

Enrollment No.....



Faculty of Engineering  
End Sem (Odd) Examination Dec-2022  
CE3EE09 Environmental Hydraulics

Programme: B.Tech.

Branch/Specialisation: CE

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

- Q.1 i. A phenomenon of rise or fall of liquid surface relative to the adjacent general level of liquid is known as- **1**  
(a) Capillarity (b) Surface tension  
(c) Vapour pressure (d) All of these
- ii. When the velocity of flow of fluid does not change, both in magnitude and direction, from point to point in the flowing fluid, for any given instant of time, the flow is- **1**  
(a) Three-dimensional (b) Non-uniform  
(c) Uniform (d) None of these
- iii. Factors Affecting Duty in Irrigation engineering- **1**  
(a) Climatic Conditions  
(b) Type of crop  
(c) Methods and system of irrigation  
(d) All of these
- iv. Sprinkler irrigation has the advantage like- **1**  
(a) Providing more uniform distribution of water and avoiding erosion on sloping lands  
(b) High in initial Cost  
(c) Wind velocity causes non uniform distribution of irrigation water  
(d) All of these
- v. The standard Symons type rainguage has a collecting area of diameter- **1**  
(a) 12.7 cm (b) 10 cm (c) 5.09 cm (d) None of these

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- vi. The flow - mass curve is an integral curve of- **1**  
 (a) The hydrograph (b) The hyetograph  
 (c) The flow duration curve (d) The S-curve
- vii. If the liquid is in contact with one side of the piston or plunger only, it is known as- **1**  
 (a) Single acting pump (b) Double acting pump  
 (c) Single cylinder pump (d) None of these
- viii. Water supply system includes- **1**  
 (a) Construction of dam  
 (b) Construction of canal  
 (c) Total arrangement from water source to distribution  
 (d) None of these
- ix. The method, which is most widely used for analysing and designing the pipes of all typed of complex water distribution network, is- **1**  
 (a) Hardy cross method (b) Circle method  
 (c) Electrical analyser (d) None of these
- x. What is the most important physical characteristic of a reservoir? **1**  
 (a) Storage capacity (b) Annual Yield  
 (c) Average yield (d) Reservoir water level
- Q.2 i. What is three-dimensional flow of fluid? **2**  
 ii. If a certain liquid has viscosity  $4.9 \times 10^{-4}$  kg(f)-sec/m<sup>2</sup> and kinematic viscosity  $3.49 \times 10^{-2}$  stokes, what is its specific gravity? **3**  
 iii. Define gauge pressure, atmospheric pressure & vacuum pressure and indicate there relative position on chart. **5**
- OR iv. Derive Bernoulli's equation from Euler's equation of motion. **5**
- Q.3 i. What do you mean by Intensity of irrigation? **2**  
 ii. Discuss the methods available for improving duty. Also derive the relation between duty and delta. **8**
- OR iii. Describe the types of sprinkler irrigation. Also write the advantages and disadvantages of sprinkler irrigation. **8**
- Q.4 i. Define the term infiltration capacity. **3**

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- ii. A catchment has six rainguage stations. In a year, the annual rainfall recorded by the gauges are as follow **7**

Stations	A	B	C	D	E	F
Rainfall (cm)	82.6	102.9	180.3	110.3	98.8	136.7

For 10 % error in the estimation of the mean rainfall, Calculate the optimum number of stations in the catchment.

