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	Question Paper Co	de	12	996										
	B.E. / B.Tech DEGREE EXAMINATIONS, NOV / DEC 2024													
	Fourth Semester													
	Civil E	ngineering												
	20CEPC401 – APPLIED	6 6		NG	INF	CER	IN	G						
	Regulations - 2020													
Du	ration: 3 Hours									М	[ax	Ma	rks: 1	00
20	PART - A (MCQ)	$(20 \times 1 = 20)$	) M	ark	c)					1,1				
		L Question		ain	5)							Marks	K – Level	СО
1.	What is the primary difference between pipe flo			nne	l flo	w?						1	K1	<i>CO1</i>
	(a) Pipe flow is influenced by gravity, while ope													
	(b) Open channel flow has a free surface exp	osed to atm	losp	heri	ic p	ress	ure	e, w	hile	piţ	pe			
	flow is fully enclosed. (c) Pipe flow is always turbulent, while open ch	annal flaw i	a <b>a</b> 1		ra 10.	min	<b>0 1</b>							
	(d) Open channel flow does not depend on fluid			•				oes						
2.	What are the three types of flow classification b									nels	s?	1	K1	<i>CO1</i>
		Subcritical,												
		Uniform, no												
3.	The velocity distribution in open channel flow i								g?.			1	K1	<i>CO1</i>
		Aaximum ne												
4.	(c) Maximum near the free surface (d) In What does "best hydraulic section" mean in the	ndependent of context of c						-				1	K1	<i>CO2</i>
4.	(a) A section that provides maximum discharge											1		002
	(b) A section that minimizes head loss.		0101	55 54		Jiiui	uiv	ou.						
	(c) A section with uniform velocity distribution.													
	(d) A section that has maximum velocity.													
5.	Specific energy in an open channel flow is defined as the:								1	K1	<i>CO2</i>			
	(a) Total energy per unit width of the channel													
	<ul><li>(b)Total energy at the channel bottom</li><li>(c) Energy per unit weight of water relative to the</li></ul>	na channal h	ho											
	(d) Energy due to friction loss		cu											
6.	The point of minimum specific energy for a	given discha	arge	e in	an	ope	n c	har	nnel	flo	W	1	<i>K1</i>	<i>CO2</i>
	corresponds to which flow condition?	0	υ			1								
	(a)Subcritical flow (b) Supercritical flow (c					pidl	ly v	ari	ed fl	ow				
7.	What does "gradually varied flow" mean in ope			ulic	s?							1	K1	СО3
	(a) Flow where the depth changes abruptly alon			1		1								
	<ul><li>(b) Flow where the depth changes slowly along</li><li>(c) Flow with constant velocity throughout the constant velocity throughout throu</li></ul>			e cn	ann	ei.								
	(d) Flow that is uniform across any cross-section		,un.											
8.	A hydraulic curve represents which of the follow		n ch	ann	el fl	ow?	2					1	K1	CO3
	(a) The change in water surface profile over a le													
	(b) The velocity distribution in a channel cross-section													
	(c) The discharge rate along the channel.													
