Ref. No. Ex/CE/PC/B/T/312/2025

BACHELOR OF ENGINEERING IN CIVIL ENGINEERING EXAMINATION 2025

(Third Year, First Semester)

Water Resources Engineering II

[WRE II]

Time: Three Hours

Full Marks 100

{Part I: 50 + Part II: 50]

Use a separate Answer-Script for each part. Each part carries equal marks

Q No		Part I (50 Marks)		Marks
		Attempt GROUP 1 or GROUP 2, from this PART. *Assume suitable values for the parameters if not supplied*		
		GROUP 1 (Question 1 & 2)		
1	(a)	Define the balancing depth for excavating a channel. Why the balancing depth calculation is necessary?	CO3	2+2=4
	(b)	Draw neat sketch to show a typical cross-section of an Irrigation Canal.	CO3	4
	(c)	What is 'Berm" and 'Back Berm'? Explain the utility in brief.	CO3	5
	(d)	Derive the expression for estimation of 'Average Unit Tractive Force' acts on channel bed and draw the sketch by showing the distribution of 'Tractive Force' on bed and both the banks.	CO3	5
	(e)	Find out the normal water depth and velocity in a channel carrying a discharge of 15 cumecs and having bed width 4.0m. Assume Manning's n=0.0220, Bed slope = 0.0010, and Side slope 2(H): 1(V).	CO3	7
2	(a)	How the rivers can be classified on the basis of topography? Explain briefly.	CO4	4
	(b)	How the river flood plain can be classified? Explain briefly.	CO4	4
	(c)	Differentiate between 'bends' and 'meanders' of rivers. Explain the causes of meandering?	CO4	4
	(d)	What is river meandering and how it differs from river bends?	CO4	3
	(e)	What are the governing variables for meander process? Explain briefly.	CO4	5
	(f)	What are the meander indices? Explain briefly.	CO4	5
		GROUP 2 (Question 3 & 4)		
3	(a)	Discuss briefly the importance of sediment transport study of a canal.	CO3	2
	(b)	What are different types of sediment load? Discuss briefly. What is '*Threshold of Motion*'?	CO3	3+1=4
	(c)	Show the curve for '*Shield's Entrainment Function*' vs. '*Particle Reynolds Number*' for laminar flow of bed through turbulent movement of bed, and then prove that, d = 11RS for channels in course alluvium.	CO3	3+3=6
	(d)	Explain Lacey's theory for regime channel. Also explain true regime, initial regime and final regime.	CO3	2+3x2=8
	(e)	Derive the expression for 'Average Unit Tractive' force for a canal. Show the diagram for the distribution of tractive force generated in a trapezoidal channel section.	CO3	3+2=5
4	(a)	When a land said to be water-logged area? What are the ill effects of water-logging? Explain briefly.	CO4	3+2=5
	(b)	Explain the causes of water-logging.	CO4	10
	(c)	Explain the controlling measures for water-logging.	CO4	10

[Turn over

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FIRST SEMESTER EXAM 2025
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(Name in full)

PAPER ××××

Time: Three hours **Full Marks =100**

(50 marks for part I and 50 Marks for part II)
Use a same Answer-Script for each part

- *Maintain neatness.* All drawings-must be drawn by pencil.
- *All the notations used here for their conventional meanings.*
- *Answer question number 1, question number 2 and question number 3 in Group A,*
- *Answer15 MCQ from Group B (out of 17 MCQ),*
- *Assume reasonable values of data if it is not supplied,*
- *Answer the Part 1 and Part 2 separately.*
- *There is no need of any code etc. for answering Part- II,*
- *In the cases where excess number of questions will be answered exceeding the required number of question/s, the first required number of question/s will be evaluated only.*

