Ref. No. Ex/CE/5/T/205/2018

BACHELOR OF CIVIL ENGINEERING (EVENING) EXAMINATION 2018

(Second Year-Evening, Second Semester)

IRRIGATION ENGINEERING

Time: Three Hours

Full Marks 100
(50 marks for each part)

Use a separate Answer-Script for each part

No. of questions		PART I (50 Marks)	Marks
		*Answer any **TWO** questions from this PART.* *Assume suitable values for the parameters if not supplied.*	
1	(a)	Draw neat sketches and discuss about the canal bed formation at different conditions of canal flow.	12
	(b)	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).	8
	(c)	Compare Kennedy's theory and Lacey's theory on regime channel.	5
2	(a)	Define the balancing depth for excavating a channel. Why the balancing depth calculation is necessary?	2+3=5
	(b)	Draw neat sketch to show a typical cross-section of an irrigation canal.	3
	(c)	What is the utility of providing a berm and back berm on either side of canal? Discuss with neat sketches.	7
	(d)	Derive the expression for estimation of 'Average Unit Tractive Force' acts on channel bed.	3
	(e)	Calculate the balancing depth for a channel section having a bed width 15 m and side slopes of 1(H):1(V) in cutting and 1.5(H):1(V) in filling. The bank embankments are kept 3.0 m higher than the ground level (berm level) and crest width of banks is kept as 2.0 m.	7
3	(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)	Prove that the 'shear stress required to move a grain on the bank is less than the shear stress required to move a grain on the bed'.	5
	(f)	Explain the Initial theory for regime and its modifiecation. Also explain true regime, initial regime and final regime.	2+3x2=8
4	(a)	What is the importance of rivers and necessities of controlling them?	3
	(b)	Write down the classification and sub-classification of rivers on the basis of topography. Explain them in brief.	3+5=8
	(c)	Write down the classification of rivers on the basis of flood hydrographs, also the classification of Indian rivers. Explain them in brief.	2+2=6
	(d)	What is called river bend and river meandering. Explain their difference briefly with sketches.	3
	(f)	What may the reason behind formation of oxbow lake?	2
	(g)	What is the objective of river training works?	3

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B. CIVIL ENGG. (PART TIME) 2ND. YEAR 2ND. SEM. EXAM. 2018

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

SUBJECT: **IRRIGATION ENGINEERING**

Time: ~~Two hours~~/ Three hours/~~Four hours/Six hours~~ **Full Marks 50**

Use a separate Answer-Script for each part

No. of Question	Part –II	Marks

- *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)	Define and explain the following terms : (i) Cash crops (ii) Available moisture (iii) Crop ratio (iv) Paleo irrigation	5
(b)	Define "Duty" and "Delta" and derive their relationship.	4
(c)	The C.CA for a distributary is 14000 hectares. The I.I. for Rabi (wheat) is 50% and for Kharif (rice) is 15%. If the total water requirement of the two crops are 35.5 cm and 120 cm and their periods of growth are 160 and 140 days respectively, (i) determine the out let discharge from average demand considerations, (ii) also determine the peak demand discharge, assuming that the Kor water depths for two crops are 12.5 cm and 18 cm and their Kor periods are 4 weeks and 2 weeks respectively.	11
(d)	How is the flow irrigation different from lift irrigation?	5
(2) (a)	With the help of graphical diagram explain the interrelationship among: Field capacity moisture content, permanent wilting point, available moisture content, non available moisture content, readily available moisture content and optimum moisture content.	4
(b)	Distinguish between hygroscopic water and gravitational water and explain which of these two types is useful for plant growth.	3
(c)	A stream of 130 liters per second was diverted from a canal and 100 liters per second were delivered to the field. An area of 1.6 hectares was irrigated in 8 hours. The effective depth of root zone was 1.7 m. The runoff loss in the field was 420 m^3 . The depth of water penetration varied linearly from 1.7 m at the head end of the field to 1.1 m at the tail end. Available moisture holding capacity of the soil is 20 cm per meter depth of soil. It is required to determine the (a) water conveyance efficiency, (b) water application efficiency, (c) water storage efficiency and (d) water distribution efficiency. Irrigation was started at a moisture extraction level of 50% of the available moisture.	10
(d)	Wheat is to be grown in a field having a field capacity equal to 27% and the permanent wilding point is 13%. Find the storage capacity in 80 cm depth of the soil, if the dry unit weight of the soil is 14.72 kN/m^2. If	8

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B. CIVIL ENGG. (PART TIME) 2ND. YEAR 2ND. SEM. EXAM. 2018

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

SUBJECT: IRRIGATION ENGINEERING

Time: ~~Two hours~~/ Three hours/~~Four hours/Six hours~~ **Full Marks 50**

Use a separate Answer-Script for each part

	irrigation water is to be supplied when the average soil moisture falls to 18 %, find the water depth required to be supplied to the field if the field application efficiency is 80 %. What is the amount of water needed at the canal outlet if the water lost in the water-courses and the field channels is 15 % of the outlet discharge?	
(3) (a)	What are the possible layout of tile drain systems?	3
(b)	In a tile drainage system, the drains are laid with their centers 1.55 m below ground level. The impervious layer is 8.5 m below the ground level and the average annual rainfall in the area is 80 cm. If 1% of the annual rainfall is to be drained in 24 hours to keep the highest position of the water table to 1metre below ground level, determine the spacing of the drain pipes. Coefficient of permeability may be taken as 0.001 cm/sec.	9
(b)	What are the disadvantages of an earthen channel in comparison with a lined channel?	4
(c)	Design a concrete lined channel of trapezoidal section to carry a discharge of 280 cumec at a longitudinal slope of 1 in 6500. The side slope of the channel are to be made as 1.5:1 and limiting depth of 3m is to be maintained. Taking Manning's rugosity coefficient for the lining =0.015	9