

## INTEGRATED P.G. ENTRANCE EXAMINATION, APRIL 2021

## BIOSCIENCE

Time : Two Hours

Maximum : 400 Marks

*Each question carries 4 marks and 1 mark will be deducted for wrong answers.***Botany**

1. Gametophyte forms the predominant plant body in \_\_\_\_\_.
  - (a) Bryophytes.
  - (b) Pteridophytes.
  - (c) Gymnosperms.
  - (d) Angiosperms.
2. False septation is seen in the ovary of which among the following ?
  - (a) Hibiscus.
  - (b) Argemone.
  - (c) Dianthus.
  - (d) Cassia.
3. In a stem undergoing secondary growth, the youngest layer of secondary phloem is seen \_\_\_\_\_.
  - (a) Just inside the cambial ring.
  - (b) In the innermost region of cambial ring.
  - (c) Just outside the cambial ring.
  - (d) In the outermost region of the cambial ring.
4. Which among the following statements is wrong ?
  - (a) An animal cell can't exist in pure water.
  - (b) A fully turgid cell does not have suction pressure.
  - (c) As the concentration of cell sap increases, water potential decreases.
  - (d) Water potential and DPD are directly proportional.
5. Remobilization of mineral ions is a common phenomenon in plants. Which among the following is not remobilized in plants ?
  - (a) Nitrogen.
  - (b) Sulphur.
  - (c) Calcium.
  - (d) Potassium.
6. Which among the following elements is not associated with photosynthetic function ?
  - (a) Iron.
  - (b) Phosphorous.
  - (c) Chlorine.
  - (d) Boron.

**Turn over**

7. Given below are few statements related to  $C_3$  and  $C_4$  plants. Choose the wrong one :
- (a)  $C_4$  plants have dimorphic chloroplasts.
  - (b)  $C_4$  plants are insensitive to elevated oxygen.
  - (c) Both  $C_3$  and  $C_4$  plants show two carboxylation events.
  - (d) In both,  $CO_2$  combines with RUBP.
8. In the respiratory ETS, complex III refers to \_\_\_\_\_.
- (a) cyt.bcl-cyt c.
  - (b) NADH dehydrogenase.
  - (c) FADH<sub>2</sub>.
  - (d) Cyt c oxidase.
9. Genetically different pollen grains are brought to the stigma in which of the following ?
- (a) Geitonogamy.
  - (b) Xenogamy.
  - (c) Cleistogamy.
  - (d) Autogamy.
10. With respect to Orchids, *Orobanche* and *Striga*, which among the following statements is correct ?
- (a) All are epiphytic.
  - (b) All are total photoautotrophs.
  - (c) All are having numerous tiny seeds.
  - (d) All the three exclusively bear yellow flowers.
11. Considering the type of origin, which among the following fruits stands odd ?
- (a) Banana.
  - (b) Apple.
  - (c) Cashew.
  - (d) Coconut.
12. Given below are features of Phloem. Select the wrong statement :
- (a) In phloem, transport occurs bidirectionally.
  - (b) Phloem parenchyma is absent in dicotyledons.
  - (c) Bast fibres are unbranched.
  - (d) Hemp is a commercially used phloem fibre.
13. In cucumbers, yield can be increased by the application of :
- (a) ABA.
  - (b) Cytokinins.
  - (c) Ethylene.
  - (d) Gibberellins.

14. Select the wrong statement from among the following :

- (a) *Nitrococcus* is a nitrifying bacteria.
- (b) *Thiobacillus* is a denitrifying bacteria.
- (c) Both *Pseudomonas* and *Nitrobacter* are denitrifying bacteria.
- (d) Both *Pseudomonas* and *Thiobacillus* are denitrifying bacteria.

15. Given below are few statements related to Transport in plants. Select the correct one :

- (a) Apoplast often provides barrier to the movement of water.
- (b) Symplastic movement is relatively fast.
- (c) Movement of water is apoplastic in the endodermis.
- (d) Both adhesive and cohesive properties of water influence Mass flow.