No. of Question	***Part –II***	**CO**	**Marks**
	Group A		
(1)(a)	Write short notes on the "utility of channel lining in Canal."	[CO1]	2
(1)(b)	When are the dates of start & end of rabi & kharif season?	[CO1]	2
(1)(c)	What is delta of a crop?	[CO1]	2
(1)(d)	Give at least three examples of each of the Kharif & Rabi season crops	[CO1]	2
Answer any three among (2)(a), (2)(b), (2)(c), (2)(d)			
(2)(a)	What is meant by sub surface irrigation? How flow irrigation differs from lift irrigation?	[CO1]	2 + 3 =5
(2)(b)	Distinguish between hygroscopic water and gravitational water and explain which of these two types is useful for plant growth.	[CO1]	5
(2)(c)	Compare between the sprinkler system of irrigation and drip irrigation method.	[CO1]	5
(2)(d)	Derive soil-moisture-irrigation relationship.	[CO1]	5
Answer (3)(a) and (3)(b).			
(3)(a)	Using Blaney-Criddle formula, estimate the PET of an area for the season June to October in which rice (K for rice = 1.10) is grown. The area is in south India with mean monthly temperature and monthly day time hours percentages (P_h) as follows:	[CO2]	7

Month	June	July	Aug	Sept.	Oct.
Monthly mean temp. (in °c)	31.5	31.0	30.0	29.0	28. 0
P_h	8.80	9.05	8.83	8.28	8.26

(3)(b)	The culturable commanded area for a distributary is 16,000 hectares. The intensity of irrigation (I.I.) for Rabi (wheat) is 40% and for Kharif (rice) is 20%. If the total water requirement of the two crops are 37.5 cm and 120 cm and their periods of growth are 160 days and 140 days respectively; Determine the outlet discharge from average demand considerations.	[CO2]	5

Part –II
Group B

- ***Answer any 15 MCQ only from the available 17 MCQs. Each MCQ is carrying 1 mark.***

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PAPER ××××

Time: Three hours **Full Marks =100**

(50 marks for part I and 50 Marks for part II)
Use a same Answer-Script for each part

- ***Some MCQ question may have more than one correct alternative, so examine each alternative of each MCQ before giving your choice of the concerned MCQ.***
- ***Giving all alternatives of any MCQ as your choices as correct answers of the concerned MCQ, will lead to zero marks for the concerned MCQ.***
- ***If anyone attempts more than 15 MCQ, then the first 15 MCQ will be evaluated and considered only and the other extra MCQ will not be evaluated and will not be considered.***

✓***Instructions (with examples) for giving answers to MCQ in this part:***

Suppose you have to answer following MCQ in your answer script:

MCQ 1) Name of the present president of the India
a) Ramnath Kobind,
b) Narendra Modi,
c) Draupadi Murmu,
d) None of the above.

MCQ 2) Dhoni is
a) Captain of the Indian Cricket team,
b) Husband of Shakshi,
c) President of the BCCI,
d) All of the above.

MCQ 3) Within the last few years
a) Russia attacked Ukraine,
b) The economic condition of Srilanka became very bad,
c) China attacked India,
d) All of the above.
……..

Then during giving answer in your answer scripts, you have to give the answers of the above MCQ in the following style only:

Part –II

Answer to MCQ 1) : c) Draupadi Murmu,
Answer to MCQ 2) : b) Husband of Shakshi,
Answer to MCQ 3) : a) Russia attacked Ukraine,
b) The economic condition of Srilanka became very bad,
……..

Note:
(A) *In MCQ 2, if anyone give alternative "**a)**" as one of the correct alternatives, he/ she is wrong as Dhoni was (not "is") Captain of the Indian Cricket team. So, read each word of the alternatives very carefully before giving your answer.*

(B) *In MCQ 3, if anybody chooses either alternative "a)" or alternative "b)" as the correct alternative, he/ she will get 0.5 marks as there were two correct alternatives.*

(C)*There is no negative marking for choosing wrong alternative as your choice in any MCQ.*

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PAPER ××××

Time: Three hours **Full Marks =100**

(50 marks for part I and 50 Marks for part II)
Use a same Answer-Script for each part

