

**ROYAL CIVIL SERVICE COMMISSION**  
**BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2012**  
**EXAMINATION CATEGORY: TECHNICAL**

**PAPER III: SUBJECT SPECIALIZATION PAPER for ENVIRONMENT SCIENCE**

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| <b>Date</b>             | : 14 October 2012                        |
| <b>Total Marks</b>      | : 100                                    |
| <b>Examination Time</b> | : 150 minutes (2.5 hours)                |
| <b>Reading Time</b>     | : 15 Minutes (prior to examination time) |

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**READ THE FOLLOWING INSTRUCTIONS CAREFULLY:**

1. Write your Roll Number clearly on the Answer Booklet in the space provided.
2. The first 15 minutes is being provided to check the number of pages, printing errors, clarify doubts and to read the instructions. You are NOT PERMITTED TO WRITE during this time.
3. Use either Blue or Black ink pen or ball point pen for the written part and Pencils for the sketches and drawings.
4. All answers should be written on the Answer Booklet provided. Candidates are not allowed to write anything on the question paper or any other materials.
5. All answers must be labeled with appropriate question numbers (Section, Question and sub-Question Numbers wherever applicable). Unlabelled answers will not be assessed.
6. This Paper is divided into two sections-namely SECTION A and SECTION B.
7. SECTION A consists of two parts: Part I and Part II.

Part I consists of 30 Multiple-Choice Questions carrying one (1) mark each and is compulsory. The answer of your choice should be clearly written in whole along with the question and option number on your answer booklet. Eg. 31(c).

Part II consists of four (4) short answer questions of five (5) marks each and all questions are compulsory. Mark for each sub-question is indicated in the brackets.

8. SECTION B consists of two Case Studies. Choose only ONE case study and answer the questions under your choice. Each case study carries fifty (50) marks in total. Mark for each sub-question is indicated in the brackets.
9. This Paper consists of EIGHT (8) pages including this Instruction page.

## SECTION A (50 MARKS)

**Part I: Select the correct answer from the multiple choices given below and write the answer against each question number on the answer sheet. Multiple answer questions (30 X 1 = 30 marks)**

- 1. Which of the following greenhouse gases has the greatest heat-trapping ability per molecule?**
  - a. Carbon dioxide
  - b. Carbon monoxide
  - c. Chlorofluorocarbon
  - d. Methane
  
- 2. The Chemical Oxygen Demand is greater than Biological Oxygen Demand in**
  - a. Clean water
  - b. Water with microbes
  - c. Water with industrial effluent
  - d. Lake water
  
- 3. The Stockholm conference on environmental protection was held in**
  - a. 1973
  - b. 1992
  - c. 1972
  - d. 1987
  
- 4. Which of the following is a major pollutant causing acid rain?**
  - a. Carbon dioxide
  - b. Sulphur dioxide
  - c. Hydrogen peroxide
  - d. Carbon monoxide
  
- 5. The concept that species have changed over long period of time is known as**
  - a. Ecology
  - b. Embryology.
  - c. Spontaneous generation
  - d. Organic evolution
  
- 6. What does the process of photosynthesis produce?**
  - a. Starch, which is metabolized into less complex molecules by dehydration synthesis
  - b. Protein, which is metabolized into less complex molecules by dehydration synthesis
  - c. Glycerol, which is metabolized into more complex carbohydrates by dehydration synthesis

- d. Glucose, which is metabolized into more complex carbohydrates by dehydration synthesis
7. Which of the following is LEAST likely to be an effect of global warming?
- Loss of fertile delta regions for agriculture
  - Change in global patterns of precipitation
  - Extinction of some species that have narrow temperature requirements
  - Decreased rate of photosynthesis in vegetation
8. Before being washed and reused, all discarded (disposed), infectious and contaminated materials should be made non infectious by soaking these contaminated items for
- 10 minutes in 0.5% chlorine solution
  - 5 minutes in 0.5% chlorine solution
  - 15 minutes in 0.5% chlorine solution
  - 8 minutes in 0.5% chlorine solution
9. The 'Waste Prevention and Management Act of Bhutan 2009' is based on which of the following three guiding principles:
- Precautionary actions, Polluters pay principle and Good Governance
  - Polluters pay principle, Principles of reduce, reuse, recycle and Precautionary actions
  - Precautionary actions, Intergenerational equity principle and Good Governance
  - Principles of reduce, reuse, recycle, Intergenerational equity principle and Good Governance
10. NAMA is a new mechanism under the UN Framework Convention on Climate Change, what does the acronym NAMA stands for?
- National Action Mitigation Adaptation
  - Nationally Appropriate Mitigation Actions
  - Nationally Appropriate Measures Achievements
  - None of the above
11. According to the laws of thermodynamics which of the following can be recycled?
- Both matter and energy
  - Neither matter nor energy
  - Matter
  - Energy
12. Which trophic level is incorrectly defined?
- Carnivores ---- secondary or tertiary consumer
  - Decomposers ---- microbial heterotrophs
  - Herbivores ---- primary consumer
  - Omnivores ---- molds, yeasts and mushrooms

