2006

AGRICULTURAL ENGINEERING - II (Optional)

Standard : Degree   Total Marks : 200

Nature : Conventional   Duration : 3 Hours

Note :   000004

(i)   *Answers must be written in English.*

(ii)   *Question **No. 1** is **Compulsory.** Of the remaining questions, attempt **any four** selecting one question from each section.*

(iii)   *Figures to the **RIGHT** indicate marks of the respective question.*

(iv)   *Use of log table, Non-Programmable calculator is permitted, but any other Table/Code/Reference book are not permitted.*

(v)   *Make suitable assumptions, wherever be necessary and state the same.*

(vi)   *Number of optional questions upto the prescribed number in the order in which they have been solved will only be assessed. Excess answers will not be assessed.*

(vii)   *Credit will be given for orderly, concise and effective writing.*

(viii) *Candidate should not write roll number, any name (including their own), signature, address or any indication of their identity anywhere inside the answer book otherwise he will be penalised.*

(ix)   *For each slab of 10 and 15 marks, the examinee is expected to write answers in 125 and 200 words respectively.*

1.   *Answer any four of the following :*

(a)   Coconut crop is planted at a spacing of 7×7 m on one hectare area. Peak   **10**
       evaporation rate of the area where crop is planted is 15 mm/day. Pan factor and
       crop coefficient are 0.70 each, respectively. Find
       (i)   Water requirement per plant per day in litres.
       (ii)   Volume of water in cubic meter required to irrigate one hectare plantation.
       (iii)   Time in hours required to irrigate one hectare if pump discharge is 3 Litre/
               sec.
               Assume welted area as 40%.

(b)   Write different steps used in design of lift irrigation system and support them   **10**
       with appropriate formulae.

P.T.O.

Marks

(c) (i) What are the different forms of precipitation ? 2

(ii) Draw schematic diagram of hydrological cycle. 3

(iii) The normal annual rainfall at stations A, B, C and D are 92.75, 87.65, 81.07 3
and 83.18 cm respectively. In a particular year station B was in operative
and stations A, C and D recorded annual rainfall of 85.36, 89.17 and 75.24
cm respectively. Estimate the rainfall at station B in that year.

(iv) Write Blaney-Criddle formula. 2

(d) (i) Differentiate between a contour bund and a graded bund. 3

(ii) What is time of concentration ? 2

(iii) Define drainage density of a basin. 2

(iv) As a control measure in which areas of a gully should a drop, a drop inlet 3
and a chute spillway be constructed ?

(e) Explain different types of soil water and soil water constants with their pressure 10
ranges and figure.

SECTION - A

2. *Answer the following sub-questions :*

(a) A soil is having field capacity and Temporary Wilting Point as 38% and 18% 10
respectively, while Bulk density is 1.50 gm/cc. Find.

(i) Depth of irrigation water to bring 150 cm root zone depth from temporary
wilting point to field capacity.

(ii) Volume of water in cubic meter for an area, of one hectare for above case.

(b) Find friction head loss by Hazen William formula through rising main of lift 10
irrigation which constitutes of Rigid Pvc pipes. The length of rising main is
1000 m and inner diameter is 86.50 mm, respectively. The discharge of the main
is 8.50 litre / second. Assume friction coefficient (c) for R Pvc as 150.

(c) Explain field method to find hydraulic conductivity. 10

(d) Design open drainage ditch in heavy black soil to carry discharge from 100 hectare 10
drainage area. The drainage coefficient is 3.80 cm. Assume manninj's n=0.04 and
bed slope = 1%.

Marks

3. *Answer the following sub-questions :*

(a) Develop in filtration equation from the following observation set. **10**

Obs. No.	Elapsed time (min)	Accumulated depth (cm)
1	0	0.00
2	1	4.00
3	2	8.00
4	3	11.00
5	4	14.00
6	5	16.50
7	10	24.00
8	15	30.25
9	20	35.00
10	30	42.00
11	40	48.00
12	50	53.00
13	60	56.50

(b) Compare drip and sprinkler irrigation methods. **10**

(c) Find hydraulic conductivity for following observation set recorded during laboratory test. **10**
(i) Diameter of core sampler = 15 cm
(ii) Length of core sampler = 7.5 cm
(iii) Diameter of supply tube = 3.0 cm
(iv) Initial reading = 40.0 cm
(v) Final reading = 21.50 cm
(vi) Initial time = 10.30 Hrs
(vii) Final time = 12.45 Hrs

(d) A 250 hectare drainage area is draining 1.75 m^3/sec discharge at it's outlet. Calculate drainage coefficient. **10**

9. *Answer the following sub-questions :*

   (a)   Explaining different types, show how biological measures can be effective in   **10** controlling soil erosion.

