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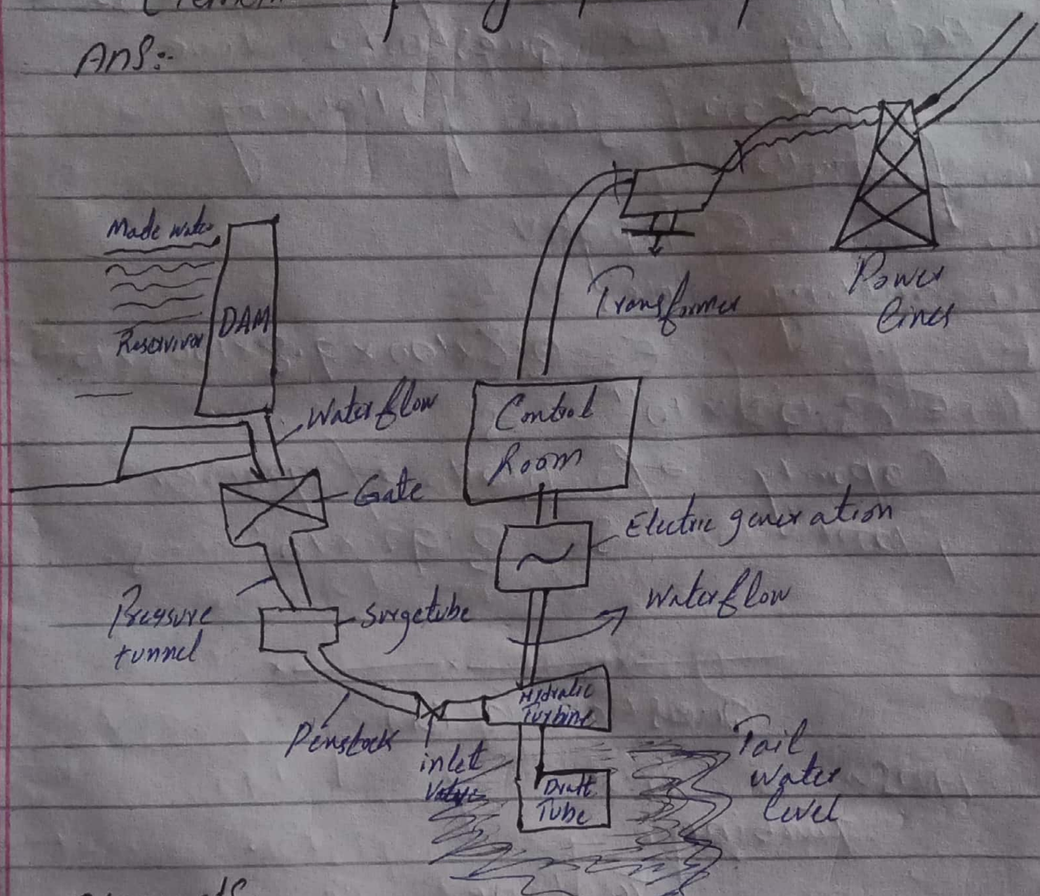
Subject power Generation

Question No 1 (a)
Elements of Hydropower plant

Ans:-



elements:-

1:> Storage Resiorver
2:> Dam
3:> Fore bay
4:> Spill way
5:> intake
6:> Surg tank
7:> Penstock
8:> value and Gates
9:> Trach Rates
10: Tradrace
11:> Draft tube
12:> prinx moves of water tubuli

Question No 1 (b)

Slowtion:-

Given that

avaliable volume = v = 5×10^{35} m^3

Avaliable head = h = 100 m

Hydraulic efficiency = ~~0.94~~ 85% = 0.85

Electrical efficency = 0.94

Therefore available effeciency $0.85 \times 0.94 = 0.8$

According to question we

can we following

formulla.

$E = \eta \rho g h v$

putting values

$E = 0.8 \times 100 \times 9.8 \times 100 \; 5 \times 10^{35}$

$E = 3.92 \times 10^{11}$ w-s

Capacity of head of power

plant is 3.92×10^{11} w-s.

———x———x———x

Question 2 (a)

Answer

Turbine

Turbine is a

rotatory mechanical device

that extract energy from

a fluid flow and convert

it into useful work.