- 13. The energy from the sun travel to the earth as**
- Visible light
  - Infrared rays
  - Radiation
  - Ultraviolet rays
- 14. How long does it take for carbon dioxide in the atmosphere to disperse?**
- 1 year
  - 10 years
  - 50 years
  - 100 years
- 15. Which of the following found in Bhutan is not a globally threatened species?**
- Golden langur
  - Dhole (wild dogs)
  - Asiatic water buffalo
  - Blue sheep
- 16. Bhutan lies in one of the most seismically active zone in the world, classified under seismic zone**
- IV and V
  - II and III
  - III and IV
  - I and II
- 17. The community based ecotourism programs have been initiated in all of the following protected areas EXCEPT**
- Jigme Singay Wangchuck National Park
  - Royal Manas National Park
  - Thrumshingla National Park
  - Jigme Dorji National Park
- 18. Which of the following rocks are susceptible to damage due to acid deposition?**
- Granite
  - Limestone
  - Slate
  - All of the above
- 19. A disadvantage in using old landfill site for cropland or pastureland is**
- The absence of many important micronutrients needed for proper plant growth
  - Low soil pH conditions that result in proper plant growth
  - The development of highly porous soils that drain away water too rapidly
  - The possible incorporation of toxic chemicals into plant tissues

- 20. The rate at which biomass becomes available to consumers is called**
- Gross primary production
  - Net density
  - Net primary productivity
  - Ecosystem productivity
- 21. Which of the following is the most energy efficient?**
- Coal-burning power plant
  - Internal combustion engine
  - Passive solar heating
  - Incandescent light bulbs
- 22. The Water Act of Bhutan was enacted in the year**
- 31 June 2009
  - 31 May 2011
  - 31 June 2012
  - 31 May 2010
- 23. The Clean Development Mechanism (CDM) is a flexible mechanism under the Kyoto Protocol that allows**
- Emission reduction projects in developed countries to earn Certified Emission Reductions which can be sold and used by developing countries to meet the part of their emission reduction target under Kyoto Protocol
  - Emission reduction projects in developing countries to earn Certified Emission Reductions which can be sold and used by industrialized countries to meet the part of their emission reduction target under Kyoto Protocol
  - Emission reduction projects to earn Certified Emission Reductions which can be sold and used by all the countries to meet the part of their emission reduction target under Kyoto Protocol
  - Emission reduction projects for the developing countries to earn Certified Emission Reductions which can be sold and used by developing countries to meet the part of their emission reduction target under Kyoto Protocol
- 24. The population size of an exotic species often grows rapidly when the species is introduced in a new environment because**
- The exotic species is resistant to pesticides
  - There is a large, underutilized food source in the new environment
  - The exotic species has few natural predators in the new environment
- I only
  - II only
  - I and III only
  - II and III only

**Part II: Provide short answers to the following questions (4 X 5 = 20 Marks)**

1. The chapter II of the National Environment Protection Act of Bhutan (NEPA) of 2007 talks about the principles applicable to environmental protection. Explain at least five environmental principles of NEPA, Bhutan, 2007.
2. How do the following aspects of Environmental Impact Assessment (EIA) provide checks on the Environmental Impact Statement (EIS) and EIA process? Explain and provide a relevant example for each of the following:
  - a. Monitoring
  - b. Surveillance and
  - c. Auditing
3. Explain why has an “ozone hole” appeared only over Antarctica when ozone depleting substances are present throughout the stratosphere?
4. Coinciding with the World Environment Day on 5<sup>th</sup> May, Royal Government of Bhutan passed an order declaring all Tuesdays as Pedestrian day throughout the country. Discuss its long term benefits and negative impacts on the country’s environment.

**SECTION B (50 MARKS)**

**Choose only 1 (one) question from the following 2 (two) questions (1 X 50 = 50 marks)**

1. Even though Bhutan is endowed with aplenty fresh renewable water resources with one of the highest per capita water availability, localized water scarcity is seen as an emerging issue in some parts of the country due to ever increasing conflicting demands from agriculture, industry, urban water supply and energy production. Therefore, **Integrated Water Resources Management** (IWRM) approach has been accepted internationally as the way forward for efficient, equitable and sustainable development and management of the world’s limited water resources. Given this scenario, answer the following:
  - a. What do you understand by Integrated Water Resources Management? Discuss the theoretical basis for Integrated Water Resources Management.
  - b. In your opinion, what are the major constraints in applying Integrated Water Resources Management process in Bhutan?
  - c. Is there an urgency to manage water resources in an integrated manner in Bhutan? What will be the benefits for the different sectors?

2. The referral hospital in Thimphu produces around 20-30 kilograms (KG) of infectious medical waste and around 10 KG of other waste materials, mostly comprising broken glasses, every day. Disposal of medical waste is an environmental concern, as many medical wastes are classified as *infectious* or *biohazardous* and it requires specific treatment and management prior to its final disposal. On this note, answer the following questions:
- a. Classify the medical wastes and discuss briefly on each classification.
  - b. What are the risks associated with hazardous medical wastes on health and environment.
  - c. Discuss the methods of prevention and management of medical wastes. Which methods would you recommend for Bhutan and why?

**End of Examination**