BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO/SP20)**

CLASS: **B.TECH** **SEMESTER IVth**
BRANCH: **CIVIL** **SESSION : SP/2023**

SUBJECT: CE421 SOLID WASTE MANAGEMENT

TIME: **02 Hours** **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	Explain the physical properties of solid waste.	[2]	1	2
Q.1(b)	The mass of C, H, O, N, and S of solid waste are 29.482,6.222,45.033,0.402,0.127 respectively. Derive the approximate molecular formula.	[3]	1	6
Q.2(a)	Classify the processes of density separation for solid waste.	[2]	3	4
Q.2(b)	Solid waste is collected from a locality using a haul container collection system. The data pertaining to the collection activities are as follows: Time taken by the vehicle to reach to first container location from the garage=15 min, time taken by the vehicle to reach to garage from the last container location=20min, the average time required to derive the vehicle between consecutive containers=6 min, round trip haul distance=50Km, time required to pick up the loaded container and to unload empty container=24 min, at site time per trip=8 min, haul constant co-efficient a=0.016h/trip, b=0.011h/trip. Determine the number of trips of the collection vehicle per day, assuming an 8-hour workday and off-route factor equal to 0.15.	[3]	2	5
Q.3(a)	Summarize the guidelines for the selection of routes for the collection of municipal solid waste.	[2]	2	2
Q.3(b)	Justify the critical design parameters for composting solid waste.	[3]	3	6
Q.4(a)	Explain the break-even distance for transfer stations.	[2]	2	2
Q.4(b)	A transfer station handling 300 tons/day, 5 days per week, costs Rs. 5 million to build and 150000 Rs. per year to operate. The capital costs of the building and transfer trucks are to be amortized over a 10-year period using a 12% discount factor. Calculate the cost of the transfer station per tons of waste assuming 5 days a week working.	[3]	2	6
Q.5(a)	Explain the incineration of solid waste.	[2]	3	2
Q.5(b)	Draw and explain the outlay of a typical material recovery facility.	[3]	3	3

::::::24/02/2023::::::M