

**WASTE MANAGEMENT WITH RENEWABLE ENERGY SYSTEMS
(REEN 5246)**

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 5 (five) from Group B to E, taking at least one from each group.*

Candidates are required to give answer in their own words as far as practicable.

**Group – A
(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) The theme of World Environment Day 2021 was related to
(a) Ecosystem Restoration (b) Beat Plastic Pollution
(c) Air Pollution (d) Desert & Desertification.
- (ii) As per the CPCB standard for Type B water signifies
(a) Untreated Sewage
(b) Water having requisite Bathing Standard
(c) Drinking Water
(d) Treated wastewater for irrigation purpose.
- (iii) A plant manufacturing Solar PV module is considered as
(a) White Category Industry (b) Orange Category Industry
(c) Red Category Industry (d) Green Category Industry.
- (iv) Identify the Environment Act/Rules which is related with genesis of CPCB, India
(a) Water Act (b) Bengal Smoke Nuisance Act
(c) Air Act (d) E-waste (Management) Rules.
- (v) Black water is also termed as
(a) Sullage (b) Grit (c) Moss (d) Sewage.
- (vi) The extended aeration system does not require
(a) Aerator (b) Primary clarifier
(c) Skilled operator (d) Electric Power.
- (vii) ISO 14000 series is related to Certification of _____ Standard.
(a) Occupational health & safety (b) Environmental management
(c) Quality Management (d) Social accountability

- (viii) A permit which allows a country to produce a certain amount of carbon emissions and which can be traded if the full allowance is not used is known as
(a) Carbon Footprint (b) Carbon Flip Bond
(c) Carbon Credit (d) None of the above.
- (ix) Compactor is used for
(a) conversion of waste to organic manure
(b) volume reduction of solid waste
(c) managing air quality
(d) none of the above.
- (x) Blue-Light Hazard is associated with
(a) LED Light (b) CFL
(c) X-ray (d) Nichrome Filament Light.

Group- B

2. (a) Discuss the categories of industries as per our state pollution control board. Indicate the particular category in which renewable industries belong. [(CO3)(Remember/LOCQ)]
- (b) A factory uses 2,00,000 litres of furnace oil (specific density 0.97) per month. If for one million litres of oil used per year, the particulate matter emitted is 3.0 tonnes per year, SO₂ emitted is 59.7 tonnes per year, NO_x emitted is 7.5 tonnes per year, hydrocarbons emitted are 0.37 tonnes per year, and carbon monoxide is 0.52 tonnes per year, calculate the height of the chimney required to be provided for safe dispersion of the pollutants. [(CO3)(Evaluate/HOCQ)]
5 + 7 = 12

3. Find L₀ from industrial BOD Data using Fujimoto method.

t (day)	0	1	2	3	4	5	6	7
BOD mg/l	0	50	100	130	156	178	196	203

[(CO3)(Evaluate/HOCQ)]
12

Group - C

4. Discuss the Principle and Operation of a solid waste Compactor used in Corporation and Municipalities. [(CO3)(Analyze/IOCQ)]
12
5. Discuss an E-waste management plan following the statutory provisions in our country with a block diagram. [(CO2)(Remember/LOCQ)]
12

Group - D

6. Enumerate the salient steps for conducting EIA in a nuclear power plant. [(CO2)(Remember/LOCQ)]
12
7. Discuss the principle and operation of a Rain water harvesting process with a neat sketch. [(CO3)(Analyze/IOCQ)]
12

Group - E

8. An industrial wastewater flow of 10,000 m³/day is aerated in a two-celled facultative type aerated lagoon operated in series and having 5 days detention time in each cell of depth 3.3 m. The temperature of inflow is 55°C and ambient temperature is 10°C, estimate the temperature in each cell. Assume $f = 0.49/\text{day}$. [(CO2)(Evaluate/HOCQ)]
12
9. Write Technical notes on LED Lamps Recycling Technology towards a Circular Economy. [(CO4)(Analyze/IOCQ)]
12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	30.2	37.5	32.3

Course Outcomes (CO):

After completion of the course the students will be able:

1. To identify the need for Waste Management Principles in Renewable Energy Systems.
2. To analyze different technologies and Legislations/Rules associated with the subject.
3. To identify new indigenous technologies and their utilization.
4. To implement Do's & Don'ts practices for Waste Management in Renewable Energy Endeavors.

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question