16. Select the wrong statement from the following :

- (a) Meiosis I and meiosis II involve a single cycle of DNA replication.
- (b) Mitosis is essential to restore the nucleo - cytoplasmic ratio.
- (c) Crossing over is an enzyme mediated process.
- (d) The synaptonemal complex dissolves during pachytene.

17. Select the correct answer from the following :

- |   |  |
|---|--|
| i) Restriction endonuclease               | (a) Insertional inactivation             |
| ii) RNA interference                      | (b) Insulin                              |
| iii) C peptide                            | (c) Cellular defense                     |
| iv) $\beta$ - galactosidase               | (d) Palindromic nucleotide sequence      |
|   | (e) Biolistics                           |
| (a) i) (d), ii) (c); iii) (b), iv) (a) ;  | (b) i) (b), ii) (d), iii) (a), iv) (e) ; |
| (c) i) (d), ii) (c), iii) (a) ; iv) (b) ; | (d) i) (a), ii) (d), iii) (e), iv) (b) ; |

18. Keoladu National park is situated in :

- (a) Africa.
- (b) Rajasthan.
- (c) Nagaland.
- (d) Japan.

**Turn over**

19. Examine the given statements. Which one explains Gause's competitive Exclusion Principle ?
- (a) Cryptically colored insects and frogs.
  - (b) *Calotropis* growing in abandoned fields.
  - (c) Monarch butterfly feeding on poisonous weed.
  - (d) None of the above.
20. Select the correct statement from the following :
- (a) The pyramid of biomass in sea is generally inverted.
  - (b) Pyramid of energy can never be inverted.
  - (c) Pyramid of numbers in a grass land ecosystem is upright.
  - (d) All statements are correct.
21. The group called FOAM is associated with :
- (a) Reducing pollutants in the marshes.
  - (b) Reducing plastic pollutants in the urban environment.
  - (c) Promoting vegetation in forest fire affected areas.
  - (d) Reducing greenhouse gas emission.
22. The Concept of Joint Forest Management has been introduced by Government of India in 1980. It was aimed at :
- (a) Protecting and managing forests with a close association with local communities.
  - (b) Conservation of forest trees with participation of neighboring states.
  - (c) Protecting the forest resources through financial support of international organizations.
  - (d) Exchanging the gemplasm of endemic forest taxa.
23. *Ratna* is an indigenous better yielding variety developed in India. It belongs to the crop :
- (a) Wheat.
  - (b) Sugarcane.
  - (c) Rice.
  - (d) Brinjal.
24. NBRJ is located at :
- (a) Howrah.
  - (b) Lucknow.
  - (c) New Delhi.
  - (d) Kerala.

25. Fucoxanthin is present in :

- (a) Ectocarpus.
- (b) Gelidium.
- (c) Spirulina.
- (d) Chara.

### Zoology

26. R.H. Whittaker proposed a five Kingdom classification based on the characteristics except :

- (a) Level of body organization.
- (b) Mode of nutrition.
- (c) Ultra structural characteristics and molecular data.
- (d) Cell type- prokaryotic or eukaryotic.

27. Which of the following is an example of bilaterally symmetrical, pseudo-coelomate animal ?

- (a) Hydra.
- (b) Leucosolenia.
- (c) Fasciola.
- (d) Ascaris.

28. All are fishes except :

- (a) Scoliodon.
- (b) Flying fish.
- (c) Hippocampus.
- (d) Silver fish.

29. Which of the following is not the function of neuroglia ?

- (a) Provision of nutrients for neurons.
- (b) Structural support to nerve cells.
- (c) Transmission of impulses.
- (d) Repair of the nervous system.

30. In the cell membrane, carbohydrates :

- (a) Always faces to the lumen of cells.
- (b) Always faces outwards, towards the extracellular space.
- (c) Directed to all sides randomly.
- (d) Not present.

