

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

PAPER III: SUBJECT SPECIALISATION PAPER FOR FISHERY

Date	: October 13, 2019
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 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 Questions
All 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 the Section, Part and Question Number will NOT be evaluated and no marks will 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 **7 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. The common name of *Schizothorax sps* is
 - a) Himalayan Trout
 - b) Trout Barb
 - c) Snow Trout
 - d) Brown Trout

2. Which of the following is NOT an Indian Major Carp?
 - a) Catla
 - b) Mrigal
 - c) Common Carp
 - d) Rohu

3. Choose one of the following fish where whirling disease is common:
 - a) Carp
 - b) Giant freshwater prawn
 - c) Sea bass
 - d) Trout

4. Choose one of the following countries where the 1st International Mahseer Conference was held:
 - a) India
 - b) Nepal
 - c) Bhutan
 - d) Thailand

5. The technique of induction of breeding by administration of pituitary extracts is
 - a) Anesthetization
 - b) Incubation
 - c) Hypophysation
 - d) Stripping

6. Scientific name of walking cat fish or Magur is
 - a) *clarias batrachus*.
 - b) *clarias garapinues*.
 - c) *clarias macrocephalus*.
 - d) *clarias dussumieri*.

7. An Eutrophic lake is a lake with
 - a) low primary productivity.
 - b) intermediate level of productivity.
 - c) high biological productivity.
 - d) None of the above.

8. Which of the following fish is a prolific breeder?
 - a) Rainbow trout
 - b) Tilapia
 - c) Golden Mahseer
 - d) Rohu

9. Which of the following is NOT a food fish?
 - a) Sea Bass
 - b) Guppy
 - c) Common carp
 - d) Sardine

10. Green mussel or *Perna veridis* is
 - a) Crustacean
 - b) Mollusca
 - c) Amphibian
 - d) Reptiles

11. Cast net is an example of:
 - a) Falling gears
 - b) Grappling gears
 - c) Surrounding nets
 - d) Entangling nets

12. Fish that migrate from salt/sea water to fresh water is
 - a) Catadromous
 - b) Diadromous
 - c) Anadromous
 - d) Potamodromous

13. Choose one of the following fishes where Kakabans are used for breeding:
 - a) Indian Major Carps
 - b) Common Carps
 - c) Rainbow Trout
 - d) Cat fish

14. The degree of fish spoilage is dependent on several factors, EXCEPT
 - a) Temperature
 - b) Size of the fish
 - c) Physical damage
 - d) None of the above

15. Water temperature during live fish transport is reduced to
 - a) lower pH.
 - b) decrease fish metabolism.
 - c) increase fish metabolism.
 - d) keep the fish cool and fresh.

16. The following fish species can be used for composite fish farming EXCEPT
- Rohu
 - Salmon
 - Mrigal
 - Silver carp
17. In aquaculture, liming is done to
- correct the pH of water and soil.
 - increase the dissolved oxygen content of a fish pond.
 - eradicate aquatic weeds.
 - enhance the water retention capacity of a fish pond.
18. “Infectious abdominal dropsy of carp” is a
- viral disease.
 - bacterial disease.
 - fungus disease.
 - parasitic disease.
19. In Parthenogenesis,
- sexes of fish are separate.
 - both male and female sex organ are present in the same individual fish.
 - produce offspring of one sex only.
 - None of the above.
20. The study of natural water body is
- Oceanography
 - Biotechnology
 - Limnology
 - Ichthyology
21. Which of the following factors can be manipulated to enhance fishpond’s primary productivity?
- Carbon dioxide
 - Light
 - Temperature
 - Nutrients
22. Which of the following is a long distance migratory fish?
- Snow Trout
 - Hilsa
 - Catla
 - Salmon
23. Nye Dotshem - in fish product development - is an example of
- Fish smoking
 - Salting
 - Fermentation
 - Curing

24. The top aquaculture producer in the world is
- The USA
 - India
 - China
 - Russia
25. An enclosure with bottom and sides of netting or bamboo etc. whether floating or totally submerged is
- Pen culture
 - Cage culture
 - Integrated culture
 - None of the above.
26. Which of the following is NOT the function of secondary sexual characters in fish?
- Recognition of opposite sex.
 - Helping in the act of copulation.
 - Maintain its position in water.
 - Facilitate parental care.
27. A totally protected fish species listed in Schedule - I of Forest and Nature Conservation Rules of Bhutan is
- Tor putitora*
 - Tor tor*
 - Anguilla bengalensis*
 - Neolissochilus hexagonolepis*
28. Choose one of the following cultures where raceway is commonly used:
- Prawn culture
 - Carp culture
 - Catfish culture
 - Trout culture
29. Inland fisheries are
- capturing fishes from sea coast.
 - deep sea fishing.
 - raising and capturing fishes in fresh water.
 - tuna cage culture.
30. Placoid scales are present in
- Salmons.
 - Hag fishes.
 - Lamprey.
 - Sharks.

PART II – Short Answer Questions (20 marks)

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

1. Explain in detail the factors that affect live fish transport. (5 marks)
2. Explain the principle of aquaculture. (5 marks)
3. Briefly explain the following: (5 marks)
 - a) Aquaculture
 - b) Hypophysation
 - c) Integrated fish farming
 - d) Modified atmosphere packaging
 - e) Sexual dimorphism
4. (a) Mention any method for controlling the aquatic weeds in fishpond. (2.5 marks)
(b) List out some of the prophylaxis, hygiene and disinfection measures in fish culture? (2.5 marks)

SECTION B: Case Study (50 marks)

Choose either Case I or Case II from this section. Each case study carries 50 marks. Mark for each sub-question is indicated in the brackets.

Case I

1. You are employed in a trout hatchery and your main responsibilities are fish breeding and seed production.
 - a) Describe your daily routine to ensure that your fish seeds/larvae are healthy. (5 marks)
 - b) As part of your answer, illustrate and discuss a typical trout breeding protocol. (10 marks)
2. Construction of dams for hydropower project is affecting our fishery resources. One view is that hatchery restocking should be considered to rectify the situation.
 - a) Discuss the above statement and the proposed management response. (10 marks)
 - b) In your opinion, what alternative management responses should be considered? (5 marks)
3. The Government wants to set up a carp fish breeding facility. As a fishery expert, you are asked to do a feasibility study. Explain in detail how feasibility study would be done? (20 marks)

Case II

1. Ecosystem Based Fisheries Management (EBFM) is now being implemented around the world.
 - a) What are the key components and elements of EBFM and what indicators are used to evaluate them? (5 marks)
 - b) How does this approach differ from more traditional approaches? (5 marks)
2. Describe hatchery culture of Indian Major Carp, including the general protocols used for brood-stock conditioning, breeding and larval rearing. As part of your answer, include a flow diagram illustrating fish larval development (from egg to post larvae). (20 marks)
3. Explain the importance of fish culture as a means to ensure food security and to generate both household and commercial revenue. (10 marks)
4. List out the core functions of the following agencies in Bhutan:
 - a) National Research Center for Riverine and Lake Fisheries. (5 marks)
 - b) National Research and Development Center for Aquaculture. (5 marks)

TASHI DELEK