WATER RESOURCES ENGINEERING-I (SEMESTER - 6)

CS/B.Tech (CE-N)/SEM-6/CE-605/09
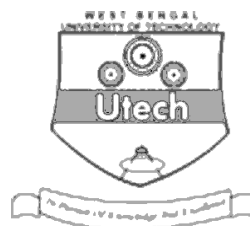
1. ....
   Signature of Invigilator

2. ....
   Signature of the Officer-in-Charge

Reg. No.

Roll No. of the Candidate

Time : 3 Hours]   [Full Marks : 70

INSTRUCTIONS TO THE CANDIDATES :

1. This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **32 pages**. The questions of this concerned subject commence from Page No. 3.

2. a) In **Group – A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question**.

   b) For **Groups – B** & **C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group – B** are Short answer type. Questions of **Group – C** are Long answer type. Write on both sides of the paper.

3. **Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.

4. Read the instructions given inside carefully before answering.

5. You should not forget to write the corresponding question numbers while answering.

6. Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.

7. **Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**

8. You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.

9. Rough work, if necessary is to be done in this booklet only and cross it through.

No additional sheets are to be used and no loose paper will be provided
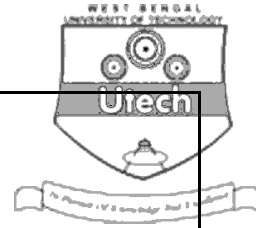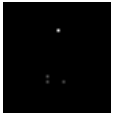

FOR OFFICE USE / EVALUATION ONLY
Marks Obtained

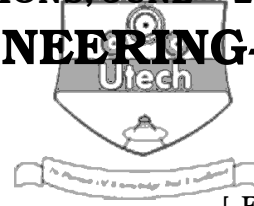|	Group – A								Group – B			Group – C			Total Marks	Examiner's Signature
Question Number																
Marks Obtained																

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Head-Examiner/Co-Ordinator/Scrutineer

6848 (15/06)

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ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009

WATER RESOURCES ENGINEERING-I

SEMESTER - 6

Time : 3 Hours]

[Full Marks : 70

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : 10 ∞ 1 = 10

   i) A hyetograph is a plot of

   a) Cumulative rainfall *vs* time
   b) Rainfall intensity *vs* time
   c) Rainfall depth *vs* duration
   d) Discharge *vs* time.

   ii) An isohyet is a line joining points having

   a) equal evaporation value

   b) equal barometric pressure

   c) equal height above the MSL

   d) equal rainfall depth in a given duration.

   iii) The dilution method of stream gauging is ideally suited for measuring discharge of

   a) a large alluvial river

   b) steady flow in a mountain stream

   c) steady flow in a small turbulent stream

   d) a stretch of a river having industrial pollution load.

4

iv) Slope-area method is extensively used in

   a) development of rating curve

   b) estimation of flood discharge based on with water marks

   c) cases where shifting control exists

   d) cases where backwater effect is present.

v) The term 'base flow' denotes a

   a) delayed ground water flow reaching a stream

   b) delayed ground water and snow-melt reaching a stream

   c) delayed ground water and interflow

   d) the annual minimum flow in stream.

vi) Khosla's formula for monthly runoff R_m due to a monthly rainfall

   P_m is $R_m = P_m - L_m$, where L_m is

   a) a constant

   b) monthly loss and depends on the mean monthly catchment temperature

   c) a monthly loss coefficient depending on the antecedent precipitation index

   d) the stream discharge against the percentage of times the flow is equalled or exceeded.

vii) A unit hydrograph has

   a) one unit of peak discharge

   b) one unit of rainfall discharge

   c) one unit of direct runoff

   d) one unit of the time base of direct runoff.
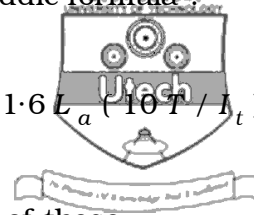
viii) Which one of the following formulae is Blaney Criddle formula ?

