

**ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2019
EXAMINATION CATEGORY: TECHNICAL**

PAPER II: GENERAL SUBJECT KNOWLEDGE PAPER FOR BIOSCIENCE

Date	: October 12, 2019
Total Marks	: 100
Writing Time	: 90 minutes (1.5 hours)
Reading Time	: 15 Minutes (prior to writing time)

GENERAL INSTRUCTIONS:

1. Write your Registration Number clearly and correctly on the Answer Booklet.
2. The first 15 minutes is to check the number of pages of Question Paper, printing errors, clarify doubts and to read the instructions. You are NOT permitted to write during this time.
3. This paper consists of **TWO Parts: Part I & Part II**
Part I consists of 70 multiple choice questions of 1 (one) mark each, and
Part II consists of 10 short answer questions of 3 (three) marks each.
4. All questions are **COMPULSORY**.
5. All answers should be written on the Answer Booklet provided to you. Candidates are not allowed to write anything on the question paper. If required, ask for additional Answer Booklet.
6. All answers should be written with correct numbering of Section, Part and Question Number in the Answer Booklet provided to you. Note that any answer written without indicating any or correct Section, Part and Question Number will NOT be evaluated and no marks would be awarded.
7. Begin each Part in a fresh page of the Answer Booklet.
8. You are not permitted to tear off any sheet(s) of the Answer Booklet as well as the Question Paper.
9. Use of any other paper including paper for rough work is not permitted.
- 10. You are required to hand over the Answer Booklet to the Invigilator before leaving the examination hall.**
11. This paper has **11 printed pages**, including this instruction page.

GOOD LUCK!!!

Part I

Multiple Choice Questions (70 marks)

Choose the correct answer and write down the letter of your chosen answer in the Answer Booklet against the question number e.g. 71 (a). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.

- The rate of transpiration will be very less in a situation where
 - wind is blowing with a very high velocity.
 - ground water is sufficiently available.
 - relative humidity is very high.
 - environment is very hot and dry.
- The concentration unit independent of temperature is
 - Molarity
 - Molality
 - Normality
 - Weight volume percent
- How many grammes of CH_3OH should be added to water to prepare 150.0 ml solution of 2.0 M of CH_3OH ?
 - 9.6 g
 - 2.5 g
 - 32.0 g
 - 150.0 g
- Which type of moment is present in *Mimosa pudica*?
 - Nyctinastic
 - Chemonastic
 - Seismonastic
 - Thigmonastic
- The outermost layer of maize endosperm is known as
 - Perisperm
 - Aleurone
 - Tapetum
 - Endothecium
- Which of the following liquids would possess the highest vapour pressure at room temperature?
 - Acetic acid (b.p. 118 °C)
 - Chlorobenzene (b.p. 132 °C)
 - Methyl alcohol (b.p. 65 °C)
 - Nitrobenzene (b.p. 212 °C)

7. The molarity of pure water is
 - a) 50.5 M
 - b) 18.5 M
 - c) 55.6 M
 - d) 100 M

8. The fertilisation in which male gametes are carried through pollen tube is known as
 - a) Syngamy
 - b) Porogamy
 - c) Siphonogamy
 - d) Chalazogamy

9. A steroid hormone which regulate glucose metabolism is
 - a) Cortisone
 - b) Cortisol
 - c) Corticosterone
 - d) 11-deoxycorticosterone

10. Which part of ovary in mammals acts as an endocrine gland after ovulation?
 - a) Stroma
 - b) Germinal epithelium
 - c) Vitelline membrane
 - d) Graafian follicle

11. The bond angle in water is
 - a) 90°
 - b) 101°
 - c) 105°
 - d) 180°

12. Sympathetic nerve accelerates heart beat due to
 - a) Insulin
 - b) Adrenalin
 - c) Glucagon
 - d) None of the above

13. Which part of human brain is concerned with the regulation of body temperature?
 - a) Medulla oblongata
 - b) Cerebellum
 - c) Cerebrum
 - d) Hypothalamus

14. IUPAC name of C_2H_5CN is
 - a) Ethyl cyanide
 - b) Acetonitrile
 - c) Propane nitrile
 - d) Ethane nitrile

15. Bipolar neurons occur in
- Vertebrate embryos
 - Retina of eye
 - Brain and spinal cord
 - Skeletal muscles
16. Which of the following is important for muscle contraction and nerve impulse transmission?
- Ca^{2+} ions
 - Mg^{2+} ions
 - Mn^{2+} ions
 - Fe^{2+} ions
17. Which of the following monosaccharides is a pentose?
- Glucose
 - Fructose
 - Arabinose
 - Galactose
18. Growth curve in animals is
- Delta curve
 - Alpha curve
 - Beta curve
 - Sigmoid curve
19. Carbohydrates are compounds of
- C, N, O
 - C, H, N
 - C, H, O
 - N, P, K
20. Growth in living being is called
- Acceretion
 - Intussuception
 - Aggregation
 - Interaction
21. Which type of carbohydrate is cane sugar?
- Polysaccharide
 - Trisaccharide
 - Disaccharide
 - Monosaccharide
22. In organic chemistry the isomers have the same
- Structural formula
 - Chemical properties
 - Physical properties
 - Molecular formula

