**ROYAL CIVIL SERVICE COMMISSION**

**BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2014**

**EXAMINATION CATEGORY: TECHNICAL**

**PAPER II: GENERAL SUBJECT KNOWLEDGE for *BIO SCIENCE* GROUP**

**Date :** 11 October 2014

**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 in the Answer Booklet.
2. The first 15 minutes are to check the number of pages, printing errors, clarify doubts and to read the instructions in Question Paper. You are NOT permitted to write during this time.
3. This paper consists of **TWO Parts, namely 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.

1. **All questions are compulsory.**
2. All answers must be written in the Answer Booklet provided to you. You will not be given any marks for answers written other than in the Answer Booklet. Ask for additional Answer Booklet if required.
3. 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 any or correct Part, Section and Question Number will NOT be evaluated and no marks would be awarded.
4. Begin each Part in a fresh page of the Answer Booklet.
5. You are not permitted to tear off any sheet(s) of the Answer Booklet as well as the Question Paper.
6. You are required to hand over the Answer Booklet to the Invigilator before leaving the examination hall.
7. This paper has **12** printed 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 (a). Each question carries ONE mark. Answering questions with more than one choice will not be evaluated.

1. The movement of a substance from an area of higher concentration to an area of lower concentration by random movement is called:
2. osmosis
3. diffusion
4. imbibition
5. guttation
6. The fight-or-flight response is developed by the hormone of:
7. Adrenal cortex
8. Hypothalamus
9. Adrenal medulla
10. Middle pituitary
11. Which one of the following inflorescences is found in sunflower?
12. Cyathium
13. Capitulum
14. Panicle
15. Spadix
16. Which one of the following elements is not an essential element as plant nutrient?
17. Carbon
18. Nitrogen
19. Sodium
20. Oxygen
21. The ‘pacemaker” of the heart is the:
22. Sinoatrial (SA) node
23. Atrioventricular (AV) bundle
24. Atrioventricular (AV) node
25. myofibres
26. What kind of light is the most effective in phototropism?
27. Far-red
28. Red
29. Blue
30. Green
31. A glassware calibrated to contain a particular volume of solution at 20oC when the bottom of the meniscus is adjusted to the center of the mark on the neck of the flask is named:
32. Conical flask
33. Erlenmeyer flask
34. Volumetric flask
35. Measuring cylinder
36. If a potato tuber is placed in a concentrated sugar solution:
37. Nothing would happen
38. It would die
39. It would become limp due to loss of water from its cells
40. It would become turgid by absorbing water from sugar solution
41. Adenosine triphosphate (ATP) commonly used to phosphorylate glucose to ‘active’ glucose-phospate, is formed in the:
42. Centrosome
43. Mitochondria
44. Golgi bodies
45. Ribosomes
46. Which of the following statements is incorrect?
47. Copper is required in leghaemoglobin synthesis
48. Cobalt is important for plants capable of fixing molecular nitrogen
49. Molybdenum functions as an electron acceptor and a donor in the reduction of nitrogen to ammonia
50. Blue-green algae are not important for nitrogen fixation
51. A physiological response to the duration of light and darkness is a:
52. Daily phase cycle
53. Circadian rhythm
54. Biological clock
55. Photoperiodism
56. In which form CO2 is mostly carried in blood?
57. Carbonic acid
58. Caronate ions
59. Hydrogencarbonate ions
60. Carbaminohaemoglobin
61. For which of the following stimuli are there no known sensory structure in living organisms?
62. Pressure
63. Radio waves
64. Vibrations
65. Magnetic fields
66. Which of these is mismatched?
67. Semicircular canals-inner ear
68. Auditory canal-outer ear
69. Ossicles-middle ear
70. Utricle and sascule-outer ear
71. Natural selection is best defined as occurring when the environment causes:
72. Assortative mating
73. Differential success in reproduction
74. A reduced gene pool
75. Differential mortality
76. In your experiment the value that occurs most frequently in the data is called:
77. mean
78. median
79. mode
80. range
81. Helium is added to oxygen used by deep-sea divers because:
82. It is less poisonous than nitrogen.
83. It is readily miscible with oxygen.
84. It is less soluble in blood under high pressure.
85. It is lighter than nitrogen
86. Hybrid vigour is due to:
87. Linkage
88. Homozygosity
89. Heterozygosity
90. Emasculation
91. The fertility of soil is reduced by:
92. Ammonifying bacteria
93. Nitrifying bacteria
94. Nitrogen fixing bacteria
95. Denitrifying bacteria
96. What are the products of photosynthesis?
97. Water and carbon dioxide
98. Oxygen and carbohydrate
99. Water and oxygen
100. Carbohydrate and water
101. The method of correcting the defective genes is called:
102. Gene therapy
103. Somatic hybridization
104. Genetic engineering
105. Protoplast fusion
106. Those micro-organisms requiring O2 as the terminal acceptor of electrons in respiration are called:
107. Facultative anaerobes
108. Obligate anaerobes
109. Aerobes
110. None of the above
111. Those drugs which cause depression of the central nervous system and produce sleepiness is termed;
112. tranquillisers
113. sedatives
114. narcotics
115. hypnotics
116. The strongest muscle of the human body is found in:
117. wrist
118. thigh
119. fingers
120. jaws
121. If the amount of rainfall collected this is 50 cc, and the collector area is 200 cm2 then what is the rainfall?
122. 2.5 cm
123. 2.5 mm
124. 0.25 mm
125. 4.0 cm
126. Which ion is involved in blood clotting?
127. K+
128. Fe+
129. Ca++
130. Na+
131. Fertilizer use, according to the Law of the Minimum, should concentrate especially on the so-called:
132. “maximum factor”
133. “minimum factor”
134. mineral fertilizer
135. organic fertilizer
136. The vertical dimension of soil exposed by excavation from the surface to the parent material is called
137. soil classification
138. soil horizon
139. soil profile
140. regolith
141. An empty weighing bottle had a mass of 10.283 g. After adding water from a 25 ml pipette, the mass was 35.225 g. If the laboratory temperature was 23 oC, and the corresponding correction factor is 1.0035 ml/g; find the volume of water delivered by the pipette.
142. 24.942 ml
143. 25.029 ml
144. 10.283 ml
145. 35.225 ml
146. Statistically precision is defined as a measure of :
147. the percent relative uncertainty
148. the magnitude of measurement
149. the reproducibility of a result
150. the measured value close to the true value
151. The pipette calibrated to deliver one fixed volume, in which the last drop of liquid does not drain out of the pipette, and it should not be blown out is called:
152. transfer pipette
153. measuring pipette
154. Ostwald-Folin pipette
155. Serological pipette
156. Rickets is caused by the deficiency of:
157. vitamin K
158. cholesterol
159. niacin
160. vitamin D
161. The standard deviation is a measure of:
162. the range of data
163. arithmetic mean
164. relative standard deviation
165. the width of the distribution
