

B. Tech Odd Semester Examination, February, 2023

Agricultural Engineering

(7th Semester)

Course No.: AED-01

[Elective-IV (Aquacultural Engineering)]

Full Marks: 50

Pass Marks: 25

Time: 2 hours

- Note:**
1. Attempt any five questions.
 2. Begin each answer in a new page.
 3. Answer parts of a question at a place.
 4. Assume reasonable data wherever required.
 5. The figures in the right margin indicate full marks for the question.
 6. All the mathematical symbols and abbreviations have their usual meanings.

1. (a) Differentiate between open channel flow and pipe flow. 5

(b) Show that relation between the alternate depths in rectangular channel can be expressed as:

$$y_c^3 = \frac{2y_1^2 \cdot y_2^2}{(y_1 + y_2)}$$

Where, y_c = critical depth, and y_1 and y_2 = alternate depths. 5

2. (a) Explain the specific energy and critical flow in open channel? 4

(b) Illustrate the potential head, pressure head, velocity head and energy gradient line in an open channel. 6

3. Develop the expressions for geometric elements (area, wetted perimeter, hydraulic radius, hydraulic depth and section factor) of trapezoidal and circular channel sections. 10
4. Write short notes on:
 - I. Hydraulic drop
 - II. Non Prismatic channel
 - III. Super critical flow
 - IV. BOD and COD
 - V. Alternate depths 10
5. (a) Describe the different methods of fertilizing the fish ponds. 7
 - (b) Illustrate the effect of pH on the growth of fish. 3
6. (a) What is the liming of fish pond? And write its principles and advantages. 6
 - (b) How is the cost of constructing a square pond cheaper than a rectangular pond for the constant area of the pond? 4
7. (a) Explain the principle of aeration with the neat sketch. 4
 - (b) The standard test results of a 1.5 kW aerator are as given below. The test tank contained 200000 litre of clean tap water. The test was run to determine that, the $(Cs)_{25}$ of the basin was 6.8 mg/L. 20% and 80% saturation were considered.

DO at 20% saturation = 1.5 mg/L in 12 min.
 DO at 80% saturation = 5.5 mg/L in 50 min.
 $(Cs)_{20} = 9.07$ mg/L
 Calculate the SOTR and SAE values. 6

8. Explain the design consideration of commercial carp hatchery. 10