**Turn over**

31. Chromosome with terminal centromere is referred as :
- (a) Acrocentric (b) Telocentric.  
(c) Sub-metacentric. (d) Metacentric.
32. The simplest amino acid is :
- (a) Glycine. (b) Valine.  
(c) Isoleucine. (d) Tyrosine.
33. Which of the following is not correct with respect to human dentition ?
- (a) Thecodont. (b) Diphyodont.  
(c) Heterodont. (d) Homodont.
34. The maximum amount of air which can be breathed out through forceful expiration after a forceful inspiration is known as :
- (a) Inspiratory capacity.  
(b) Total lung capacity.  
(c) Expiratory capacity.  
(d) Vital capacity.
35. At rest the axon membrane is :
- (a) Impermeable to sodium and potassium ions.  
(b) Equally permeable to sodium and potassium ions.  
(c) Permeable only to chloride ions.  
(d) Much more permeable to potassium than to sodium.
36. Which one is not a reflex action ?
- (a) Coughing. (b) Sneezing.  
(c) Yawning. (d) Weeping.
37. For the discovery double helix structure of DNA, Nobel Prize was awarded to James Watson, Francis Crick and \_\_\_\_\_.
- (a) Har Govind Khurana. (b) Rosalind Franklin.  
(c) Maurice Wilkins. (d) Tatum.

38. Milk protein is :
- (a) Glycine. (b) Casein.  
(c) Albumin. (d) Haemoglobin.
39. Which of the following is not a bone of human leg ?
- (a) Femur. (b) Humerus.  
(c) Fibula. (d) Tibia.
40. Zika and chikungunya virus are transmitted to people primarily through the bite of \_\_\_\_\_ species of mosquitoes.
- (a) Culex.  
(b) Anopheles.  
(c) Aedes and anopheles respectively.  
(d) Aedes.
41. Nail hoofs and horns are examples of :
- (a) Bony tissue. (b) Cartilage tissue.  
(c) Connective tissue. (d) Epidermal tissue.
42. Which one of the following gases was most likely absent in free form in the primordial atmosphere at time of origin of life ?
- (a) Hydrogen. (b) Ammonia.  
(c) Oxygen. (d) Methane.
43. Rhinoceros in India is found in \_\_\_\_\_.
- (a) Kazaringa sanctuary in Assam.  
(b) Jim Corbett National park, Uttarakhand.  
(c) Gir forest, Gujarat.  
(d) Eravikulam National park, Kerala.
44. Which of the following group of animals are poikilothermic animals ?
- (a) Whale, pigeon and bat. (b) Sea horse, frog and snake.  
(c) Monkey, dog and parrot. (d) Man, vulture and cat.

**Turn over**

45. Which one of the following glands does not secrete saliva ?
- (a) Sublingual gland. (b) Submaxillary gland.  
(c) Parotid gland. (d) Lacrimal gland.
46. Which one of the following statements is true about viruses ?
- (a) All viruses contain RNA as genetic material.  
(b) All viruses contain DNA as genetic material.  
(c) All viruses replicate only within the host cell.  
(d) All viruses possess a protein coat around its genetic material at all stages of their life cycle.
47. Although blood flow through large arteries at high pressure, when the blood reaches small capillaries the pressure decreases because \_\_\_\_\_.
- (a) The valves in the arteries regulate the rate of blood flow into the capillaries.  
(b) The total cross sectional area of capillaries arising from an artery is much greater than that of the artery.  
(c) The volume of blood in the capillaries is much lesser than that in the arteries.  
(d) Elastin fibers in the capillaries help to reduce the arterial pressure.
48. A DNA with the sequence 5'GCA TGT 3' would be complementary to the sequence :
- (a) 5'CGU AAC3'. (b) 5'CGT ACU3'.  
(c) 5'GGU ACA3'. (d) 5'CGU ACA3'.
49. Blind spot in the eye contains :
- (a) Cones. (b) Rods.  
(c) Both rods and cones. (d) Neither the cons nor the rods.

### Chemistry

50. Movement of a substance against its electrochemical gradient is known as :
- (a) Osmosis. (b) Diffusion.  
(c) Active transport. (d) Absorption.