166. Titration is a procedure in which increments of the known added reagent solution is known as:
167. an indicator
168. equivalence point
169. the titrant
170. end point
171. Which of these components of blood fights infection?
172. white blood cells
173. red blood cells
174. platelets
175. plasma
176. The process during which essential elements are converted from organic combination to simple inorganic forms is called:
177. immobilization
178. nitrification
179. mineralization
180. carbon cycle
181. The difference between the systolic pressure and the diastolic pressure is called:
182. Arterial blood pressure
183. Pulse pressure
184. Sphygmomanometer
185. Riva-Rocci
186. It is thought that increasing amounts of greenhouse gases in the atmosphere causes additional heat and thus bring about global warming because:
187. greenhouse gases react among themselves and generate more heat
188. they absorb more solar energy which in turn raises the Earth’s temperature
189. they emit more heat than other atmospheric gases causing global warming.
190. they radiate heat back to the Earth and increases it’s temperature.
191. The end products of protein digestion are:
192. monosaccharides
193. amino acids
194. fatty acids
195. steroids
196. If evolution occurs, we would expect different biogeographical regions with similar environments to:
197. have plants and animals that have similar adaptations
198. all contain the same mix of plants and animals
199. each have its own specific mix of plants and animals
200. both (a) and (c)
201. When a mutation is limited to the substitution of one nucleotide pair for another, it is called a:
202. point mutation
203. translocation
204. base inversion
205. sugar-phosphate deletion
206. The difference between the largest and smallest data points which gives us some idea of the variation in our experiments is called:
207. confidence interval
208. standard deviation
209. range
210. histrogram
211. Pollination specifically taking place between two neighbouring flowers of the same plant is called:
212. self-pollination
213. cross-pollination
214. geitonogamy pollination
215. none of the above
216. Which part of the heart pumps blood to the lungs?
217. Left atrium
218. Right atrium
219. Left ventricle
220. Right ventricle
221. The development of the fruit without fertilization is spoken of as:
222. oospore
223. porogamy
224. parthenocarpy
225. seed
226. Biological catalysts secreted by the living cells to bring biological reactions in various metabolic processes is called:
227. substrate
228. catalysis
229. enzymes
230. proteins
231. Which of the following is not a micronutrient?
232. Cu
233. Mn
234. Zn
235. Ca
236. Nitrification represents a very important phase in the nitrogen cycle. In this ammonia or any of its salts is first acted on by which bacteria:
237. Clostridium
238. Nitrobacter
239. Azotobacter
240. Nitrosomonas
241. In view of the complex nature of organic compounds and their occurrence only in the living world, Berzelius, a famous Swedish chemist, suggested that they were produced under the influence of a mysterious force, called:
242. Electromagnetic force
243. Vital force
244. Gravitational force
245. Black hole
246. Soil particle holds some water so tenaciously on its surface as an extremely thin film by the force of imbibitions. This water is known as:
247. Capillary water
248. Hygroscopic water
249. Soil water
250. Surface water
251. Depending on the nature of fungi the lichens have been classified into:
252. two main groups
253. three main groups
254. four main groups
255. five main groups
256. The leguminous plants supply bacteria with:
257. fats
258. proteins
259. carbohydrates
260. nitrogenous food
261. Which one of the following laws formulated by Mendel is also called the law of purity of gametes.
262. Law of Unit characters
263. Law of Dominance
264. Law of Segregation
265. None of the above
266. Which of the plants will enrich the soil with nitrogen:
267. Potato
268. Maize
269. Alfalfa
270. wheat
271. An instrument used for measuring the pressure of the atmosphere is known as:
272. Hydrometer
273. Altimeter
274. Barometer
275. Tensiometer
276. A digestive enzyme, named amylase, in the saliva begins digestion of:
277. proteins
278. carbohydrates
279. fats
280. oils
281. A precisely manufactured glass tube with graduation enabling you to measure the volume of liquid delivered through the stopcock (the valve) at the bottom is called:
282. burette
283. delivery tube
284. capillary tube
285. pipette
286. Which one of the following formulae represents propyl alcohol?
287. CH3OH
288. CH3CH2OH
289. CH3CH2CH2OH
290. CH3CH2CH2CH2OH
291. The first stable intermediate product formed during the process of photosynthesis is:
292. phosphoric acid derivatives of sugars
293. phosphoglyceric acid
294. glucose
295. fructose
296. Micronutrients are those which are:
297. less important than macronutrients
298. more important than macronutrients
299. needed in very small quantities but are as important as macronutrients
300. present in very small amounts in the soil
301. Heart sounds are produced by :
302. contraction of the myocardium
303. flow of blood in the ventricles
304. flow of blood in the atria
305. closure of the heart valves
306. C3 plants differ from C4 plant in:
307. type of end products of photo synthesis
308. types of pigments involved in photonsynthesis
309. substance that accept CO2 in carbon assimilation
310. number of ATP molecules that are consumed in preparing sugar
311. When a capillary tube is immersed in water and placed vertically with one end in the liquid, observation shows that:
312. the water level drops in the tube below that of the level in the container
313. the water rises in the tube to a height above the surface in the container
314. the water level in the tube is equal to the water level outside the tube
315. none of the above
316. The enrichment of water by nitrogen or phosphorus causing algae and higher forms of plant life to grow too fast which disturbs the balance of organisms present in water and the quality of the water concerned is termed as:
317. Eutrophication
318. Atmospheric depression
319. Environmental pollution
320. Soil degradation
321. The plants that grow in constantly moist situations are called:
322. Hydrophytes
323. Hygrophytes
324. Mesophytes
325. Epiphytes
326. Which two bones are the longest in the human body?
327. two fibulas
328. two tibias
329. two femurs
330. two ulnas
331. Soil with a fairly even mixture of different sized particles generally having the best combination of physical and chemical properties in terms of cultivation and crop growth is called:
332. Sandy loam
333. Clay loam
334. Loam
335. Silty clay loam
336. In Lind’s book *A Treatise on Scurvy*, he emphasized on:
337. Vitamin B12
338. Vitamin C
339. Vitamin K
340. Vitamin B1
341. It is understood that Global carbon is held in a variety of different stocks. A stock that is taking-up carbon is called a:
342. Carbon source
343. Carbon sink
344. Carbon fluxes
345. Carbon footprint
346. The cohabitation of two unrelated organisms that benefit mutually from the close association is called:
347. Photosynthesis
348. Symbiosis
349. Mycorrhizae
350. Allelopathy

