Flood Routing

Q.1 The hydrologic flood-routing methods use
(a) equation of continuity only
(b) both momentum and continuity equations
(c) energy equation only
(d) equation of motion only

Q.2 The hydraulic methods of flood routing use
(a) equation of continuity only
(b) both the equation of motion and equation of continuity
(c) energy equation only
(d) equation of motion only

Q.3 The St. Venant equations for unsteady open channel flow are
(a) continuity and momentum equations
(b) momentum equation in two different forms
(c) momentum and energy equations
(d) energy and continuity equations

Q.4 The prism storage in a river reach during the passage of a flood wave is
(a) a constant
(b) negative during rising phase
(c) function of inflow only
(d) function of outflow only

Q.5 The wedge storage in a river reach during the passage of a flood wave is
(a) a constant
(b) negative during rising phase
(c) positive during rising phase
(d) positive during falling phase

Q.6 In routing a flood through a reach, the point of intersection of inflow and outflow hydrographs coincides with the peak of outflow hydrograph
(a) in all cases of flood routing
(b) when the inflow is into a reservoir with an uncontrolled outlet
(c) in channel routing only
(d) in all cases of reservoir routing

Q.7 Which of the following is a proper reservoir routing equation?
(a) $\frac{1}{2}(I_1 - I_2)\Delta t + \left(S_1 + \frac{Q_1\Delta t}{2}\right) = \left(S_2 - \frac{Q_2\Delta t}{2}\right)$
(b) $(I_1 + I_2)\Delta t + \left(\frac{2S_1}{\Delta t} - Q_1\right) = \left(\frac{2S_2}{\Delta t} + Q_2\right)$
(c) $\frac{1}{2}(I_1 + I_2)\Delta t + \left(S_2 - \frac{Q_2\Delta t}{2}\right) = \left(S_1 + \frac{Q_1\Delta t}{2}\right)$
(d) $(I_1 + I_2) + \left(\frac{2S_1}{\Delta t} - Q_1\right) = \left(\frac{2S_2}{\Delta t} + Q_2\right)$

Q.8 The Muskingum method of flood routing is a
(a) form of reservoir routing method
(b) hydraulic routing method
(c) complete numerical solution of St. Venant equations
(d) hydrologic channel routing method

Q.9 The Muskingum method of flood routing assumes the storage S is related to inflow rate I and outflow rate O of a reach as S =
(a) $K[xI - (1-x)O]$ (b) $K[xO + (1-x)I]$
(c) $K[xI + (1-x)Q]$ (d) $K[I - (1-x)Q]$

Q.10 The Muskingum method of flood rouging gives $Q_2 = C_0I_2 + C_1I_1 + C_2Q_1$. The coefficients in this equation will have values such that
(a) $C_0 + C_1 = C_2$
(b) $C_0 - C_1 - C_1 = 1$
(c) $C_0 + C_1 + C_2 = 0$
(d) $C_0 + C_1 + C_2 = 1$

Q.11 The Muskingum channel routing equation is written for the outflow from the reach Q in terms of the inflow I and coefficients C_0, C_1 and C_2 as
(a) $Q_2 = C_0I_0 + C_1Q_1 + C_2I_2$
(b) $Q_2 = C_0I_2 + C_1I_1 + C_2Q_1$
(c) $Q_2 = C_0I_0 + C_1I_1 + C_2I_2$
(d) $Q_2 = C_0Q_0 + CQ_1 + C_2I_2$

Q.12 In the Muskingum method of channel routing, the routing equation is written as $Q_2 = C_0I_2 + C_1I_1 + C_2Q_1$. If the coefficients K = 12 h and x = 0.15 and the time step for routing Δt = 4h, the coefficient C_0 is
(a) 0.016 (b) 0.048
(c) 0.328 (d) 0.656

Q.13 In the Muskingum method of channel routing, the weighting factor x can have a value
(a) between -0.5 to 0.5
(b) between 0.0 to 0.5
(c) between 0.0 to 1.0
(d) between -1.0 to +1.0

Q.14 In the Muskingum method of channel routing, if x = 0.5, it represents as outflow hydrograph
(a) that has reduced peak
(b) with an amplified peak
(c) that is exactly the same as the inflow hydrograph
(d) with a peak which is exactly half of the inflow peak

Q.15 If the storage S, inflow rate I and outflow rate C for a river reach is written as
$$S = K[xI^n + (1-x)Q^n]$$
then
(a) $n = 0$ represents storage routing through a reservoir
(b) $n = 1$ represents the Muskingum method
(c) $n = 0$ represents the Muskingum method
(d) $n = 0$ represents a linear channel

Q.16 A linear reservoir is the one in which
(a) volume varies linearly with elevation
(b) storage varies linearly with the outflow rate
(c) storage varies linearly with time
(d) storage varies linearly with the inflow rate

Q.17 An isochrone is a line on the basin map
(a) joining rainguage stations with equal rainfall duration
(b) joining points having equal standard time
(c) connecting points having equal time of travel of the surface runoff to the catchment outlet
(d) that connects points of equal rainfall depth in a given time interval

