B.Tech 8th Semester Exam., 2015

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 option (any *seven*) : 2×7=14

   (a) The critical shear stress z, at which
   incipient motion of the sediment takes
   place, is proportional to

   (i) $\sqrt{d}$

   (ii) d

   (iii) d^2

   (iv) None of the above

   where d is grain size.

   (b) Manning's rugosity coefficient is
   proportional to

   (i) $\sqrt{d}$

   (ii) d

   (iii) $d^{1/6}$

   (iv) $d^{2/3}$

   where d is representative grain diameter
   of bed surface.

   (c) The bed of an alluvial channel carrying
   silted water at a high velocity is
   expected to be

   (i) rippled

   (ii) duned

   (iii) flat

   (iv) wavy

   (d) The critical velocity $V_0 = 0 \cdot 55my^{0.64}$, as
   suggested by Kennedy for design of
   trapezoidal irrigation channel, is

   (i) the maximum permissible velocity

   (ii) the minimum permissible velocity

   (iii) Both (i) and (ii)

   (iv) None of the above

(e) Meander ratio in an alluvial meandering river is given by

(i) $\dfrac{\text{Meander length}}{\text{Meander width}}$

(ii) $\dfrac{\text{Meander width}}{\text{Meander length}}$

(iii) $\dfrac{\text{Meander width}}{\text{Meander length}} \times 100$

(iv) None of the above

(f) Aggrading rivers are

(i) silting rivers

(ii) scouring rivers

(iii) rivers in regime

(iv) meandering rivers

(g) The unit of Chezy's coefficient C is

(i) $\sqrt{m/s}$

(ii) m/s

(iii) m

(iv) None of the above

(h) The unit of Shield's entrainment function is

(i) N/m^2

(ii) m

(iii) kg/m/sec

(iv) No dimensions

(i) The most important shape parameter in sediment analysis is

(i) sphericity

(ii) shape factor

(iii) roundness

(iv) form factor

(j) Structures which can be used for measuring the discharge of small streams are

(i) dam

(ii) spillway

(iii) notch, weir, flumes and drops

(iv) None of the above

2. (a) What are various stages of a river? Give the salient features of each stage. 6

(b) Define the following terms : 8

(i) Meander length

(ii) Meander width

(iii) Meander ratio

(iv) Tortuosity

3. (a) Explain the different methods of avoiding damages by floods. 7

   (b) Define 'recurrence interval', 'frequency' and 'design flood' as applied to annual floods or rainfall. 7

4. (a) Define flood routing. What are the usual assumptions made in routing a flood in a reservoir? 7

   (b) What should be the recurrence interval of a flood such that the probability of its occurrence in a 10-year period is 0·01?

5. (a) What is meant by 'river training'? What are the different objectives served by it? 6

   (b) Differentiate between the following : 8

   (i) Permeable groynes and Impermeable groynes

   (ii) Attracting groynes and Repelling groynes

6. (a) Explain the functions and design the features of marginal banks. 7

   (b) Write short notes on 'cut-off' and 'cut-off ratio'. 7

7. (a) Explain in detail the Shield's sediment transport theory. 7

   (b) What do you understand by 'sediment transport' in a river? What are aggrading rivers and degrading rivers? 7

8. (a) What equipment will you use for making velocity measurements in a stream? Explain. 7

   (b) What are the factors that influence the selection of a site for a stream gauging station? 7

9. The following data were collected for a stream at a gauging station :

Distance from one end of water surface (m)	Depth of water (m)	Velocity at 0·6d (m/sec)
0	0	—
1·2	0·7	0·40
2·4	1·7	0·60
3·6	2·5	0·75
4·8	1·3	0·50
6·0	0·5	0·35
7·2	0	

Compute the discharge by mid-section method. 14

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