B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2014

AGRICULTURAL AND IRRIGATION ENGINEERING

Seventh Semester

AI 9405 – IRRIGATION EQUIPMENT DESIGN

(Regulation 2008)

Time: 3 hours   **Marks: 100**

<u>Part – A</u>   10 x 2 = 20

1. Answer ALL questions

2. Allowed to use tables and nomograph

1. Write the formula used for calculating the discharge in a reciprocating pumping with and without considering the piston road

2. What do you mean by Indigenous water lifts?

3. Define Moment of momentum

4. Draw the flow direction in turbine pumps, mixed flow pump and propeller pump.

5. Draw the wetting patterns for different soils.

6. Write the equation, governing the flow through drippers.

7. Write the factor to be considered for selecting the sprinkler.

8. Name the four medium head sprinklers

9. What is cablegation?

10. Discuss the purpose of butterfly valve

Part - B   5 x 16 = 80

11. (i) Explain the design procedure involved in greenhouse irrigation system with a neat sketch.   (8)

    (ii) Write the working of Solenoid and Pressure relief valves with diagram.   (8)

12.(a) (i) A centrifugal pump handles liquid whose kinematic viscosity is three times that of water. The dimensionless specific speed of the pump is 0.183 revolutions and it has to discharge 2 m³/s of liquid against a total head of 15 m. determine the speed, test head and flow rate for a one-quarter scale model investigation of the full size pump if the model uses water.   (10)

    (ii) Explain the common types of low and high head indigenous water lift.   (6)

(OR)

(b) (i) A reciprocating pump has a suction head of 6 m and delivery head of 15 m. it has a bore of 150 mm and stroke of 250 mm and piston makes 60 double strokes in a minute. Calculate the force required to move the piston during (a) suction stroke, (b) during the delivery stroke. Find also the power to drive the pump. (10)

(ii) Explain the characteristics of centrifugal pump. (6)

13.(a) (i) Explain the working principle of airlift pump with a neat sketch. (8)

(ii) State the criteria and procedure for the selection of irrigation pumps. (8)

(OR)

(b) (i) Explain the working of vertical turbine pumps with a schematic diagram. (8)

(ii) Explain the different Pump troubles and its Remedies. (8)

14.(a) (i) Explain the step by step procedure involved in the design of drip irrigation system (10)

(ii) Design a drip irrigation system for a 7 hectare orchard crop in semi arid region. The field is rectangular with a length of 400 m along the head end. The field is nearly flat and the soil is sandy loam. The irrigation water source is a river flowing close to the top corner of the field. The crop spacing is 4 m x 5 m. Assume necessary data. (6)

(OR)

(b) (i) State the different type of filters and explain the working principle of any three filters in Drip system. (16)

15(a) The land holding of 14 ha of size 200 m x 700 m is considered for an sprinkler irrigation. It has to be designed for a sprinkler irrigation system to irrigate the entire area in 6 days period. The time for moving the pipe and irrigation should not exceed 17 hrs/day. A 30 m deep well located in the centre of the field will provide the following discharge – drawdown relationship: 12.5 lps at 15 m and 18.5 lps at 25 m. The required depth of irrigation is 6 cm and the water application rate is not to exceed 0.80 cm/hr. The system is to be designed for an average pressure of 2.9 kg/cm^2 at the sprinkler nozzle. The highest point in the field is 1.25 m above the well site and 1.2 m risers are needed for the sprinklers. Assume pump efficiency as 65% and motor efficiency as 75 %. (16)

(OR)

(b) (i) Explain the step by step procedure involved in the design of sprinkler irrigation system. 8)

(ii) List the different types of sprinklers and explain the medium head sprinkles (8)