!! पढमं नाणं तओ दया !!

SHRI JAIN VIDYA PRASARAK MANDAL

COLLEGE OF EDUCATION

ESTD 8/ 9 / 1927

Fattechand Marg, Chafeker Chowk Chinchwad, Pune 411033. Tel.: 020-27352274,

APPROVED BY NCTE, GOVT. OF MAHARASHTRA & AFFILIATED TO SAVITRIBAI PHULE PUNE UNIVERSITY

NCTE CODE- 123228/2015

SPPU ID CODE: PU/PN/B.Ed./240/2006

Website: www.sjvpmcoe.in

Email: sjvpmbed@gmail.com

Dr. Kothawade P.L.

(B.Sc. , M.A. , M.Ed. , Ph.D.) , Principal

7.1.4. Institution Has water management and conservation initiative in the form of:

Any Other Information

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Website: www.sjvpmcoe.in Dr. Kothawade P.L.

Email: sjvpmbed@gmail.com (B.Sc. , M.A. , M.Ed. , Ph.D.) , Principal

Rain water harvesting facility:

Rainwater harvesting facility is available adjacent to Institute hostel. Rainwater collected during rainy season of Boys hostel and B.Ed college building is collected in tank at the bottom of institute. Rainwater harvesting is an important environment friendly approach. It is a Green Practice having two fold benefit of maintains the groundwater level constant. This green practice can be encouraged to protect the environment. Rainwater and run-off water, stored in a planned way, can save the earth from soil erosion and flood and recharge the aquifers to increase the groundwater level. Rainwater harvesting is eco-friendly and economical. The cost of digging a catchment area can be saved by roof-top collection of rainwater. The best part of the practice of rainwater harvesting, is that if unused, this water can be collected in natural ponds or artificial tanks and decanted to the ground thus charging the a aquifer. Institute constructed rain water harvesting plant. Institute has huge infrastructure, in rainy season abundant amount of water collected on roof top of the building. Rain water collected and passed through pipes at specific position of the roof top. All water collected in the rain water harvesting pit. Harvested water is collected in tank and supply to trees.

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1.BOYS HOSTEL RAIN WATER HARVESTING

2.Waste water recycling

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3.bore wells

WATER TANKS

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NOTICE Date: 07/09/2022

All the staff members and students should try to save water whenever possible.

Turn off the taps if open, leaking taps should be reported immediately in the office,

do not throw water instead give it to the plants.

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Chapter 7

Rain Water Harvesting:

The system of rain water harvesting is an integral part of any educational institution. This system helps to conserve the rain water and to use during the time of its desirable. This system helps the students to understand the basic concepts of rainwater harvesting system and their effective use in the real life.

It is seen that there is a natural slope at the Institute campus, such natural slope can be used to take the water through some specific path and absorb under the ground. There is one empty bore well in the Institute campus, such empty bore well can be charged with the use of rainwater harvesting system. In addition to this some ring wells can be prepared and rainwater, gray waste water from all the building can be taken through some specific path in these ring wells and used to charge under the ground to maintain the ground level water.

7.1. Advantages of rain water harvesting –

(a) Promotes adequacy of underground water

(b) Mitigates the effect of drought

(c) Reduces soil erosion as surface run-off is reduced

(d) Decreases load on storm water disposal system

(e) Reduces flood hazards

(f) Improves ground water quality / decreases salinity (by dilution)

(g) Prevents ingress of sea water in subsurface aquifersin coastal areas

(h) Improves ground water table, thus saving energy (to lift water)

(i) The cost of recharging subsurface aquifer is lower than surface reservoirs

(j) The subsurface aquifer also serves as storage and distribution system

(k) No land is wasted for storage purpose and no population displacement is involved

(l) Storing water underground is environment friendly

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7.2. Rain water harvesting potential –

The total amount of water that is received in the form of rainfall over an area is called the rain water endowment of that area. Out of this, the amount that can be effectively harvested is called rain water harvesting potential.

All the water which is falling over an area cannot be effectively harvested, due to various losses on account of evaporation, spillage etc. Because of these factors the quantity of rain water which can effectively be harvested is always less than the rain water endowment. The collection efficiency is mainly dependent on factors like runoff coefficient and first flush wastage etc. Runoff is the term applied to the water that flows away from catchments after falling on its surface in the form of rain.

