

ANSWERS AND EXPLANATIONS1. *Ans. (b)*2. *Ans. (a)*3. *Ans. (c)*4. *Ans. (b)*5. *Ans. (b)*6. *Ans. (a)*7. *Ans. (a)*8. *Ans. (b)*9. *Ans. (b)*10. *Ans. (c)*11. *Ans. (b)*12. *Ans. (b)*13. *Ans. (b)*14. *Ans. (b)*15. *Ans. (c)*16. *Ans. (a)*17. *Ans. (b)*18. *Ans. (b)*19. *Ans. (c)*20. *Ans. (a)*21. *Ans. (a)*22. *Ans. (d)*23. *Ans. (c)*24. *Ans. (c)*25. *Ans. (c)*

For unit hydrograph, the depth of flow is '1' unit.

So, by dividing DRH by '5' it will become an unit hydrograph.

26. *Ans. (b)*

$$\begin{aligned} \text{Duty, } D &= \frac{864B}{\Delta} = \frac{864 \times 120}{70} \\ &= 1481 \text{ ha/cum} \end{aligned}$$

27. *Ans. (d)*

In saturation zone there is no Air.

28. *Ans. (b)*

Manning's formula

$$V \propto R^{2/3} \cdot S^{1/2}$$

29. *Ans. (a)*30. *Ans. (b)*31. *Ans. (d)*32. *Ans. (c)*33. *Ans. (d)*

$$y_0 \text{ (normal depth)} = 0.6 \text{ m}$$

$$F = 2.0 = \frac{V}{\sqrt{gy}}$$

Specific energy,

$$E = y + \frac{V^2}{2g} = y + \frac{F^2 gy}{2g}$$

$$E = y + \frac{F^2 y}{2}$$

At uniform flow,

$$E = y_0 + \frac{F^2 y_0}{2} = 0.6 + \frac{(2)^2 \times 0.6}{2}$$

$$E = 1.8 \text{ m}$$

34. *Ans. (a)*

$$y_1 = 0.25 \text{ m}$$

and $y_2 = 1.25 \text{ m}$

Energy loss in jump,

$$E_L = \frac{(y_2 - y_1)^3}{4y_1 y_2} = \frac{(1.25 - 0.25)^3}{4 \times 0.25 \times 1.25}$$

$$E_L = 0.8 \text{ Nm/N}$$

35. *Ans. (d)*36. *Ans. (b)*

Froude number,

$$F = 0.5$$

$$y_0 = 1 \text{ m}$$

$$F = \frac{V}{\sqrt{gy}}$$

$$0.5 = \frac{V}{\sqrt{9.81 \times 1}}$$

$$\therefore V = 0.5\sqrt{9.81} = 1.566 \text{ m/s}$$

Using Manning Formula :

$$V = \frac{1}{n} R^{2/3} S^{1/2}$$

For wide Rectangular channel,

$$R = y$$

$$\therefore 1.566 = \frac{1}{0.015} \times (y_0)^{2/3} \sqrt{S}$$

$$1.566 = \frac{1}{0.015} \times 1 \times \sqrt{S}$$

$$\sqrt{S} = 1.566 \times 0.015 = 0.0235$$

$$S = 0.00551$$

37. *Ans. (c)*

38. *Ans. (a)*

39. *Ans. (b)*

Hydraulic radius for most economical sections

Section	Max. Hydraulic Mean Radius(R)
Rectangular	$\frac{y}{2}$
Trapezoidal	$\frac{y}{2}$
Triangular	$\frac{y}{2\sqrt{2}}$

where, y = depth of flow

40. *Ans. (c)*

A weir is called submerged (or drowned) when the water level on the down stream side of the weir is above the crest level of the weir.

41. *Ans. (d)*

42. *Ans. (c)*

In radial gate, water face segment is made concentric to the supporting pins so that the entire water thrust passes through the pin. Hence the lifting force is required only against the weight of the gate. Hence radial gate can be operated with minimum operating hoisting mechanism. For small work it can be manually operated.

43. *Ans. (a)*

44. *Ans. (b)*

In relatively flat land areas (plain area) it is often necessary and advantageous to align irrigation canals along the watersheds (ridge lines) to irrigate the nearby areas.

Whereas in hilly areas, ordinary canals are aligned along the contour line.

45. *Ans. (b)*

46. *Ans. (c)*

47. *Ans. (c)*

Sensitivity is defined as the ratio of the rate of change of discharge through the outlet to the rate of change of water level of the distributary, referred to the normal depth of the channel. For rigid modules, the discharge is fixed and hence sensitivity is zero.

48. *Ans. (a)*

49. *Ans. (b)*

50. *Ans. (d)*

$$\alpha_s = \frac{\phi_s}{3}$$

Where, α_s = Polar deflection angle = $\frac{l^2}{6RL}$

and ϕ_s = Spiral angle = $\frac{l^2}{2RL}$