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Q : 1) Though Manning's formula is dimensionally non – homogeneous, it is commonly used in practice because.

A : It is in a simple form

B : It was derived from extensive field data

C : It can be made dimensionally homogeneous

D : It can be related to chezy's coefficient or Darcy-Weisbach's friction factor

Q : 2) At a hydraulic jump, the depths at the two sides are 0.4 m and 1.4 m. The head loss in the jump is nearly.

A : 1.0 m

B : 0.9 m

C : 0.7 m

D : 0.45 m

Q : 3) Flumes carrying open channel flow is correctly matched?

A : Non-modular flume - Flow is unaffected by drowing

B : Venturi flume - Standing wave forms at the throat

C : Venturi flume - Flow at the throat is at less than critical velocity

D : Standing wave flume - Hump is not provided at the throat

Q : 4) Consider the following statements :

- 1. In an open channel flow, energy grade line is obtained by adding datum head, pressure head and velocity head**
- 2. In an open channel, hydraulic grade line is the free surface itself**
- 3. For a pipe and an open channel of same dimension, the hydraulic gradient line is located at the same height above datum.**
- 4. Energy gradient line of an open channel is always horizontal**

Which of these statements are correct?

A : 1, 2 and 3

B : 1 and 4

C : 1, 3 and 4

D : 2, 3 and 4

Q : 5) Formula, the differential equation of gradually varies flow (with the usual notations) is given by

$$\text{A : } \frac{dy}{dx} = S_o \frac{[1 - (y_c/y)^{10/3}]}{[1 - (y_o/y)^3]}$$

$$\text{B : } \frac{dy}{dx} = S_o \frac{[1 - (y_o/y)^{10/3}]}{[1 - (y_c/y)^3]}$$

$$\text{C : } \frac{dy}{dx} = S_o \frac{[1 - (y_o/y)^3]}{[1 - (y_c/y)^3]}$$

$$\text{D : } \frac{dy}{dx} = S_o \frac{[1 - (y_c/y)^3]}{[1 - (y_o/y)^3]}$$

Q : 6) The Chezy's coefficient C is related to Darcy Weisbach friction factor f as

A : $C = \sqrt{(g/8f)}$

B : $C = \sqrt{(8g/f^{1/4})}$

C : $C = \sqrt{(8g/f)}$

D : $C = \sqrt{(f/8g)}$

Q : 7) For a hydraulically efficient rectangular section, the ratio of width to normal depth is

A : 0.5

B : 1.0

C : 2.0

D : $2\sqrt{3}$

Q : 8) Consider the following statements in regard to the critical flow :

- 1. Specific energy is maximum for a given discharge**
- 2. Specific force is maximum for a given specific discharge**
- 3. Discharge is maximum for a given specific force**
- 4. Discharge is maximum for a given specific energy**

Which of these statements are correct?

A : 1, 2, 3 and 4

B : 1 and 2

C : 2 and 3

D : 3 and 4

Q : 9) If F_1 and F_2 are the Froude numbers of flow before and after the hydraulic jump occurring in a rectangular channel, then

$$\text{A : } F_2^2 = \frac{F_1^2}{\left(-1 + \sqrt{1 + 8F_1^2}\right)^3}$$

$$\text{B : } F_2^2 = \frac{8F_1^2}{\left(-1 + \sqrt{1 + 8F_1^2}\right)^3}$$

$$\text{C : } F_2^2 = \frac{F_1^2}{\left(-1 + 2\sqrt{1 + 8F_1^2}\right)^3}$$

$$\text{D : } F_2^2 = \frac{8F_1^2}{\left(-1/2 + \sqrt{1 + 8F_1^2}\right)^3}$$

Q : 10) The critical depth of water flowing through a rectangular channel of width 5 m when discharge is $12.5 \text{ m}^3/\text{s}$ is