23. Decreased defence against pathogens causes ageing, and it is due the disappearance of
- Pituitary gland
 - Thymus gland
 - Parathyroid gland
 - Spleen
24. The undifferentiated cells in the adult which retain the power to divide are called
- Meristematic cells
 - Postmitotic cells
 - Stem cells
 - All the above
25. In malaria, the product released by mosquitoes into blood that causes chill and fever is called
- Haematin
 - Schuffner's dots
 - Haemazoin
 - Haematoin
26. Which pair is essential for the growth of fish in water?
- Nitrates and sulphates
 - Sulphanates and carbonates
 - Calcium and phosphorus
 - Carbonates and phosphates
27. Which is not a natural polymer?
- Wool
 - Silk
 - Leather
 - Nylon
28. Solarisation is
- formation of chlorophyll.
 - destruction of chlorophyll.
 - utilisation of sunlight.
 - none of the above
29. The route by which virtually all energy enter into ecosystem is
- Leaf abscission
 - Respiration
 - Photosynthesis
 - Transpiration
30. The chemical name of bleaching powder is
- Calcium hypochlorite
 - Calcium chlorohypochlorite
 - Calcium chlorate
 - Calcium perchlorate

31. The impurities present in the mineral are called
- Flux
 - Alloy
 - Gangue
 - Slag
32. Graham's law is correlated with
- Diffusion
 - Imbibitions
 - Osmosis
 - Absorption
33. Water used as moderator in nuclear reactor is called
- Hard water
 - Heavy water
 - Nuclear water
 - Soft water
34. Isotonic solutions have
- same freezing point.
 - same temperature.
 - same vapour pressure.
 - same osmotic pressure.
35. Stomatal opening is regulated by
- Light
 - Temperature
 - Atmospheric pressure
 - Wind
36. Faraday's laws of electrolysis are related to the
- atomic number of the cation.
 - atomic number of the anion.
 - equivalent weight of the electrolyte.
 - speed of the cation.
37. When HCl is added to the following oxides, which one would give H_2O_2 :
- MnO_2
 - BaO
 - PbO_2
 - None of the above
38. Water lost in the process of guttation is
- pure water
 - impure water
 - in vapour form
 - both (a) and (c)

39. In plasmolysed cell, the space between nucleus and plasma membrane is occupied by
- Hypotonic solution
 - Hypertonic solution
 - Isotonic solution
 - Air
40. Water potential in plant cells is determined by
- Matric potential
 - Solute potential or osmotic potential
 - Pressure potential
 - All of the above
41. *Ascaris* is most commonly found in:
- Men
 - Women
 - Children
 - (a) and (b)
42. Which of the following is not a concept of Lamarck?
- Environmental pressure causes variation.
 - Rate and survival of organism is different due to variation.
 - Inheritance of acquired character.
 - If an organ is used constantly it will continuously increase in size.
43. An evolutionary process giving rise to new species adapting to new habitat and ways of life is called
- Adaptation
 - Adaptive radiation
 - Convergent evolution
 - Microevolution
44. Which of the following enzyme converts maltose to glucose?
- Diastase
 - Zymase
 - Maltase
 - Invertase
45. The pH of a solution is 5.9. If the hydrogen ion concentration is decreased hundred times, the solution will be
- more acidic.
 - neutral.
 - basic.
 - of the same acidity.
46. Mutation is more common when it is present in
- Recessive condition
 - Dominant condition

- c) Constant in population
d) None of the above
47. Genetic diversity in agricultural crops is threatened by
a) excessive use of fertilisers.
b) intensive use of biopesticides.
c) introduction of high-yielding varieties.
d) extensive intercropping.
48. Which of the following is not done in wildlife sanctuary?
a) Fauna is conserved
b) Flora is conserved
c) Soil and flora are utilised
d) Hunting is prohibited
49. How much volume of 0.6 M NaOH is required to neutralise 30 cm³ of 0.4 M HCl?
a) 30 cm³
b) 20 cm³
c) 40 cm³
d) 50 cm³
50. Which of the following solution has the highest boiling point?
a) 0.1 M BaCl₂
b) 0.1 M NaCl
c) 0.1 M Urea
d) 0.1 M glucose
51. Haemophilia is a condition where there is
a) no production of haemoglobin in the blood.
b) no production of melanin in the skin.
c) a delay in clotting of blood.
d) a failure of clotting mechanism of blood.
52. When chromosome number of a given organism has one additional chromosome in one of the homologous pairs, the condition is known as
a) Trisomy
b) Monosomy
c) Polyploidy
d) Nullisomy
53. Which of the following represents the edible part of fruit of litchi?
a) Pericarp
b) Mesocarp
c) Juicy aril
d) Endocarp

