GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Fourth Semester Regular) Examinations, May – 2024

22BBTPC24004 – Upstream Process Engineering

(Biotechnology)

Time: 3 hrs   Maximum: 70 Marks

(The figures in the right hand margin indicate marks)

PART – A   (2 x 5 = 10 Marks)

Q.1. Answer *ALL* questions

		CO #	Blooms Level
a.	Differentiate among Critical Speed and Operating Speed of Ball Mill.	CO2	K2
b.	What is Fourier's Law of Heat conduction with all assumption?	CO2	K1
c.	What is critical thickness of insulation?	CO1	K2
d.	Define Flux. Mention the Flux in terms of molar unit and mass Unit.	CO3	K1
e.	Differentiate between free and force convection heat transfer.	CO3	K1

PART – B   (15 x 4=60 Marks)

Answer *ALL* questions

		Marks	CO #	Blooms Level
2. a.	Briefly explain the operations and working principles of various types of Grinders.	7	CO1	K2
b.	Evaluate the Ball mill performance by considering various factors by which grinding efficiency can be increased.	8	CO3	K1
	(OR)			
c.	Derive the three laws of size reduction from the generalised equation of comminution.	7	CO1	K2
d.	Briefly explain the operations and working principles of various types of crusher with neat sketches.	8	CO3	K2
3.a.	Enumerate the continuity equation based on the principle of conservation of mass.	7	CO1	K3
b.	A 30 cm diameter pipe, conveying water, branches into two pipe of diameters 20cm and 15 cm respectively. If the average velocity in the 30cm diameter pipe is 2.5 m/sec ,find the discharge in this pipe .Also determine the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/sec.	8	CO3	K2
	(OR)			
c.	Derive the Bernoulli's Equation without friction on the basis of Newton's second law of motion for potential flow.	7	CO1	K2
d.	Analyse the principle, construction, working and flow equation for a venturimeter.	8	CO3	K2
4.a.	What is Fourier's Law of Heat conduction with all assumption? What is the	7	CO1	K1

importance of thermal conductivity through which heat is flowing?

b.	Evaluate the heat flow for One dimensional steady state Heat conduction through a composite Sphere.	8	CO3	K2

(OR)

c.	Derive the relation among Heat flow and Overall heat transfer coefficient in case of combined conduction and convection considering the different resistance offered by hot fluid, cold fluid and metal wall.	7	CO1	K3
d.	A wall is made of brick of thermal conductivity 1.0 W/ (m.K), 230mm thick. It is lined on the inner face with plaster of thermal conductivity 0.4 W/ (m.K) and of thickness 10mm.If a temperature difference of 30 K is maintained between the two faces, What is the heat flow per init area of wall?	8	CO3	K3
5.a.	Do the analysis among mass, heat and momentum transfer? From this mention the Reynolds analogy and Chilton Colburn analogy.	7	CO1	K2
b.	Derive the Rayleigh's equation in terms of relative volatility in case of differential distillation.	8	CO3	K2

(OR)

c.	State Ficks Law of diffusion. Mention the importance of Diffusivity.	7	CO1	K2
d.	Derive the Flux Equation in case of an Equimolecular counter diffusion.	8	CO3	K2

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