

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Backlog), Nov.-Dec. 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. Rate of flow of water through the ground strata, can be estimated by
 - (a) Manning' formula
 - (b) striker formula
 - (c) Darcy's formula
 - (d) Dupuit's formula
- ii. For diversion of flood water of rivers, the type of canal constructed, is.....
- iii. Discharge per unit drawdown of a well is known as the
 - (a) specific yield
 - (b) specific retention
 - (c) specific capacity
 - (d) specific storage
- 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. The dimension of coefficient of Transmissibility T are
 - (a) L^2/T
 - (b) L^3T^2
 - (c) L/T^2
 - (d) dimensionless
- 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) $T = Vk d$
 - (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 aboveSilt excluders are constructed on the
- viii
 - (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 A current meter measures the velocity of flow, if it is held.....
- Q.2 Short answer type questions (4 questions @ 2.5 marks) 10
- What are dam classification based on construction material? Write any four.
 - A crop require a total depth of 92 cm of water for a base period of 120 days. Find the duty of water.
 - 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.
 - 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 25m. Calculate the yield from the well under a drawdown of 4 m .the coefficient of permeability of aquifer = 60m/day. Assume radius of circle of influence equal to 200 m. 05
- Q.4A 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.4B Compare Kennedy's and lacey's silt theories. Why 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 Two identical tube wells penetrating fully a 12 m thick aquifer are located at 180 m apart. The tube wells have diameter of 30 cm , radius of influence of 300 m, and the coefficient of permeability of aquifer is 10^{-3} m/sec. Compute
 (i) Discharge of tube well when only one is working with a drawdown of 5m.
 (ii) Percentage decrease in discharge of the well, if both are working with drawdown of 5m. 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 05

calculate the discharge required in the water course.

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 Discuss in brief, about various types of irrigation efficiencies. 05

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

OR

Q.7B How topography will govern selection of a Dam. Explain your answer with example. 05

Q.8A What preliminary investigation are necessary for selecting a site for the dam? 10
How will you optimize size and type of a dam considering the preliminary investigation? You may consider catchment area of Banas river (Rajasthan) to answer your query.

Q.9A Classify the hydel head scheme according to available head .Explain principal component of hydroelectric scheme. 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 Explain with help of diagram, the various component parts, along with their functions, of a diversion headwork. (Head-work) 10