0	(d) The critical depth for a given flow rate What type of slope is characterized by a slop	a graatar 41	20-	th a	نس	tion1	_~1	0.00	in	0.0	717	1	K1	CO3
9.	What type of slope is characterized by a slop channel flow?	e greater li	Idll	uie	CII	ucal	I SI	ope	/ 111	ope	115	1	111	005
	(a) Mild slope (b) Critical slope (c) Steep slope	(d) Adverse	slo	pe										

(a) Mild slope (b) Critical slope (c) Steep slope (d) Adverse slope

(a) Flow changes from suberritical to suberritical.       (b) Flow changes from supercritical to suberritical.         (b) Flow changes from supercritical to suberritical.       (c) Flow is uniform throughout the channel.         (d) Flow is critical frozogbout the channel.       (f) To increase flow velocity (b) To dissipate excess energy in open channel flow (c) To minimize head loss in pipelines (d) To create suberritical flow parteam       I KI CO4         (a) A udden rise in the water surface level moving downstream.       (c) A transition from laminar to turbulent flow       I KI CO5         (a) A transition from laminar to turbulent flow       I KI CO5       (c) A transition from laminar to turbulent flow         (a) Multi such so perate underwater, while reaction turbines of not.       (b) Impulse turbines operate underwater, while reaction turbines of not.       I KI CO5         (a) Multi such convert pressure energy and reduce nurbines so rearter.       I KI CO5       (c) Reaction turbines (h) Francis turbine (c) Pelton wheel (d) Propeller turbine       I KI CO5         (b) To discharge water directly into the atmosphere       I KI CO5       (c) To convert kinetic energy into pressure energy and reduce exit velocity       I KI CO5         (c) To nease the kinet generally used for which of the following applications?       I KI CO5       (c) High-flow, high-pressure energy and reduce exit velocity       KI CO5         (d) To prevent exitation at the turbine (c) Kaplan turbine (d) Impulse turbines       KI CO5       (c) Go convert kinetic energy of water <th>10.</th> <th>A hydraulic jump typically occurs when:</th> <th>1</th> <th>K1</th> <th><i>CO4</i></th>	10.	A hydraulic jump typically occurs when:	1	K1	<i>CO4</i>		
(c) Flow is uniform throughout the channel.       (d) Flow is critical throughout the channel.       I       What is the main purpose of a hydraulic jump in engineering applications?       I       KI       CO4         (a) To increase flow velocity       (b) To dissipate excess energy in open channel flow       I       KI       CO4         (a) A studden rise in the water surface level moving downstream.       I       KI       CO4         (a) A sudden rise in the water surface level moving downstream.       I       KI       CO5         (a) A sudden rise in the water surface level moving downstream.       I       KI       CO5         (a) A sudden rise in the water surface level moving downstream.       I       KI       CO5         (a) A transition from laminar to turbulent flow       I       KI       CO5         (a) Impulse turbines operate undrevater, while reaction turbines water.       I       KI       CO5         (a) Impulse turbines operate at high specific speeds, while reaction turbines operate at low specific speeds.       I       KI       CO5         (a) Kuptan turbine.       (b) Praveis turbine (c) Plot wheter       I       KI       CO5         (a) Mubite turbines operate at high specific speeds, while reaction turbines operate at low specific speeds.       I       KI       CO5         (a) To prevent cavitation at the turbine exit       (d) Propelle		(a) Flow changes from subcritical to supercritical.					
(d) Flow is critical throughout the channel.       I       KI       CO4         (a) To increase flow velocity       (b) To dissipate excess energy in open channel flow upstream       I       KI       CO4         (a) To increase flow velocity       (b) To create subcritical flow upstream       I       KI       CO4         (a) A sudden drop in the water surface level moving downstream.       I       KI       CO4         (a) A transition from laminar to turbulent flow       I       KI       CO5         (a) Madden drop in the water surface level moving downstream.       I       KI       CO5         (a) A transition from laminar to turbulent flow       I       KI       CO5         (a) Mapulse turbines covert pressure energy entirely to kinetic energy before entering the turbine, while reaction turbines do not.       I       KI       CO5         (a) Mapulse turbines operate at high specific speeds, while reaction turbines operate at low specific speeds.       I       KI       CO5         (a) What is the purpose of adrift tube in a reaction turbine?       I       KI       CO5         (a) To increase the kinetic energy of water       I       KI       CO5         (a) Mapulse turbines correating turbine (c) Pelton wheel       (d) Propeller turbine       KI       CO5         (b) To discharge water directly into the atmosphere       I							
11. What is the main purpose of a hydraulie jump in engineering applications?       I       KI       CO4         (a) To increase flow velocity       (b) To dissipate excess energy in open channel flow       I       KI       CO4         (a) To minimize head loss in pipelines (d) To create subcritical flow upstream.       I       KI       CO4         (a) A sudden rise in the water surface level moving downstream.       I       KI       CO4         (a) A sudden rise in the water surface level moving downstream.       I       KI       CO4         (a) A ransition from laminar to turbulent flow       I       KI       CO5         (a) Impulse turbines operate undervaker, while reaction turbines do not.       I       KI       CO5         (a) Impulse turbines operate undervaker, while reaction turbines operate at low specific speeds.       I       KI       CO5         (a) Impulse turbines operate undervaker, while reaction turbines operate at low specific speeds.       I       KI       CO5         (a) Mapulse turbines operate undervaker, while reaction turbines operate at low specific speeds.       I       KI       CO5         (a) Impulse turbines operate undervaker, while reaction turbines operate at low specific speeds.       I       KI       CO5         (a) To increase the kinetic energy of water       I       KI       CO5         (b) To discharge water d							
