SIV

2010

AGRICULTURAL ENGINEERING - II (Optional) 200075

Standard : Degree **Total Marks : 200**

Nature : Conventional (*Essay*) *type.* **Duration : 3 Hours**

Note :

*(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 books 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/she 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 questions :

(a) What do you understand by Evapotranspiration and Consumptive use of crops. Name methods for direct measurement of Evapotranspiration and explain Lysimeter experiment with the neat sketch. **10**

(b) Draw and discuss typical characteristics curves for a centrifugal pump and show, how will you select a pump suitable for an irrigation system? **10**

(c) Name different factors affecting the shape of the hydrograph. Write briefly the theory of unit hydrograph. **10**

(d) Write briefly about drop spillway and chuse spillway. **10**

(e) Write principal methods of expressing soil moisture. Why soil moisture is required to be estimated on weight and volume basis. Explain principle of Tensiometer and write steps to measure the soil moisture? **10**

P.T.O.

Marks

SECTION - A

2. Answer the following sub-questions :

(a) Write methods of estimating infiltration characteristics of soil in field condition. Explain stepwise double Infiltrometer method for field measurement of infiltration. **10**

(b) Explain adaptability and types of furrow irrigation method. Discuss furrow irrigation design considering furrow spacing, furrow length, furrow slope and furrow stream and duration. **10**

(c) Discuss importance and variability of hydraulic conductivity in drainage design. Explain single augur hole method with neat sketch for determination of saturated hydraulic-conductivity in drainage field. **10**

(d) Discuss requirements and benefits of agricultural drainage. Explain types of drainage system used in the field using simple sketches. **10**

3. Answer the following sub-questions :

(a) Discuss importance of irrigation in agriculture and also explain harm full effect of excess irrigation in the field as well as in irrigation command. **10**

(b) An area of 2.5 hectare of crop was irrigated by a stream of 75 lit/sec for 10 hours. The irrigation was applied at 50% soil moisture depletion. The available water holding capacity of soil was 16 cm per meter depth. Soil water estimation, two days after irrigation when soil sampling in the field could be done, showed that the 2.5 hectare of crop stored 17 hac-cm depth of water in 90 cm root zone. Estimate water application & storage efficiency. **10**

(c) Discuss surface and sub surface drainage criteria in humid and semi-arid region in steady and unsteady state condition. Give suitable values for these conditions. **10**

(d) Discuss ellipse equation in steady state condition for design of drainage system in agriculture field with neat sketch. Explain each term used and show how this equation is used for subsurface design. **10**

SECTION - B

4. Answer the following sub-questions :

(a) Establish a relationship for discharge in steady state condition from a well fully penetrating in a confined aquifer. Draw neat sketch showing flow pattern and showing all parameters. **15**

(b) Write and discuss various components and classification of canal irrigation system in India according to their head works. **15**

Marks

(c) Discuss different types of diversion structure in canal and components in head works. 10

5. Answer the following sub-questions :

(a) Explain Darcy's law and its applicability and limitations, hydraulic conductivity, Transmissivity and coefficient of Storage in confined and unconfined aquifers. 15

(b) Design an irrigation channel using Kennedy theorem to carry 40 cumec of discharge with base width to depth ratio as 2.5. The critical velocity ratio is 1.00 and Manning's coefficient was assumed as 0.025 15

(c) Discuss operation & maintenance of irrigation canal and irrigation head works. 10

SECTION - C

6. Answer the following sub-questions :

(a) (i) Explain Simpson's rule. 5

(ii) Explain Darcy's law. How permeability can be measured by falling head method? 10

(b) Write briefly about base flow separation. 10

(c) Write briefly about fully erosion and its control 15

7. Answer the following sub-questions :

(a) (i) In a triangle Δ ABC fore bearings of lines $\overline{AB}$, $\overline{BC}$ and $\overline{CA}$ are 30° 30′, 170° 45′ and 300° 15′ respectively find interior angles $\angle A$, $\angle B$ and $\angle C$ 5

(ii) Explain seepage pressure and the process of consolidation 10

(b) Write briefly about synthetic unit hydrograph. 10

(c) Discuss about any soil loss equation. Write briefly about sediment control measures in reservoir. 15

SECTION - D

8. Answer the following sub-questions :

(a) Briefly discuss the design procedure of a bench terrace. 10

(b) Write briefly about wind erosion and its control. 10

(c) How dry spell, wet spell and on set of effective monsoon can be predicted from rainfall data? 10

(d) Write briefly about basic components of an ideal remote sensing systems 10

P.T.O.

Marks

9. Answer the following sub-questions :

(a) Discuss briefly about water harvesting structures **10**

(b) Write briefly about gravity dams. **10**

(c) How to evaluate socio-economic benefits of a watershed programme? **10**

(d) State and explain Stefan - Boltzmann law. Explain briefly atmospheric windows. **10**

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