Model Answer

B. Sc. -V^th Semester Examination 2013

Rural Energy System.

① Multiple Choice Question + (Answer)

(i) Non-conventional energy
(ii) Sound energy
(iii) Alcohal
(iv) Compact fluorescent lamp.
(v) Double glass layer
(vi) Tamil Nadu
(vii) Jacques d'Arson Val
(viii) The Sea
(ix) Solar
(x) All of these

② Short Answer :-

(i) Solar Cell :- The direct conversion of solar energy into electrical energy by means of the photovoltaic effect, that is, the conversion of light (or other electromagnetic radiation) into electricity. The photovoltaic effect is defined as the generation of an electromotive force as a result of the absorption of ionizing radiation. Energy conversion devices which are used to convert sunlight to electricity by the use of the photovoltaic effect are called solar cells. A single converter cell is called a solar cell or more generally, a photovoltaic cell, and combination of such cell, designed to increase the electric power output is called a solar module or solar array. Photovoltaic cell are made of semiconductors that generate electricity when they absorb light. ~~Aphotons~~ As photons are received, free electrical charges are generated that can be collected on contacts applied to the surface of the semiconductors.

Answer (ii) → Component of Bio gas : Popularly known as gabar gas.

(*) It containing 55 - 65 % — methane
30 - 40 % → CO_2

(*) Rest being the impurities → H_2, H_2S and N_2

(*) The calorific value between - 5000 to 5500 k cal/kg.

Answer (iii) Constraint related with the growth of wind energy in India → (i) the wind speed.
(ii) High cost of generation (power.)
(iii) Complex technology
(iv) Geographical situation.
(v) Irregular production.
(Please elaborate all these points)

Answer. iv : Pyrolysis → It is an irreversible chemical in biomass caused by the action of heat in absence of oxygen. this process may yield either solid, liquid or gaseous fuel. Without oxygen the energy split the chemical bonds and leaves the energy stored in biomass. The reactions are complex in the process. Pyrolysis of cow manure, wood saw dust, liberates H_2, N_2, CO, CO_2, C_2H_4 and C_2H_6. Hydrogen and carbon monoxide can be converted into metanal, gasoline, diesel ammonia for fertilizer, drugs, building or bonding material and synthetic textiles. The main advantages of pyrolysis includes, compactness, simple equipment, low pressure operation, negligible waste product and high conversion efficiency.

Answer V : Energy plantation means growth of plant material for their ~~fule~~ fuel value offers a renewable source of liquid fuel and organic chemical. Energy plantation can be considered as long term alternatives

(v) — to fossil and nuclear energy sources. When land plants are grown purposely for their fuel value, by capturing solar radiation in is called "energy plantation". Through the process of photo synthesis, plants are able to convert solar energy into bio-mass which can be used as a source of fuel. Fuel produced by plant growth will have two main advantages over directly harnessing the solare energy at the surface of earth either by thermal or photovaltaic means Perennial crop are always preferred for this purpose due to their continuous growth with minimum of efforts.

Useful in rural area → (i) Provide fodder to animal.
(ii) Best use of fellow or grazing land area.
(iii) Effective, if manage properly.
(iv) Provide utternate source of energy.
(v) Provide employment in rural areas.

Best Plants → Babool, casuarina, eucalyptus.

Answer vi: Non-conventional energy sources →

(i) Solar energy
(ii) wind energy
(iii) Energy from Bio-mas and Bio-gas.
(iv) Ocean Thermal energy
(v) Tidal energy
(vi) Geo thermal energy
(vii) Hydrogen energy.
(ix) Fuel Cell
(x) Hydro - energy
(xi) Thermionic converter.
(xii) Thermo-electric perwer.

• Long Answer → Give detail about these points.

(i) Floating type Bio-gas model.

(i) Merit → (i) Less operation cost.
(ii) Less maintance cost in long term production.
(iii) Clearly seen the gas holding position in digester tank.
(iv) Produce more quantity of gas in comparision to other models.
(v) If required biannual maintance (tank cleaning)

(ii) Demerit → (i) High cost
(ii) Difficult to identify the leakage in below side of tank.
(iii) For tank cleaning, it required more human power in comparision to other models.

(ii) Future energy challenges →

(i) Fastest growth of population demands more energy for their day to day activities and required more industrial & agricultural production.
(ii) Increasing demand of energy in transportation sectors, industrial sector and service sector etc.
(iii) High cost of non-renewable energy development equipment/machines.
(iv) Over mining of our fossil fuel, causes reduction in our reservoir, so it not fullfil the future demands.
(v) Non-availability of raw material for our nuclear power generation, ~~and de~~
(vi) Lack of effective management in power distribution.
(vii) Thermal power generation units are are polluting our environments
(viii) High cost of liquid fuel in international market.

Answer(iii) Petroleum Gas :- Liquefied petroleum gas, also called- LPG, GPL, LP Gas. Liquified petroleum gas or simply propane or butane. It is flammable mixture of hydrocarbon gases used as a fuel in heating applications and vehicles.

LPG → LPG bought and sold include mixes that are primarily propane (C_3H_8), primarily butane (C_4H_{10}) and most commonly mixes including both propane & butane. LPG is prepared by refining petroleum or 'wet' natural gas and derived from fossil fuels.

Advantage of LPG → (i) Highly inflammable, provide good energy
(ii) Clean energy
(iii) Less-effect in environment pollution.

Disadvantage of LPG → (i) Transportation cost is very high
(ii) Highly precaution needed during storage.

Answer-(iv) The word gasification implies converting a solid or liquid into a gaseous fuel without leaving any solid carbonaceous residue. It is an equipment (Gasifier) which can gasify a variety of bio-mass such as wood waste, agricultural waste like stalks and root of various crops, maize cobes etc. The gasifier is essentially a chemical reactor wher various complex physical and chemical processes take place. Biomass gets dried, heated, pyrolysed, partially oxidised and reduced, as it flows through it. The gas produced in the gasifer is a clean burning fuel having heating value of about 950-1200 kcal/m³. Hydrogen (18-20%) and carbon-monoxide (18-24%) are the main constituents of the gas. In gasifier the bio mass converting into fuel by two method. (i) Bio-chemical
(ii) Thermo-chemical

Classification of Bio-mass Gasifers :-
(i) The direction of the gas flow
(ii) Output or capacity of the gasifiers.