Runoff depends upon the area and type of catchment over which it falls as well as surface features. Runoff can be generated from both paved and unpaved catchment areas. Paved surfaces have a greater capacity of retaining water on the surface and runoff from unpaved surface is less in comparison to paved surface. In all calculations for runoff estimation, runoff coefficient is used to account for losses due to spillage, leakage, infiltrations catchment surface wetting and evaporation, which will ultimately result into reduced runoff. Runoff coefficient for any catchment is the ratio of the volume of water that run off a surface to the total volume of rainfall on the surface.

The runoff coefficient for various surfaces is given in following table –

Sr. No.	Type of catchment	Coefficient
1.	Roof Catchment	
	Tiles	0.8 – 0.9
	Corrugated metal sheets	0.7 – 0.
2.	Ground Surface Coverings	
	Concrete	0.6 – 0.8
	Brick Surface	0.5 – 0.6
3.	Untreated ground catchments	

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	Soil on slope less than10 %	0.0 – 0.3
	Rocky natural catchments	0.2 – 0.5

Based on the above factors, the water harvesting potential of site could be estimated using the following equation:

Rain Water harvesting potential = Amount of Rainfall x area of catchment x Runoff coefficient

7.3. Rain water harvesting methods –

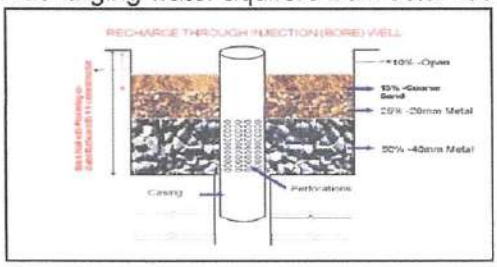
(a) Storing rain water for direct use

(b) Recharging ground water aquifers, from roof top run off

(c) Recharging ground water aquifers with runoff from ground area

According to the site of Institute the method of recharging ground water aquifers from roof top run off may be suitable. Recharging ground water aquifers from roof top run off. Rain water that is collected on the roof top of the building may be diverted by drain pipes to a filtration tank (for bore well, through settlement tank) from which it flows into the recharge well, as shown in following Figure. The recharge well should preferably be shallower than the water table. This method of rain water harvesting is preferable in the areas where the rainfall occurs only for a short period in a year and water table is at a shallow depth.

The schematic diagram of recharging water aquifers from solar roof top run off is as follows -



7.4. Existing Situation –

Institute has not Installed rain water harvesting setup at building. Enertek Recommends to install rain water harvesting setup.

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Chapter 8

Waste Disposal & Vermi composting:

8.1. Vermiculture Composting Culture –

Vermicomposting is basically a managed process of worms digesting organic matter to transform the material into a beneficial soil amendment. The institute has been started Vermi culture composting culture in house on 30 Sq. meter land. The main purpose of this is to reduce disposable waste in the Institute campus and after complete process of Vermi composting it is used as manure for plantation and greenery in the campus. It is also used for the demonstration and awareness in farmers to implement organic farming and its importance.

The main benefits of the process are to reduce the waste in the environment and utilized for some useful purpose and it is cost savings process.

The earthworms being voracious eaters consume the biodegradable matter and give out a part of the matter as excreta or Vermi-castings. The Vermi-casting containing nutrients is a rich manure for the plants. Vermicompost, apart from supplying nutrients and growth enhancing hormones to plants, improves the soil structure leading to increase in water and nutrient holding capacities of soil. Fruits, flowers and vegetables and other plant products grown using vermicompost are reported to have better keeping quality. A growing number of individuals and institutions are taking interest in the production.

Process:
The process of composting crop residues / Agri wastes using earthworms comprise spreading the agricultural wastes and cow dung in gradually built-up shallow layers. The pits are kept shallow to avoid heat built-up that could kill earthworms. To enable earthworms to transform the material relatively faster a temperature of around 300C is maintained. The final product generated by this process is called vermicompost which essentially consist of the casts made by earthworms eating the raw organic materials. The process consists of constructing brick lined beds generally of 0.9 to 1.5 m width and 0.25 to 0.3 m height are constructed inside a shed open from all sides. For commercial production, the beds can be prepared with 15 m length, 1.5 m width and 0.6 m height spread equally below and above the ground. While the length of the beds can be made as per convenience, the width and height cannot be

