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ET-533(A)

B.Tech. Civil (Water Resources Engineering)

Term-End Examination

June, 2014

ET-533(A) : IRRIGATION ENGINEERING

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any **five** questions. All questions carry equal marks. Support your answers with examples and neat diagrams. Use of calculator is permitted.*

1. Write short notes on the following : *7×2=14*

(a) Water Logging

(b) Factors affecting selection of equipment for grading

(c) Irrigation scheduling

(d) Parshall flume

(e) General weather in India

(f) Border Irrigation

(g) Choice of method of irrigation

2. (a) In an orchard (in a sandy soil) trees are planted at 5 m interval, and it is estimated to have the canopy cover of 75%. The monthly average pan evaporation is 6·3 mm/day. The pan coefficient and crop coefficient may be assumed as 0·70 and 1·15, respectively. If the coefficient of application uniformity is 0·90, determine the number of drippers and the number of operating hours. *6*

(b) Explain the following in brief with neat sketch : *4×2=8*

(i) Vertical well type drop

(ii) Diversion box

(iii) Cart track crossing

(iv) Turn out

3. (a) A sample of 100 cm^3 was taken from the field, and laboratory experiments on it were conducted and following data was obtained : *7*

Fresh weight of soil sample = 178 gm

Oven-dry weight of the soil sample = 160 gm

$\rho_w = 1$ gm/cm^3

$\rho_s = 2{\cdot}65$ gm/cm^3

Compute the soil moisture contents by weight and volume basis respectively, and also determine porosity.

(b) What do you mean by potential and actual evapotranspiration ? Explain them in detail. *7*

4. (a) Cross-section of a drainage channel has a bed width of 1·75 m, a side slope of 1 : 1 and the depth of flow is 2 m. For a drainage coefficient of 12·5 mm/day/ha, compute the area that can be safely drained by this section, at a bed slope of 1 in 4000, using Manning's equation. Take 'n' = 0·022. *7*

(b) Explain the role and functioning of various land grading equipments. *7*

5. Determine the drain spacing using Hooghoudt formula and for the following conditions. Depth of impervious layer below the ground level D = 4·5 m

Thickness of the top layer D_a = 1·2 m

Depth of root zone H = 0·75 m

Permeability of the top 1·2 m thick layer K_a = 1·8 m/day

Permeability of the bottom layer K_b = 0·85 m/day

Deep percolation rate l_p = 6 mm/day. *14*

6. (a) It is required to calculate the effective head and power of drive motor for a centrifugal pump to deliver a discharge of 100 lt/sec, from a sump to an overhead tank using following data.

Water level difference between sump and overhead tank = 24·8 m

Suction lift = 2·8 m

Delivery head = 22·0 m

Head loss in suction pipe = 1·06 m

Head loss in delivery pipeline = 5·41 m

Diameters of suction and delivery pipe = 250 mm *10*

(b) Differentiate between centrifugal pump and reciprocating pump on the basis of their operating characteristics. *4*

7. (a) Explain the construction and principle of working of centrifugal pump with the help of labelled diagrams. *10*

(b) Explain main features of turbine pumps. *4*