KATHMANDU UNIVERSITY
End Semester Examination
14 – January 2024

Marks Scored:

Level : B.E.
Year : IV
Course : CIEG 407
Semester : I

Exam Roll No. :
Time: 30 mins.
F. M. : 10

Registration No.:
Date :

SECTION "A"
[20Q. × 0.5 =10 marks]

Choose the most appropriate answer among the given choices.

1. Given that the base period is 100 days and the duty of the canal is 1000 hectares per cumecs, the depth of water will be _____.
   a. 0.864 cm b. 8.64 cm c. 86.4 cm d. 864 cm

2. The water which can be utilized by the crops from the soil is called _____.
   a. Field capacity water b. Capillary water
   c. Hygroscopic water d. None of the mentioned

3. Acidic soils are reclaimed by _____.
   a. Leaching of the soil b. Using limestone as a soil amendment
   c. Using Gypsum as a soil amendment d. Provision of drainage

4. 10 m^3/s of water is diverted to a 32-hectare field for 4 hours. Soil probing after irrigation showed that 0.3 m of water had been stored in the root zone. Water application efficiency in this case would be _____.
   a. 96% b. 66.67% c. 48% d. 24%

5. Consider the following zones:
   I. Saturation zone II. Capillary zone III. Intermediate zone IV. Soil water zone
   Which of these does not relate to the zone of aeration in the soil profile?
   a. I and II b. II and III c. IV only d. I only

6. A canal fall is a control structure _____.
   a. Located at a place where the country slope is flatter than the canal bed slope
   b. Located most economically where the depth of cutting is less than the balancing depth
   c. The location of which is independent of the command to be served
   d. Designed to secure raising of water surface on its u/s

7. The soil becomes practically infertile when its pH value is above _____.
   a. 0 b. 7 c. 11 d. 2

8. For medium silt whose average grain size is 0.16 mm, Lacey's silt factor is likely to be
   a. 0.3 b. 0.45 c. 0.7 d. 1.32

9. Rigid boundary canals, whose bed and banks are made with non-erodible materials, are in
   a. Initial regime b. Final regime c. True regime d. Permanent regime

10. A canal fall is a control structure
    a. Located at a place where the country slope is flatter than the canal bed slope
    b. Located most economically where the depth of cutting is less than the balancing depth
    c. The location of which is independent of the command to be served
    d. Designed to secure raising of water surface of its upstream

11. Pinpoint the correct statement:
    a. Irrigation helps in adopting mixed cropping.
    b. 'Mixed cropping' means sowing of a different crop after a particular crop has been grown
    c. Over irrigation may lead to saving in fertilizers
    d. Irrigation helps in avoiding mixed cropping

12. In a well-drained soil, the useful moisture for plant growth essentially comes from
    a. Gravity water
    b. Capillary water
    c. Hydroscopic water
    d. Water of adhesion

13. Consider the following statements:
    The function of a cut-off in an earth dam is to
    I. reduce uplift pressures on the dam
    II. prevent undermining of foundation
    III. reduce loss of stored water
    IV. support the dam
    Which of these statements are **CORRECT**?
    a. I and III
    b. II and IV
    c. II and III
    d. III and IV

14. In a river, silt excluder and silt ejector are constructed
    a. At a location after the head regulator and at the head of the canal, respectively
    b. At the head of the canal and at a location after the head regulator, respectively
    c. At the same location
    d. At specific locations depending upon the diverse factors and their locations do not follow a set pattern

15. As per the Lacey's method for design of alluvial channels, identify the TRUE statement from the following:
    a. Wetted perimeter increases with an increase in design discharge
    b. Hydraulic radius increases with an increase in silt factor
    c. Wetted perimeter decreases with an increase in design discharge
    d. Wetted perimeter increases with an increase in silt factor

16. In a barrage on pervious foundation, sheet piles are provided both upstream and downstream of the barrage to reduce uplift pressure and to prevent piping. Which one of the following statements are true in this regards?
    a. Compared to downstream sheet pile, the upstream sheet pile is more effective in reducing uplift and piping
    b. Compared to upstream sheet pile, the downstream sheet pile is more effective in reducing uplift and piping
    c. Downstream sheet pile is more effective in reducing uplift while the upstream sheet pile is more effective in reducing piping
    d. Upstream sheet pile is more effective in reducing uplift while the downstream sheet pile is more effective in reducing piping

17. The permissible tractive force in an erodible channel depends upon which of the following?
    i. Angle of repose of the material
    ii. Particle size
    iii. Sediment content of water
    iv. Wetted perimeter of channel
    Select the correct answer using the codes given below:
    a. i, ii, and iv
    b. i, ii and iii
    c. i and iii only
    d. ii and iv only

18. Leaching is a process
    a. By which alkali salts present in the soil are dissolved and drained away
    b. By which alkali salts in soil come up with water
    c. Of draining excess water of irrigation
    d. Which controls water-logging

19. Salinity in irrigation water is measured by
    a. SAR value
    b. Electrical – conductivity value
    c. pH – value
    d. Both a and c

20. The worst condition of uplift on the floor of a syphon aqueduct occurs when there is
    a. High flood flow in the drainage with canal dry
    b. Full supply flow in the canal with drainage dry
    c. High flood flow in the drainage with canal running full
    d. Water is at drainage bed and canal is dry

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SECTION "B"
[4Q.× 10 = 40 marks]

Attempt *ALL* questions. Assume suitable value if any data is missing.

1. a. How the extraction pattern of Soil moisture varies in root zone in plants differs? Explain. [3]

   b. Calculate the bed width for an irrigation channel to carry a discharge of 5 cumec. Side slopes of the channel are ½ horizontal to 1 vertical. Assume critical velocity ratio as 0.8. Take first trial depth of flow as 1 m. The channel has a bed slope of 0.2 m per kilometer. Using Kutter's equation, $V = C\sqrt{RS}$, check the depth. The value of C for the given conditions is computed as 30. V is the mean velocity of flow in m/s and R is the hydraulic mean radius in meter. State the factors on which the value of C will depend. [5]

   c. Explain the importance of Duty and Delta in Irrigation. [2]

2. a. Show the relationship to obtain the maximum area irrigated with a supply ditch. [5]

   b. A river discharges 1000 m^3/s of water at high flood level of RL = 103. A weir is constructed for flow diversion with a crest length of 255 m and total length of concrete floors as 40 m. The weir has to sustain the under seepage at a maximum static head of 2.4 m. The silt factor and the safe exit gradient for the river bed material are 1.1 and 1/6 respectively. Determine the depth of cut-off required at the downstream end of the concrete floor. Take the level of downstream concrete floor as RL = 100. Check for the exit gradient. [5]

3. a. What is the difference between silt excluder and silt extractors or silt ejectors? [3]

   b. Determine the evapotranspiration and irrigation requirement for wheat, if the water application efficiency is 65% and the consumptive use coefficient for the growing season is 0.58 for the following data: [5]

Month	Mean monthly temperature, °C	Monthly percentage of sunshine hours	Effective rainfall, cm
November	18	7.2	2.6
December	15	7.15	2.8
January	13.5	7.3	3.5
February	14.5	7.1	2

   c. Define retrogression. What is the main cause of retrogression? [2]

4. a. What are the different corrections used in Khosla's method of independent variables for determination of pressures and exit gradient for seepage below a weir or a barrage? Write in brief. [4]

   b. As an Irrigation Engineer, what would be your main responsibility in operation and maintenance of irrigation system? [4]

   c. Explain the objectives of river training works. [2]