- OR iii. What is a unit hydrograph? List the assumptions involved in the unit hydrograph theory. **7**

- Q.5 i. Write short note on: **4**  
 (a) Check valve (b) Pressure relief valve

- ii. Water has to be supplied to a town with one lakh population at the rate of 150 litres/c/day from a river 2000 m away. The difference in elevation between the lowest water level is the sump and reservoir is 36 m. If the demand has to be supplied in 8 hours, Determine the size of the main and B.H.P (Brake Horse Power) of the pump required. Assume the maximum demand as 1.5 times the average demand. Assume  $f = 0.0075$ , velocity in the pipe 2.4 m/sec and efficiency of pump 80 %. **6**

- OR iii. What is the requirement of a good water distribution system? Describe in brief various types of distribution system. **6**

- Q.6 Attempt any two: **5**  
 i. Write a short note on Hardy cross method along with the assumptions used in it. **5**  
 ii. Explain critical path method in detail. **5**  
 iii. Explain gradient method in detail. **5**

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**Marking Scheme**  
**CE3EE09 Environmental Hydraulics**

Q.1	i.	A phenomenon of rise or fall of liquid surface relative to the adjacent general level of liquid is known as-	<b>1</b>
		(a) Capillarity	
	ii.	When the velocity of flow of fluid does not change, both in magnitude and direction, from point to point in the flowing fluid, for any given instant of time, the flow is-	<b>1</b>
		(c) Uniform	
	iii.	Factors Affecting Duty in Irrigation engineering-	<b>1</b>
		(d) All of these	
	iv.	Sprinkler irrigation has the advantage like-	<b>1</b>
		(d) All of these	
	v.	The standard Symons type rainguage has a collecting area of diameter-	<b>1</b>
		(a) 12.7 cm	
	vi.	The flow - mass curve is an integral curve of-	<b>1</b>
		(a) The hydrograph	
	vii.	If the liquid is in contact with one side of the piston or plunger only, it is known as-	<b>1</b>
		(a) Single acting pump	
	viii.	Water supply system includes-	<b>1</b>
		(c) Total arrangement from water source to distribution	
	ix.	The method, which is most widely used for analysing and designing the pipes of all typed of complex water distribution network, is-	<b>1</b>
		(a) Hardy cross method	
	x.	What is the most important physical characteristic of a reservoir?	<b>1</b>
		(a) Storage capacity	
Q.2	i.	Three-dimensional flow of fluid	<b>2</b>
	ii.	If a certain liquid has viscosity $4.9 \times 10^{-4}$ kg(f)-sec/m <sup>2</sup> and kinematic viscosity $3.49 \times 10^{-2}$ stokes, what is its specific gravity?	<b>3</b>
		Formula	1 mark
		Answer	2 marks
	iii.	Define gauge pressure, atmospheric pressure & vacuum pressure and indicate there relative position on chart.	<b>5</b>
		Each Pressure 1 mark for each (1 mark * 3)	3 marks
		Relative position	2 marks

OR	iv.	Derive Bernoulli's equation from Euler's equation of motion. As per explanation	<b>5</b>
Q.3	i.	Intensity of irrigation	<b>2</b>
	ii.	Methods available for improving duty	<b>8</b>
		1 mark for each (1 mark * 4)	4 marks
		Relation between duty and delta.	4 marks
OR	iii.	Types of sprinkler irrigation	4 marks
		Advantages of sprinkler irrigation	2 marks
		Disadvantages of sprinkler irrigation	2 marks
Q.4	i.	Infiltration capacity.	<b>3</b>
	ii.	Calculate the optimum number of stations in the catchment.	<b>7</b>
		Formula	1 mark
		$\sigma =$	1 mark
		Cv	1 mark
		Answer	4 marks
OR	iii.	Unit hydrograph	2 marks
		Assumptions involved in the unit hydrograph theory	5 marks
Q.5	i.	(a) Check valve	2 marks
		(b) Pressure relief valve	2 marks
	ii.	Determine the size of the main and B.H.P (Brake Horse Power) of the pump required.	<b>6</b>
		Formula	2 marks
		Answer	4 marks
OR	iii.	Requirement of a good water distribution system	3 marks
		Types of distribution system.	3 marks
Q.6		Attempt any two:	
	i.	Hardy cross method along with the assumptions used in it.	<b>5</b>
		As per the explanation	
	ii.	Critical path method	<b>5</b>
		As per the explanation	
	iii.	Gradient method	<b>5</b>
		As per the explanation	

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