51. XeF<sub>2</sub> molecule is :
- (a) Linear. (b) Trigonal planar.  
(c) Pyramidal. (d) Square Planar.
52. The bond order in O<sub>2</sub><sup>+</sup> is the same as in :
- (a) N<sub>2</sub><sup>+</sup>. (b) CN<sup>-</sup>.  
(c) NO. (d) NO<sup>+</sup>.
53. The continuum in an atomic spectrum is due to :
- (a) Instability in excited state.  
(b) Interaction of ion with an atom.  
(c) Uncertainty principle.  
(d) Ionisation of atom.
54. Resonance structures of a molecule does not have :
- (a) Identical arrangement of atom.  
(b) Nearly the same energy content.  
(c) The same number of paired electrons.  
(d) Identical bonding.
55. The kind of delocalization involving sigma bond orbitals is called :
- (a) Inductive effect. (b) Hyperconjugation effect.  
(c) Electromeric effect. (d) Mesomeric effect.
56. Which of the following reactions cannot be used for the reduction of
- $$R_2CO \longrightarrow R_2CH_2$$
- (a) Clemmenson reduction. (b) Wolf Kishner reduction.  
(c) Wurtz reaction. (d) HI/red P at 200° C.
57. Which of the following does not give NO<sub>2</sub> on heating ?
- (a) KNO<sub>3</sub>. (b) Pb(NO<sub>3</sub>)<sub>2</sub>.  
(c) Cu(NO<sub>3</sub>)<sub>2</sub>. (d) AgNO<sub>3</sub>.

**Turn over**

58. The bonds present in  $N_2O_5$  are :
- (a) Only ionic.
  - (b) Covalent and co-ordinate.
  - (c) Only covalent.
  - (d) Only Co-ordinate.
59. The elements which exist/s in the liquid state are :
- (a) Bromine.
  - (b) Mercury.
  - (c) Gallium.
  - (d) All of the above.
60. Which of the following dissolves in hot conc. NaOH ?
- (a) Fe.
  - (b) Cu.
  - (c) Zn.
  - (d) Ag.
61. Which of the following ligands is a bidentate ?
- (a) EDTA.
  - (b) Ethylenediamine.
  - (c) Acetate.
  - (d) Pyridine.
62. The number of isomers exhibited by  $[Cr(NH_3)_3Cl_3]$  :
- (a) 2.
  - (b) 1.
  - (c) 6.
  - (d) 4.
63. Brown ring test is made for :
- (a)  $NO_3^-$ .
  - (b)  $Cl^-$ .
  - (c)  $I^-$ .
  - (d)  $Br^-$ .
64. Natural Rubber is polymer of :
- (a) Ethylene.
  - (b) Vinyl Chloride.
  - (c) Phenol.
  - (d) Isoprene.
65. Stronger the oxidizing agent, greater will be :
- (a) Reduction potential.
  - (b) Oxidisation potential.
  - (c) Ionic behaviour.
  - (d) None of the above.

66. Vapour density of a gas is 22. What is its molecular mass ?
- (a) 21. (b) 33.  
(c) 27. (d) 44.
67. The number of spherical nodes in  $3p$  orbitals are :
- (a) 1. (b) 3.  
(c) 4. (d) 2.
68. The lightest metal is :
- (a) Li. (b) Fe.  
(c) Cu. (d) Ag.
69. Which of the following species is paramagnetic ?
- (a)  $\text{CO}_2$ . (b) NO.  
(c)  $\text{O}_2^{2-}$ . (d)  $\text{CN}^-$ .
70. In an endothermic reaction the value of  $\Delta H$  is :
- (a) Zero. (b) Positive.  
(c) Negative. (d) Constant.
71. Precipitation takes place when ionic product :
- (a) Equals the solubility product. (b) Exceeds the solubility product.  
(c) Is less than solubility product. (d) Is almost zero.
72. The number of NaCl molecules in unit cell of its crystal is :
- (a) 1. (b) 3.  
(c) 4. (d) 5.
73. The unit of rate constant for a zero order reaction is :
- (a)  $\text{Litre sec}^{-1}$ . (b)  $\text{Litre mol}^{-1} \text{sec}^{-1}$ .  
(c)  $\text{Mol litre}^{-1} \text{sec}^{-1}$ . (d)  $\text{Mol sec}^{-1}$ .

