B.Tech Odd Semester (CBCS) Exam., December—2018

AGRICULTURAL ENGINEERING

(7th Semester)

Course No. : AEEL–04

[Elective Discipline—IV (Aquacultural Engineering)]

Full Marks : 50
Pass Marks : 15

Time : 2 hours

Note : 1. Answer 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 margin indicate full marks for the questions.

1. *(a)* Describe the significance and present status of aquacultural engineering in India. 2+2=4

(b) Write short notes on the following : 1½×4=6

(i) Hydraulic jump
(ii) Critical depth
(iii) Prismatic channel
(iv) Alternate depths

2. *(a)* Show that the relation between the alternate depths in rectangular channel can be expressed as

$$y_c^3 \quad \frac{2y_1^2 \quad y_2^2}{(y_1 \quad y_2)}$$ 5

(b) Develop the expressions for geometric elements (area, wetted perimeter, hydraulic radius, hydraulic depth and section factor) of circular channel sections. 5

3. *(a)* Describe the factors which can affect the solubility of oxygen in aquacultural pond. 6

(b) What do you mean by 'Bohr Root' effect? 4

4. *(a)* What do you mean by dike? Explain the design consideration of main dike. 1+5=6

(b) Show that cost of construction of squarish pond is cheaper than the rectangular pond for constant area of pond. 4

5. *(a)* Differentiate between tide-fed farm and pump-fed farm. 4

(b) Design a pumping unit system for a semi-intensive shrimp farm as per the details given below : 6

Water holding capacity of each pond = 10000 m^3

Number of ponds = 10

Availability of electricity in the area = 5 hours (maximum)

Daily rate of water exchange = 20%

Head up to which water is to be lifted = 5 m

Gross efficiency of the pump = 60%

6. *(a)* What is aeration? Explain the necessity of aerator in intensive aquaculture pond. 1+3=4

(b) Calculate the SOTR and SAE values of 2 kW cascade aerator. The results of standard test are given below : 6

The test tank contained 200 m^3 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 = 1·36 mg/L in 11·2 min

DO at 80% saturation = 5·44 mg/L in 53 min

$(Cs)_{20}$ = 9·07 mg/L

7. *(a)* With neat sketch, explain a typical recirculatory aquaculture system. 6

(b) What is the importance of nitrogen removal unit and UV disinfection unit in recirculatory aquaculture system? 4

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

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