(a) To increase flow velocity       (b) To dissipate excess energy in open channel flow         (c) To minimize head loss in pipelines (d) To create subcritical flow upstream       1       KI       CO4         12. Positive surges in open channel flow are characterized by:       1       KI       CO4         (a) A sudden frise in the water surface level moving downstream.       (c) An oscillating water surface.       1       KI       CO3         (a) A nuclean time water surface level moving downstream.       (c) An oscillating water surface.       1       KI       CO3         (a) Impulse turbines operate underwater, while reaction turbines do not.       (c) Reaction turbines do not.       1       KI       CO3         (a) Impulse turbines operate at high specific speeds, while reaction turbines operate at low specific speeds.       1       KI       CO3         (a) Kaplan turbine       (b) Francis turbine       (c) Petlon wheel       (d) Propeller turbine       1       KI       CO3         (a) To increase the kinetic energy of the atmosphere       (c) To convert kinetic energy to prossure energy and reduce exit velocity       1       KI       CO3         (a) Pelon wheel       (b) Francis turbine       (c) Kaplan turbine       1       KI       CO4	11		1	K1	CO4		
(c) To minimize head loss in pipelines (d) To create subcritical flow upstream       I       KI       CO4         (a) A sudden rise in the water surface level moving downstream.       (b) A sudden rise in the water surface level moving downstream.       (c) An oscillating water surface.       (d) A transition from laminar to turbulent flow         (a) Must is the primary distinction between impulse and reaction turbines?       I       KI       CO5         (a) Inpulse turbines operate underwater, while reaction turbines do not.       (e) Reaction turbines operate and high specific speeds, while reaction turbines operate at low specific speeds.       I       KI       CO5         (a) Must is the primary distinction between impulse turbines use water.       (d) Impulse turbines operate at high specific speeds, while reaction turbines operate at low specific speeds.       I       KI       CO5         (a) Kaplan turbine       (b) Francis turbine       (c) Pellon wheel       (d) To prevent cavitation at the turbine vitine       I       KI       CO5         (a) Kaplan turbine       (b) Francis turbine       (c) Pellon wheel       (d) To prevent cavitation at the turbine vitine vitine       I       KI       CO5         (a) Nati is the purpose of a draft tube in a reaction turbine       (d) Propeller turbine       I       KI       CO5         (a) Nati is the purpose of a draft tube in a reaction turbine vitine       I       KI       CO5       (a) Provent cavit	11.						
12. Positive surges in open channel flow are characterized by:       I       KI       Co4         (a) A sudden rise in the water surface level moving downstream.       (b) A sudden drop in the water surface level moving downstream.       I       KI       Co5         (d) A transition from laminar to turbulent flow       I       KI       Co5         (a) Impulse turbines convert pressure energy entry to kinetic energy before entering the turbine, while reaction turbines do not.       I       KI       Co5         (a) Rapulse turbines convert pressure energy entry to kinetic energy before entering the turbine, while reaction turbines do not.       I       KI       Co5         (a) Kaplan turbine (b) Francis turbine (c) Pelton wheel (d) Propeller turbine       I       KI       Co5         (a) To increase the kinetic energy of water       I       KI       Co5         (a) To increase the kinetic energy of water       I       KI       Co5         (b) To discharge water directly into the atmosphere       I       KI       Co5         (a) Provent cavitation at the turbine (c) Raplan turbine (d) Impulse turbine       I       KI       Co5         (a) To prevent cavitation at the turbine (d) Low-flow nplications?       I       KI       Co5         (a) A sudden turbe in a receproating turbine (d) Impulse turbine       I       KI       Co6         (a) To prevent cav							
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(d) A transition from laminar to turbulent flow       I       K1       C05         (a) Inpulse turbines operate underwater, while reaction turbines?       I       K1       C05         (a) Inpulse turbines operate underwater, while reaction turbines use ont.       (b) Impulse turbines operate at high specific speeds, while reaction turbines operate at low specific speeds.       I       K1       C05         (a) Kaplan turbine (b) Francis turbine (c) Pelton wheel       (d) Propeller turbine       I       K1       C05         (a) Kaplan turbine (b) Francis turbine (c) Pelton wheel       (d) Propeller turbine       I       K1       C05         (a) To increase the kinetic energy of water       (b) To discharge water directly into the atmosphere       I       K1       C05         (a) To increase the kinetic energy into pressure energy and reduce exit velocity       I       K1       C05         (a) To increase the kinetic energy of water       (d) To prevent cavitation at the turbine exit       I       K1       C05         (a) To increase the kinetic energy into the atmosphere       (e) To convert kinetic energy into the atmosphere       I       K1       C05         (a) High-prosure, low-flow applications       (b) Low-frow shigh-accuracy applications?       I       K1       C06         (a) High-flow, high-pressure applications       (b) Low-frow shigh-accuracy applications       I							
