B.Tech. Civil (Water Resources Engineering)

Term-End Examination

December, 2006

ET-533(A) : IRRIGATION ENGINEERING

Time : 3 hours *Maximum Marks : 70*

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

1. Define the following : *7×2=14*

(a) Void ratio

(b) Exfiltration

(c) Irrigation requirement

(d) Drainage coefficient

(e) Reference crop evapotranspiration

(f) Specific speed of a pump

(g) Effective rainfall

2. (a) What do you mean by conjunctive use of surface and ground water ? Describe in brief the ground water potential of India. *7*

(b) Describe various factors that influence the choice of a method of irrigation for a given situation. 7

3. (a) List the merits and demerits of sub-surface drainage system for agricultural lands. Under what conditions is a sub-surface drainage system recommended ? 7

(b) Calculate the drainage area which can be safely drained by a trapezoidal drainage channel having a bed width of 2 m and depth of flow of 1·5 m. The side slope of the channel is 2 horizontal : 1 vertical. The channel slope is 0·02 percent. Take drainage coefficient of the land as 12·5 mm/day and Manning's rugosity coefficient as 0·025. 7

4. Distinguish between any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Field capacity and Wilting point

(b) Potential evapotranspiration and Evaporation

(c) W-index and ϕ-index

(d) Net irrigation requirement and Field irrigation requirement

(e) Land scrapers and Land graders

(f) Centrifugal pump and Turbine pump

5. (a) Discuss advantages and disadvantages of drip and sprinkler irrigation systems. 7

(b) Describe various components of a sprinkler irrigation system and give step by step procedure of the design of a sprinkler system. 7

6. (a) Describe various criteria governing selection of a pump for irrigation. 7

(b) A farmer wishes to buy a pumping set for the following cropping pattern on his farm. Determine the size of the pump in litres per second.

Season	Crop	Area (ha)	Depth of each irrigation (cm)	Rotation period (days)
Rabi	Wheat	4·0	7·5	12
	Cotton	0·8	6·0	20
	Vegetables	0·8	7·5	10
	Mustard	4·4	5·0	25

Consider daily 10-hour of working. 7

7. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Irrigation efficiencies

(b) Warabandi

(c) Land capability classification

(d) Border irrigation

(e) Mole drainage

(f) Ring Infiltrometer