Please check that this question paper contains 09 questions and 02 printed pages within first ten minutes.

[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

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21 SEP 2022

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) How does a hydraulic jump help in dissipating the energy of water falling over a weir or a dam?
(c) What is 'cistern element' in fall? Give various expressions for its dimensions.
(d) Draw a neat sketch of a typical fish ladder indicating the purposes served by it.
(e) Write any two functions of the distributary head regulator and the cross regulator.
(f) A stream has a width of 30m; depth of 3m and a mean velocity of 1.25m/sec. Find the height of weir to be built on the stream floor to raise the water level by 1m. Assume value of discharge coefficient as 0.95.

Part – B **[Marks: 04 each]**

Q2 Explain with the help of diagram, the various component parts, along with their functions, of a diversion headwork.

Q3 Explain Hind's method of designing canal transitions.

Q4 Define proportionality of an outlet. Distinguish between a hyper proportional outlet and a sub proportional outlet. Find out the expressions for the setting of both the types.

Q5 Discuss in brief various causes of failure of weirs and their remedies.

Q6 Describe with neat sketches the different types of canal escapes that can be constructed on modern canal projects.

Q7 A river discharges 1000cum/sec of water at high flood level of RL 103m. A weir is constructed for flow diversion with a crest length of 255m and total length of concrete floor as 40m. The weir has to sustain the under seepage at a maximum static head of 2.4m. The silt factor and the safe exit gradient for the river bed material are 1.1 and 1/6 respectively. Determine the depth of cutoff required at the downstream end of the concrete floor. Take the level of downstream concrete floor as RL 100m. Check for exit gradient.

Part – C

[Marks: 12 each]

Q8 A weir with a vertical drop has the following particulars:

Flood discharge	= 2800cumecs
HFL before construction	= 285.0m
Minimum water level	= d/s bed level = 278.0m
FSL of canal	= 284.0m
Allowable afflux	= 1.0m
Bligh's creep coefficient	= 12

Assume any other data, if not given.

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OR

Figure-1 shows the section of a barrage. The various dimensions and levels are in metres. Determine the uplift pressure at the key points and the exit gradient. Also find whether the section provided is safe against uplift and piping if it is founded on fine sand with permissible exit gradient of 1/6.

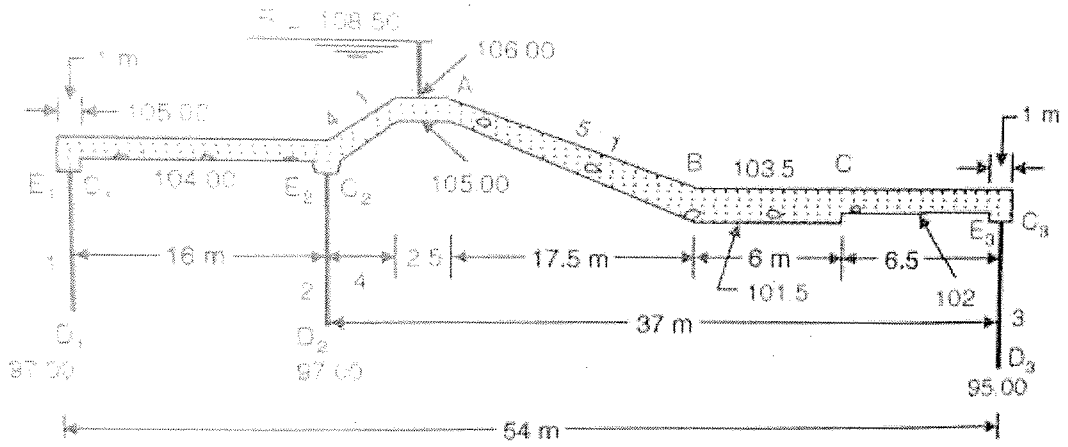

Figure-1

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
Drop	= 1.5m
Bed width u/s and d/s	= 26m
Full Supply Depth u/s and d/s	= 1.8m

Design the floor using Bligh's theory taking creep coefficient as 8. Check the design by Khosla's theory and make changes if necessary. Safe exit gradient may be taken as 1/5.

OR

Design the head regulator for a distributary channel taking off from the parent channel, for the following data:

Discharge of parent channel	= 100cumecs
Discharge of distributary	= 15cumecs
FSL of parent channel u/s and d/s	= 218.10m and 217.90m
Bed width of parent channel u/s and d/s	= 42.00m and 38.00m
Water depth in parent channel u/s and d/s	= 2.50m
FSL of distributary	= 217.10m
Bed width of distributary	= 15m
Water depth in distributary	= 1.5m

Assume a safe exit gradient of 1/5

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