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<ul> <li>(a) Impulse turbines operate underwater, while reaction turbines do not.</li> <li>(b) Impulse turbines convert pressure energy entirely to kinetic energy before entering the turbine, while reaction turbines do not.</li> <li>(c) Reaction turbines use air as a working fluid, while impulse turbines use water.</li> <li>(d) Impulse turbines operate at high specific speeds, while reaction turbines operate at low specific speeds.</li> <li>(a) Kaplan turbine (b) Francis turbine (c) Pelton wheel (d) Propeller turbine</li> <li>(a) Kaplan turbine (b) Francis turbine (c) Pelton wheel (d) Propeller turbine</li> <li>(e) To discharge water directly into the atmosphere</li> <li>(f) To discharge water directly into the atmosphere</li> <li>(g) To prevent cavitation at the turbine exit</li> <li>(h) Which type of turbine is generally used for which of the following applications?</li> <li>(a) High-pressure, low-flow applications (d) Impulse turbine</li> <li>(c) Allowing air to enter the suction line</li> <li>(d) Increasing the friction in the pump system</li> <li>(e) Allowing air to enter the suction line</li> <li>(f) Much the dug sprime</li> <li>(g) Allowing air to enter the suction line</li> <li>(h) When the pump loses prime</li> <li>(h) When the various types of flow in open channels?</li> <li>(h) When the various types of flow in open channels?</li> <li>(h) When the various types of flow in open channels?</li> <li>(h) When the range operating the section?</li> <li>(h) Costing the pressure flow that estion flow cavitation</li> <li>(c) Allowing air to enter the section flow cavitations</li> <li>(c) Allowing air to enter the section flow cavitation at the correctal discharge</li> <li>(h) When the pump loses prime</li> <li>(h) Mhen the pump loses prime</li> <li>(h) Mhen the pump loses prime<td>10</td><td></td><td>,</td><td><math>V_{1}</math></td><td><i>CO5</i></td></li></ul>	10		,	$V_{1}$	<i>CO5</i>		
(b) Impulse turbines convert pressure energy entirely to kinetic energy before entering the turbine, while reaction turbines do not.       (c) Reaction turbines operate at high specific speeds, while reaction turbines operate at low specific speeds.         (d) Impulse turbines operate at high specific speeds, while reaction turbines operate at low specific speeds.       I       KI       C05         (a) Kaplan turbine       (b) Francis turbine       (c) Pelton wheel       (d) Propeller turbine       I       KI       C05         (a) To discharge water directly into the atmosphere       (c) To convert kinetic energy into pressure energy and reduce exit velocity       I       KI       C05         (a) Petron wheel       (b) Francis turbine       (c) Kaplan turbine       I       KI       C05         (a) To convert kinetic energy into pressure energy and reduce exit velocity       (d) To prevent cavitation at the turbine exit       I       KI       C05         (a) Pelton wheel       (b) Francis turbine       (c) Kaplan turbine       (d) Impulse turbine       I       KI       C05         (a) High-pressure, low-flow applications       (b) Low-pressure, high-flow applications       I       KI       C06         (a) High-pressure appleations and energy loss       (e) Allowing at to center the suction line       (d) Low-flow, high-accuracy applications       I       KI       C06         (a) Increasing the power output of the pu	13.	· · ·	Ι	ΚI	005		
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14. Which of the following turbines is classified as an impulse turbine?       i       k1       C03         (a) Kaplan turbine       (b) Francis turbine       (c) Pelton wheel       (d) Propeller turbine         15. What is the purpose of a draft tube in a reaction turbine?       i       k1       C03         (a) To increase the kinetic energy of water       (b) To discharge water directly into the atmosphere       i       k1       C03         (d) To prevent cavitation at the turbine exit       1       k1       C05       i       k1       C05         16. Which type of turbine is generally used for low head and high flow rate applications?       i       k1       C05         (a) Pelton wheel       (b) Francis turbine       (c) Kaplan turbine       (d) Increasing the friction in the pump system       i       k1       C06         (a) Increasing the friction in the pump system       (b) Reducing the pressure fluctuations and energy loss       i       k1       C06         (a) When the actual discharge is less than the theoretical discharge       i       k1       C06         (a) Men the actual discharge is greater than the theoretical discharge       i       k1       C06         (a) Increasing the pump operates in reverse       i       k1       C06         (c) Mhen the actual discharge is greater than the theoretical discharge       i <td></td> <td></td> <td></td> <td></td> <td></td>							
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K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create 12996	23.	Denne Bradauity furied now.			-		
	<i>K1</i> -	– Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create		129	996		

