.
(c) Produce electrophile. (d) Break bond.

Section D (Physics)

76. The perpendicular magnetic flux through each turn of a 100 turn coil is $(t^3 - 2t)$ milli Weber, where t is in seconds. The induced emf at $t = 2\text{s}$ is :
- (a) 4mV. (b) -4mV.
(c) -1V. (d) 1V.
77. The trajectory of a carrom coin moving in XY plane is given by $x = 2t + 4t^2$ and $y = 5t$, where x and y are in meters and t in seconds. The acceleration attained by the coin at $t = 5$ sec is :
- (a) Zero. (b) 16m/s^2 .
(c) 8m/s^2 . (d) 24m/s^2 .
78. Energy of a photon corresponding to wavelength 1234 nm is approximately equal to :
- (a) 1eV. (b) 2eV.
(c) 3eV. (d) 4eV.
79. 240V rms AC is applied to a step-down transformer which has a turn ratio of 8 : 1. Approximate peak load voltage in the secondary will be
- (a) 42.4 V. (b) 86.5 V.
(c) 27.5 V. (d) 30.0 V.
80. The angle between the vectors $\hat{i} + \hat{j} + \hat{k}$ and $-2\hat{i} - 2\hat{j} - 2\hat{k}$ is :
- (a) 180° . (b) 45° .
(c) 90° . (d) 0° .

81. An electric dipole placed in a non-uniform electric field experiences :
- (a) A force but no torque. (b) Neither a force nor a torque.
(c) A torque and a force. (d) A torque but no force.
82. Motion of a particle can be described in x-direction by $x = a \sin \omega t$, and y-direction $y = b \cos \omega t$. The particle is moving on :
- (a) A circular path of radius 'a'. (b) A circular path of radius 'b'.
(c) An elliptical path. (d) A straight line.
83. Considering the motion of a satellite around earth, the physical quantity that is conserved is :
- (a) Velocity. (b) Linear momentum.
(c) Angular momentum. (d) All of the above.
84. A wave is represented by the equation $y = 7 \sin (7 \pi t - 0.04 x + \pi/3)$, where x is in meters and t is in seconds. The speed of the wave is :
- (a) 49π m/s. (b) 175π m/s.
(c) $49/\pi$ m/s. (d) 0.28π m/s.
85. If the Earth is stopped in its orbit and allowed to fall freely towards the Sun, how many days will it take before it plunges into the Sun. (Hint : Use Kepler's laws) :
- (a) 365. (b) $365/\sqrt{2}$.
(c) $365/(2\sqrt{2})$. (d) $365/(4\sqrt{2})$.
86. In the nuclear reaction given below, how many α and β particles are emitted ?
- $${}_{92}^{238}\text{X} \rightarrow {}_{90}^{226}\text{X}$$
- (a) 3α and 3β . (b) 3α and 4β .
(c) 3α and 6β . (d) 4α and 3β .
87. A sonometer wire of length 30 cm vibrates in its third harmonics. What will be its corresponding wavelength ?
- (a) 60 cm. (b) 10 cm.
(c) 30 cm. (d) 20 cm.

Turn over

88. A diatomic gas initially at 180°C is compressed adiabatically to one eighth of its original volume. The temperature after compression will be :
- (a) 395.4°C . (b) 144°C .
(c) 18°C . (d) 887.4°C .
89. If sodium vapour lamp in Young's double slit experiment is replaced by monochromatic blue light of same intensity :
- (a) Fringe width increases.
(b) Fringe width decreases.
(c) Fringe width remains same.
(d) Fringes become less intense.
90. For a photodiode the conductivity increases when a wavelength less than 620nm is incident on it. The band gap of crystal used to fabricate the diode is :
- (a) 1.12eV . (b) 1.8eV .
(c) 2.0eV . (d) 1.62eV .

Section E (Mathematics)

91. In a certain town 25% families own a phone , and 15% own a car, 65% families own neither a phone nor a car. 2000 families own both a car and a phone. Consider the following statements in this regard :
- 1) 10% families own both a car and a phone
 - 2) 35% families own either a car or a phone.
 - 3) 40,000 families live in the town.

Which of the above statements are correct :

- (a) 1 and 2. (b) 1 and 3.
(c) 2 and 3. (d) 1, 2 and 3.
92. The point on the curve $y = 6x - x^2$, where the the tangent is parallel to x - axis is :
- (a) (0, 0). (b) (3, 9).
(c) (6, 0). (d) (2, 8).

93. If $\tan A = \frac{1}{2}$ and $\tan B = \frac{1}{3}$, then the value of $A + B$ is :

(a) $\frac{\pi}{6}$.

(b) $\frac{\pi}{4}$.

(c) $\frac{\pi}{3}$.

(d) π .

94. A portion of a 36 m long tree is broken by a tornado and the top struck up the ground making an angle of 30° with the ground level. The height of the point where the tree is broken is equal to :

(a) 12 m.

(b) 18 m.

(c) $12\sqrt{2}$ m.

(d) $9\sqrt{2}$ m.

95. A man arranges to pay off a debt of Rs. 44,000 by 50 annual installments which are in A.P. When 40 of the installments are paid he dies leaving one fourth of the debt unpaid. The value of the 10th installment is :

(a) Rs. 610.50.

(b) Rs. 709.50.

(c) Rs. 720.50.

(d) Rs. 879.50.

96. 36 games were played in a tournament where each player placed one against the rest. The number of players are :

(a) 18.

(b) 12.

(c) 9.

(d) 8.

97. If A and B are square matrices of order 4 such that $|A| = 2$ and $|B| = 3$, then the determinant of 2 AB is equal to :

(a) 12.

(b) 22.

(c) 48.

(d) 96.

98. A bag contains 5 black balls, 4 white balls and 3 red balls. If a ball is selected randomwise, the probability that it is a black or red ball is :

(a) $\frac{1}{4}$.

(b) $\frac{1}{3}$.

(c) $\frac{5}{12}$.

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

Turn over

99. $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\sqrt{2} \cos x - 1}{\cot x - 1} =$

(a) 1

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

(c) $\frac{1}{\sqrt{2}}$.

(d) $\frac{1}{2\sqrt{2}}$.

100. The area bounded by the curves $y = e^x$, $y = e^{-x}$ and the ordinates $x = 0$ and $x = 2$ is :

(a) $\frac{1}{e}$.

(b) $\left(e - \frac{1}{e}\right)^2$.

(c) $\left(e + \frac{1}{e}\right)^2$.

(d) $e^2 - \frac{1}{e^2}$.