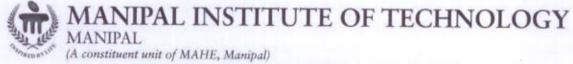
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VII SEMESTER B.TECH. (CHEMICAL ENGINEERING) ENDSEM EXAMINATIONS, NOV 2022

SUBJECT: PE-IV PROJECT ENGINEERING [CHE 4069]

REVISED CREDIT SYSTEM (23/11/2022)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- Answer ALL the questions.
- Missing data may be suitable assumed.

1.A	Discuss the various preliminary data to be collected regarding weather conditions for the construction of the plant.	4
1.B	Develop the instrumentation symbol for the following: combined dual service board mounted manual flow recording controller number 3 connected to equipment through pneumatic transmission and connected to controller through electrical connection, locally mounted pressure recorder number 2 by mechanical transmission to the pipeline	3
1.C	Explain intangible factors (with rough estimates) involved in the calculation of fixed cost for the industry.	3
2.A	Explain safety critical equipment, shape factor, cold strength	3
2.B	Explain the working of carbon dioxide extinguishers used for extinguishing fire.	
2.C	Evaluate the optimum pipe diameter for a Dichlorobenzene flow rate of 9000 kg/h, at	
	25° C. Stainless steel pipe will be used. Density of Dichlorobenzene, $1300 \ kg/m^3$ Viscosity of Dichlorobenzene $1.324 \times 10^{-3} \ Ns/m^2$ at 25° C.	4
	The optimum pipe diameter for turbulent flow is given by	4
	Carbon steel pipe: $d_{i, optimum} = 0.664 \ G^{0.51} \rho^{-0.36}$	

	Stainless steel pipe: $d_{i,optimum} = 0.465 G^{0.43} \rho^{-0.31}$	
	ρ the density in kg/m^3 , G the flow rate in kg/s	
.A	(a) Distinguish between plant service air and instrumentation air.(b) Why do we use dome shaped structure to store hygroscopic materials.	2
В	Classify the different types of liquids which are stored in the industry. Discuss the methods used and how do we store these liquids.	4
B.C	The fluid from the reactor is to be transported to the storage tank through various pipelines. Initially the fluid from the reactor flows through the first pipe and then it is connected to an open ball valve, then the ball valve is connected to second pipe. The fluid flows through the second pipe and the second pipe is connected to closed globe valve and globe valve is connected to third pipe. Finally, third pipe is connected to storage tank. The first pipe and second pipe are attached to ball valve by flanged connection. The second pipe and third pipe are connected to globe valve by threaded connection. Compile the data given and make a relationship among the parts and construct the piping and instrumentation diagram.	
4.A	The motion of sand grains through water is studied on an enlarged scale by means of plastic model 10 times the prototype grain size. Solve and get the specific gravity of the plastic which will yield an immersed weight of the proper magnitude to ensure dynamic similarity? The particle moving with a uniform velocity through a fluid experiences a force given by $F = \frac{\pi}{6} d^3 (\rho_p - \rho_f) g$ Take specific gravity of sand as 2.65	
4.B	With the help of sketches, distinguish between slip on flange and lap joint type of flang used in pipelines.	e

4.C	characteristics are given Q is tons of filtrate in filt is filtered at constant pre ton/hr of feed and it is to the volume of the filtrate costs for power, washing cleaning cost Rs. 12 per 13 per cent (weight) solid	by the equation $Q = (K\theta_f)^{0.5} A$ ering time of θ_f hours and A is essure in the filter press at a rate be washed with an equal amount. The dumping and assembling and labor during filtering are m^2 . The plant operates 6500 hinds and the cake contains 74 per 20 per m^2 of filtering area. So	I, where K value is 1.32×10^{-6} area of the filter, m^2 . The slurr te to process an average of 1.2 ant of water equal to one-eight time is taken as 7 hr. The direct estimated as Rs. 15 per m^2 , and the slurry feed container cent solids. The annual fixed	s, y 5 h et d s s		
5.A	Draw a network diagram	for a construction project with	the information given below.			
	Job i-j		Duration time (weeks)			
	Successor event j	Predecessor event i				
	100	90	8			
	90	80	5			
	80	60	9			
	90	70	8.33			
	80	50	4			
	70	50	0			
	60	20	8.33	5		
	70	30	12			
	60	50	0			
	50	40	10			
	40	20	6			
	30	10	6			
	40	10	8.33			
	20	10	4			
	Estimate the project completion time.					
5.B	With a neat sketch explain the working of fluid expansion thermometers.					
5.C	Show the flowsheet for showing recycle and bypassing in process flow diagrams.					