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increased as an increased width affects the ease of operation and an increased height on conversion rate due to heat built up. Cow dung and farm waste can be placed in layers to make a heap of about 0.6 to 0.9 m height. Earthworms are introduced in between the layers @ 350 worms per m3 of bed volume that weighs nearly 1 Kg. The beds are maintained at about 40-50% moisture content and a temperature of 20–300 C by sprinkling water over the beds. When the commercial scale production is aimed at, in addition to the cost of production, considerable amount must be invested initially on capital items. The capital cost may work out to about Rs. 5000 to 6000 for every tonne of vermicompost production capacity. The high unit capital cost is since large units require considerable expenditure on preparation of Vermi beds, shed to provide shelter to these beds and machinery. However, these expenditures are incurred only once. Under the operational cost, transportation of raw materials as also the finished product are the key activities. When the source organic wastes and dung are away from the production facility and the finished product requires transportation to far off places before being marketed, the operational cost would increase. However, in most of the cases, the activity is viable and bankable. Following are the items required to be considered while setting up a unit for production of Vermi-compost.

Components of a Commercial Unit –
Commercial units must be developed based on availability of cow dung locally. If some big dairy is functioning then such unit will be an associated activity. Commercial units must not be designed based on imported cow dung.

1. Sheds
For a Vermi-composting unit, whether small or big, this is an essential item and is required for securing the Vermi beds. They could be of attached roof supported by bamboo rafters or steel trusses. Locally available roofing materials or HDPE sheet may also be used in roofing to keep the capital investment at reasonably lower level. If the size is so chosen as to prevent wetting of beds due to rain on a windy day, they could be open sheds. While designing the sheds adequate room/pathways must be left around the beds for easy movement of the laborers attending to the filling and harvesting the beds.

2. Vermi-beds
Normally the beds have 0.3 to 0.6 m height depending on the provision for drainage of excess water. Care should be taken to make the bed with uniform height over the entire width to avoid low production owing to low bed volumes.

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The bed width should not be more that 1.5 m to allow easy access to the center of the bed.

3. **Fencing and Roads/Paths**

The site area needs development for construction of structures and development of roads and pathways for easy movement of hand-drawn trolleys/wheel barrows for conveying the raw material and the finished products to and from the Vermi sheds. The entire area must be fenced to prevent trespass by animals and other unwanted elements. These could be estimated based on the length of the periphery of the farm and the length and type of roads/paths required. The costs on fencing and formation of roads should be kept low as these investments are essential for a production unit, yet would not lead to increase in production.

4. Water Supply System

As the beds must be kept moist always with about 50% moisture content, there is a need to plan for a water source, lifting mechanism and a system of conveying and applying the water to the Vermi-beds. Drippers with round the clock flow arrangement would be quite handy for continuous supply and saving on water. Such a water supply system requires considerable initial investment. However, it reduces the operational cost on hand watering and proves economical in the long run. The cost of these items would depend on the capacity of the unit and the type of water supply chosen.

5. Transportation

For any Vermi-composting unit transport arrangement is a must. When the source of raw material is away from the production unit, an off-site transport becomes major item of investment. A large sized unit with about 1000 tonnes per annum capacity may require a three-tonne capacity mini-truck. With small units particularly with the availability of raw material near the site, expending on transport facility may become infructuous. On-site transport facilities like manually drawn trolleys to convey raw material and finished products between the storage point and the Vermi-compost sheds could also be included in the project cost.

Recommendations –

Enertek recommends to install Waste Composting and Vermi-composting project of appropriate size.

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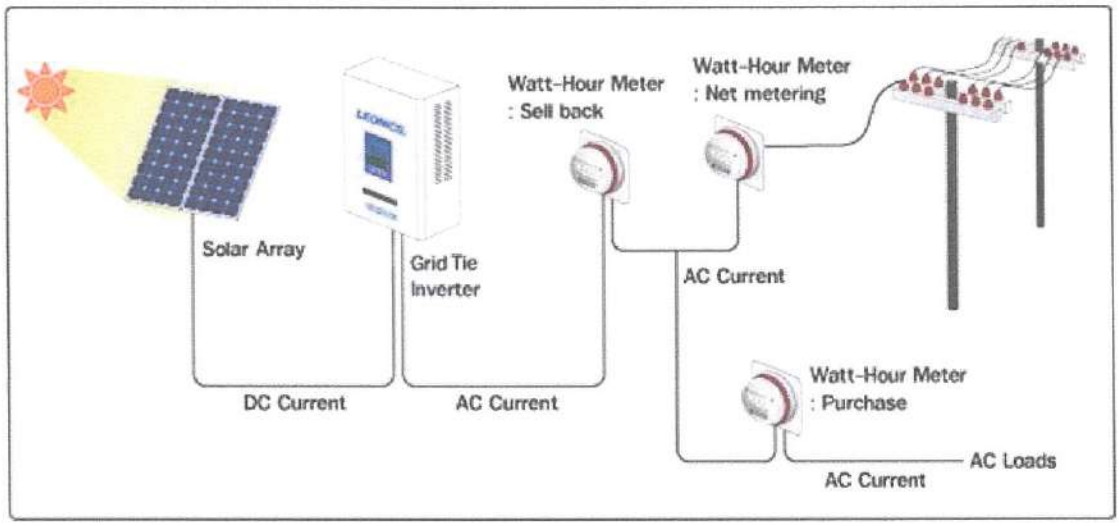
Chapter 10

