Bunding

1- Explain different types of engineering measures of soil erosion control. Mention the design criteria of contour bund. [IFS (Mains) AG 2019:8 marks]

2- Calculate the height of contour bund to be constructed on a land slope of 5 percent. Assume the following: [IFS (Mains) AG 2019: 3.3×3 marks]

(i) Rainfall excess for 24 hours duration is 80 cm.

(ii) 15 m is horizontal interval.

(iii) Depth of water flow over the weir is 30 cm.

3- Write short notes on: [IFS (Mains) AG 2019: 2 × 1=2 marks]

(i) Nalla bunding

4- Write the step-by-step procedure for planning and design of a graded bunding:

[IFS (Mains) AG 2017: 10 marks]

5- What are the contour and graded bunds? How do they differ in design and functional aspects? [IFS (Mains) AG 2016: 10 marks]

6- Calculate the cross-section of a contour bund used to store 24-hour excess rainfall of 10 cm. The annual rainfall is about 120 cm with a high intake rate and there is low coverage of crops over the land. The land slope is 4%. Use Cox's formula for VI of contour bund. [IFS (Mains) AG 2016: 10 marks]

7- Design the dimensions of a weir used to discharge excess runoff through a contour bund for the conditions given below: [IFS (Mains) AG 2016: 20 marks]

Land slope = 1.5%

Top width of the bund = 45 cm

Height of the bund = 60 cm

Height of crest above GL = 30 cm

Side slope of the bund = 2:1

VI = 1 m

Length of the bund = 400 m

Intensity of rainfall for the return period and time of concentration

Determine the volume of water stored behind the bund before it starts flowing.

8- What is a waste weir in a contour bund design? Explain. Why do we need them? Where these should be located? Describe the clear overfall waste weir with diagram. [IFS (Mains) AG 2015: 10 marks]

9- Calculate the design dimensions of a contour bund in a medium deep soil having an average slope of 4%. The maximum expected rainfall during a 10-year recurrence interval is 20 cm. Infiltration capacity of the soil in the area is such that 20% of the rain infiltrates into the soil. The horizontal interval between bunds is 50 m. Assume the slope of seepage line to be 4:1.

[IFS (Mains) AG 2015: 10 marks]

10- Design a contour bund with the following: [IFS (Mains) AG 2014:20 marks]

Land slope = 2.0%

Rainfall abstration = 30%

The maximum rainfall expected in 10-year recurrence interval = 10 cm

Horizontal spacing between the bund = 100 m

Side slope of the bund = 1.5:1

Seepage line of bund soil = 5:1

Freeboard = 20% of water depth

11- A variable grade graded bund of 300 m is to be constructed in a cultivated land of 4% surface slope: The bund channel is to be created by the embankment only and the horizontal distance between these two bunds is 50 m. Estimate the time of concentration and the total drop in head in designing this graded bund. Assume channel grade to be 0.1%, 0.12%, 0.13% and 0.15% for each 1/4th length from upper section onwards. Show the sketch of the bund.

[IFS (Mains) AG 2010:20 marks]

12- Design a contour bund with the following: [IFS (Mains) AG 2010:20 marks]

      Land slope = 3%

      Rainfall abstraction = 25%

      The maximum rainfall expected in 10 year recurrence interval = 10 cm

      Horizontal spacing between the bund = 50 m

      Side slope of the bund = 1.5 : 1

      Seepage line in bund soil = 5:1

13- A bund is to be constructed of top width 2.0 m and side slope 1.5:1 by the soils of excavated channel 3.0 m deep, 2.0 m bottom width and 1:1 side slope. The channel and bund is constructed side-by-side of equal length. What is the height and bottom width of the bund?   [IFS (Mains) AG 2010:10 marks]

14- Compute the value of earthwork made and percentage area lost during the construction of bund on 40 ha land, which has slope of 3.2%. The details of bund are below: [IFS (Mains) AG 2009:10 marks]

- Vertical Interval (VI) = 2.0 m
- Base width = 3.0 m
- Top width = 0.75 m
- Height of bund = 1.5 m

15- What is surplussing arrangement in the design of contour bunds? Write its need and suggest the suitable location in the bund. Also list different types of outlets used in contour bunding.   [IFS (Mains) AG 2012:8 marks]

16- What are the steps involved in the design of the contour bunds? How these parameters can be estimated?   [IFS (Mains) AG 2007: 10 marks]

17- Calculate the cross-section of a contour bund used to store 24 – h excess rainfall of 10 cm. Annual rainfall is about 120 cm with a high intake rate and there is low coverage of crops over the land. The land slope is 4%. Use Cox's formula for VI of contour bund.   [IFS (Mains) AG 2006: 10 marks]

18- Design the dimensions of a weir used to discharge excess runoff through a contour bund for the following conditions Land slope = 1.5%, top width of bund 45 cm, height of bund = 60 cm, height of crest above GL 30 cm, side slope of bund = 2:1, VI = 1 m, length of bund = 400 m. Intensity of rainfall for the return period and time of concentration 12 cm/h. During the peak rainfall, constant infiltration rate 2.5 cm/h. No water is stored behind the bund before the peak rainfall occurs. Determine the volume stored behind the bund before it starts flowing.

[IFS (Mains) AG 2006: 30 marks]

19- Design a 350 m long graded bund in sandy loam soil on a land having an average slope of 3%. The bund channel is formed by embankment only. The horizontal distance between two adjacent bunds is 70 m. The land is having cultivated crop. The bund channel is on a grade of 0.1% for the first 100 m, 0.12% for the next 100 m and 0.14% for the rest. Assume runoff coefficient 0.3 and rainfall intensity as 20 cm/hr. [IFS (Mains) AG 2002: 10 marks]

20- Design notch dimensions of a waste weir to discharge excess runoff from a contour bunded area on a land having an average slope of 3%. Assume that the most severe rain occurring during the recurrence interval lasts for 3 hours. The rainfall intensities are such that 15 cm of rain occurs during the first hour, 18 cm during second hour and 16 cm during third hour.

[IFS (Mains) AG 2002: 10 marks]

21 Determine the dimensions of a graded bund in a sandy loam soil for the following conditions: Length of bund – 600 m, average land slope = 2.5%, V.1. = 1.5 m, grade of bund = 0.18%. Rainfall intensity for the time of concentration and for the recurrence interval = 16.5 cm/hr, maximum depth of water near the bund = 0.3 m, runoff coefficient = 0.3, stable side slope = 1.5:1, slope of seepage line = 5:1.

[IFS (Mains) AG 2001: 25 marks]

22- With the help of a sketch, derive an expression for the depth of water that will be stored behind a contour bund in terms of excess rainfall and vertical interval. Explain how the total height and other dimensions of the bund are decided.

[IFS (Mains) AG 2001: 25 marks]

23- Four hundred meter long graded bunds are constructed on an average slope of 2.5%. Vertical interval is 1.5m. The rainfall intensity for the time of

concentration and for the recurrence interval is 16.5 cm/h. The run off coefficient is 0.3. Estimate the design run-off rate of each bund.

[IFS (Mains) AG 2000: 10 marks]