

**ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2015
EXAMINATION CATEGORY: TECHNICAL**

PAPER II: GENERAL SUBJECT KNOWLEDGE FOR BIOSCIENCE GROUP

Date : 10 October 2015
Total marks : 100
Examination Time : 90 minutes (1.5 hours)
Reading Time : 15 Minutes (prior to examination time)

GENERAL INSTRUCTIONS

1. Write your Registration Number clearly and correctly on the Answer Booklet.
2. The first 15 minutes is being provided to check the number of pages, printing error, clarify doubts and to read instructions in Question Paper. You are NOT permitted to write during this time.
3. This paper consists of **TWO parts: – Part I and 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 Part, Section and Question Number in the Answer Booklet provided to you. Note that any answer written without indicating correct Part, Section 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. You are required to hand over the Answer Booklet to the Invigilator before leaving the examination hall.
10. This question paper has thirteen (13) pages in all, including this Instruction page.

Good Luck!

PART I: MULTIPLE CHOICE QUESTIONS

Choose the correct answer and write down the letter corresponding to the correct answer chosen in the Answer Booklet against the question number. E.g. 71 (b). Each question carries ONE mark. Answering questions with more than one choice will not be evaluated.

1. A solution whose composition is known by virtue of the way it was made from a reagent of known purity or by virtue of its reaction with a known quantity of a standard reagent.
 - a. Concentration
 - b. Solvent
 - c. Standard solution
 - d. Stock solution

2. Which of the following is not a macronutrient?
 - a. Nitrogen
 - b. Manganese
 - c. Phosphorus
 - d. Potassium

3. The experimental scientists make a fundamental distinction between different types of errors. But the one which is so serious that there is no real alternative to abandoning the experiment and making a completely fresh start is defined as:
 - a. Random errors
 - b. Gross errors
 - c. Systematic errors
 - d. Experimental errors

4. Which of the following soil is the best for plant growth?
 - a. Sandy soil
 - b. Clayey soil
 - c. Silty soil
 - d. Loamy soil

5. Which of the following is responsible for desertification?
 - a. Deforestation
 - b. Mining
 - c. Overgrazing
 - d. All of the above

6. The process of measuring how much of a constituent is present in a substance is:
 - a. Qualitative analysis
 - b. Quantitative analysis

- c. Gravimetric analysis
 - d. Volumetric analysis
7. We do not know what life really is. But we know that all living organisms are composed of characteristic types of structural units called:
- a. Protoplasm
 - b. DNA
 - c. Cells
 - d. Mitochondria
8. The statement, “equal volume of all gases under the same conditions of temperature and pressure contain the same number of molecules,” was hypothesised by:
- a. Gay-Lussac
 - b. Dalton
 - c. Avogadro
 - d. Cannizzaro
9. All living beings respire continuously, and respiration is thus a process of:
- a. Releasing energy
 - b. Building energy
 - c. Take in carbon dioxide
 - d. None of the above
10. The cell-wall of the plant cell is made up of a chemical substance named:
- a. Lignin
 - b. Pectin
 - c. Cellulose
 - d. protein
11. Sugars containing six or less carbon atoms in each molecule are known as:
- a. Monosaccharides
 - b. Disaccharides
 - c. Oligosaccharides
 - d. Polysaccharides
12. Blood platelets are found only in the blood of:
- a. Birds
 - b. Mammals
 - c. Reptiles
 - d. Amphibians
13. The only way to detect the “hidden hunger” in plant caused by mild nutrient deficiencies is to conduct:
- a. Soil test
 - b. Plant tissue test

- c. Both (a) and (b)
 - d. None of the above
14. Freshly expressed milk contains:
- a. Lactic acid
 - b. Citric acid
 - c. Maleic acid
 - d. None of the above
15. Which chemical depletes ozone?
- a. CO_2
 - b. Cl_2CF_2
 - c. CH_4
 - d. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
16. Which chemical element is central in the chlorophyll molecule?
- a. Nitrogen
 - b. Phosphorus
 - c. Potassium
 - d. Magnesium
17. Photosynthesis is the most important producer of molecular oxygen on our planet. From which molecule do oxygen atoms liberated by photosynthesis come?
- a. Carbon dioxide
 - b. Water
 - c. Glucose
 - d. Chlorophyll
18. Organ of Jacobson helps in:
- a. Touch
 - b. Smell
 - c. Vision
 - d. Hear
19. The name fermentation is given to chemical reactions brought about by micro-organisms such as:
- a. Yeast
 - b. Bacteria
 - c. Moulds
 - d. All of the above
20. The process whereby the concentration of a reagent is determined by reaction with a known quantity of a second reagent.
- a. Measurement
 - b. Coloration