Turn over

74. A pH of 7 signifies :

- (a) Pure Water. (b) Neutral solution.  
(c) Basic Solution. (d) Acidic Solution.

75. Out of Cu, Ag, Fe, Zn, the metal which can displace all others from their salt solution is :

- (a) Ag. (b) Cu.  
(c) Zn. (d) Fe.

### Physics

76. A metal ring is being heated such that its area in  $m^2$  at any instant 't' second is given by  $A = 3t^2 + \pi$ . The rate of increase of area at  $t = 5$  second is :

- (a)  $90 m^2s^{-1}$ . (b)  $60 m^2s^{-1}$ .  
(c)  $30 m^2s^{-1}$ . (d)  $15 m^2s^{-1}$ .

77. A proton, a neutron, a  $\beta$ -particle and an  $\alpha$ -particle are moving with equal velocity. Which of the following is correct ?

1.  $\beta$ -particle has greatest de Broglie wavelength.

2.  $\alpha$ -particle has the smallest de Broglie wavelength.

- (a) 1 only. (b) 2 only.  
(c) Both 1 and 2. (d) Neither 1 nor 2.

78. The magnetic flux in a circuit having a resistance of  $10 \Omega$  varies as  $\phi = 6t^2 - 5t + 1$ . The induced current at  $t = 1$  second is :

- (a) 0.7 A. (b) 1 A.  
(c) 2 A. (d) 5 A.

79. A proton is accelerated through a potential difference of 1V. Its energy is :

- (a) 1eV. (b) 0.  
(c) 2eV. (d) 4eV.

80. The value of  $m$  so that the vector  $3\hat{i} - 2\hat{j} + \hat{k}$  may be perpendicular to  $2\hat{i} + 6\hat{j} + m\hat{k}$  is :

- (a) 2. (b) 3.  
(c) 5. (d) 6.

81. A particle in uniform circular motion can possess :
- (a) Radial acceleration only.
  - (b) Tangential acceleration only.
  - (c) Both radial and tangential acceleration.
  - (d) Neither radial nor tangential acceleration.
82. Which one of the following waves does not involve oscillations of particles of a medium ?
- (a) Waves in a hanging spring.
  - (b) Ripples on a water surface.
  - (c) Ultrasonic waves.
  - (d) A light wave.
83. A charged Particle is Released from rest in a region of steady and uniform electric and magnetic fields which are parallel to each other. The particle will move in a :
- (a) Circle.
  - (b) Helix.
  - (c) Straight line.
  - (d) Parabola.
84. A particle is moving along a circular path with a uniform speed in a plane. Through what angle the direction of its angular velocity change when it completes  $3/4^{\text{th}}$  of a revolution ?
- (a)  $0^\circ$ .
  - (b)  $45^\circ$ .
  - (c)  $90^\circ$ .
  - (d)  $270^\circ$ .
85. Assume that an hourglass that takes a time of two minutes on Earth is taken to the Moon. How long would it take for all the sand to fall off ? (Hint : Acceleration due to gravity on the Moon is  $1/6^{\text{th}}$  of that on the Earth).
- (a) 2 minutes.
  - (b)  $2 \times 6$  minutes.
  - (c)  $2/6$  minute.
  - (d)  $2 \times \sqrt{6}$  minutes.
86. A radioactive sample has  $4 \times 10^{10}$  nuclei at a certain time. The number of active nuclei remaining after 4 half-lives is :
- (a)  $1 \times 10^{10}$ .
  - (b)  $5 \times 10^8$ .
  - (c)  $25 \times 10^8$ .
  - (d)  $25 \times 10^9$ .