Solar PV:

The college Should opt for rooftop solar photovoltaics plant. This is a clean and green source of energy that can be directly utilized as a substitute to the Grid Power. In this section we shall be seeing the benefits and proposal for Solar PV system – On Grid Type

In this system, there is no battery backup required, the energy generated is directly utilized by the load and the excess units are fed back into the grid with a net meter. At the end of the month the difference of the two will be your actual billed units. This system is more cost effective than a Battery type/ Islanding type/ Solar PV off grid system.



Benefits of solar: -

- Electricity produced by solar cells is clean and silent. Because they do not use fuel other than sunshine, PV systems do not release any harmful air or water pollution into the environment, deplete natural resources, or endanger animal or human health.
- Photovoltaic systems are quiet and visually unobtrusive.
- Small-scale solar plants can take advantage of unused space on rooftops of existing buildings.
- Solar energy is a locally available renewable resource. It does not need to be imported from other regions of the country or across the world. This reduces environmental impacts associated with transportation and reduces our dependence on imported oil. And, unlike fuels that are mined and harvested, when we use solar energy to produce electricity we do not deplete or alter the resource.

Total solar PV capacity that can be connected on roof is 3 kW depending on actual space available on the roof of science building which is facing south direction.

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Considering 3 kW System-

- Units generated per day = 14 kWh
- Annual Generation Possible = 4,928 kWh
- Area required = 30 sqm
- Saving = 49,275 INR per year
- Investment = 1,95,000 INR plus taxes
- Depreciation applicable
- Possible Payback – 4 yrs.

Note: - Figures mentioned here are based on thumb rule, Quotation will be given that will cover the necessary details on request.
According to peak, Shine hours and global irradiance available at location = 4.5 kWh/kWp Generation Considered
Solar Payback & estimated generation

Year	Energy kWh/Anum	Energy (kWh) rate	Cost saving (Rs.)
1	4,928	₹ 10.00	₹ 49,275
2	4,878	₹ 10.20	₹ 49,758
3	4,829	₹ 10.40	₹ 50,246
4	4,781	₹ 10.61	₹ 50,738
5	4,733	₹ 10.82	₹ 51,235
6	4,686	₹ 11.04	₹ 51,737
7	4,639	₹ 11.26	₹ 52,244
8	4,593	₹ 11.49	₹ 52,756
9	4,547	₹ 11.72	₹ 53,273
10	4,501	₹ 11.95	₹ 53,795
11	4,456	₹ 12.19	₹ 54,323
12	4,412	₹ 12.43	₹ 54,855
13	4,368	₹ 12.68	₹ 55,393
14	4,324	₹ 12.94	₹ 55,935
15	4,281	₹ 13.19	₹ 56,484
16	4,238	₹ 13.46	₹ 57,037
17	4,196	₹ 13.73	₹ 57,596
18	4,154	₹ 14.00	₹ 58,160
19	4,112	₹ 14.28	₹ 58,730
20	4,071	₹ 14.57	₹ 59,306
21	4,030	₹ 14.86	₹ 59,887
22	3,990	₹ 15.16	₹ 60,474
23	3,950	₹ 15.46	₹ 61,067
24	3,911	₹ 15.77	₹ 61,665
25	3,871	₹ 16.08	₹ 62,270
Total	1,09,479		₹ 13,88,240

- *Note Considering 1% Degradation of Solar Panels and System per annum*

  2% increase considered in electricity cost per annum

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