- c. Chemical analysis
 - d. Standardization
21. The study of the detailed structure of tissues making up a particular organ is called:
- a. Physiology
 - b. Morphology
 - c. Histology
 - d. Sociology
22. The blood does not clot inside the body because of:
- a. Oxygenation of blood
 - b. Colour of blood
 - c. Heparin in blood
 - d. Absence of fibrinogen in blood
23. One mole of hydrogen is 2 g. Therefore, 2 g of hydrogen at S.T.P. will occupy:
- a. 2.24 dm^3
 - b. 22.4 dm^3
 - c. 224 dm^3
 - d. 0.224 dm^3
24. The process of taking in food from outside into alimentary canal through mouth is called:
- a. Inhalation
 - b. Egestion
 - c. Ingestion
 - d. Assimilation
25. The major constituent of a solution is called:
- a. Concentration
 - b. Solute
 - c. Solvent
 - d. Moles
26. The subject that deals with the facts and laws of inheritance of parental characters by the offspring is:
- a. Organic evolution
 - b. Taxonomy
 - c. Palaeobotany
 - d. Genetics
27. Rh factor is present in:
- a. All vertebrates
 - b. All mammals

- c. All reptiles
 - d. Man and rhesus monkey only
28. The process by which the dormant embryo wakes up, grows out of the seed-coat and establishes itself as a seedling is called
- a. Pollination
 - b. Hibernation
 - c. Germination
 - d. Flowering
29. The fusion of two dissimilar sexual reproductive units called gametes is termed:
- a. Fission
 - b. Fertilization
 - c. Zygosporium
 - d. Oospore
30. When the male and the female flowers are borne by one and the same plant it is said to be:
- a. Dioecious
 - b. Monoecious
 - c. Dichogamy
 - d. Herkogamy
31. Concentrations of trace components of a sample can be expressed as:
- a. Gram per kilogram
 - b. Parts per million
 - c. Parts per billion
 - d. Both (b) and (c)
32. The movement of plant organs in response to the force of gravity is called:
- a. Haptotropism
 - b. Geotropism
 - c. Chemotropism
 - d. Hydrotropism
33. The simplest formula of a compound is called its:
- a. Molecular formula
 - b. Chemical formula
 - c. Empirical formula
 - d. Structural formula
34. The process whereby relatively small and simple molecules link together to form much larger units is:
- a. Polymers
 - b. Polymerization

- c. polymorph
 - d. Polyethylene
35. The largest single mass of lymphatic tissue in the body is:
- a. Lung
 - b. Liver
 - c. Kidney
 - d. Spleen
36. A plant which lives on another plant but does not take food or anything from that plant is called:
- a. Endophyte
 - b. Epiphyte
 - c. Host
 - d. parasite
37. Many substances can exist in more than one form in the solid state, and the phenomenon is known as:
- a. Allotropy
 - b. Polymorphism
 - c. Isomorphism
 - d. Triple point
38. The boiling point of a liquid is that temperature at which its vapour pressure is equal to the:
- a. External pressure
 - b. External Temperature
 - c. Volume of the container
 - d. Weight of the container
39. Thread-like white lines on the vegetable leaf that gradually widen, are a symptom of:
- a. Aphids
 - b. Armyworm feeding
 - c. Leaf miners
 - d. Bark beetles
40. A sample of NaOH weighing 5.0 g is dissolved in 45 g of water. (1 g of water is approximately 1 ml). What is the weight percent of NaOH in the solution?
- a. 5%
 - b. 10%
 - c. 20%
 - d. 30%

41. The C_4 plants are photosynthetically more efficient than C_3 plants because:
- The carbon dioxide compensation point is more
 - Carbon dioxide generated during photorespiration is trapped and recycled
 - C_4 plants have more chloroplasts
 - They have chlorophyll a_{673}
42. Extensive planting of trees to increase cover is called :
- Afforestation
 - Agroforestation
 - Deforestation
 - Social forestry
43. Pepsin is an example of :
- Hormone
 - Vitamin
 - Enzyme
 - Nutrient
44. Which one of the following phenomena supports Darwin's concept of natural selection in organic evolution?
- Development of transgenic animals
 - Prevalence of pesticide-resistant insects
 - Development of organs from stem cells for organ transplantation.
 - None of the above
45. Root caps are absent in:
- Mesophytes
 - Xerophytes
 - Hydrophytes
 - Lithophytes
46. As compared to a dicot root, a monocot root has:
- More abundant secondary xylem
 - Many xylem bundles
 - Inconspicuous annual rings
 - Relatively thicker periderm
47. The scientific study of soil is:
- Soil science
 - Pedology
 - Soil chemistry
 - Geology

