[Total No. of Questions: 09]

[Total No. of Pages: 02]

Uni. Roll No._____

Program: **B.Tech. (Batch 2018 onward)**

Semester: 6th

Name of Subject: **Irrigation Engineering**

Subject Code: **PCCE – 115**

Paper ID: 17240

Scientific calculator is Allowed

EVENING

21 JUN 2023

Use of Khosla Curves, Montague Curve and Blench Curve is allowed

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:
1) Parts A and B are compulsory
2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
3) Any missing data may be assumed appropriately

Part – A

[Marks: 02 each]

Q1 (a) What do you understand by launching apron?

(b) Differentiate between Bligh's creep theory and Lane's weighted creep theory.

(c) What is a canal fall? What is its necessity?

(d) Give the classification of the cross drainage works depending upon the relative positions of the canal and the drainage.

(e) A non modular outlet can work under a small available head. Comment.

(f) A weir across an alluvial river has a horizontal floor of length 60m and retains 6m of water under full pond condition. If the downstream sheet pile is driven to a depth of 6m below the average bed level, calculate the exit gradient.

Part – B

[Marks: 04 each]

Q2 Define the terms flexibility, setting, proportionality and sensitivity. Derive an expression for the flexibility. How is flexibility related with sensitivity?

Q3 A cross regulator is to be built for a distributory channel taking off from the parent channel, with the following data:

|	
Discharge	= 100cumecs
FSL u/s and d/s	= 218.10m and 217.90m
Bed width u/s and d/s	= 42.00m and 38.00m
Full supply depth u/s and d/s	= 2.50m

Determine the *crest level, waterway width* and *length of u/s & d/s cutoff walls.*

Q4 Design a submerged pipe outlet for the following data:

Discharge through outlet = 0.04cumecs

FSL of distributory canal = 100.00m

Full supply depth of distributory canal = 1.1m

FSL of water course = 99.90m

Assume an average value of coefficient of discharge as 0.7.

Q5 The hydraulic structure is having its u/s bed level at a RL of 103.00m, crest level at a RL of 104.50m and d/s bed level at a RL of 101.50m (the crest level and the d/s bed level are connected by an inclined glacis), determine the location of point P where the hydraulic jump will be formed. Assume $q = 10cumecs/m$, $H_L = 1.50m$ and u/s TEL = 107.50m. Also draw the pre-jump profile by selecting at least 3 points.

Q6 What is the purpose of providing a fish ladder? Discuss the general design considerations for its design.

Q7 Diagrammatically differentiate between a silt excluder and a silt extractor, as used for silt control at the diversion headwork.

Q8 Figure below shows the section of a barrage. The various dimensions and levels are in meters. Determine the uplift pressure at the key points. Also find whether the section provided is safe against piping and uplift if it is founded on fine sand with permissible exit gradient of 1/6. (Take correction of 3.3% for slope of 1 in 4)
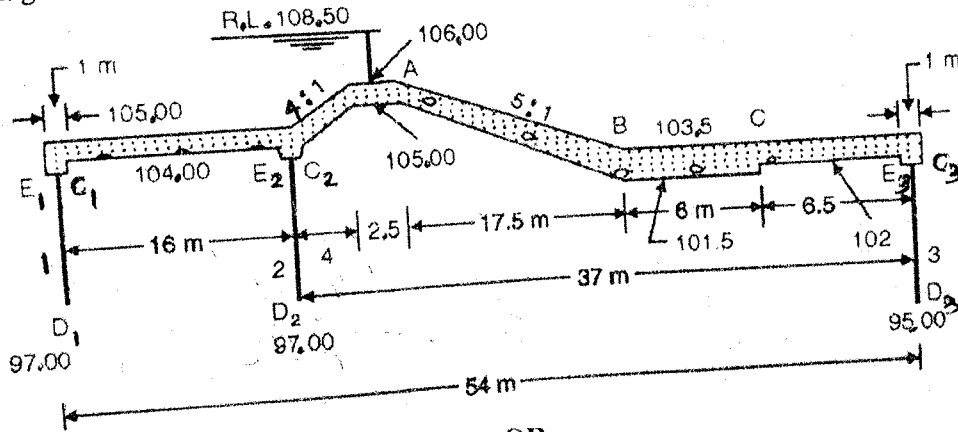
OR

Design a vertical drop weir using Bligh's theory, for the following data:

Design flood discharge = 3000cumecs
FSL of canal = 199.00m
Retrogression of bed = 0.50m
Bligh's creep coefficient = 10
Minimum d/s water level = bed level = 193.00m

HFL before construction = 200.00m
Average bed level of river = 193.00m
Lacey's silt factor = 1.0
Allowable afflux = 1.0m

Q9 Design a Sarda type fall for a channel from the following data:

Full Supply discharge u/s and d/s	= 40 cumecs
Full Supply Level u/s and d/s	= 218.30m and 216.80m, respectively
Full Supply Depth u/s and d/s	= 1.8m
Bed width u/s and d/s	= 26m
Bed level u/s and d/s	= 216.50m and 215.00m, respectively
Drop	= 1.5m
Side slopes	= 1 : 1
Safe exit gradient	= 1/5

OR

Design a suitable cross drainage work, given the following data at the crossing of a canal and drainage.

Canal
Full supply discharge	= 32cumecs
Full supply level	= 213.5m
Canal bed level	= 212.0m
Canal bed width	= 20m
Side slopes	= 1.5H:1V
Canal water depth	= 1.5m

Drainage
High flood discharge	= 300cumecs
High flood level	= 210.0m
High flood depth	= 2.5m
General ground level	= 212.5m

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P.T.O.