BACHELOR OF CIVIL ENGINEERING EXAMINATION 2019
(Second Year, Second Semester)

IRRIGATION ENGINEERING

Time: Three Hours

	Full Marks: 100
	Part I: 60 Marks
	Part II: 40 Marks

Use a separate Answer-Script for each part

Question No.	PART I (60 Marks)	Marks
	*Answer any **THREE** questions from this PART.* *Assume suitable values for the parameters if not supplied*	
1 (a)	Discuss briefly the importance of sediment transport study of a canal.	2
(b)	Discuss briefly about different types of sediment load. What is 'Threshold of motion'?	3+1=4
(c)	Show the curve for 'Shield's Entrainment Function' vs. 'Particle Reynold's Number' for laminar flow of bed through turbulent movement of bed.	3
(d)	Prove that $d = 11RS$ for channels in course alluvium.	3
(e)	Explain the Initial theory for regime and its modifiecation. Also explain true regime, initial regime and final regime.	2+3x2=8
2 (a)	Define the balancing depth for excavating a channel. Why the balancing depth calculation is necessary?	2+2=4
(b)	Draw neat sketch to show a typical cross-section of an 'Irrigation Canal' and 'Back Berm' and explain briefly.	4
(c)	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.	5
(d)	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).	7
3 (a)	Compare Kennedy's theory and Lacey's theory on regime channel.	4
(b)	Design a canal to carry a discharge of 30 cumecs having sediment load concentration 40 ppm by weight. The average grain size of the bed material is 0.25mm. Assume the cross-section of the canal is trapezoidal with side slope 0.5(H): 1(V).	9
(c)	Design an irrigation canal to carry 44 cumecs at a slope of 1 in 5500, considering Kutter's n= 0.022 and CVR=0.90.	6
(d)	Estimate the resultant tractive force in a rippled bed canal.	1
4 (a)	Briefly explain about the formation of 'River Course'	3
(b)	What is the importance of rivers and necessities of controlling them?	4
(c)	Write down the classification and sub-classification of rivers on the basis of 'Topography' and 'Flood Hydrograph'. Explain them in brief.	3+6=9
(d)	What is called river 'Bend' and 'River Meandering'? Explain their difference briefly with sketches.	4

B.E. CIVIL ENGINEERING SECOND YEAR
SECOND SEMESTER EXAM 2019

(~~1st~~/2nd Semester/~~Repeat/Supplementary /Spl. Supplementary /Old/Annual/Bi-Annual~~)

SUBJECT: IRRIGATION ENGINEERING
(Name in full)
PAPER xxxx

Time: ~~Two hours/~~ Three hours/~~Four hours/Six hours~~   Full Marks ~~30~~/100

(~~45~~/40   marks   for   this   part)

Use a separate Answer-Script for each part

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Part –II

Marks

No. of
Question

- *Do not retain mobile phone (even in switched of condition, too) to avoid R.A*
- *Maintain neatness.*
- *Assume reasonable data if it is not supplied.*
- *Answer any two questions*
- *All drawings must be drawn by pencil*
- No code etc. will be needed to answer the questions of this part

(1)(a) Classify the irrigation system through a tree structure. How wild flooding differs from check flooding? $3+3=6$

(b) Discuss 'border flooding' method of application of irrigation water to the field with the help of a neat sketch. 5

(c) In which respect the drip irrigation method & sprinkler irrigation method differs from the other conventional water distribution techniques? Answer in a concise way of discussion. 6

(d) Distinguish between surface irrigation and sub-surface Irrigation. 3

(2)(a) Define "Base period" and "Duty" and derive their relationship. $1+1+3=5$

(b) What is the role of transit loss in variation of duty? 4

(c) Discuss briefly on the crop seasons in the Indian agriculture. 5

(d) What is Kor watering? 2

(e) A stream of '115 litres/sec' was delivered from a canal and '100 litres/sec' were delivered to the field. An area of 2 hectares was irrigated in 10 hours. The run off loss in the field was $360m^3$. Determine for this case – Water conveyance efficiency and Water application efficiency. $2\times2 =4$

(3)(a) Briefly explain the advantages of lined channel in comparison with earthen channel. 5

(b) What are the different types of canal linings? 5

(c) An unlined canal giving a seepage loss of 3.0 cumecs per million square metres of wetted area is proposed to be lined with 10cm thick cement concrete lining, which costs Rs.220/- per 10 m^2. Using following data, work out the economics of lining & benefit cost ratio: 10

(i) Life of lining: 50 years

(ii) Annual revenue per cumec of water from all crops Rs.3.5 lakhs.

(iii) Discharge in the channel: 85 cumecs

(iv) Area of the channel: 42m^2

(v) Wetted perimeter of the channel: 18.3m

(vi) Wetted perimeter of the lining: 18.1 m

(vii) Annual maintenance cost of unlined channel: Rs. 1.0/per 10 m^2.

(viii) Seepage loss in lined canals: 0.04 cumec per million m^2 wetted area

(ix) Percentage savings of annual maintenance charges in lined canals, out of annual maintenance charges for unlined canal: 38%

(x) Rate of interest: 7.2%

End of the Question