Register Number:……..

KUMARAGURU
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B.E. DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Fourth Semester

CIVIL ENGINEERING

U18CEI4201: Applied Hydraulics and Hydraulic Machinery

COURSE OUTCOMES

CO1: Design most economical section for an open channel.
CO2: Analyze critical flow condition in channels.
CO3: Determine GVF profiles.
CO4: Select appropriate type of turbines for the given conditions.
CO5: Assess the characteristics of pumps and turbines.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	Write the formula for Froude number	CO1	[K_1]
2.	Show that maximization of discharge required minimization of the wetted perimeter of the channel for a given area of flow.	CO1	[K_2]
3.	Differentiate prismatic and non-prismatic channels.	CO2	[K_2]
4.	Define specific energy	CO2	[K_1]
5.	State the uses of hydraulic jump	CO3	[K_2]
6.	What is meant by positive and negative surges?	CO3	[K_2]
7.	What are the main parts of centrifugal pump?	CO4	[K_1]
8.	What is the purpose of an air vessel fitted in the pump?	CO4	[K_2]
9.	Define mechanical efficiency	CO5	[K_1]
10.	What is specific speed of the turbine?	CO5	[K_1]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a)	How do you classify open channels? Explain in detail. Also explain the velocity distribution in open channel.	8	CO1	[K_2]
	b)	Differentiate closed flow closed conduit flow and open channel flow.	8	CO1	[K_2]

12.	a)	Calculate the Specific energy, Critical depth, and the velocity of the flow of 10 m^3 in a cement lined rectangular channel 2.5 m wide with 2 m depth of water. Is the given flow being sub critical or super critical?	8	CO2	[K_3]
	b)	How would you express the specific energy for a wide rectangular channel with depth of flow 'D' and velocity of flow 'V'? Draw the typical specific energy diagram and explain its features.	8	CO2	[K_2]
13.	a)	A power canal is constructed at Coimbatore with trapezoidal section has to be excavated through hard clay at the minimum cost. Determine the dimensions of the channel given, discharge equal to 14 m^3/s, bed slope 1/2500, Manning's n = 0.02.	8	CO1	[K_3]
	b)	The bed width of a trapezoidal channel section is 40 m, and the side slope is 2 horizontal to 1 vertical. The discharge in the canal is 60 cumecs. The Manning's n is 0.015 and the bed slope is 1 in 5000. Determine the normal depth	8	CO1	[K_3]
14.		Derive the Dynamic equation of gradually varied flow with assumptions	16	CO3	[K_3]
15.		A centrifugal pump delivers salt water against a head of 15 m at a speed of 100 rpm. The vanes are curved backward at 30º with the periphery. Obtain the discharge for an impeller diameter of 30 cm and outlet width of 5 cm at a manometric efficiency of 90 %.	16	CO4	[K_3]
16.	a)	Discuss the Working principle ,Function and applications involved in Francis's turbine with neat Sketch	6	CO5	[K_2]
	b)	Design a Pelton wheel for a head of 60 m to develop 95.65 kw shaft power at 200 rpm. Given the velocity of bucket is 0.45 times the velocity of jet (Ku_1 = 0.45, Assume any other data missing	10	CO5	[K_3]

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