

**ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2018
EXAMINATION CATEGORY: TECHNICAL**

PAPER III: SUBJECT SPECIALISATION PAPER FOR FORESTRY

Date	: 7 October 2018
Total Marks	: 100
Writing Time	: 150 minutes (2.5 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 being provided 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 SECTIONS**, namely SECTION A & SECTION B:
 - **SECTION A** has two parts: Part I - 30 Multiple Choice Questions
Part II - 4 Short Answer QuestionsAll questions under SECTION A are COMPULSORY.
 - **SECTION B** consists of two Case Studies. Choose only **ONE** case study and answer the questions of your choice.
4. 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.
5. 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.
6. Begin each Section and Part in a fresh page of the Answer Booklet.
7. You are not permitted to tear off any sheet(s) of the Answer Booklet as well as the Question Paper.
8. Use of any other paper including paper for rough work is not permitted.
9. **You are required to hand over the Answer Booklet to the Invigilator before leaving the examination hall.**
10. This paper has **8 printed pages**, including this instruction page.

GOOD LUCK

SECTION A

PART I: Multiple Choice Questions (30 marks)

Choose the correct answer and write down the letter of your chosen answer in the Answer Booklet against the question number e.g. 31 (d). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.

1. Where it is impossible to restore a site to its original condition, the establishment on it of a community which is similar to the original is
 - a) Replacement ecology
 - b) Restoration ecology
 - c) Rehabilitation ecology
 - d) All of the above

2. Which two plant species of Thymelaeaceae family are used as raw materials for paper making?
 - a) *Daphne bholua* and *Lyonia ovalifolia*
 - b) *Edgeworthia gardneri* and *Symplocos paniculata*
 - c) *Daphne bholua* and *Edgeworthia gardneri*
 - d) All of the above

3. Flowers having stamens, pistils, petals and sepals are
 - a) Complete flower
 - b) Incomplete flower
 - c) Perfect flower
 - d) Imperfect flower

4. Bhutan is located along the humid East Himalayan Range covering sub-tropical forest type in the Southern Foothills to Alpine type in the Northern High Himalayas. Which one of the following tree species belongs to the Dipterocarpaceae family of a tropical origin found in the Southern Foothills?
 - a) *Tectona grandis*
 - b) *Shorea robusta*
 - c) *Alstonia*
 - d) None of the above

5. The geographic source or origin of the seed or any reproductive material is termed as
 - a) Seed origin
 - b) Clone seed
 - c) Seed orchard
 - d) Provenance

6. Which one of the following is NOT the beneficial effect of mulching in the forest nursery?
 - a) Lessens both the frequency of watering and amount of water required.
 - b) Prevents sown seeds from being exposed.

- c) Suppresses the development of desired tree seeds.
d) Prevents cracking or hardening of the soil surface.
7. Which of the following pine species is exotic to Bhutan?
- a) *Pinus excelsa*
b) *Pinus roxburghii*
c) *Pinus bhutanica*
d) None of the above
8. Among the following different pines found in Bhutan, which pine is mainly used for the extraction of resin?
- a) *Pinus wallichiana*
b) *Pinus bhutanica*
c) *Pinus roxburghii*
d) *Pinus patula*
9. Royal Society for Protection of Nature (RSPN) is a Non-Governmental Organization established in the year 1987 with the objective to conserve Bhutan's unique environment. Critically endangered White-bellied Heron (*Ardea insignis* Hume) is one of the priority bird species that the RSPN is protecting. What is the main reason for protecting White-bellied Heron?
- a) Socially and culturally important.
b) Population is significantly decreasing.
c) Rampant poaching by the locals.
d) Declining of habitats due to developmental activities.
10. The International Day of Forest 2018 was celebrated around the world with the theme...
- a) Forests and Clean Environment
b) Forests and Water
c) Forests and Energy
d) Forests and Sustainable Cities
11. World Rangers Day is celebrated worldwide to commemorate Rangers killed or injured in the line of duty and to celebrate the work Rangers do to protect the planet's natural treasures and cultural heritage. When is World Ranger Day celebrated?
- a) March 22
b) March 21
c) June 5
d) July 31
12. The Ramsar Convention on Wetlands of International Importance was signed in 1971 in the city of Ramsar in
- a) Iran
b) Kuwait
c) Iraq
d) Turkey

