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				S	ubje	ct C	ode:	KM	E302
Roll No:									

BTECH (SEM III) THEORY EXAMINATION 2021-22 FLUID MECHANICS & FLUID MACHINES

Time: 3 Hours Total Marks: 100

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief.

 $2 \times 10 = 20$

Q no.	Question	Marks	CO
a.	Define ideal fluid.	2	1
b.	Describe capillary rise.	2	1
c.	Define Froude's number.	2	2
d.	Describe the significance of Reynold's number.	2	2
e.	Explain eddy viscosity.	2	3
f.	Define laminar sub layer.	2	3
g.	Define unit power for a turbine.	2	4
h.	Explain the function of penstock in a hydroelectric power plant.	2	4
i.	Define a pump.	2	5
j.	Describe the slip of a reciprocating pump.	2	5

SECTION B

2. Attempt any three of the following:

 $3 \times 10 = 30$

Q no.	Question	Marks	CO
a.	A horizontal venturimeter with inlet diameter 200 mm and throat	10	1
	diameter 100 mm is employed to measure the flow of water. The reading	•	
	of the connected differential manometer is 180 mm of mercury.		
	Calculate the rate of flow if the co-efficient of discharge is 0.98.		
b.	For a two-dimensional flow the velocity potential function is given by	10	2
	the expression,		
	$\phi = x^2 - y^2.$		
	(i) Determine velocity components in x and y directions.		
	(ii) Determine stream function.		
c.	Derive the expression for energy thickness.	10	3
d.	Explain the governing of Pelton turbine with neat sketch.	10	4
e.	Explain the ideal indicator diagram. Describe the effect of friction in	10	5
	suction and delivery pipes on indicator diagram.		

SECTION C

3. Attempt any *one* part of the following:

 $1 \times 10 = 10$

Q no.	Question	Marks	CO
a.	Discuss the effect of increase in temperature on viscosity of fluids along	10	1
	with the logic.		
b.	Illustrate the difference between notch and weir. During an experiment	10	1
	in a laboratory, 0.05 m ³ of water flowing over a right-angled notch was		
	collected in 1 minute. If the head of the sill is 50 mm, calculate the co-		
	efficient of discharge.		



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				S	ubje	ct C	ode:	KM	E302	
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4. Attempt any *one* part of the following:

$1 \times 10 = 10$

Q no.	Question	Marks	CO
a.	The resistance R experienced by a partially submerged body depends	10	2
	upon the velocity V, length of the body l , viscosity of the fluid μ , density of the fluid ρ and gravitational acceleration g. Using Buckingham's pi		
	theorem, determine an expression for R.		
b.	Illustrate the derivation for continuity equation for three-dimensional	10	2
	flow.		

5. Attempt any *one* part of the following:

$1 \times 10 = 10$

Q no.	Question	Marks	CO
a.	Illustrate:	10	3
	(i) Siphon		
	(ii) Pipes in series		
	(iii) Total energy line		
b.	A kite 0.8 m X 0.8 m weighing 3.924 N assumes an angle of 12 ⁰ to the	10	3
	horizontal. The string attached to the kite makes an angle of 45 ⁰ to the		
	horizontal. The pull on the string is 24.525 N when the wind is flowing		
	at a speed of 30 km/hour. Calculate the corresponding co-efficient of		
	drag and co-efficient of lift. Density of air is given as 1.25 kg/m ³ .	1	CV.

6. Attempt any *one* part of the following:

$1 \times 10 = 10$

Q no.	Question	Marks	CO
a.	Illustrate the derivation for the expressions of:	10	4
	(i) Unit discharge for a turbine		
	(ii) Unit speed for a turbine		
b.	A jet of water, 60 mm in diameter, strikes a curved plate at its center	10	4
	with a velocity of 18 m/s. The curved vane is moving with a velocity of		
	6 m/s in the direction of the jet. The jet is deflected through an angle of		
	165 ⁰ . Assuming the plate to be smooth, calculate:		
	(i) Thrust on the plate in the direction of jet		
	(ii) Power of the jet		
	(iii) Efficiency of the jet		

7. Attempt any *one* part of the following:

$1 \times 10 = 10$

Q no.	Question	Marks	СО
a.	Illustrate the derivation for the:	10	5
	(i) Specific speed of centrifugal pump		
	(ii) Minimum speed for starting a centrifugal pump		
b.	Illustrate the classification of reciprocating pump. Show that the work	10	5
	done by a reciprocating pump is proportional to the area of indicator		
	diagram.		