



**Department of Mechanical Engineering**

**CE8403 APPLIED HYDRAULIC ENGINEERING**

**Unit II - GRADUALLY VARIED FLOW MCQ Bank**

1. If the value of rate of change of specific energy is  $7.79 \times 10^{-4}$  m and  $S_f = 0.00013$ , calculate the value of bed slope.

- a) 1 in 1000
- b) 1 in 1100**
- c) 1 in 1200
- d) 1 in 1300

Answer: b

2. Calculate the rate of change of depth of a rectangular channel having depth 1m and width 4m. Given:  $C = 40$ ,  $S_0 = 1/900$ ,  $S_f = 0.0005$

- a)  $4.94 \times 10^{-4}$  m
- b)  $5.94 \times 10^{-4}$  m
- c)  $6.94 \times 10^{-4}$  m**
- d)  $7.94 \times 10^{-4}$  m

Answer: c

3. Calculate the rate of change of depth of a triangular channel if the depth is 4m and the side slope is 1H:2V. Given:  $S_0 = 1$  in 1500;  $S_f = 0.00004$  and  $n=0.010$ .

- a)  $8.95 \times 10^{-4}$  m**
- b)  $9.95 \times 10^{-4}$  m
- c)  $10.95 \times 10^{-4}$  m
- d)  $11.95 \times 10^{-4}$  m

Answer: a

4. Calculate the value of  $S_f$  for a trapezoidal channel having depth 2m, width 5m and side slope of 1H:1.5V. Given:  $dy/dx = 1.18 \times 10^{-3}$ ,  $S_0 = 1$  in 1000,  $C = 50$ .

- a) 0.00001**
- b) 0.00002
- c) 0.00003
- d) 0.00004

Answer: a

5. Determine the rate of change of depth of a rectangular channel having dimensions 2m×3m and the velocity of flow is 2 m/s.

Given:  $S_0 = 1$  in 500 and  $S_f = 0.0007$ .

- a) 0.63m
- b) 1.63m**
- c) 2.63m
- d) 3.63m

Answer: b

6. Calculate the velocity of flow in a triangular channel having depth 7m and the side slope of the channel is 1H:4V if the bed slope of the channel is 1 in 1200 and the slope of the energy line is 0.00010. Given:  $(dy)/dx=7.55m$ .

- a) 1 m/s**
- b) 2 m/s
- c) 3 m/s
- d) 4 m/s

Answer: a

7. Calculate the value of bed slope of a trapezoidal channel having depth 2m and width 2.5m with a side slope of 1H:3V. Given:  $dy/dx=1.43 \times 10^{-3}$ ;  $S_f = 0.00002$ ;  $V = 1.5$  m/s.

- a) 1 in 1000
- b) 1 in 900
- c) 1 in 800**
- d) 1 in 700

Answer: c

8. The dimensions of a rectangular channel section is  $2.5m \times 1m$ . Calculate the value of  $S_f$  if the bed slope of the channel is 1 in 600. Given:  $dy/dx=1.52 \times 10^{-3}m$ .

- a) 0.0002
- b) 0.0003
- c) 0.0004
- d) 0.0005**

Answer: d

9. The dimensions of a rectangular channel section is  $2.5m \times 1m$ . Calculate the rate of change of specific energy if the rate of change of depth is  $1.52 \times 10^{-3}m$ .

- a)  $1.17 \times 10^{-3}m$**
- b)  $2.00 \times 10^{-3}m$
- c)  $2.03 \times 10^{-3}m$
- d)  $2.06 \times 10^{-3}m$

Answer: a

10. Calculate the value of rate of change of specific energy for a triangular channel having depth 3.5m and the side slope is 1H:2V. Given:  $V = 2.5$  m/s,  $dy/dx=8.6 \times 10^{-4}$ .

- a)  $3.47 \times 10^{-4}m$
- b)  $4.47 \times 10^{-4}m$**

c)  $5.47 \times 10^{-4} \text{ m}$

d)  $6.47 \times 10^{-4} \text{ m}$

Answer: c

11. What is the expression for head loss in case of a GVF?

a)  $h_f = \frac{1}{2} S_f$

b)  $h_f = LS_f$

c)  $h_f = 2LS_f$

d)  $h_f = 3LS_f$

Answer: b

12. What is the expression for the length of the backwater curve?

a)  $L = \frac{E_2 - E_1}{S_f - S_0}$

b)  $L = \frac{E_2 - E_1}{S_f}$

c)  $L = \frac{E_2 - E_1}{S_0 - S_f}$

d)  $L = \frac{E_2 - E_1}{S_0}$

Answer: c

13. Calculate the head loss if the length of the back water curve is 25000m and  $S_f = 0.00006$ .

a) 1m

b) **1.5m**

c) 2.0m

d) 2.5m

Answer: b

14. Estimate the slope of energy line in a GVF having length of the back water curve 30000m and head loss of 1m.

a)  $1.33 \times 10^{-5}$

b)  $2.33 \times 10^{-5}$

c)  **$3.33 \times 10^{-5}$**

d)  $4.33 \times 10^{-5}$

Answer: c

15. Determine the length of the back water curve if  $E_1 = 2.8 \text{ m}$  and  $E_2 = 5.6 \text{ m}$ . Given:  $S_0 = 0.00009$   $S_f = 0.00004$ .

