2 0 1 8

B.Tech Even Semester (CBCS) Exam., May—2018

AGRICULTURAL ENGINEERING

(8th Semester)

Course No. : AE–804 (C)

(Watershed Planning Management)

(Elective III)

Full Marks : 75

Pass Marks : 30

Time : 3 hours

Note : 1. Answer **one** question from each Unit.
2. Begin each answer in a new page.
3. Answer parts of a question at a place.
4. Assume reasonable data, wherever required.
5. The figures in the margin indicate full marks for the questions.

UNIT—I

1. *(a)* Briefly discuss about the following watershed management programmes : 2×5=10

(i) Drought-prone area programme

(ii) Desert development programme

(iii) National watershed development programme for rainfed agriculture

(iv) Control of shifting cultivation

(v) World Bank assisted integrated watershed development project

(b) Write down the main principles of the watershed management. 5

2. Elaborately discuss about the design specification of contour bund. 15

UNIT—II

3. *(a)* Write the basic difference between stone wall terraces and Puerto Rico terraces. 2

(b) Write down the main objectives of a bench terrace. 3

(c) With neat sketch, design the following parameters of a bench terrace : 10

(i) Terrace spacing

(ii) Terrace width

(iii) Terrace gradient

(iv) Terrace cross-section

4. *(a)* Define the following : 9

(i) V-ditches

(ii) Gradonies

(iii) Box-cum-pit

(b) List out the suitable soil and water conservation measures for non-arable lands for *in situ* conservation. 2

(c) Define ditch-cum-bund fencing and stone wall fencing. 4

UNIT—III

5. *(a)* List out the different groups of water harvesting techniques. 2

(b) Discuss about the design criteria of long-term runoff harvesting structures. 3

(c) Estimate the volume of excavation required to construct a dugout pond with an average depth of 3 m, a bottom width of 9 m and a bottom length of 24 m. The side slopes adopted are 2 : 1. 5

(d) Calculate the volume of water stored in farm pond, given that the areas enclosed by different contours at the site are as follows : 5

Sl. No.	*Contour Value* (m)	*Area enclosed* (m^2)
1	100	215
2	101	260
3	102	315
4	103	380
5	104	460
6	105	525
7	106	610

6. Design an earthen embankment with the following data : 15

Catchment area = 20·2 ha

Intensity of rainfall = 17·5 cm/hr

RL of natural surface = 100·00

RL of HFL = 103·00

Runoff coefficient = 0·30

Soil type = sandy loam

Slope of saturation line = 4 : 1

UNIT—IV

7. *(a)* Define the following : 6

(i) Non-recording or standard rain gauge

(ii) Recording rain gauge

(b) Discuss about the steps needed to follow while selecting a rain gauge site. 4

(c) Stepwise discuss about the process of sediment sampling. 5

8. *(a)* Discuss about the operation steps and maintenance of recording rain gauge. 8

(b) Elaborately discuss about the mechanics of sediment transportation. 7

UNIT—V

9. *(a)* List out the objectives of estimating benefit-cost ratio for a watershed project. 4

(b) Define the following : 4

(i) Economical evaluation

(ii) Financial evaluation

(c) Stepwise discuss about the procedure for estimation of benefit-cost ratio for a watershed project. 7

10. Prepare a format for preparation of watershed management plan. 15

★ ★ ★