   (b)   Discuss about different lining materials and techniques for controlling seepage   **10** from farm pond.

   (c)   What is the significance of land use capability classification ? Discuss in short   **10** about the characteristics of the land capability classes.

   (d)   What are the types of satellite images ? Discuss advantages and limitations of   **1** satellite remote sensing.

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SECTION - B

4. *Answer the following sub-questions :*

   (a) Show different types of aquifers and related parameters of ground water through a neat sketch. **10**

   (b) A canal is 8.59 m wide at bottom with 1 : 1 side slope. The depth of flow is 1.20 m. Rugosity coefficient of bed material is 0.025 and bed slope of canal is 1:5000. Calculate mean velocity of flow using Kutter's equation. **15**

   (c) Enlist different types of falls used in canals and explain with figure the cylinder or well type fall. **15**

5. *Answer the following sub-questions :*

   (a) A tube well of 300 mm diameter fully penetrates to a confined aquifer. Thickness of aquifer is 25m. Calculate the yield of well under drawdown of 4m. The coefficient of permeability of aquifer is 60 m/day. Assume radius of circumference of influential zone to 200m. **15**

   (b) Explain the procedure for design of lined canal. **10**

   (c) Explain different features used for hydraulic design of cross drainage work. **15**

SECTION - C

6. *Answer the following sub-questions :*

   (a) (i) What is bearing of a line ? What are the different designations by which bearing of a line can be expressed ? How calculating the total included angle can check accuracy of a close traverse ? Find the interior angle formed by lines AB and BC if fore bearing of AB is 243° and back bearing of BC is S 67° E· **5**

   (ii) What is earth pressure ? How does it differ from water pressure ? Explain active and passive earth pressure. With the help of Mohr's circle explain elastic and plastic state of earth pressure. **10**

   (b) Explain when runoff can be expected from a catchment due to a storm ? Mentioning the assumptions explain rational formula for estimation of runoff. What are the basic differences between rational method and curve number technique ? **10**

   (c) What are the factors that affect water erosion ? Classify water erosion. Briefly discuss about any one of them. **15**

7. *Answer the following sub-questions :*

(a) (i) Define 'bench mark' and 'backsight'. In a levelling work following staff 10 readings were taken along a line at 10 m interval : 2.6, 1.3, 3.75, 1.9, 0.6, 2.15, 0.35, 3.2, 1.6, 2.5 and 0.8 m. The levelling instrument was shifted after 3rd, 7th and 9th readings. Considering the first point as a bench mark with R.L. of 112.5 m find R.L. of all other points. Also determine the slope of the line joining first and the last points.

(ii) What are consistency limits of a soil ? Explain Darcy's law. 5

(b) Draw neat sketch of a hydrograph showing all the components. Discuss in brief 10 about the factors affecting shape of a hydrograph. What is the utility of a unit hydrograph ?

(c) Explain the types of soil movement in wind erosion. What are the different control 15 measures for wind erosion ? Differentiate between shelterbelt and windbreak.

SECTION - D

8. *Answer the following sub-questions :*

(a) What is a contour bund ? In which type of soil and up to what percentage of 10 land slope can a contour bund be recommended ? Explain the role of a grassed waterway as far as conservation of soil is concerned. Briefly mention the design steps of a grassed waterway.

(b) Briefly discuss about the selection of site and general approach to design a dugout 10 farm pond.

(c) What is the importance of the evaluation of a soil and water conservation work 10 in watershed ? Briefly discuss about the different criteria for evaluating a water-shed programme.

(d) What are the different types of platforms used in remote sensing ? How GIS 10 technique can be applied in management of watershed ?