Q.18 Due to flood routing
(a) peak of the hydrograph (of flood) gets reduced in size and occurs earlier in time
(b) peak of the hydrograph of flood gets reduced in size and gets delayed in time
(c) peak of the hydrograph is increased in size and time of base of hydrograph is increased
(d) peak of the hydrograph is decreased in size and time of base of hydrograph is decreased

Q.19 Match List-I with List-II and select the correct answer using the codes given below the lists:
List-I
A. Reservoir routing
B. Hydraulic routing
C. Channel routing
D. Hydrologic routing
List-II
1. Solution of equation of continuity
2. Solution of St. Venant's equations
3. Storage is a unique function of outflow discharge
4. Storage is a function of inflow as well as outflow
Codes:

	A	B	C	D
(a)	3	2	4	1
(b)	3	2	1	4
(c)	3	1	2	4
(d)	2	3	4	1

Q.20 Match List-I with List-II and select the correct answer using the codes given below the lists:
List-I
A. Thiessen's method
B. Thiem's solution
C. Laplace equation
D. Muskingum method
E. Sequent peak algorithm

List-II
1. Unsteady flow in a well
2. Groundwater flow
3. Flood routing
4. Reservoir storage computation
5. Precipitation
6. Wastershed simulation

Codes:

	A	B	C	D	E
(a)	5	4	2	3	6
(b)	5	1	2	3	4
(c)	1	5	2	6	3
(d)	5	1	3	2	4

Q.21 Match List-I with List-II and select the correct answer using the codes given below the lists:

List-I
A. Blaney-Criddle equation
B. Shield's curve
C. Muskingum method
D. Nash model

List-II
1. Channel routing
2. IUH
3. Initiation of sediment motion
4. Evapotranspiration

Codes:

	A	B	C	D
(a)	4	2	1	3
(b)	4	3	1	2
(c)	3	4	1	2
(d)	4	3	2	1

Q.22 **Assertion (A):** Now-a-days, hydraulic methods of flood routing is used extensively to route the passage of flood in a river.
Reason (R): With the use of present day computers, the Naiver-Stroke's equation can be solved for the given boundary conditions, with requisite degree of accuracy.
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true and R is not the correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

Q.23 If I = inflow rate, O = outflow rate, and S = storage in a reach, the continuity equation used in flood routing is
(a) $I + \frac{dS}{dt} = 0$
(b) $O - I = \frac{dS}{dt}$
(c) $I + O + \frac{dS}{dt} = C$
(d) $I - O = \frac{dS}{dt}$

Q.24 If in a system, an input $x_1(t)$ gives an output $y_1(t)$, and an input $x_2(t)$ gives rise to an output $y_2(t)$, the system is linear for an input $\{x_1(t) + x_2(t)\}$ then which gives output as
(a) $y_1(t) + y_2(t)$
(b) $y_1(t).y_2(t)$
(c) $y_1(t)/y_2(t)$
(d) $x_1(t) + x_2(t)$

Q.25 **Assertion (A):** In level pool routing, the peak of the outflow hydrograph must intersect the inflow hydrograph.
Reason (R): In the level pool routing, the outflow is a function of the water surface elevation in the reservoir.
(a) both A and R are true and R is the correct explanation of A
(b) both A and R are true but R is not a correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

Q.26 Which of the following equation is used in hydrological flood routing?
(a) Energy equation
(b) Continuity equation
(c) Equation of motion
(d) Both (a) and (c)

Q.27 In case of channel routing, the storage is a function of
(a) inflow discharge only
(b) outflow discharge only
(c) both (a) and (b)
(d) None of the above

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Answers **Flood Routing**

1. (a)	2. (b)	3. (a)	4. (d)	5. (c)	6. (b)	7. (d)	8. (d)	9. (c)	10. (d)
11. (b)	12. (a)	13. (b)	14. (a)	15. (b)	16. (b)	17. (c)	18. (b)	19. (a)	20. (b)
21. (b)	22. (b)	23. (d)	24. (a)	25. (a)	26. (b)	27. (b)			

Explanations **Flood Routing**

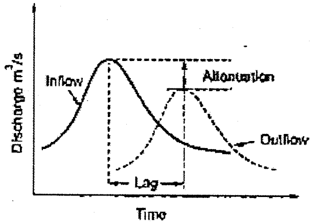
12. (a)

$$C_0 = \frac{0.5\Delta t - kx}{k + 0.5\Delta t - kx}$$

$$= \frac{0.5 \times 4 - 12 \times 0.15}{12 + 0.5 \times 4 - 12 \times 0.15}$$

$$= 0.016$$

18. (b)



Flood routing is an important technique necessary for the complete solution of flood problems. When a flood passes through a reservoir, its peak reduces and it requires bigger times base. The reduction in peak flow is called attenuation and delay in occurrence of peak is called 'lag'. Using flood routing lag and attenuation can be determined.

27. (b)
In reservoir routing, storage is a function of outflow discharge only.

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