A : $(2.25)^{1/2} \text{ m}$

B : $(1.6)^{1/2} \text{ m}$

C : $(0.46)^{1/3} \text{ m}$

D : $(0.64)^{1/3} \text{ m}$

Q : 11) Water can flow 1 m depth in alternatively four channels of different sections as shown below :

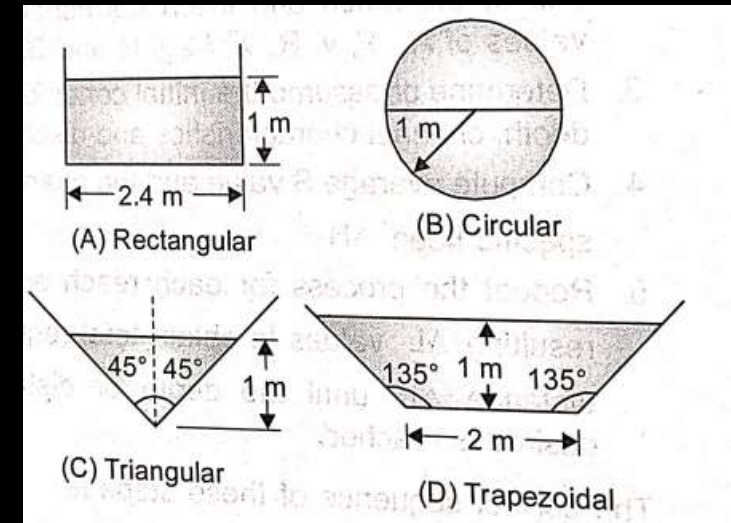
Which one of the following sequences shows their hydraulic radii, arranged in descending order?

A : D-C-B-A

B : D-A-B-C

C : A-B-C-D

D : A-B-D-C



Q : 12) For Froude number of a hydraulic jump as 5.5. The jump can be classified as a/an:

A : Undular jump

B : Oscillating jump

C : Weak jump

D : Steady jump

Q : 13) If the Froude number of flow in a rectangular channel at a depth of flow of y_o is F_o , then what is y_c/y_o is equal to?

A : $F_o^{1/3}$

B : $F_o^{2/3}$

C : $F_o^{3/2}$

D : $\frac{1}{\sqrt{F_o}}$

Q : 14) A hydraulically efficient trapezoidal section of open channel flow carries water at the optimal depth of 0.6m. Chezy coefficient is 75 and bed slope is 1 in 250. What is the discharge through the channel?

A: $1.44 \text{ m}^3/\text{s}$

B : $1.62 \text{ m}^3/\text{s}$

C : $1.92 \text{ m}^3/\text{s}$

D : $2.24 \text{ m}^3/\text{s}$

Q : 15) In the step methods (both direct and standard), the computations must

A : Proceed downstream in subcritical flow

B : Proceed upstream in subcritical flow

C : Always proceed upstream

D : Always start at a control section

Q : 16) Which of the following equations are used for the derivation of the differential equation for water surface profile in open channel flow?

- 1. Continuity equation**
- 2. Energy equation**
- 3. Momentum equation**

Select the correct answer using the code given below :

A : 1, 2 and 3

B : Only 1 and 3

C : Only 1 and 2

D : Only 2 and 3

Q : 17) In a wide rectangular channel if the normal depth is increased by 20%, then what is the approximate increase in discharge?

A : 25%

B : 30%

C : 35%

D : 40%

Q : 18) For a smooth hump in a sub-critical flow to function as a broad crested weir, the height ΔZ of the hump above the bed must satisfy which one of the following?

