

CSM – 12/17

Agricultural Engineering

Paper – I

Time : 3 hours

Full Marks : 300

The figures in the right-hand margin indicate marks.

*Candidates should attempt Q. No. 1 from Section – A and Q. No. 5 from Section -- B which are compulsory and any **three** of the remaining questions selecting at least **one** from each Section.*

SECTION – A

1. Answer any **four** sub-parts not exceeding **150** words for each sub-part :
 - (a) Explain the procedure of laser land levelling. 15
 - (b) Describe various factors to be considered while laying out agricultural fields. 15
 - (c) Differentiate : 15
 - (i) Steady and unsteady flow

- (ii) Uniform and non-uniform flow
 - (iii) Laminar and turbulent flow
 - (d) What is open channel flow ? Explain various formulae / methods for its measurement. 15
 - (e) What is the drainage coefficient ? Explain its role / importance in designing drainage system of agricultural area. 15
2. (a) Explain any **two** dimensionless product, describing its importance in fluid flow problems. 15
- (b) Explain various forms / types of irrigation efficiency including water use efficiency and relate it with water productivity. 15
- (c) Explain bio-drainage and mole-drainage with examples. 15
- (d) What are the adverse effects of over-irrigation ? How you approach to remove these hazards ? 15
3. (a) Explain the most popular method of estimating the evapotranspiration of crop and list out the others. 15

- (b) What are the lining materials ? Discuss their relative merits, stability and cost effectiveness in reducing water losses. 15
- (c) Discuss working and functions of culverts, inverted siphons, distributory and pipes for handling water flow. 15
- (d) Explain methodology for scheduling irrigation to different crops, describing various criteria / factors considered. 15
4. (a) Define field capacity, wilting point, available soil moisture, consumptive use. How these terms are relevant in scheduling irrigation ? 15
- (b) Explain, in detail, various factors considered in designing sub-surface drainage system. 15
- (c) What is the relevance of saturated hydraulic conductivity in drainage investigation ? Explain by example. 15
- (d) Explain characteristic curve of centrifugal pumps and interceptor drain, with appropriate figure / graph etc. 15

SECTION – B

5. (a) How the hydrologic cycle works ? Explain with schematic diagram, the various components it possess and influences the water availability on earth. 15
- (b) What is artificial recharge ? How it differs from ground water recharge ? Explain with practical examples. 15
- (c) How you seal brackish and saline aquifer horizons ? When sea water intrusion takes place in coastal areas ? Explain with example. 15
- (d) Explain, in brief, the measures for basin-wide ground water development. 15
6. (a) Discuss, in detail, various forms / types of shallow and deep tubewells. 15
- (b) What are the objectives, functions and design of multiple well systems ? How it is advantageous over traditional well system ? 15

- (c) Compare vegetative and mechanical measures to control soil erosion, elaborating their merits, demerits, relative stability and cost effectiveness. 15
- (d) Write and explain various steps of planning watershed management programme. 15
7. (a) Discuss, in detail, the land capability classification. Write if you know any modifications in it under Indian conditions. 15
- (b) How the water harvesting system be advantageously used by Indian farmers to alleviate drought and submergence ? 15
- (c) Describe the role of remote sensing and GIS in watershed planning. 15
- (d) Discuss your views regarding gaps between planning and implementation of watershed development programme in the state of Odisha. 15

8. (a) Describe, with schematic diagram, an ideal farm plan for 10 ha farm with the required amenities to human, animal, birds population along with various infrastructural support. 15
- (b) How you design threshing floor and drying space for agricultural and horticultural commodities ? 15
- (c) What are the building materials used on farm for various uses ? Elaborate the bearing capacity of soil, factor of safety etc. 15
- (d) Explain design of dairy / poultry farm with equipments. 15

