Form A: Paper-setting Blank

Ref No. EX/CE/T/323/2017

B.CIVIL ENGG THIRD YEAR SECOND SEMESTER. 2017

(~~1st~~ /2nd-Semester/~~Repeat/Supplementary /Spl. Supplementary /Old/Annual/Bi-Annual~~)

SUBJECT: **HYDRAULIC STRUCTURES**

(Name in full)

PAPER ××××

Time: ~~Two hours~~/ Three hours/~~Four hours/Six hours~~ **Full Marks ~~30~~/100**

Use a separate Answer-Script for each part

1. Answer Q.1 and any one from the rest.
2. Assume reasonable values of data if it is not supplied.
3. No code etc. will be needed to answer the questions of this part

No. of Question		Part –I (35 Marks)	Marks
Q.1	a)	Explain the function of a fish ladder in a Diversion Head work.	4
	b)	Illustrate functions of a canal head regulator indicating its Salient aspects	6
	c)	Explain the limitations of Bligh's Method for determination of hydraulic gradient with cut off.	5
	d)	Explain why seepage cut off is necessary on the downstream side of a dam.	5
Q.2	a)	Illustrate salient aspects of Khosla's method of independent variables.	5
	b)	A hydraulic structure has a horizontal floor distance between u/s and d/s pile lines of 25m. The lengths of u/s and d/s pile lines are 7.5 m and 10.5m respectively and the working head is 5m. Draw the hydraulic grade line and determine the floor thickness at 5m, 10m and 15m from u/s pile line using both Bligh's method and Lane's method, Indicate the differences between the thicknesses obtained by these methods at each point. Also examine the chance of piping failure considering the subsoil to be fine sand.	10
Q.3	a)	Explain with a neat sketch how forc ue to wave is estimated for design of a gravity dam.	5
	b)	A gravity dam has the following dimensions : Height = 95 m Freeboard = 2.5 m Slope of u/s face = 0.15 : 1. $\alpha_h = 0.1$ Determine hydrodynamic force on the u/s side of the dam and its moment about the base of the dam by any standard method.	10

Ref. No. Ex/CE/T/323/2017

BACHELOR OF CIVIL ENGINEERING EXAMINATION 2017

(Third Year; Second Semester)

HYDRAULIC STRUCTURES

Time: Three Hours

Full Marks 100

Part I: 35 Marks
Part II: 35 Marks
Part III: 30 Marks

Use a separate Answer-Script for each part

No. of questions	Part II (35 Marks)	Marks
	*Answer **Question 1 as COMPULSORY** and **ANY ONE Question from 2 & 3** in this part.* *Assume suitable values for the parameters if not supplied.*	
1	Derive the expression of 'Loss of Energy' in 'Hydraulic Jump', using momentum formula for horizontal bed.	1
2	Design and draw (on a graph sheet) an Ogee spillway for low tail water curve, to be constructed on the good condition rock, using the following design data: Height of the spillway crest from reservoir bed = 110m No. of spans = 5 Length of each clear span = 12.5m Thickness of each pier = 3m D/s slope = 1 (V): 0.8 (H) Design discharge = 8500 Cumecs Assume U/s Profile $y= [0.126H_d] - [\{0.4315H_d^{0.375}\}(x+0.27H_d)^{0.625}] + [\{0.724(x+0.27H_d)^{1.85}\} / H_d^{0.85}]$, D/s profile $x^{1.85} = 2(H_d)^{0.85}y$, $K_p = 0.01$ and $K_a = 0.1$.	18+7=2
3 (a)	What is 'Canal Fall Structure'? What is the necessity of the same?	2+2=
(b)	Derive the discharge through a trapezoidal notch.	
(c)	Derive the correlation between the full supply water depth and half supply water depth.	
(d)	Note down the head loss with a neat sketch, at different stages from the inlet well to the downstream full supply level, in case 'syphon well drop' type canal fall structure.	4+3=
(e)	What is the advantage of using the 'syphon well drop' type canal fall structure?	
(f)	Design the size and number of trapezoidal notches required for a canal dropt with the following particulars: Full supply discharge = 15Cumecs; Bed width = 6.5m; Full supply water depth = 1.5m	

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Form A: Paper-setting Blank

Ref No. Ex/CE/T/323/2017

B.E. CIVIL ENGINEERING THIRD YEAR SECOND SEMESTER EXAM 2017

(~~1st~~/2nd Semester/~~Repeat/Supplementary/Spl. Supplementary/Old/Annual/Bi-Annual~~)

SUBJECT: **HYDRAULIC STRUCTURE**

(Name in full)

PAPER ××××

Time: ~~Two hours~~/ Three hours/~~Four hours/Six hours~~ **Full Marks ~~30~~/100**

(~~15~~/30 marks for this part)

Use a separate Answer-Script for each part

Part - III

No. of Question			Marks
		• *Maintain neatness.* • *Assume reasonable data if it is not supplied.* • *Answer any two questions* • All drawings-must be drawn by pencil • No Code will be allowed with the students to answer the questions	
(1)	(a)	What are the drawbacks of water transportation?	5
	(b)	What are the advantages of water transportation?	5
	(c)	What are the guiding factors for site selection of harbours?	5
(2)	(a)	What are the requirements of a good port?	5
	(b)	What is a dock? Classify dock with a tree structure.	5
	(c)	What are the defects in harbours? Discuss briefly.	5
(3)	(a)	Discuss briefly about wet docks in tidal basins.	5
	(b)	Discuss on the design of wet docks.	10
(4)	(a)	What is reservoir? In how many types the reservoirs may be broadly divided depending upon the purpose served by a given reservoir? Briefly write on the functioning and advantages of a storage reservoir.	2+3+5=10
	(b)	What are the requirements of a good harbour?	5

End of the Question