A : $\Delta Z \geq (E_1 - y_c)$

B : $\Delta Z \geq (E_1 - E_c)$

C : $\Delta Z \leq (E_1 - y_c)$

D : $\Delta Z \leq (E_1 - E_c)$

Q : 19) Match List-I (flow section Type_ with List-II (Critical Discharge is proportional to) where y is the depth of flow and select the correct answer using the code given below the lists:

A : 2, 3, 4, 1

B : 4, 1, 2, 3

C : 2, 1, 4, 3

D : 4, 3, 2, 1

List-I	List-II
A. Shallow parabolic	1. $Y(z^{3/2})$ 2. $Y^{3/2}$
B. Triangular	3. $Y^{5/2}$
C. Rectangular	4. y^2
D. Trapezoidal	

Q : 20) Which one of the following statements is not correct? A control section in an open channel is the site

A : Where the flow quantity can be controlled

B : At which flow is known to be critical

C : Where the discharge can be measured

D : Where the specific energy is determined

Q : 21) In connection with a gradually varied flow with notations y_o = normal depth, y_c = critical depth and y = depth in the gradually varied flow. Match List-I with List-II and select the correct answer using the code given below the lists :

Codes :

A : 4, 1, 2, 3

B : 2, 3, 4, 1

C : 4, 3, 2, 1

D : 2, 1, 4, 3

List-I	List-II
A. $y_c > y_o > y$	1. M_1
B. $y_o > y > y_c$	2. S_3
C. $y > y_c > y_o$	3. M_2
D. $y > y_o > y_c$	4. S_1

Q : 22) Consider the following statements:

- 1. Hydraulically most efficient channel section for an open flow will carry maximum discharge for a given area of cross section**
- 2. For a given cross sectional area hydraulic radius is maximum when the wetted perimeter is minimum**

Which of the statements given above is / are correct?

A : 1 only

B : 2 only

C : Both 1 and 2

D : Neither 1 nor 2

Q : 23) The type of just that forms when initial Froude number lies between 2.5 and 4.5 is

A : Weak jump

B : Steady jump

C : Undular jump

D : Oscillating jump

Q : 24) Consider the following statements regarding specific energy of the flow in an open channel

- 1. There is only one specific energy curve for a given channel**
- 2. Alternate depths are the depths of flow at which the specific energy is the same**
- 3. Critical flow occurs when the specific energy is minimum for the flow rate**

Which of the above statements is / are correct?

A : 1 only

B : 1 and 2 only

C : 2 and 3 only

D : 1, 2 and 3

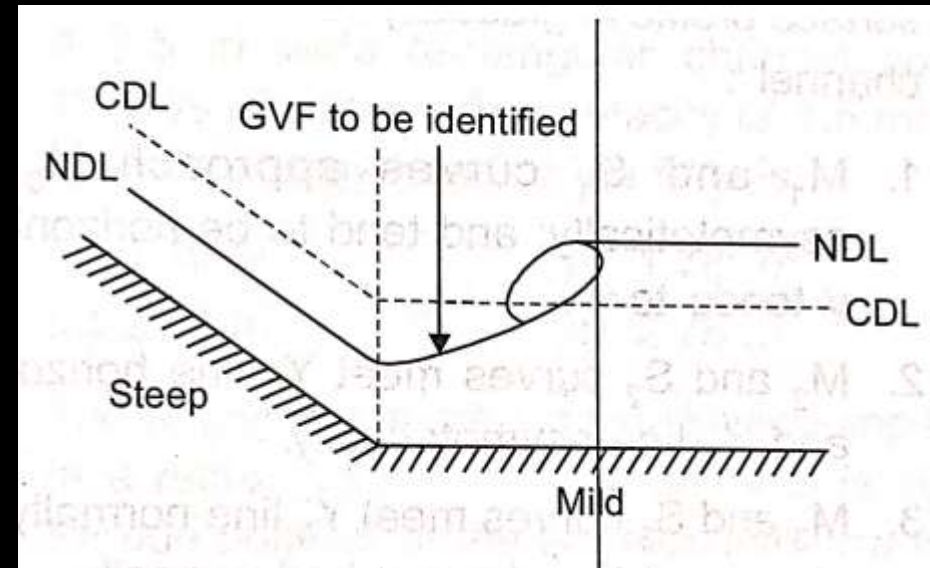
Q : 25) The water surface profile in the flow situation as shown in the figure is :