48. Terrestrial plants take huge amount of water daily but the most of it is lost to the air through:
- Evaporation
 - Translocation
 - Transpiration
 - Leaching
49. Aqua regia is a mixture of:
- 3 parts of concentrated HCl + 1 part of concentrated HNO₃
 - 1 part of concentrated HCl + 3 parts of concentrated HNO₃
 - 3 parts of concentrated HCl + 2 parts of concentrated HNO₃
 - 2 parts of concentrated HCl + 3 parts of concentrated HNO₃
50. The pH of the digestive juices within the human small intestine is between 7.5 to 8.5. This environment is slightly:
- Basic
 - Acidic
 - Neutral
 - None of these
51. Biogas generation is mainly based on the principle of:
- Putrification
 - Degradation
 - Fermentation
 - Both (a) and (b)
52. The science concerned with vegetable culture is called
- Floriculture
 - Olericulture
 - Horticulture
 - Agriculture
53. Vegetative propagation in ginger is carried out by means of:
- Tuber
 - Rhizome
 - Bulb
 - Roots
54. The storage carbohydrate in animal is :
- Starch
 - Cellulose
 - Glycogen
 - Glucose

55. In cabbage, cauliflower and broccoli, hollow stems with darkened interiors are most often caused by:
- Phosphorus deficiency
 - Boron deficiency
 - Draught
 - Calcium deficiency
56. Graffian follicles are characteristically found in the:
- Ovary of mammal
 - Ovary of frog
 - kidney
 - Tyroid of mammal
57. An empty weighing bottle has a mass of 10.283 g. After adding water from a 25 ml pipette, the mass was 35.225 g. If the lab temperature was 23 °C, (*the correction factor for volumetric calibration at the specified temperature is 1.0035 ml/g*), the volume of water delivered by the pipette was:
- 10.283 ml
 - 24.942 ml
 - 25.029 ml
 - 35.225 ml
58. A biosphere reserve conserves and preserves:
- Wild animals
 - Wild land
 - Natural vegetation
 - All of the above
59. Blind spot contains:
- Rods
 - Cones
 - Both rods and cones
 - None of the above
60. In a lab a closed chamber containing a drying agent is called:
- Fume hood
 - Desiccators
 - Desiccant
 - Mortar and pestle
61. Human body cells contain:
- 21 pairs of chromosomes
 - 22 pairs of chromosomes
 - 23 pairs of chromosomes
 - 24 pairs of chromosomes

62. Scientific and commercial method of bee keeping for production of honey and wax is called:
- Apiculture
 - Sericulture
 - Silviculture
 - Pisciculture
63. The death of the last individual of a species is called:
- Extinction
 - Suicide
 - Biological corridor
 - None of the above
64. Carbon dioxide constitutes about 0.03% of the atmosphere by:
- Volume
 - Weight
 - Mass
 - All of the above
65. The major cause for land degradation in our country is:
- Soil erosion
 - Pollution of soil
 - Glacial lake outburst
 - Deforestation
66. Aflatoxin is a mycotoxin produced primarily by :
- Fungus
 - Virus
 - Bacteria
 - Rabies
67. The flower or bloom of which plant changes its colour based on the level of soil pH:
- Red rose
 - Tiger Lilly
 - Hydrangea
 - Blue poppy
68. Soil factors are otherwise known as:
- Climatic factors
 - Edaphic factors

- c. Biotic factors
 - d. Physiographic factors
69. Male mosquitoes take their food from:
- a. The human blood
 - b. The standing water
 - c. The sap of plants
 - d. All of the above
70. Hormone replacing the requirement of verbalization is:
- a. Ethylene
 - b. Gibberellins
 - c. Auxin
 - d. Cytokinin

Part II: SHORT ANSWER QUESTIONS

ANSWER ALL THE FOLLOWING 10 SHORT ANSWER QUESTIONS (3 MARKS EACH)

1. List three most important factors causing soil acidification in nature and justify your points. (3 marks)
2. Why is the colour of a leaf kept in the dark frequently yellow or pale green? Which pigment do you think is more stable? Does moonlight support photosynthesis? (3 marks)
3. What is pollution? Is global warming a pollutant or a product of pollution? How human activities are influencing global temperature? (3marks)
4. What is biological control? What is the single most criterion for using biological control? Mention one advantage it has over the use of pesticide. (3 marks)
5. Briefly answer the following question. (3 marks).
 - a. Explain what is meant by disease.
 - b. What is the difference between ectoparasite and endoparasite?
 - c. How is endogenous chemical agents different from exogenous chemical agents?
6. What is pulse pressure? Give its value in a healthy person. What is the full form of ECG? (3 marks)
7. What were the contributions made by Gregor Johann Mendel and Dmitri Mendeleev? Through whose work the elements, if arranged according to their atomic mass, exhibit an apparent periodicity of properties. (3 marks)

8. Is ecology same or different from ecosystem? Why do you think is tiger protection so important? What is biodiversity? (3 marks)
9. What is the difference between genotype and phenotype? Which one of the two is influenced by your genes and the environment? (3 marks)
10. Define cross pollination and self pollination. Give one example each. What are their advantages and disadvantages? (3 marks)