a) 26000m

b) 36000m

c) 46000m

d) **56000m**

Answer: d

16. If the difference between specific energies is 2m calculate the rate of change of specific energies if the length of the back water curve is 26314m.

- a)  $6.6 \times 10^{-5} \text{m}$
- b)  $7.6 \times 10^{-5} \text{m}$**
- c)  $8.6 \times 10^{-5} \text{m}$
- d)  $9.6 \times 10^{-5} \text{m}$

Answer: b

17. Calculate the bed slope of the channel if the slope of the energy line 0.00024 and the length of the back water curve is 104166.67m. Given:  $E_1 - E_2 = 3\text{m}$ .

- a)  $2.28 \times 10^{-5}$
- b)  $3.28 \times 10^{-5}$
- c)  $4.28 \times 10^{-5}$
- d)  $5.28 \times 10^{-5}$**

Answer: d

18. If the depths in a channel are 2m and 4m and the velocities are 0.5 m/s and 0.3m/s, calculate the difference between specific energies.

- a) 2m**
- b) 3m
- c) 4m
- d) 5m

Answer: a

19. Calculate the slope of the energy line if the bed slope of the channel is  $4.81 \times 10^{-5}$  if the depths of the channel are 2.7m and 4.7m and velocities are 1 m/s and 0.5m/s respectively.

- a) 0.00002
- b) 0.00003
- c) 0.00004
- d) 0.00005**

Answer: d

20. The dimensions of a rectangular channel is 3m×2m and the bed slope of the channel is 1 in 1000, calculate the rate of change of depth if the rate of change of specific energy is  $2 \times 10^{-5} \text{m}$ . Given:  $n = 0.010$

- a)  $1.43 \times 10^{-5} \text{m}$
- b)  $2.43 \times 10^{-5} \text{m}$
- c)  $3.43 \times 10^{-5} \text{m}$**
- d)  $4.43 \times 10^{-5} \text{m}$

Answer: c

21. Specific energy in GVF changes only under which of the following conditions.

- a) Difference between bed slope and slope of energy line**
- b) Both bed slope and energy slope are equal

- c) Presence of bed slope alone
- d) Presence of energy slope alone

Answer: a

22. The channel is prismatic in case of a GVF.

**a) True**

b) False

Answer: a

23. Calculate the value of frictional slope for a rectangular channel having width 5m and depth 3m. Given:  $V=2$  m/s and  $n = 0.012$ .

a)  $2.01 \times 10^{-4}$

b)  $3.01 \times 10^{-4}$

c)  $4.01 \times 10^{-4}$

**d)  $5.01 \times 10^{-4}$**

Answer: d

24. Calculate the frictional slope of a triangular channel having depth 2.5m and side slope of 1H:2V if the rate of change of specific energy is  $1.6 \times 10^{-5}$  m/s. Given:  $V=1.57$  m/s

a)  $5.53 \times 10^{-4}$  m

b)  $6.53 \times 10^{-4}$  m

**c)  $7.53 \times 10^{-4}$  m**

d)  $8.53 \times 10^{-4}$  m

Answer: c

25. What happens to the depth of flow when there is an obstruction in the path?

a) Remains the same

**b) Increases**

c) Decreases

d) Flow stops

Answer: b

26. Calculate the value of Froude's number if the ratio of rate of change of specific energy and rate of change of depth is 0.9.

a) 0.29

b) 0.30

**c) 0.31**

d) 0.32

Answer: c

27. Which of the following assumptions is true in case of GVF?

a) The flow is not steady

**b) The streamlines are parallel**

c) Pressure distribution is not hydrostatic

d) Channel has varying alignment and shape

Answer: b

28. The ratio of bed slope and the slope of energy line is 2, calculate the value of slope of energy line if the length of back water curve is 20000m. Given:  $E_1=2\text{m}$  and  $E_2=5\text{m}$ .

- a)  $0.5 \times 10^{-4}$
- b)  $1.0 \times 10^{-4}$
- c)  **$1.5 \times 10^{-4}$**
- d)  $2.0 \times 10^{-4}$

Answer: c