Choose the correct alternative/ alternatives for any 15 MCQ from the following 17 MCQ:

No. of Question		**CO**	Marks
1)	1000 m^2 to 8000 m^2 area of cultivation is generally noticed in (A) Border Flooding (B) Check Flooding (C) Ordinary Flooding (D) All of the above	[CO1]	1
2)	Wild flooding (A) is controlled by levees (B) is not controlled by levees (C) partially controlled by levees (D) is same as border flooding (E) (A) and (D) of the above	[CO1]	1
3)	When irrigation starts, the infiltration rate is high at (A) the upper end of the border (B) the lower end of the border (C) everywhere within the border (D) in any specific place depending upon the real situation in the field.	[CO1]	1
4)	The vertical intervals among levees are generally: (A) 2 to 5 cm (B) 5 to 10 cm (C) 2 to 8 cm (D) None of the above	[CO1]	1
5)	In India this sprinkler irrigation method has come into use since (A) 1920 (B) 1935 (C) 1950 (D) None of the above	[CO1]	1
6)	The irrigation water should be supplied as soon as the moisture falls up to: (A) The field capacity moisture content (B) The optimum level of moisture content (C) The permanent wilting point (D) None of the above	[CO1]	1
7)	_____ is the densest and heaviest type of soil. The blank space should be filled by: (A) Sand (B) Clay (C) Silt (D) None of the above	[CO1]	1
8)	_____ mostly adopted in tea and coffee gardens. The blank space should be filled by: (A) Drip Irrigation (B) Paleo irrigation	[CO1]	1

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(50 marks for part I and 50 Marks for part II)
Use a same Answer-Script for each part

(C) Sprinkler Irrigation
(D) Both (A) and (B)

9) _____ is the ratio of the area actually irrigated by the cultivators to the mean supply discharge set out from the outlet of the distributary over the crop period. The blank space should be filled by: [CO1] 1
(A) Duty
(B) Nominal Duty
(C) Storage Duty
(D) None of the mentioned above

10) Time factor help to: [CO1] 1
(A) Correlate with capacity factor
(B) Supply discharge in a canal during a period to its designed full capacity
(C) Check the dangers of over irrigation
(D) None of the above

11) With this inclination angle of _____ to the vertical (in sprinkler irrigation method), it is possible to irrigate the whole strip of 15 m width. The blank space should be filled by: [CO1] 1
(A) 135^{O}
(B) 120^{O}
(C) 150^{O}
(D) None of the above

12) In this drip irrigation method, irrigation water is conveyed on the surface in _____ mm diameter tubing's fed from large feeder pipes. The blank space should be filled by: [CO1] 1
(A) 12 to 16,
(B) 8 to 10,
(C) 16 to 20,
(D) None of the above

13) The application rate varies between _____ depending on the soil characteristics (drip irrigation method). The blank space should be filled by: [CO1] 1
(A) 2 and 10 L/h
(B) 2 and 20 L/h
(C) 2 and 15 L/h
(D) None of the above

14) We can measure the consumptive use through: [CO2] 1
(A) Blaney-Criddle Equation,
(B) Penman's equation,
(C) Hargreaves class B pan evaporation method,
(D) All of the above

15) Depending upon the soil, air in pores and water in pores, there are [CO1] 1
(A) two stages of soil
(B) four stages of soil
(C) three stages of soil
(D) All of the above

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(50 marks for part I and 50 Marks for part II)

Use a same Answer-Script for each part

16) When defining "the equivalent moisture", there is linking of a centrifugal force (of _____ times that of gravity) in the definition of the equivalent moisture. The blank space should be filled by: [CO1] 1
(A) 1000
(B) 500,
(C) 2000,
(D) None of the above

17) The seepage loss in channels can be occurred either through [CO2] 1
(A) Percolation,
(B) Absorption,
(C) Evaporation,
(D) None of the above

End of Questions