13. Bhutan is endowed with rich water sources in the form of glaciers, lakes, rivers, streams, springs and wetlands. Ironically, many places within Bhutan faces water shortage both for drinking and irrigation. The reason could be due to
- indiscriminate logging all over the country.
 - lack of proper planning and infrastructure development.
 - Global Lake Outburst Flood (GLOF)
 - rural-urban migration.
14. Environmental Impact Assessment is one of the fundamental process of any mega-project like hydropower, mining, roads etc. It is being carried out primarily to
- improve the environmental design of the project.
 - ensures that resources are efficiently and appropriately used.
 - identify appropriate measures for mitigating the potential impacts of the project.
 - All of the above
15. Three pilot schemes of payment for environmental services (PES) are established in the country with the objective to
- enhance the forest productivity.
 - meet the demand of forest fuelwood.
 - benefit both the service providers and users.
 - reduce forest fire.
16. Which type of relationship where one of the organisms benefits greatly from the symbiosis, which in other words is one-sided symbiotic relationship, is called
- Symbiosis
 - Commensalism
 - Parasitism
 - Mutualism
17. Bhutan is considered as one of the watershed located along the Himalayan Range and comprises of numerous watersheds within it. It is an area of
- Topo-graphically delineated land drained by a river or river systems.
 - Landform with many water bodies.
 - Composed of wetland, rivers, springs and lakes.
 - Forest, land and water bodies.
18. Social forestry is the practice of forestry on an area outside the forest area for the benefit of the rural and urban communities. The term is coined by
- Ernst Haeckel
 - Roy Calpham
 - Tansley
 - J. C. Westoby

19. The total land area under protected area system (National Parks, Wildlife Sanctuaries, Strict Nature Reserve, Royal Botanical Park & Biological Corridor) constitute
- a) 42.71 %
 - b) 52.40%
 - c) 51.44 %
 - d) 51.52%
20. Community forest in Bhutan is introduced to encourage people's participation in promoting sustainable forest management. The first community forest was established at Dozom, Mongar in the year
- a) 1990
 - b) 1998
 - c) 1982
 - d) 1997
21. As the country develops, several developmental activities are implemented without much mitigation measures. However, it is necessary to assess those developmental plans before implementation. One of issue is related to drying up of water sources. What is necessary to reduce such happenings in future for similar developments?
- a) Map hydrogeological (aquifer zone) zone.
 - b) Carry out detail environmental impact assessment.
 - c) Stakeholder consultation.
 - d) All of the above
22. The basic instrument used in measuring tree height during the forest inventory is
- a) Diameter tape
 - b) Hypsometer
 - c) Digital caliper
 - d) Baltimore stick
23. The scientific method for measuring the amount of water entering, stored within, and leaving a watershed is
- a) Hydrologic budget
 - b) Water flow
 - c) Stored water
 - d) All of the above
24. The understanding of the physiological functioning of an organisms in relation to their environments is also called
- a) Behavioral study
 - b) Ecological study
 - c) Basic natural study
 - d) None of the above

25. Which one of the following timber species is exotic to Bhutan but widely preferred for its quality?
- Tsuga dumosa,
 - Larix griffithii
 - Tectona grandis
 - Shorea robusta
26. Human wildlife conflict is a serious issue in Bhutan. Some of the immediate measures are
- Electric fencing and habitat management.
 - Habitat enrichment and water management.
 - Culling and cash incentives.
 - None of the above
27. Bhutan falls within the countries having high forest cover, low deforestation (HFLD). Currently, Bhutan is implementing REDD+ readiness to prepare for the REDD+ Strategy. What is REDD?
- Reducing emission from deforestation and destruction.
 - Reducing environmental impact from deforestation and degradation.
 - Reduction of emission from forest degradation and deforestation.
 - None of the above
28. Green Bhutan Corporation Limited (GBCL) is a state-owned enterprise in the agriculture sector. What is the primary role of GBCL?
- Raising of forest nursery.
 - Plantation in the open areas.
 - Greening of the urban areas.
 - All of the above
29. In which circumstance does the Forest and Nature Conservation Act clearly states that the permit for timber felling shall not be issued?
- On a steep slope and road sides.
 - Within 100 feet of the bank or edge of any river, stream, water course or water source.
 - From the state forest.
 - Within 100 meter from the settlements.
30. Which one of the following wild animals is NOT included in Schedule I of Forest and Nature Conservation Act of Bhutan?
- Pigmy Hog
 - Takin
 - Golden Langur
 - Common leopard