Turn over

87. A bar magnet suspended horizontally at a place makes 9 vibrations per minute. If the pole strength of the magnet is quadrupled by remagnetisation, what will be its number of vibrations per minute ?
- (a) 6. (b) 36.  
(c) 18. (d) 9.
88. An amplifier has a voltage gain  $A_v = 1000$ . The voltage gain in dB is :
- (a) 3. (b) 20.  
(c) 30. (d) 60.
89. In Young's double slit experiment, 12 fringes are formed in a certain segment of the screen when light of wavelength 600nm is used. If the wavelength is changed to 600nm number of fringes observed in the same segment of the screen is
- (a) 12. (b) 18.  
(c) 24. (d) 30.
90. One mole of an ideal gas with initial temperature T K does 6R joules of work adiabatically. If the ratio of specific heat of this gas at constant pressure and at constant volume is 5/3 the final temperature of the gas will be
- (a)  $(T + 2.4)$ . (b)  $(T - 2.4)K$ .  
(c)  $(T + 4)K$ . (d)  $(T - 4)K$ .

### Mathematics

91.  $(A \cap B) \setminus C = \underline{\hspace{2cm}}$ .

- (a)  $(A \setminus C) \cap B$ . (b)  $(A \setminus B) \cap C$ .  
(c)  $(B \setminus A) \cap C$ . (d) None of these.

92. The binary operation  $*$  on  $R^2$  is defined by  $a * b = a^2 + b^2$ . Then  $*$  is \_\_\_\_\_.

- (a) Both commutative and associative.  
(b) Commutative but not associative.  
(c) Associative but not commutative.  
(d) None of these.

93.  $f: \mathbb{C} \rightarrow \mathbb{C}$  be given by  $f(a+ib) = a-ib$ . Then geometrically  $f$  is \_\_\_\_\_.

- (a) Clockwise rotation through an angle  $90^\circ$ .
- (b) Reflection about Y axis.
- (c) anti clockwise rotation through an angle  $90^\circ$ .
- (d) Reflection about X axis.

94. If  $z = \frac{i\sqrt{-9} + 7i}{1 + \sqrt{-1}}$ , What is the imaginary part of  $\bar{z}$  ?

- (a) 7.
- (b) -5.
- (c)  $7/2$ .
- (d) 5.

95. Let  $z = \cos \frac{2\pi}{3} + i \sin \frac{2\pi}{3}$ . Then  $z^{2345} =$  \_\_\_\_\_.

- (a) 1.
- (b)  $i$ .
- (c)  $z$ .
- (d)  $z^2$ .

96. If  $f(x) = 3x^2 + 2x + 6$ , and  $f(a) = 0 = f(b)$  then  $a^3 + b^3 =$  \_\_\_\_\_.

- (a)  $\frac{100}{27}$ .
- (b)  $-\frac{100}{27}$ .
- (c)  $\frac{32}{9}$ .
- (d)  $-\frac{32}{9}$ .

97. What is the relationship between Arithmetic Mean (AM), Geometric Mean (GM) and Harmonic Mean (HM) :

- (a)  $AM \leq GM \leq HM$ .
- (b)  $GM \leq HM \leq AM$ .
- (c)  $HM \leq GM \leq AM$ .
- (d)  $HM \leq AM \leq GM$ .

98. Which of the following is the condition for perpendicular lines with slopes  $m_1$  and  $m_2$  :

- (a)  $m_1 - m_2 = \frac{\pi}{2}$ .
- (b)  $m_1 + m_2 = 1$ .
- (c)  $m_1 + m_2 = -1$ .
- (d) None of these.

Turn over

99. In  $\mathbb{R}^2$ , the equation  $ax^2 + 2bxy + cy^2 = 0$  represents :

- (a) Pair of straight lines.                      (b) Circle passing through origin.  
(c) Parabola.                                      (d) Lines intersecting at origin.

100. Which of the following is the value of  $\tan 75^\circ$  ?

- (a)  $3 + \sqrt{2}$ .                                      (b)  $3 - \sqrt{2}$ .  
(c)  $2 + \sqrt{3}$ .                                      (d)  $2 - \sqrt{3}$ .

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