Q. Code: 670356

Reg. No. | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2019

Third Semester

CH18302 – FLUID MECHANICS

(Chemical Engineering)

(Regulation 2018)

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

Answer **ALL** questions

PART A - (10 X 2 = 20 Marks)

		CO	RBT
1.	State the effect of temperature and pressure on viscosity of fluids.	1	U
2.	Define the continuum concept of a fluid.	1	U
3.	Differentiate 'gauge pressure' from 'absolute pressure'.	2	AN
4.	State the assumptions made in the derivation of the Bernoulli's equation.	2	U
5.	List out minor losses when a fluid is flowing through a pipe.	3	U
6.	How friction factor is calculated for a rough pipe?	3	AP
7.	Name at least four flow measuring devices. Mention the uses of pitot tube and notch?	4	U
8.	Highlight the general range of specific speed of centrifugal pumps.	4	U
9.	Define the term similitude in relation to geometric similarity.	5	U
10.	State the laws of dimensional homogeneity.	5	U

PART B - (5 X16 = 80 Marks)

11.	(a)		With a neat sketch of rheological behaviour explain the behavior of Newtonian fluid and non Newtonian fluids.	(16)	1	U
			(OR)			
	(b)	(i)	Discuss about hydrostatic pressure distribution or general equation for variation of pressure due to gravity at various heights in a static fluid.	(10)	1	AP
		(ii)	Calculate the density, specific weight and weight of one litre of petrol with specific gravity 0.7.	(6)	1	AN
12.	(a)	(i)	The right limb of a simple U-tube manometer containing mercury (density 13600 Kg/m^3) is open to the atmosphere while the left limb is connected to a pipe in which a fluid of density 900 kg/m^3 is flowing. The centre of the pipe is 12 cm below the level of mercury in the right limb. Find the pressure	(8)	2	AN

		of fluid in N/m2 in the pipe if the difference of mercury in the two limbs is 20 cm.			
	(ii)	Water is flowing through a pipe having diameters 20 cm and 10 cm at sections 1 and 2 respectively. The rate of flow through pipe is 35litres/s. Section 1 is 6 m above datum and section 2 is 4 m above datum. If the pressure at section 1 is 39.24 N/cm^2, find the intensity of pressure at section 2.	**(8)**	**2**	**AN**
		(OR)			
	(b)	Derive the full form of Bernoulli equation with fluid friction and pump work for the flow of an incompressible fluid.	**(16)**	**2**	**AN**
13.	(a)	Derive the mathematical expression for determining the pressure drop when an incompressible fluid flows through a closed pipe under laminar conditions. State the assumptions made and the potential application of the mathematical expression.	**(16)**	**3**	**AN**
		(OR)			
	(b)	A bed containing 35000 kg of sand particles of diameter 0.16 mm is to be fluidized with air at 400°C and 20 Kgf/cm^2 pressure in a cylindrical vessel of 3 m diameter. The density of sand particles is 2.7 g/cm^3. The viscosity of air at the operating condition is 0.032 cP. Calculate, (i)The min height of fluidized bed ($\varepsilon = 0.55$) (ii) The pressure drop in the fluidized bed. (iii) The critical superficial velocity.	**(16)**	**3**	**AN**
14.	(a)	Explain the working principles of orifice meter and venture meter with a neat diagram. Derive the volumetric flow rate expression.	**(16)**	**4**	**U**
		(OR)			
	(b)	Explain the working principle and characteristics of a Centrifugal pumps with a neat diagram in detail.	**(16)**	**4**	**U**
15.	(a)	(i) Enumerate the methods of selecting the repeating variables.	**(8)**	**5**	**U**
		(ii) Write a brief note on the similitude and explain the types of similarity.	**(8)**	**5**	**U**
		(OR)			
	(b)	The pressure difference ΔP in a pipe diameter D and length L due to viscous flow depend on the velocity V, viscosity μ, density ρ. Using Buckingham's π - Theorem, obtain an expression for ΔP.	**(16)**	**5**	**AN**