

Time: 1.30 Hours

Marks: 45

N.B.

1. Question number 1 is compulsory.
2. Attempt any two questions from Q.2 to Q.5.
3. Draw neat diagrams and write chemical equations wherever necessary.
4. Figures to the right indicate full marks.  
(Atomic Weights: H=1, C=12, N=14, O=16, Na = 23, Ca = 40, Mg=24, Cl=35.5, S =32, K=39)

Q.1 Solve any five from the following

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- a) What is Air Pollution? Give any two sources of it.
- b) Distinguish between temporary and permanent hardness with .(Any three points)
- c) What is Solid Waste Management? Give the rules of solid waste management.
- d) Explain the need for non-conventional energy sources.
- e) What is Biomass Energy? Give any two Advantages of it.
- f) We need to manage Natural resources, justify with three reasons.
- g) Calculate temporary, permanent and total hardness of water sample containing  $Mg(HCO_3)_2 = 7.3$  ppm,  $Ca(HCO_3)_2 = 16.2$  ppm  $MgCl_2 = 9.5$ ppm,  $CaSO_4 = 13.6$  ppm.

Q.2

- a) What is energy audit? Explain why energy audit is important.
- b) Define pyrolysis. Explain pyrolysis process of biomass for generation of hydrogen.
- c) A 5 ml sample of waste water was refluxed with 30 ml of potassium dichromate solution and after refluxing the excess unreacted dichromate required 23 ml of 0.1M FAS solution. A blank of distilled water on refluxing with 30 ml of dichromate solution required 36 ml of 0.1M FAS solution. Calculate COD value of the waste water.

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Q.3

- a) Explain Activated Sludge Process of waste water.
- b) With Schematic diagram describe the working of photovoltaic cell
- c) What is solid waste? Explain any two sources of it

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Q.4

- a) Explain with chemical reactions working of catalytic converters.
- b) Give Principle, working and application of hydrogen fuel cell.
- c) Define Wind energy? What are the advantages and limitations of Wind energy? ( any two points each )

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Q.5

- a) Give Principal, working, diagram, advantages and limitations of Reverse osmosis process.
- b) Explain the ozone hole and its effects on human health.
- c) 50 ml of standard hard water containing 1 mg of pure  $CaCO_3$  per ml, consumed 45 ml of EDTA. 50 ml of the water sample required 25 ml of the same EDTA solution using EBT indicator. After boiling and filtering, 50ml of the water sample required 15 ml of the same EDTA for titration. Calculate the total, permanent and temporary hardness of the water sample.

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