KATHMANDU UNIVERSITY
End Semester Examination
June/July, 2023

Marks Scored:

Level : B.E.
Year : II

Course : CIEG 206
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date : 02 JUL 2023

SECTION "A"
[20 Q. × 0.5 = 10 marks]

Encircle the most appropriate answer.

1. The mass curve of rainfall is a plot of
   a. Rainfall depths for various equal durations plotted in decreasing order
   b. Rainfall intensity vs time in chronological order
   c. Accumulated rainfall intensity vs time
   d. Accumulated precipitation vs time in chronological order

2. The surface joining the static water levels in several wells penetrating a confined aquifer represents
   a. Water table surface
   b. Capillary fringe
   c. Piezo metric surface of the aquifer
   d. Cone of depression

3. The discharge per unit drawdown at well is called
   a. Specific yield
   b. Specific capacity
   c. Storage coefficient
   d. Transmissivity

4. Water existing capillary zone is a part of
   a. Phreatic line
   b. Ground water
   c. Gravity water
   d. Vadose water

5. The time required by rainwater to reach the outlet of drainage basin, is generally called
   a. Time of concentration
   b. Time of overland flow
   c. Concentration time of overland flow
   d. Duration of the rainfall

6. The flow-mass curve is graphical representation of
   a. Cumulative rainfall and time
   b. Discharge and percentage probability of flow being equal or exceeded
   c. Cumulative discharge volume and time in chronological order
   d. Discharge and time in chronological order

7. The radius of influence is
   a. Radius of the main well
   b. Distance from the wall of main well to the point of zero draw down
   c. Distance from the center of main well to the point of zero drawdown
   d. Radius of observation well r_1 and r_2

8. The area between the isohyets 45cm and 55cm is 100 square km and between 55cm and 65cmis 150 square km. The average depth of annual precipitation over the above basin of 250 square km will be
   a. 50 cm
   b. 55 cm
   c. 56 cm
   d. 60 cm

9. If d is the depth of aquifer through which water is flowing, then the relationship between permeability k and transmissivity T is given by
a. $T = k * d$ b. $T = k/d$ c. $T = d / k$ d. $T = K - d$

10. A catchment is made of 60% area with runoff coefficient 0.4 and remaining 40% area with runoff coefficient 0.6. What is the weighted runoff coefficient to be used in rational formula?
a. 0.6 b. 0.24 c. 0.5 d. 0.48

11. In the single point method of finding mean velocity across a vertical, the velocity is measured above the stream bed at
a. 0.4d b. 0.6d c. 0.7d d. 0.8d

12. Pick up the wrong statement from the following
a. Transport of sediment particles by bouncing along the bed is known as saltation.
b. The trap efficiency of the reservoir decreases with increase in the capacity –inflow ratio
c. The sediment which moves as bed load at one section may move as suspended load at another section
d. Deposition of coarse sediment takes place at the entrance to the reservoir

13. Removal of soil from rivulets by concentrated overland flow is known as
a. Sheet erosion b. Rill erosion c. Channel erosion d. Gully erosion\

14. What does hydrograph display?
a. Variations of discharge over time
b. Variations in snowfall overtime
c. Variations in water temperature against discharge
d. Variations in sediment concentration against river discharge

15. All the land that contributes water to particular stream or river is the
a. Watershed b. Runoff zone c. Water table d. Rain shadow

16. The rational method used for the computation of the runoff from a watershed gives
a. Runoff volume b. Discharge rate of channel
c. Runoff rate d. Peak runoff rate

17. Darcy's law for ground water movement states that the velocity is proportional to
a. Hydraulic gradient b. The square of hydraulic gradient
c. The logarithmic of hydraulic gradient d. Reciprocal of hydraulic gradient

18. The basic principle of unit hydrograph is
a. Non linearity and variance b. Non linearity and invariance
c. Linearity and variance d. Linearity and invariance

19. The time lag of a hydrograph increases with
a. Increase in intensity of storm b. Decrease in intensity of storm
c. Increase in time of concentration d. Decrease infiltration capacity of the storm

20. A structure is designed for T year flood. It has an estimated useful life period of N years. Then the probability that will not fail during the life period is
a. $(1 - 1/T)$ b. $1 - (1 - 1/T)^N$ c. $(1 - 1/T)^N$ d. $(1 - 1/N)^T$

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Time : 2 hrs. 30 mins.

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Semester : II
F. M. : 40

SECTION "B"

Attempt *ALL* questions. Make suitable assumptions wherever needed.

1. What do you understand by hydrologic model? Explain the hydrologic model in brief. [1+3]

2. A catchment area of 150 Km^2 received 125 cm of rainfall in a year. At the outlet of the catchment, the flow in the stream draining the catchment was found to have an average rate 2.5 m^3/s for 3 months, 4.5 m^3/s for 6 months and 3.5 m^3/s for 3 months. Calculate the runoff coefficient of the catchment. [2.5]
If the afforestation of the catchment reduced the runoff coefficient to 0.4, what is the increase in the abstraction from precipitation due to infiltration, evaporation and transpiration, for the same annual rainfall of 125 cm? [2.5]

3. Explain the atmospheric transport process in brief. [3]

4. A 30cm diameter well penetrating an unconfined aquifer of 20m thick below water table is pumped at a uniform rate of 600 liters/min, till the water level in the well becomes steady. Two observations wells drilled radially at a distance of 20 and 80 m from the center of the well show depression of 3.2m and 1.1m respectively.
   a. Determine the permeability of the aquifer. [3]
   b. Determine the drawdown at the main well. [2]

5. Differentiate between (*ANY TWO*) [2 × 2.5 = 5]
   a. Flow duration curve and Rating curve
   b. Hydrograph and Hyetograph
   c. Infiltration and Evapotranspiration

6. The ordinate of 6 hour- unit hydrograph is given below [6]

Time (h)	0	6	12	18	24	30	36	42	48	54	60	66
Ordinate 6h -UH	0	25	63	154	121	93	70	50	32	22	10	0

Determine the flood hydrograph due to storm given below

Time of beginning of storm	0	6	12	18
Accumulated rainfall (cm)	0	3	5.6	9.2

The Φ-index for the storm can be assumed to be 0.1 cm/h. Assume base flow to be 18m^3/s constant throughout.

7. What is flood routing? State the differences of hydrologic and hydraulic routing. [1+2]

8. Describe the types of fluvial sediment. List different methods available for reservoir sediment control. [2+2]

9. Given the following data for a stream gauging operation in a river. Compute the discharge. [5]

Distance from right bank (m)	**Depth (m)**	**Velocity (m/s)**
		At 0.6d
0	-	-
1.5	0.2	0.2
2.5	0.4	0.4
4.0	0.7	0.7
5.5	0.4	0.4
6.5	0.2	0.2
8	-	-