

**B.E. CIVIL ENGINEERING THIRD YEAR FIRST SEMESTER EXAM 2019 (Old)**  
**IRRIGATION ENGINEERING**

Time: Three hours,

Full Marks 100

(50 marks for each part)

Use a separate Answer-Script for each part

**Page : 1 of 1**  
**Part - I (50 Marks)**

1. Answer any two questions.
2. Assume reasonable value of data if it is not supplied.

No. of Question		Marks
(1)(a)	Compare between Kennedy's theory and Lacey's theory and indicate about the improvements those have been incorporated in Kennedy's theory when compared with Lacey's theory.	8
(b)	Design an irrigation channel to carry 45 cumec of discharge with base width to depth ratio of 2.5. The critical velocity ratio is 1.0. Given that Kutter's rugosity coefficient = 0.023. Use Kennedy's method for design.	17
(2)(a)	Explain the term "Threshold of Motion".	5
(b)	A canal is to be designed to carry a discharge of 56 cumecs. The slope of the canal is 1 in 1000. The soil is coarse alluvium having a grain size of 5 cm. Assuming the canal to be unlimited and of a trapezoidal section, determine a suitable section for the canal, $\phi$ (angle of internal friction) may be taken as $37^\circ$ .	20
(3)(a)	What is water logging? Does it influence soil salinity?	2+1
(b)	Discuss briefly the causes of water logging.	10
(c)	How water logging can be controlled?	12

**The End**

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~~(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~~

(45/50 marks for each part)

Use a separate Answer-Script for each part

Page : 1 of 2

1. *Maintain neatness. Assume reasonable data if it is not supplied.*
2. Question no.1 is mandatory. Answer any other three questions alongwith question no.1
3. All drawings-must be drawn by pencil. Do not retain mobile phone during examination.
4. No code etc. will be needed to answer the questions of this part

No. of Question	Part -I/II	Marks																		
(1)(a)	An unlined canal giving a seepage loss of 3.0 cumecs per million square metres of wetted area is proposed to be lined with 12cm thick cement concrete lining, which costs Rs.180/- per 10 square metres. Given the following data work out the economics of lining & cost benefit ratio: (i) Life of lining: 50 years (ii) Annual revenue per cumec of water from all crops Rs.3.33 lakhs. (iii) Discharge in the channel: 85.5 cumecs (iv) Area of the channel: 40.5 m <sup>2</sup> (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 <sup>2</sup> . (viii) Seepage loss in lined canals: 0.04 cumec per million m <sup>2</sup> wetted area (ix) Percentage savings of annual maintenance charges in lined canals, out of annual maintenance charges for unlined canal: 36% (x) Rate of interest: 8.1%	9																		
(b)	What are the disadvantages of an earthen channel in comparison with a lined channel?	5																		
(2)(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 <sub>h</sub> ) as follows :	5																		
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Month</th> <th style="text-align: center;">June</th> <th style="text-align: center;">July</th> <th style="text-align: center;">Aug</th> <th style="text-align: center;">Sept.</th> <th style="text-align: center;">Oct.</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Monthly mean temp. (in °c)</td> <td style="text-align: center;">31.5</td> <td style="text-align: center;">31.0</td> <td style="text-align: center;">30.0</td> <td style="text-align: center;">29.0</td> <td style="text-align: center;">28.0</td> </tr> <tr> <td style="text-align: center;">P<sub>h</sub></td> <td style="text-align: center;">8.80</td> <td style="text-align: center;">9.05</td> <td style="text-align: center;">8.83</td> <td style="text-align: center;">8.28</td> <td style="text-align: center;">8.26</td> </tr> </tbody> </table>	Month	June	July	Aug	Sept.	Oct.	Monthly mean temp. (in °c)	31.5	31.0	30.0	29.0	28.0	P <sub>h</sub>	8.80	9.05	8.83	8.28	8.26	
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(b)	Streams of "120 litres/sec" were 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 <sup>3</sup> . Determine for this case - a. Water conveyance efficiency and b. Water application efficiency.	5																		
(c)	Just give the names of conventional techniques of water distribution in the farms.	2																		
(3)(a)	How the following factors affect the 'duty' of a crop (discuss about any two): (i) Soil and subsoil condition, (ii) Stage of growth, (iii) Temperature	2×3 = 6																		
(b)	What is transit loss?	2																		
(c)	What are the main crop sessions in India?	4																		
(4)(a)	With the help of graphical diagram explain the interrelationships among : Field capacity moisture content, permanent wilting point, available moisture content, non available moisture content, readily available moisture content, optimum moisture	9																		

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**PAPER xxxx**

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**Full Marks 30/100**  
(45/50 marks for each part)

Use a separate Answer-Script for each part

**Page : 2 of 2**

- (4)(b) "In optimum utilization of water, the cultivator has to get the maximum yield using any 3 amount of water." - Explain the meaning of the sentence. 3
- (5)(a) In which ways you can align irrigation canals? 6
- (b) After how many days water supply is needed to soil in order to ensure sufficient irrigation 6 of a given crop for following field conditions :
- Field capacity of soil= 30%, dry density of soil in average=  $1.55 \text{ gm/cm}^3$ , permanent wilting point= 14%, effective depth of root zone= 80 cm, daily consumptive use of water for given crop= 1.1 cm, readily available moisture= 80 % of the available moisture.

***End of the Questions***