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END SEMESTER EXAMINATION – 2022

Semester : 3rd (New)

Branch : Civil Engineering

Subject Code : CV-301

WATER RESOURCES ENGINEERING

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Instructions :

1. *All* questions of PART – A are compulsory.
2. Answer any *five* questions from PART – B.

PART – A

Marks – 25

1. Fill in the blanks : $1 \times 10 = 10$
 - (a) The portion of global water flowing below the surface of earth is known as _____.
 - (b) _____ is the area of land irrigated by supplying one meter cube of water continuously over the entire base period.

[Turn over

(c) If the depth of water applied to a crop during its first water after it is grown upto a few centimeters height is 19 cm, the Kor depth is _____.

(d) Precipitation is collected and measured in _____.

(e) The elevation difference between the catchment outlet and the highest point on the basin perimeter is called _____.

(f) _____ is provided by the side of the divide wall for the free migration of the fishes from upstream to downstream or the vice-versa.

(g) A dam that resists all the forces acting on it by its own weight is called _____.

(h) The canal that is laid along the ridge line between two different catchment areas is called _____.

(i) The excessive accumulation of water in the soil is known as _____.

(j) _____ is the phenomena of loss of soil from the soil surface under the action of water, wind etc.

2. Write true or false :

$1 \times 10 = 10$

- (a) Area to be irrigated for Rabi crop is generally less than area to be irrigated for Kharif crop.
- (b) The ratio of the mean supply discharge of a canal over a particular duration to the maximum discharge capacity of the canal is the capacity factor.
- (c) Rain is a type of precipitation in the form of ice flakes.
- (d) The Hydrological cycle does NOT have a specific start and end.
- (e) Rainwater harvesting is a technique to measure rainfall.
- (f) In a barrage, the crest level is kept low with large gates.
- (g) Hydrostatic pressure force is the only major force that acts on the body of a gravity dam.
- (h) Infiltration gallery is a part of gravity dam that drains out the excess water accumulated in the dam body.

(i) Super Passage is the cross-drainage work adopted where the canal passes over the drain and the bed of the canal is well above the High Flood Level (H.F.L) of the drain.

(j) Lining of water increases water logging.

3. Choose the correct answers : $1 \times 5 = 5$

(a) Which of the following is NOT automatic rain gauge ?

- (i) Tipping-Bucket Type
- (ii) Weighing-Bucket Type
- (iii) Natural-Syphon Type
- (iv) Symons' Gauge

(b) Which of the following is true ?

- (i) Gross Command Area = Culturable Command Area – Uncultivable area.
- (ii) Culturable Command Area = Gross Command Area – Uncultivable area.
- (iii) Culturable Command Area = Gross Command Area \div Uncultivable area.
- (iv) Culturable Command Area = Gross Command Area \times Uncultivable area.

(c) A watershed is a/the

- (i) irrigation system
- (ii) total land area from where precipitation occurs get accumulated and drains into a river
- (iii) erosion prevention measure
- (iv) portion of water existing sub-surface.

(d) An isohyet is a line joining points having

- (i) equal evaporation value
- (ii) equal height above the MSL
- (iii) equal barometric pressure
- (iv) equal rainfall depth in a given duration

(e) A canal aligned at right angles to the contours of the area is called

- (i) Ridge canal
- (ii) Side slope canal
- (iii) Protective canal
- (iv) Productive canal.

PART – B

Marks – 45

4. (a) What is irrigation ? Write two advantages of irrigation. $2+2=4$

(b) Define Surface irrigation and Sub-surface irrigation. 2

(c) Define the terms 'Intensity of Irrigation', 'Kor Period' and 'Time factor'. 3

5. (a) Proof the relation among Duty, Delta and Base Period. 4

(b) What do mean by Crop rotation ? Write two examples of cash crops. $1+2=3$

(c) If the area under Rabi crop cultivation is 40 hectares and that under Kharif crop cultivation is 20 hectares, then calculate the crop factor. 2

6. (a) What do you mean by Hydrological Cycle ? Draw a schematic diagram of Hydrological cycle. 4

(b) Using the Thiessen Polygon method, find average rainfall over a catchment. The data is : 5

Rain Gauge Station	A	B	C	D	E
Polygon Area (km ²)	50	45	37	30	57
Precipitation (mm)	30.1	33.8	31.8	25.8	25.9

7. (a) What are the factors affecting runoff in a basin ? 3

(b) What do you mean by Diversion Head Work ? Draw a schematic diagram showing different components of Diversion Head Works. 1+3=4

(c) Write the differences between a weir and a barrage ? 2

8. (a) Explain in brief with neat sketches the forces acting on a gravity dam. 4

(b) Write the factors to be considered for the selection site of a gravity dam. 3

(c) What are the causes of failure of earth dam ? 2

9. (a) What do you mean by a Canal ? 1

(b) What are the different (a) types and (b) advantages of canal lining ? 3+3=6

(c) Write down the ill effects of water logging on the agricultural land. 2

10. Write short notes on any *three* : 3×3=9

- (a) Cross-drainage work
- (b) Watershed management
- (c) Isohyetal method
- (d) A weir
- (e) Level crossing.