

13. (a) (i) Estimate the stoichiometric air for a biofuel whose ultimate analysis reveals:
C : 30% , H₂ : 40%, O₂ = 20%, N₂ = rest (8)
- (ii) What is equivalence ratio? Comment on the value of equivalence ratio for combustion, gasification, biomethanation and pyrolysis processes (8)

(or)

- (b) Compare the following bioenergy conversion systems
- (i) fixed dome and floating drum-biomethanation plant
- (ii) updraught and downdraught gasification system

14. (a) (i) Explain the principle, construction and working of power generation systems employed in liquid dominated hydrothermal geothermal systems (12)
- (ii) Enumerate the merits and demerits of geothermal energy (4)

(or)

- (b) (i) Compare the principle, working, merits and demerits of Claude Cycle and Anderson Cycle employed for power generation in OTEC systems (12)
- (ii) List the advantages of tidal turbines over wind turbines (4)

15. (a) (i) Explain the principle, construction and working of an Alkaline Fuel Cell (12)
- (ii) List the impediments hampering the wide adaptability of fuel cell technology(4)

(or)

- (b) (i) Detail on the various technologies available for hydrogen production (12)
- (ii) Gist the merits and demerits of hydrogen as a fuel (4)