



JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), April-May 2015

B. Tech in Civil Engineering, Semester VI

Roll No.....

CE 603: Water Resource and Irrigation Engineering

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A	Objective type multiple choice questions (10 questions @ 1 mark)	10
i.	A current meter measures the velocity of flow, if it is held.....	
ii.	For diversion of flood water of rivers, the type of canal constructed, is.....	
iii.	A hydroelectric scheme operating under a head of 80 m will be classified as (a) low head scheme (b) medium head scheme (c) high head scheme (d) none of the above	
iv.	The forces, which are considered for the analysis of an elementary profile of a gravity dam under empty reservoir condition, are i) Water pressure ii) Self weight iii) Uplift iv) Pressure due to earthquake The correct answer is (a) Only (ii) (b) (i), (ii) and (iii) (c) (i), (ii) and (iv) (d) (i), (ii), (iii) and (iv)	
v.	An artesian aquifer is the one where (a) water surface under the ground is at atmospheric pressure (b) water is under pressure between two impervious strata (c) water table serves as upper surface of zone of saturation (d) none of the above	
vi.	If d is the depth of the aquifer through which water is flowing, then the relationship between permeability k and transmissible T is given by (a) $T = kd$ (b) $T = k/d$ (c) $T = Vkd$ (d) $k = VTd$	
vii.	Horizontal acceleration due to earthquake results in (a) hydrodynamic pressure (b) inertia force into the body of the dam (c) both (a) and (b) (d) none of the above	
viii.	Silt excluders are constructed on the (a) river bed upstream of head regulator (b) river bed downstream of head regulator (c) canal bed upstream of head regulator (d) none of the above	

ix	If there are two canals taking off from each flank of a river, then there will be (a) one divide wall and one undersluice (b) one divide wall and two undersluices (c) two divide walls and one undersluice (d) two divide walls and two undersluices	
x	Seepage through foundation in an earthen dam is controlled by providing (a) rock toe (b) horizontal blanket (c) impervious cut off (d) chimney drain	
Q.2	Short answer type questions (4 questions @ 2.5 marks)	10
i.	Write short notes on Ogee-shaped spillway.	
ii.	What is meant by consumptive use of water?	
iii.	Draw uplift pressure diagram for dam with the following data (i) depth of water = 90 m (ii) top width = 20 m (iii) bottom width = 35 m Uplift may be considered to be acting on 45 % of the area of section. Tail water depth is 8 m.	
iv.	What are the disadvantages of irrigation?	
Q.3A	Discuss with the help of diagram various forms of a soil moisture.	05
Q.3B	A tube well of 300 mm diameter penetrates fully a confined aquifer. The length of the strainer is 25 m. Calculate the yield from the well under a drawdown of 4 m. The coefficient of permeability of aquifer = 60 m/day. Assume radius of circle of influence equal to 200 m.	05
Q.4A	Discuss in brief, about various types of irrigation efficiencies.	05
Q.4B	Compare Kennedy's and Lacey's silt theories. Why is Lacey's conception superior to that of Kennedy's theory?	05
Q.5A	What is sprinkler irrigation? Discuss the advantage and disadvantage of sprinkler irrigation over surface irrigation.	05
Q.5B	The root zone of a certain soil has a field capacity of 30% and permanent wilting percentage is 10%. Determine the depth of moisture in the root zone at the field capacity and wilting point? (The dry weight of the soil is 13.73 kN/m ³ or 1400 (kg(f)/m ³).	05
Q.6A	A water course commands an irrigated area 1000 hectares. The intensity of irrigation of rice in the 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.	05



Q.6B What is a spillway? What are its function? Enumerate various type of spillways. 05

OR

Q.6B For an elementary profile of a dam ,the following data are available 05

Limiting height of a masonry dam =90 m

Weight of masonry dam =2400 Kg/m³

Uplift intensity factor =0.67

Factor of safety =2.0

specific weight of water =9810N/m³

(i)determine safe limiting stress ignoring uplift

(ii) Also determine H (limiting height) and bottom width when uplift intensity factor and factor of safety are given.



Q.7A Table below gives the necessary data about the crop, duty of water and area under each crop commanded by a canal taking off from a storage reservoir. Taking a time factor for the canal to be (12/20).calculate the discharge required at the head of the canal .if the capacity factor is 0.8, determine the design discharge. 05

Crop	Base period (days)	Area (hectares)	Duty of water at the head of the canal(hectares/cumec)
Sugar cane	320	900	580
Overlap for sugarcane in hot weather	90	150	580
Wheat(Rabi)	120	750	1600
Bajra(kharif)	120	600	2000
Vegetables(hot weather)	120	320	600

Q.7B Describe with neat sketch unconfined aquifer. And explain the terms "storage coefficient "and "coefficient of transmissibility". 05

OR

Q.7B Define any five 05

(i)Duty and Delta ,(ii)Permanent wilting point,(iii)Critical velocity ratio(m), (iv)forebay ,(v)Penstock,(vi)piping, (vii)weir and barrage .

Q.8A A gravity well has a diameter of 1 m. Before pumping is started the depth of water in the well is 50 m. when pumping is being done at the rate of 2000 liter per minute the drawdown in a well 20 m away is 4 m and in another well 40 m away is 2 m. Determine (a) radius of the circle of influence (b) coefficient of permeability (c) drawdown in the well. 10

Q.9A Explain with help of diagram, the various component parts, along with their functions, of a diversion headwork 10

Q.9B A most efficient trapezoidal section is required to give a maximum discharge of 21.5m³/s of water. The slope of channel bottom is 1 in 2500. 10

	Taking $C = 70 \text{ m}^{1/2}/\text{sec.}$ in chezy's equation, determine the dimension of the channel. Also determine the value of manning, n taking the value of velocity of flow as obtained for the channel by chezy's equation.	
	OR	
Q.9B	Classify the hydel head scheme according to available head .Explain principal component of hydroelectric scheme.	10