**Part II: SHORT ANSWER QUESTIONS**

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

1. Answer briefly for the following questions: ( 3 marks)
2. What is Carbohydrate? Name three types of carbohydrates
3. Appendicitis is a common problem in the developed countries among the adolescents. What is appendicitis and why is it common in the developed countries?
4. What is Mesophyte? Give one example of mesophytic plant
5. When you visit the hospital for some ailment, first thing the doctors measure your blood pressure. What do you understand by blood pressure? What are the two types of pressure they measure?
6. Following are the abbreviated forms for three important international bodies. Write their full form along with one of their key functions: (3 marks)
   1. WWF
   2. ADB
   3. JICA
7. Answer the following questions? (3 marks)
   1. What is the full form of pH?.
   2. pH of human blood
   3. pH of normal water
8. What symptoms would plants show if there is lack of : (3 marks)
   1. Phosphorous in the soil?
   2. Nitrogen in the soil?
   3. Potassium in the soil?
9. What is chlorophyll? Name three (3) elements of chlorophylls in the plants. ( 3 marks)
10. What are the three types of tropism in plants? ( 3 marks)
11. It is widely believed that planting more trees reduces the stream flow. Considering the large forest coverage in Bhutan, we might receive less stream flow. What is your stand on the above statement? (3 marks)
12. Bhutan adopted an interesting development strategy following middle path. What do you understand by middle path development strategy? (3 marks)
13. What time is it at Thimphu (90oE), if it is 2 pm at GMT? Show your work (8 pm) (3 marks)

------------- **TASHI DELEK** ---------------