PART II – Short Answer Questions (20 marks)

This part has 4 Short Answer Questions. Answer ALL the questions. Each question carries 5 marks.

1. Bhutan's total land area under forest cover stands at 71 % (NFI 2016) and it is one of the countries with highest forest cover in the world. On the other hand people argue that "more trees mean less water". Should we cut down trees to conserve water? Discuss briefly.
2. Environmental Impact Assessment (EIA) is one of the fundamental processes of any developmental activities. What do you understand by EIA? What are the benefits of EIA? Discuss briefly.
3. Bhutan declares three wetland of international importance. Name all three sites and why are these three sites declared as wetland of international importance?
4. Electric fencing is said to be proven successful technology in addressing the human-wildlife conflict in Bhutan. Is it sustainable and advisable to adopt this technology widely in Bhutan? Discuss briefly.

SECTION B

Case Study

Choose either Case I OR Case II from this section. Each case study carries 50 marks.

Case I

Pine-die back along the mid-altitudes of the Bhutan Himalayas

Periodic pine die-backs were observed several times in the last few decades since 1994 to 2018 along the mid-altitudes of the dry river valleys of the Bhutan Himalaya mainly affecting the *Pinus wallichiana*. Initial investigations were focused on the biotic factors of pine die-back and ruled out any entomological or pathological association with the pine die-back. The later research was focused on the abiotic factors mainly rainfall, temperature, and soil moisture contents.

The adverse environmental conditions are found to be low soil moisture content (6 %), high evapo-transpiration ratio (1.4) and a low aridity index (24.7) as the possible factors causing pine die-back in the plantation forest.

Plantations were carried out several times by both Field Divisions and Research Centre along the same site to revegetate the open areas.

Answer the following questions:

1. As a trained technical expert in the field of forest management, how will you manage the affected forest (pine-die back) from further dying? (25 marks)
2. If the problem is related to adverse site condition as stated above, is it still beneficial and advisable to carry out extensive plantation in these areas? What alternative measures will you carry out to address the issues of pine dying? (20 marks)
3. Will you advise planting of deciduous broad-leaved species in the affected sites? Please justify your view point. (5 marks)

Case II

Human-wildlife in Bhutan

Human wildlife conflict remains one of the major issues occurring in Bhutan leading to abandonment of agricultural fields in rural areas. Despite of various strategies, human-wildlife conflict continues to be a major problem for the farmers. Farmers experienced crop damage and animal depredation by different wildlife species. Wild pig appeared as a major crop raider compared to Assamese macaque, gray langur and barking deer. Additionally, predators (cat family) and others are also considered as a major cause of livestock depredation in the country. According to the State of the Nation report, 70 percent of farmers in the country reported crop damage by wildlife. About 12 percent of farmers reported loss of livestock to wildlife. Rural urban migration is also partly attributed to human wildlife conflict.

On the other hand the results of National Forest Inventory (Vol. 1, 2016) revealed 71 % forest cover of the total geographical area of the country making a suitable habitat for all types of wildlife. Bhutan falls within the High Forest cover, Low Deforestation (HFLD) countries in the world and eligible for payments for conservation. Bhutan currently is implementing about USD 9 million REDD + Readiness grant.

Answer the following questions:

1. Habitat enrichment is one strategy for conflict control. However, despite huge forest cover, the conflict still exists in Bhutan. Discuss long-term measures to reduce human-wildlife conflict? (20 marks)
2. What could be the continuing reasons of human-wildlife conflict besides several measures in place such as electric fencing, guarding, etc.? (20 marks)
3. What are your strategies in addressing the issues of increasing human-wildlife conflict in Bhutan? (10 marks).

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