

**GURU NANAK INSTITUTE OF TECHNOLOGY**

An Autonomous Institute under MAKAUT

**2020-2021****Waste Management of Food Industry****FT701****TIME ALLOTTED: 3 HOURS****FULL MARKS: 70***The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable***GROUP – A****(Multiple Choice Type Questions)**Answer any *ten* from the following, choosing the correct alternative of each question: **10×1=10**

		<b>Marks</b>	<b>CO No</b>
1.	(i) Removal of heavy toxic metal from waste will be carried out by a) ion exchange treatment b) ultra filtration c) biosorption d) electro dialysis	1	CO4
	(ii) For the composting of any organic material C/N ratio should be around a) 20-25 b) 25-30 c) 30-35 d) 35-40	1	CO2
	(iii) The methane and carbon dioxide bears the ratio in biofuel as a) 4:1 b) 2:3 c) 3:2 d) None of these	1	CO3
	(iv) Air supply available is less than that required for complete combustion in case of: a) Pyrolysis b) Incineration c) Gasification d) .Sand Bed Drying	1	CO4
	(v) Find the odd one out of the following: a) Incineration b) Pyrolysis c) Vermicomposting d) Sand Bed Drying	1	CO5
	(vi) Degree of decomposition of solid waste can be measured by a) final drop in temperature b) oxygen uptake rate c) starch iodine test d) all of these	1	<b>CO5</b>

(vii)	What is the advantage of incineration- a) Required minimum land b) Required any weather c) Both of them d) None of them	1	CO1
(viii)	C/N ration of blood a) 5 b) 3 c) 7 d) 1.5	1	CO1
(ix)	Depth of Oxidation ponds is a) 5-6m b) 1-1.5 m c) 2-8 m d) 0.5-1 m	1	CO3
(x)	What is the major end product of trickling filter a) SO <sub>2</sub> b) MgSO <sub>4</sub> c) CaSO <sub>4</sub> d) CO <sub>2</sub>	1	CO3
(xi)	MLSS stands for - a) Minimum liquid suspended solid b) Maximum lipid suspended solid c) Mixed Liquor Suspended Solid d) Mixed Liquid Suspended Solid	1	CO4
(xii)	sludge ratio = a) $Qr/Q = L_s / (1000 - L_s)$ b) $Qr/Q = g_s / (1000 - g_s)$ c) $Qr/Q = V_s / (1000 - V_s)$ d) $Qr/Q = V_s / (1000 - V_{s-1})$	1	CO3

**GROUP – B\***

**(Short Answer Type Questions)**

Answer any *three* from the following: **3×5=15**

		<b>Marks</b>	<b>CO No.</b>
2.	a) Derive the relationship between 5-day BOD and ultimate BOD.	2	CO1
	b) If BOD <sub>5</sub> of a sample measured at 20°C is 250 mg/L. Determine 3- day BOD at 27°C. Assume K <sub>20°C</sub> is 0.23 d <sup>-1</sup> and coefficient of temperature activity is 1.06	3	CO1
3.	Describe the different aspects of aerobic composting.	5	CO4
4.	a) Explain carbon to nitrogen (C/N) ratio.	2	CO1
	b) What are the major waste found in agriculture and animal husbandry sector?	2	CO2
	c) What is the major component in municipal waste?	1	CO2
5.	a) What is flocculation and sanitization?	2	CO3
	b) What is the major step of liquid wastewater treatment?	3	CO3

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|----|----|-------------------------------------|---|-----|
| 6. | a) | What is sludge recirculation ratio? | 2 | CO3 |
|    | b) | Explain sludge volume index .       | 3 | CO3 |

**GROUP – C\***

**(Long Answer Type Questions)**

Answer any *three* from the following: **3×15=45**

			<b>Marks</b>	<b>CO No.</b>
7.	a)	Discuss briefly the principle of landfill bioreactor.	4	CO1
	b)	What is landfill gas ?	2	CO1
	c)	10T/d of MSW is decided to be treated in a landfill bioreactor. The average depth of the compacted solid waste in the landfill reactor is 5m and experimentally it is found that the specific weight of compacted solid wastes is 400 kg/m <sup>3</sup> . With these information it is required to estimate the area required for land filling operation, if one cycle dumping period is 1 year.	6	CO4
	d)	What is bio remediation ?	3	CO3
8.	a)	Define vermi composting	3	CO2
	b)	Describe types of anaerobic digestion	5	CO2
	c)	Is vermi composting an ideal fertilizer? If yes, explain.	7	CO2
9.	a)	A fruit and vegetable processing unit generates 1 ton of solid waste that needs to be stabilized aerobically. Estimate the amount of oxygen required to oxidize the waste. It may be assumed that the initial composition of the biodegradable organic material to be decomposed is [C <sub>6</sub> H <sub>7</sub> O <sub>2</sub> (OH) <sub>3</sub> ] <sub>5</sub> and the final composition of the residual organic matter is [(C <sub>6</sub> H <sub>7</sub> ) <sub>2</sub> (OH) <sub>3</sub> ] <sub>2</sub> . After the oxidation process, 40% of the material is available as compost. Determine the amount of compost.	7	CO4
	b)	With a neat diagram, explain the operation of horizontal fixed bed gasifier.	6	CO4
	c)	What is bio gas?	2	CO5
10.	a)	What is mixed Liquor Suspended Solid (MLSS) ?	3	CO3
	b)	Oxidation ponds –Explain .	5	CO3
	c)	What are the factors Affecting Pond Reactions	7	CO3
11.	a)	What are the major sources of Dairy waste ?	3	CO2
	b)	What are the important characteristics of dairy waste?	2	CO2
	c)	Give the layout of dairy waste treatment strategy.	10	CO2