26.	Dist	inguish between draw down and back water curve.	2	K2	CO3					
	. What are the classifications of hydraulic jump?				CO4					
	What is meant by surge?				CO4					
		cribe the impulse turbine with example.	2 2	K2 K1	CO5 CO6					
30.	What is meant by manometric head with regard to a centrifugal pump?									
	PART - C ( $6 \times 10 = 60$ Marks)									
31.	a)	Answer ALL Questions Derive an expression for the discharge through a channel by Chezy's formula. <b>OR</b>	10	K2	CO1					
	b)	Find the rate of flow for a rectangular channel 7.5 m wide for uniform flow at a depth of 2.25 m. The channel is having bed slope as 1 in 1000. Take Chezy's constant $C = 55$ .	10	K2	<i>CO1</i>					
32.	a)	Prove that half of the top width of a most economical trapezoidal section is equal to the length of the one of the side slopes and derive the hydraulic mean depth as half of the depth of the flow.	10	K2	<i>CO2</i>					
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	b)	<ul> <li>A 3m wide rectangular channel conveys 12m<sup>3</sup> of water at a depth of 2m. Find out</li> <li>(i) Specific energy of flowing fluid.</li> <li>(ii) Critical depth, critical velocity and the minimum specific energy.</li> </ul>	10	K2	CO2					
		(iii) Froude number and state whether the flow is sub-critical or supercritical.								
33.	a)	Derive the dynamic equation for the Gradually Varied Flow and state clearly the assumptions in analysis of GVF.	10	К2	CO3					
	1.)	OR	10	K2	CO3					
	b)	Determine the length of the backwater curve in a rectangular channel width of 4m depth of water at upstream side 2m and downstream side 3m discharge of channel is $15 \text{ m}^3$ /s. Take $i_b=1/2000 \& i_e=0.000031$ .	10	K2	05					
34.	a)	Derive the expression for depth of hydraulic jump. OR	10	K2	<i>CO4</i>					
	b)	The depth of flow of water at a certain section of rectangular channel 5m wide is 0.6m. The discharge through a channel is $15 \text{ m}^3$ /s. if hydraulic jump take place on the downstream side. Find the depth of flow after jump, height of the hydraulic jump and loss of energy per kg of water.	10	K2	<i>CO4</i>					
35.	a)	Explain briefly about the various efficiencies of hydraulic turbines. OR	10	K2	CO5					
	b)	A Pelton wheel is to be designed for the following specification: (i) Shaft Power = 11,772 kW (ii) Head = 380 meters (iii)Speed = 750 rpm	10	K2	CO5					
		<ul> <li>(iv)Overall efficiency = 86%</li> <li>(v) Jet diameter= not to exceed 1/6th of the wheel diameter.</li> </ul>								
		Determine: (i) Wheel diameter (ii) Diameter of the jet								
		(iii)Number of jets required Take $C_v=0.985$ and speed ratio $K_{u1}=0.45$								
36.	a)	Explain the working principle of centrifugal pump with its advantages. OR	10	K2	<i>CO</i> 6					

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

b) A single acting reciprocating pump, running at 60 rpm delivers  $0.53 \text{ m}^3$ /s. The <sup>10</sup> K2 CO6 diameter of the piston is 200mm and stroke length 300mm. Determine the theoretical discharge, coefficient of discharge, percentage of slip of the pump.

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