54. In leaves of C₄ plants, malic acid synthesis during carbon dioxide fixation occurs in
- Epidermal cells
 - Mesophyll cells
 - Bundle sheath cells
 - Guard cells
55. Solid NaCl is a bad conductor of electricity since
- there are no ions in solid NaCl
 - solid NaCl is covalent
 - ions are not mobile in solid NaCl
 - there are no electrons in solid NaCl
56. Dry ice is an example of a crystalline solid which is
- Ionic
 - Molecular
 - Covalent
 - Metallic
57. How many isomers are possible in C₄H₈O molecule?
- 3
 - 4
 - 5
 - 6
58. Which of the following cell organelles is associated with photorespiration?
- Mitochondria
 - Peroxisome
 - Chloroplast
 - All of the above
59. Law of limiting factors was given by
- Leibig
 - Blackman
 - Calvin
 - Darwin
60. Most of the fossils are found in which rock?
- Sedimentary rock
 - Metamorphic rock
 - Igneous rock
 - None of the above
61. A plant requires magnesium for
- holding cells together.
 - protein synthesis.
 - chlorophyll synthesis.
 - cell wall development.

62. Carbohydrate must contain at least
- 2 carbon atoms
 - 3 carbon atoms
 - 4 carbon atoms
 - 6 carbon atoms
63. Which of the following is a polysaccharides?
- $\text{CH}_2\text{OH}(\text{CHOH})_4\text{CHO}$
 - $\text{CH}_2\text{OH}(\text{CHOH})_3\text{CO}\cdot\text{CH}_2\text{OH}$
 - $\text{C}_{12}\text{H}_{22}\text{O}_{11}$
 - $(\text{C}_6\text{H}_{10}\text{O}_5)_n$
64. Blue litmus turns red in a solution of pH
- below 7
 - above 7
 - at 7
 - at all pH
65. The process of evaporation of a liquid is accompanied by
- an increase of enthalpy.
 - a decrease of entropy.
 - no change in free energy.
 - an increase of entropy.
66. The process of decay of dead organic matter is known as
- Nitrification
 - Denitrification
 - Ammonification
 - Nitrogen fixation
67. Nitrite is converted to nitrate by
- Nitrosomonas*
 - Nitrobacter*
 - Pseudomonas*
 - Clostridium*
68. Commercially important ore of lead is
- Haematite
 - Siderite
 - Galena
 - Sphalerite
69. The structure of H_2O_2 is
- Planar
 - Non-planar
 - Spherical
 - Linear

70. Transfer of pollen grains from the anther to the stigma of another flower of the same plant is called
- Autogamy
 - Cleistogamy
 - Geitonogamy
 - Allogamy

PART II – Short Answer Questions (30 marks)

Answer ALL 10 short answer questions. Each question carries 3 marks.

- In a process of absorption and movement of water in plants cells some carrier proteins allow transport only if two types of molecules move together.
 - What is this process called? (1 mark)
 - The process has two types. Name and define the two types involved? (2 marks)
- Calculate the mole fraction of each of the component of a mixture made by dissolving 10.0 g of NaOH and 12.7 g of iodine in 54.0 g of water. (3 marks)
- Based on the taxonomic relationship of two parents, list three types of hybridisation and define each of them. (3 marks)
- Crystalline solids are said to have regular arrangements of atoms, ions or molecules. List three more characteristics of a crystalline solid. (3 marks)
- How does species diversity differ from ecological diversity? (3 marks)
- Benzene is the simplest and most important of the aromatic hydrocarbon.
 - Name the scientist who discovered it, year of discovery, and in which material was it first discovered. (1.5 marks)
 - Give reason why it is named benzene. What is the formula and its commercial name for benzene. (1.5 marks)
- What are honey guides? What is their importance for the plant possessing them? (3 marks)
- How an individual can prevent the loss of biodiversity and exploitation of its resources? Give three examples. (3 marks)
- Give the full form of CT and MRI. How are they different from each other? (3 marks)
- In thermodynamics, a system is defined as a specific portion of matter under study which is isolated from the rest of the universe with a bounding surface. Name the different type of systems and briefly explain them with an example. (3 marks)

TASHI DELEK