a) $ET = 2 \cdot 54\ KF$
b) $ET = 1 \cdot 6\ L_a\ (10\ T\ /\ I_t\ )^a$

c) $ET = I_i\ /\ S_i\ + K_i$
d) None of these.

ix) Lysimeter is used for measuring

a) Evaporation
b) Transpiration

c) Evapo-transpiration
d) none of these.

x) Evapo-transpiration is confined

a) to daylight hours
b) night time only

c) land surface only
d) none of these.

xi) The average pan coefficient for the standard US Weather Bureau class A pan is

a) $0 \cdot 85$
b) $0 \cdot 70$

c) $0 \cdot 90$
d) $0 \cdot 20$.

xii) The probable maximum depth of precipitation over a catchment is given by the relation $PMP =$

a) $P + K A^n$
b) $P + K \sigma$

c) $P \exp(- K A^n)$
d) mP.

xiii) In a certain irrigation project, for a given year, 72% and 56% of the culturable command remained unirrigated in Kharif and Rabi seasons, respectively. The intensity of irrigation for that year and for that project is

a) 36%   b) 64%

c) 72%   d) 128%.

xiv) The duty at the end point of a canal minor, where the Govt. control usually ceases is called

a) duty on field   b) outlet duty

c) flow duty   d) storage duty.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Define Duty & Delta of a crop and express relation between them.

3. Calculate the optimum no. of rain guages station for the given catchment with the following data :

Station No.	1	2	3	4
Rainfall in mm	700	500	300	440

Assume the error in the rainfall estimation as 10%.
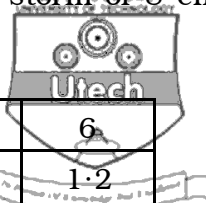
4. Explain objectives, advantages and disadvantages of canal lining.

5. Explain the following :

a) Infiltration index

b) Evapo-transpiration.
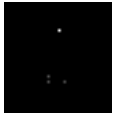
6. Calculate the value of φ-index from the following data of storm of 8 cm precipitation that resulted in a direct runoff of 4.4 cm :

Time in Hr.	1	2	3	4	5	6
Incremental Rainfall per Hr. in cm	0·57	0·58	1·25	3·00	1·40	1·2

7. Explain precipitation types and form.

8. Write the rain gauge densities according to WMO recommendations and Indian Standards.

9. Explain the procedure for checking a rainfall data for consistency.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 ∞ 15 = 45

10. a) What are the drawbacks of Kennedy's theory ?

b) Applying Kennedy's theory design an irrigation channel to carry a discharge of 5 cumec. Assume $N = 0·0225$ and $m = 1$. The channel has a bed slope of 0·2 m per kilometre. 5 + 10

11. a) Compare Lacey's theory with Kennedy's theory.

b) Design an irrigation channel in alluvial soil according to Lacey's silt theory for the following data :

Full supply discharge = 10 cumec

Lacey's silt factor = 0·9, side slopes of channel $= \frac{1}{2} (H) : 1 (V)$ 5 + 10

12. Design a trapezoidal shaped concrete lined channel to carry a discharge of 200 cumec at a slope of 30 cm/km. The side slopes of the channel are 1.5 : 1. The value of N may be taken as 0.017. Assume limiting velocity in the channel as 2 m/s.
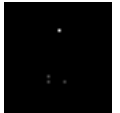
Also solve the problem if limiting velocity is not given but $B/D = 5$. 15

13. What are the advantages and disadvantages of channel lining ? Give some methods of prevention of silt deposition in canal. 10 + 5
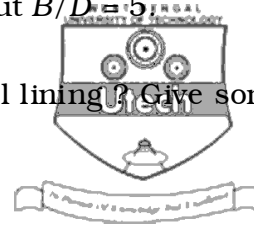
14. What do you mean by economics of canal lining ? What do you mean by waterlogging and how can it be prevented ? 5 + 3 + 7

15. Find the mean precipitation for the area sketched in fig below by Thiessen's method. The area is composed of a square plus an equilateral triangular plot of side 4 kms. Rainfall readings in centimetre at various stations are also given in the fig. 15

Dia.

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END