Reg. No.



## VII SEMESTER B. TECH (BIOTECHNOLOGY & CHEMICAL ENGG) END SEMESTER EXAMINATION (REGULAR), JAN-FEB 2021 SUBJECT: SOLID WASTE MANAGEMENT [BIO 4004] REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

## Instructions to Candidates:

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

1A.	List the functional elements of waste management. In your own terms, how does integrated waste management incorporate the functional elements?									
1B.	If you were choose a carrier in solid waste management in a government agency, what level of government-city, country, regional, state, federal-would you select to give you breadth of experience and a fair degree of responsibility for taking constructive action? Why?									
1C.	A community is pro- made up of the for yard waste, 24% percentage distribu- distribution of wast are now generated Components Food wastes Paper Cardboard Plastics Textiles Rubber Leather Yard Wastes Wood Glass Tin cans	poposing to achieve a 50% rate of separation by weight of waste llowing items: mixed paper, 40%; cardboard, 8%; plastics, 8%; glass, 12; and tin cans, 8%. Determine the as collected ution for the residual waste components, assuming the typical se components given in table is representative of the waste that Solid Waste as collected excluding waste components now recycled and excluding food waste that is ground up. 9.0 34.0 6.0 7.0 2.0 0.5 18.5 2.0 8.0 6.0	3							
	Aluminum Other metal	0.5								
	Dirt ash etc	3.0								
	Total	100.0								

	A community produces the following on an annual basis:																	
	Fr	Fraction										Tons per year						
	Μ	Mixed house waste									230							
	Re	Recyclables								25								
Commercial waste						45												
10	Leaves and miscellapeous					IS	120							2				
10.	Treatment plant sludge 5												J					
	The recyclables are collected separately and processed at a materials recovery																	
	facility. The mixe	d hou	usehol	d wast	e and	the co	mmer	cial	wast	e go	to t	he l	andfi	ll, as				
	do the leaves ar	nd mis	scellar	neous	solid v	vastes.	The	slud	lges	are d	Iried	d an	d ap	plied				
	on land (not into	the la	andfill	), and	the C	& D w	astes	are	used	d to f	ill a	larg	ge ra	vine.				
	Calculate the diversion																	
2.4	Although compa	ction	of wa	iste ind	crease	s the a	amou	nt o	ot sol	id wa	aste	e tha	at ca	n be	2			
2A.	separation of wa	ste co	ar are	ents at	t a mat	rerial re	cover	v fa	cility	7 7	.11 1	espe			2			
	Given the follow	Given the following daily solid waste generation data for a period of 10 days																
	Determine the ty	pe of	distrib	ution a	ind sta	tistical	chara	cter	ristics	s of da	ata.			•				
2B.	Day	1	2	3	4	5	6	7		8	9		10		3			
	Generation rate	34	48	290	61	205	170	12	20	75	11	0	90					
	yd <sup>3</sup> /day																	
2C.	Illustrate the ins	strume	entatio	on setu	up use	ed for	CHN	&S	anal	ysis	and	d ex	plair	the	3			
	operational princ	iples (	of CHI	N&S ap	oparati	JS.												
2D.	What is the heati	ng va	lue of	EDTA	?										2			
	Determine the chemical composition of the organic fraction, without and with sulfur																	
	Calculate the energy content for chemical composition of with sulfur using modified																	
	dulong formulae.																	
	Component	Wet	weia	ht. Ib	МС		Che	mical Composition. Ka										
				(%)	C	н		0			S		\sh					
					70	10	6	1	27.6	2	6		/	5				
	Food wastes	4.1			10	40	0.4	+	37.0	2.0	0	0.4	, 	5				
3A.	Paper	15.4			6	43.5	> 6	_	44	0.	3	0.2		6	5			
	Cardboard	2.7			5	44	5.9	)	44.6	0.3	3	0.2	2	6				
	Plastics	3.2			2	60	7.2	2	22.8	0		0		10				
	Textiles	0.9			10	55	6.6	5	31.2	4.	6	0.1	5 2	2.5				
	Rubber	0.9			2	78	10	)	-	2		-		10				
	Leather	0.2			10	60	8		11.6	10	)	0.4	-	10				
	Yard Wastes	8.4			60	47.8	3 6		38	3.4	4	0.3	5 4	4.5				
	Wood         0.9         20         49.5         6         42.7         0.2         0								0.1		1.5							
	Leather Yard Wastes Wood	0.2 8.4 0.9			10 60 20	60 47.8 49.5	8 3 6 5 6		11.6 38 42.7	10 3.4 0.2	) 4 2	0.4 0.3 0.1	}	10 4.5 1.5				
	Explain the pres	20000	of his		tranci	formati	on of	ho-	arda		not-	A 14/14	houi	tabla				



% by wt	Specific weight (Kg/m <sup>3</sup> )									
8.0	288.34									
en provided to each Paper <sup>#</sup> (Newspaper constitutes 20% of 89.7 all paper by weight) 35.8										
6.4	49.66									
6.9	65.68									
1.8	65.68									
0.4	129.75									
0.4	160.20									
17.3	100.92	4								
1.8	237.10									
9.1	195.43									
5.8	89.70									
0.6	160.20									
this program). The Other metals 3.0 320.38										
2.7	480.60									
Assuming 80 % material separation rate, determine: i). the proportion of the space required for each group of materials in the collection vehicle, and ii). The number of trips per week required if the size pf the collection vehicle id 11.5 m <sup>3</sup> .										
Illustrate the typical underground pneumatic waste transport system for high-rise apartment buildings.										
Illustrate the sectional view of sanitary landfill and discus the terms used in landfilling of solid waste.										
en (avg. cor	ncentration in air									
is 0.01 mg/m <sup>3</sup> ) for a 8 hours per day for 300 days per year over a period of 30 years. The avg. breathing rate of worker is 1m <sup>3</sup> /h. Estimate the risk of cancer if the carcinogen has a potency factor of 0.1 (mg/kg/day) <sup>-1</sup> . Assume average life of worker to be 65 years.										
ate the risk sume avera	r a period of 30 c of cancer if the age life of worker	3								
ate the risk sume avera	a period of 30 of cancer if the age life of worker dieldrin spilled in	3								
ate the risk sume avera uene and o ne half the	a period of 30 of cancer if the age life of worker dieldrin spilled in eir initial values.	3								
ate the risk sume avera uene and o ne half the nd dieldrin	a period of 30 of cancer if the age life of worker dieldrin spilled in eir initial values. are 0.0778 and	3								
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ate the risk sume avera uene and o ne half the nd dieldrin	r a period of 30 c of cancer if the age life of worker dieldrin spilled in eir initial values. are 0.0778 and	3 2								
ate the risk sume avera uene and o ne half the nd dieldrin asis) as a fu of 70 ton/d	r a period of 30 c of cancer if the age life of worker dieldrin spilled in eir initial values. are 0.0778 and unction of the ay to be placed	3 2								
ate the risk sume avera- uene and o ne half the nd dieldrin asis) as a fu of 70 ton/d ng faces is	r a period of 30 c of cancer if the age life of worker dieldrin spilled in eir initial values. are 0.0778 and unction of the ay to be placed 3:1. Assume	3 2 3								
	% by wt           8.0           6 of           35.8           6.4           6.9           1.8           0.4           0.4           0.4           0.4           0.4           0.4           17.3           1.8           9.1           5.8           0.6           3.0           2.7           ate is 1.732           the proport           icle, and ii)           ato 11.5 m <sup>3</sup> nsport syste           discus the           en (avg. cor	% by wt         Specific weight (Kg/m³)           8.0         288.34           6 of         89.7           35.8								