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Code : 011835

**B.Tech 8th Semester Exam., 2020**

**RIVER HYDRAULICS AND  
SEDIMENT TRANSPORT**

Time : 3 hours

Full Marks : 70

Instructions :

- (i) The marks are indicated in the right-hand margin.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.

1. Choose the correct answer of the following  
(any seven) :  $2 \times 7 = 14$

(a) The tractive force method of designing stable channels in non-cohesive soils, is applicable only when the channels

- (i) carry sediment water
- (ii) carry clear water
- (iii) carry sediment water, but sediment concentration does not exceed 500 ppm or so
- (iv) carry any type of water

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(b) Critical velocity ratio for use in Keneedy's theory, is

- (i) less than 1
- (ii) more than 1
- (iii) equal to 1
- (iv) All of the above

(c) Lacey's regime theory is not applicable to a canal in

- (i) true regime
- (ii) initial regime
- (iii) final regime
- (iv) None of the above

(d) Tortuosity in a meandering river, is

- (i) 1
- (ii)  $< 1$
- (iii)  $> 1$
- (iv) None of the above

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- (e) The secondary factor, which is responsible for meandering in an alluvial river is

(i) inadequate land gradient

~~(ii) deficient silt load~~

(iii) constant discharge

(iv) None of the above

- (f) Lacey's scour depth for a stream, carrying a discharge of 3 cumecs per meter width having a silt factor 1.2, is

(i) 1.32 m

~~(ii) 2.64 m~~

(iii) 3.96 m

(iv) 4.32 m

- (g) The river reach upstream of a newly built dam may behave, as

~~(i) aggrading~~

(ii) degrading

(iii) virgin

(iv) None of the above

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- (h) Hydraulic depth is the ratio of

(i) wetted area to wetted perimeter

~~(ii) wetted area to top width~~

(iii) wetted area to bottom width

(iv) None of the above

- (i) The cross-section of natural silt transporting channels tends to have the shape of

(i) trapezium

(ii) semi-ellipse

(iii) semi-circle

(iv) None of the above

- (j) For a most economical trapezoidal channel section

(i) hydraulic mean radius equals the depth of flow

(ii) hydraulic mean radius equals half the depth of flow

(iii) bottom width is twice the depth of flow

(iv) bottom width is half the depth of flow

2. Explain with neat sketches the different types of 'spurs' which are commonly used for controlling and training Indian rivers? 14

3. Write short notes on (any two) : 14

1. Use of leaves for protecting cities from floods

2. Balancing depth

3. Importance of sediment transport in designing earthen irrigation canals

4. Discuss the salient features of Kennedy's theory for the design of earth channel based on the critical velocity concept, and mention its limitation. Also design an earth canal section to carry 50 cumes discharge at a slope of 0.25 m/km, having been given that  $N = 0.0025$  and  $m = 1$ . 7+7=14

5. Discuss critically the statement 'the banks of an unlined canal are more susceptible to erosion than its bed, and hence the stability of the banks and not of its bed is the governing factor in unlined canal designs.' 14

6. Differentiate between the following : 7+7=14

1. Suspended load and Bed load

2. Permeable and Impermeable spurs

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7. Design a channel which has to carry 25 cumecs with a bed load concentration of 40 ppm by weight. The median grain diameter of the bed material may be taken as 0.30 mm. Use Lacey's regime perimeter and Meyer-Peter formulas. 14

8. Draw a typical canal cross-section which is partly constructed in cutting and partly in filling. Discuss briefly its various components, such as side slopes, berms, banks, service road, dowla, spoil banks, etc. 14

9. Explain how the following assist in river control : 14

(i) Revetment

(ii) Guide bunds

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