A : S_3

B : M_3

C : S_2

D : M_1



Q : 26) For a hydraulically efficient rectangular channel of bed width 5 m, the hydraulic radius is equal to

A : 2.5 m

B : 1.25 m

C : 5 m

D : 2 m

Q : 27) The sequent depth in a hydraulic jump formed in a rectangular horizontal channel is 10. The Froude number of the supercritical flow is

A : 12.2

B : 10.4

C : 7.42

D : 4.21

Q : 28) Hydraulic jump forms in a horizontal rectangular channel carrying a unit discharge of $1.019 \text{ m}^3/\text{sec}/\text{m}$ at a depth of 101.9 mm . This jump is classified as

A : Weak jump

B : Oscillating jump

C : Steady jump

D : Strong jump

Q : 29) In a wide rectangular channel, the normal depth is increased by 20%. This would mean an increase in the discharge of the channel nearly by

A : 20%

B : 26%

C : 36%

D : 56%

Q : 30) An open channel is of isosceles triangle shape, with side slopes 1 vertical and n horizontal. The ratio of the critical depth to specific energy at critical depth will be

A : $\frac{2}{3}$

B : $\frac{3}{4}$

C : $\frac{4}{5}$

D : $\frac{5}{6}$

Q : 31) Which of the following statements is correct regarding flow in open channel?

A : The curve for kinetic energy is a parabola

B : The curve for potential energy is a parabola

C : Specific energy is asymptotic to the vertical axis

D : At critical depth the specific energy is maximum

Q : 32) Which one of the following statement is correct regarding critical state of flow through a channel section?

A : Specific energy is a minimum for a given discharge

B : Specific energy is a maximum for a given discharge

C : The Froude number is greater than two

D : The discharge is a minimum for a given specific force

Q : 33) For a given discharge in an open channel, there are two depths which have the same specific energy. These two depths are known as

A : Alternate depths

B : Critical depths

C : Normal depths

D : Sequent depths

Q : 34) For subcritical flow in an open channel, the control section for gradually varied flow profile is

A : At the downstream end

B : At the upstream end

C : At both upstream and downstream ends

D : At any intermediate section

Q : 35) The flow in a rectangular channel is subcritical. If width of the channel is reduced at a certain section, the water surface under no-choke condition will

A : Drop at a downstream section

B : Rise at a downstream section

C : Rise at an upstream section

D : Not undergo any change

Q : 36) Direct step method of computation for gradually varied flow is

A : Applicable to non-prismatic channels

B : Applicable to prismatic channel

C : Applicable to both prismatic and non prismatic channels

Q : 37) For a 'best' symmetrical trapezoidal section of an open channel with a given area of section and side slopes, one of the following statements holds true:

A : Half the top width is equal to one of the side slope

B : Half the top width plus the bottom width is equal to both the side slope put together

C : Water depth is equal to half bottom width

D : Hydraulic mean depth is equal to half the top width

Q : 38) It is most appropriate to say that uniform flow in an open channel occurs when there is a balance between

A : Gravity and frictional forces

B : Gravity and inertial forces

C : Inertial and frictional forces

D : Inertial and viscous forces

Q : 39) If the Froude number characterizing flow in an open channel is less than unity, an increase in channel width causes the water surface elevation to

A : Form ripples

B : Remain same

C : Decrease

D : Increase

Q : 40) For a rectangular channel section, Match List-I (Geometrical element) with List-II (proportion for hydraulically efficient section) and select the correct answer using the codes given below the lists :

y_e is the flow depth corresponding to hydraulically efficient section

Codes :

A : 2, 4, 1, 3

B : 3, 1, 4, 2

C : 3, 4, 1, 2

D : 3, 4, 2, 1

List-I	List-II
A. Top width	1. $y_e/2$
B. Perimeter	2. y_e
C. Hydraulic radius	3. $2y_e$
D. Hydraulic depth	4. $4y_e$

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