NATIONAL INSTITUTE OF TECHNOLOGY HAMIRPUR (H.P.) DEPARTMENT OF CIVIL ENGINEERING End Semester Theory Examination May, 2023

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Course Name: Water Resources Engineering-II Duration: 3 Hours Course Code: CE-322 Max.*Marks: 50

Roll No...../

Instructions:

- Attempt all questions.
- Assume any other suitable data if required.

Q.1.	Derive an expression for the discharge through a channel by Chezy's formula.	[5]
Q.2.	What is integrated watershed management (IWRM) approach? Explain its different objectives.	[5]
Q.3.	A water course commands an irrigated area 1000 hectares. The intensity of irrigation of rice in this area is 70%. The transplantation of rice crop takes 15 days and during the transplantation period the total depth of water required by the crop on the field is 500 mm. During the transplantation period, the useful rain falling on the field is 120 mm. Find the duty of irrigation water for the crop on the field during transplantation, at the head of the field and also at the head of the water course assuming losses of water to be 20% in the water course. Also calculate the discharge required in the water course.	[5]
	What are the factors affecting duty?	
01	After how many days will you order irrigation in order to ensure healthy growth of	[5]

- Q.4. After how many days will you order irrigation in order to ensure healthy growth of [5] crops, if
 - (i) Field capacity of soil = 29%
 - (ii) Permanent wilting percentage = 11%

(iii) Density of soil = 1 300 kg/m3

(iv) Effective depth of root zone = 700 mm

(v) Daily consumptive use of water for the given crop = 12 mm

For healthy growth moisture content must not fall below 25% of the water holding capacity between the field capacity and the permanent wilting point.

Explain the terms 'crop period' and 'base period'.

Q.5. A farmer wishes to have his own pump set for the following cropping pattern to be [5], followed in five hectares of his land. Calculate the right size of pump he should have, litres/second.

Season	Crop	Area to be irrigated, ha	Intensity irrigation, cm	Rotation period days
	Wheat	2.0	7.5	12
D 1'	Cotton	0.4	7.5	20
Rabi	Vegetables	0.4	7.5	10
	Mustard	2.2	5.0	40

For each crop, duration of pumping hours per day is 10.

What is consumptive use of water?

Roll No.....

[10]

- Q.6. Design an irrigation channel to carry a discharge of 5 cumec. Assume N = 0.0225 and [5] m = 1. The channel has a bed slope of 0.2 m per kilometre. Discuss the Lacey's initial and final regime conditions?
- Q.7. Determine the dimensions of the irrigation canal for the following data : (B/D) ratio = [5] 3.7; N = 0.0225; m = 1.0; and S = (1/4000). Side slopes of the channel are 1/2 horizontal to 1 vertical. Also determine the discharge which will be flowing in the channel. Discuss the drawbacks of Kennedy's theory.
- Q.8. A channel section is to be designed for the following data: Discharge Q = 5 cumec, Silt [5] factor f = 1.0, Side slope = 0.5H : 1V. Also determine the bed slope of the channel. Discuss the drawbacks of Lacey's theory.
- Q.9. (a.) Write short notes on:
 - i. Water logging causes and preventive measures
 - ii. Hydraulic jump and principle of energy dissipation
 - iii. Hydraulic mean depth and wetted perimeter
 - iv. Factors affecting the choice of the method of irrigation
 - v. Water resources availability and demand in India

OR

- (b.) Write short notes on:
 - i. Field capacity and wilting point

ii. Available moisture and readily available moisture

iii. Gradually varied flow and assumptions for computation

- iv. Surface irrigation and sub-surface irrigation
- v. Advantages and limitations of sprinkler method of irrigation

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