

THE OPEN UNIVERSITY OF SRI LANKA

M.Sc./POST-GRADUATE DIPLOMA IN ENVIRONMENTAL SCIENCE  
LEVEL 10



**AQUATIC RESOURCES AND THEIR MANAGEMENT – ZYPA606**  
**CAT 1 (OPEN BOOK TEST)**

DATE: 06<sup>th</sup> April 2019

Time: 13.00 – 14.30 hours

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**REGISTRATION NUMBER:** .....

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### INSTRUCTIONS

- Answer all questions in **Part A** and **Part B**.
- Answers to **Part A** must be indicated in the annexed answer sheet by placing a cross (X) in the relevant cage.
- Please **do not remove** any of the pages from the question paper and submit the whole question paper with the answers, at the end of the exam.

**ZYPA606**  
**OPEN BOOK TEST 1**

**Answer sheet for the Question No. 1 (Part A)**

| Question No. | (a) | (b) | (c) | (d) |
|--------------|-----|-----|-----|-----|
| 1.1          |     |     |     |     |
| 1.2          |     |     |     |     |
| 1.3          |     |     |     |     |
| 1.4          |     |     |     |     |
| 1.5          |     |     |     |     |
| 1.6          |     |     |     |     |
| 1.7          |     |     |     |     |
| 1.8          |     |     |     |     |
| 1.9          |     |     |     |     |
| 1.10         |     |     |     |     |
| 1.11         |     |     |     |     |
| 1.12         |     |     |     |     |
| 1.13         |     |     |     |     |
| 1.14         |     |     |     |     |
| 1.15         |     |     |     |     |
| 1.16         |     |     |     |     |
| 1.17         |     |     |     |     |
| 1.18         |     |     |     |     |
| 1.19         |     |     |     |     |
| 1.20         |     |     |     |     |

**PART A****Question 1**

(20x2 = 40 marks)

## 1.1 High specific heat capacity

- (a) enables aquatic organisms to live even under intense solar radiation.
- (b) prevents the formation of ice in animal and plant tissues during winter.
- (c) reduces evaporation of water from lakes and seas.
- (d) makes the transition between seasons less abrupt enabling organisms to adjust gradually.

## 1.2 Lakes covered by ice for a part of the year and stratified during warm seasons for periods of several days to weeks, but with irregular interruption by mixing can be considered as

- (a) cold monomictic lakes.
- (b) cold polymictic lakes.
- (c) oligomictic lakes.
- (d) amictic lakes.

## 1.3 The lake Baikal of Russia has been formed due to

- (a) glacial activities.
- (b) tectonic movements.
- (c) river activities.
- (d) volcanic activities.

## 1.4 Which colour of the spectrum has deepest penetration in a clear waterbody?

- (a) Ultra Violet radiation
- (b) Red light
- (c) Blue light
- (d) Green light

## 1.5 The carbonate buffering system

- (a) buffers large changes in pH.
- (b) absorbs H<sup>+</sup> ions to prevent high alkalinity.
- (c) disassociate H<sup>+</sup> ions to prevent acidification.
- (d) has only bicarbonates in higher pH values.



1.9 \_\_\_\_\_ is the process of acceleration of eutrophication due to increased phosphorous content in lakes,

- (a) Chemical eutrophication
- (b) Cultural eutrophication
- (c) Custom eutrophication
- (d) Secondary eutrophication

1.10 At the compensation point

- (a) the net carbon dioxide assimilation is higher than zero.
- (b) the rate of photosynthesis exactly matches the rate of cellular respiration.
- (c) phytoplankton maximize their time spent.
- (d) only 0.1% of the surface light intensity remains.

1.11 Wetlands

- (a) do not recharge groundwater aquifers.
- (b) store flood water and release it gradually to the downstream.
- (c) have a low biological productivity.
- (d) cannot trap silt due to high rate of velocity of water.

1.12 Which of the following is **incorrect** regarding the fluoride ions?

- (a) Fluoride rich areas mainly lie in the dry zone.
- (b) Fluoride concentration higher than 0.5 ppm in drinking water reduces the cause of dental caries.
- (c) More than 1.5 ppm in drinking water discolour the teeth of children.
- (d) Fluorides are not absorbed by our skeletal system.

1.13 The toxins produced by the toxic strains of *Microcystis aeruginosa* is

- (a) a phospholipid.
- (b) released out when lysis of the cells occurs.
- (c) an exo-toxin secreted out by algal cells.
- (d) lethal only to human beings.

## 1.14. Sedimentation

- (a) damages the spawning habitats and eggs of fish.
- (b) increases hydrological exchange to interstitial spaces in soil.
- (c) increases the diversity of benthic macro-invertebrate fauna.
- (d) decreases the primary production of water column.

## 1.15 Construction of dams across rivers

1. obstruct upstream migration of fish and invertebrates.
2. causes siltation immediately upstream of the dam.
3. causes bottom and bank erosion immediately below the dam
4. changes the extent of inundation of flood plains downstream.

From the above statements

- (a) 1, 2 and 4 are correct.
- (b) 2 and 3 are correct.
- (c) 1 and 4 are correct.
- (d) All are correct.

1.16. Which of the following statement is **incorrect** regarding water quality requirement?

- (a) Agricultural irrigation requires toxins free water.
- (b) Boating and navigation do not care for water quality.
- (c) Portable water requires highest water quality.
- (d) Swimming and food industry require pathogens free water.

## 1.17. Select the point source of pollution.

- (a) Runoff from agricultural fields
- (b) Deposition from the atmosphere
- (c) Animal husbandry farm
- (d) Municipal water treatment plant

## 1.18 Marshes within the Wilpattu National Park represent

- (a) flood plains associated with a river.
- (b) flood plains isolated from a river.
- (c) oxbow lakes made from a river.
- (d) dried out seasonal small river.

1.19 Low Total Dissolve Solids (TDS) in ground water indicates

- (a) low flow rates in ground water.
- (b) salt intrusion into ground water.
- (c) lack of soluble material in soil.
- (d) low pollution level.

1.20. Which of the following is not a part of the policy document for water resources?

- (a) Flood water management
- (b) Demand management
- (c) Ground water management
- (d) Information management

## PART B

### Question 2

An upcountry reservoir in Sri Lanka was recently reported for having algal blooms for about 3-4 months per a year. Imagine that you are a research officer of a water quality monitoring institution and have been asked to investigate reasons for the problem within a period of one-year and suggest suitable corrective measures.

- (i) Considering that no solid data is available on the reservoir, list all possible research questions/objectives that you need to investigate in this problem to suggest suitable corrective measures. (8 marks)
- (ii) Briefly describe the experimental method for investigating each research question/objective. (8 marks)
- (iii) One of the reasons for algal bloom formation can be the pollution from the catchment area. Identify and list the point sources and non-point sources of pollution that can be present in the catchment area. (8 marks)

- (iv) Explain the criteria/conditions for the selection of sampling points for the investigations.  
(8 marks)
- (v) Prepare the research work plan (Gantt chart) for a year, including all the investigations within the time frame. Wherever possible you can combine the methods of investigations.  
(10 marks)
- (vi) Suggest possible remedial measures for the possible causes for algal bloom formation.  
(8 marks)
- (vii) Giving suitable examples, discuss why an integrated catchment management approach is necessary for water resource management in a reservoir.  
(10 marks)