Types

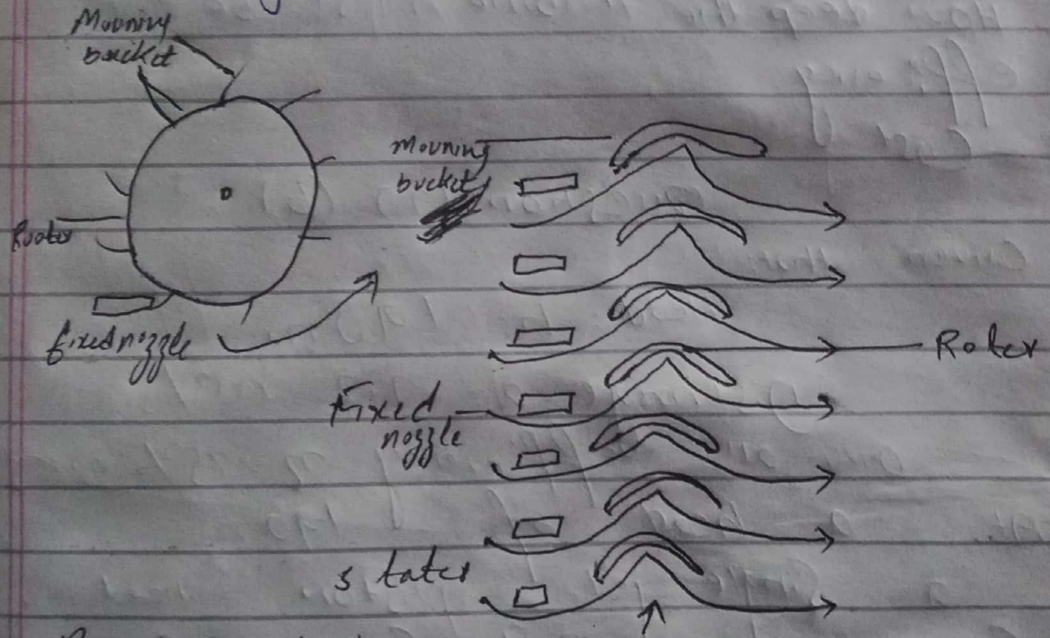
(i) Impulse Turbine:-

The impulse

turbine generally uses the

velocity of the water.

to move the runner the water stream hits each bucket on the runner.
An impulse turbine is generally suitable for high head low flow applications.
In impulse turbine at inlet only kinetic energy available. But in reaction turbine at inlet kinetic energy as well as pressure energy both are available.



Reaction turbine :-
A reaction turbine develops power from the Combined reaction of pressure and moving water.
the runner is placed directly in the water stream flowing over the blades rather than striking each individually.

Reaction turbines are generally used for sites with lower head and higher flows than compared with the impulse turbines

parameters:-

The following parameters are used in Hydropower plants.

(i) Height of standing water "head"
(2) flow of water
(3) volume of water
(4) How deep the turbine must be set.
(5) efficiency
(6) Cost

Question (2) (b)

Given that:

Head: h: 190 m

Discharge - Q = 2.2 m²/s

Over all efficiency: η = 85% 0.85

At a head of 190 m. a single jet piston wheel seem most suitable so we can use following formula calculated specific speed

$$ns = \frac{85.49}{(h)^{0.243}}$$

$$ns = \frac{85.49}{(190)^{0.243}} = 23.88 \text{ rpm}$$

The out put power can be obtained by using $p = \eta \rho Q g h$ watts.

$$P = 0.85 \times 1000 \times 2.2 \times 9.81 \times 190 = 3485.5 \text{ kW}$$

$n = n_s = \frac{n^{3/4}}{\sqrt{h}} = 23.88 \times \frac{(190)^{3/4}}{\sqrt{3485.5}}$

$= 285.32$ rpm

an Alternater rated at 50 Hz frequency with Symchronous Speed appraching 285.32 rpm but not greater is to be selected. The no of poles required are Computed by using

$N_s = \frac{120f}{P}$

or

$P = \frac{120 \times 50}{285.32} = 21.02$ poles

Sleeting 24 poles alternater will rotate at 250 rpm at 50 Hz seens just right the turbine will have diameter which Can be determined by using equation.

$D = 38.567\frac{\sqrt{h}}{n} = 38.567\frac{\sqrt{190}}{250} = 2.12$ m

The jet diameter Can be Calculated by using equation.

$Q = \pi dg^2 (vg)/4$

The jet velocity $= v_j = \sqrt{2gh} = \sqrt{2 \times 9.8 \times 190}$

$= 61.05$ m/sec

therefore jet diameter will

$$d_j = \sqrt{\frac{4q}{\pi v_j}} = \sqrt{\frac{4 \times 2.2}{3.14 \times 61.05}} = 0.214$$

$d_j = 21.4cm$

---x---x---x---

Question NO 3

Ans

Stages of the Nuclear fuel cycle

The nuclear fuel cycle represents the progression of nuclear fuel from creation to disposal mixed oxide is another type of nuclear fuel. The nuclear fuel typically include the following Stages.

⇒ Uranium recovery to extract U or unmined uranium ore and concentration will they are to produce a uranium ore concentrate sometimes called U_3O_8 or "yellow cake)

⇒ Conversion of uranium ore concentrate into uranium hexafluoride (UF_6)

⇒ Enrichment to increase the Conc of uranium 235 (U235) in UF_6.

⇒ Deconservation to reduce the herards associated the depleted uranium uranium hexafluoride (DUF6) or "tailings" produced in earlier stages of fuel cycle

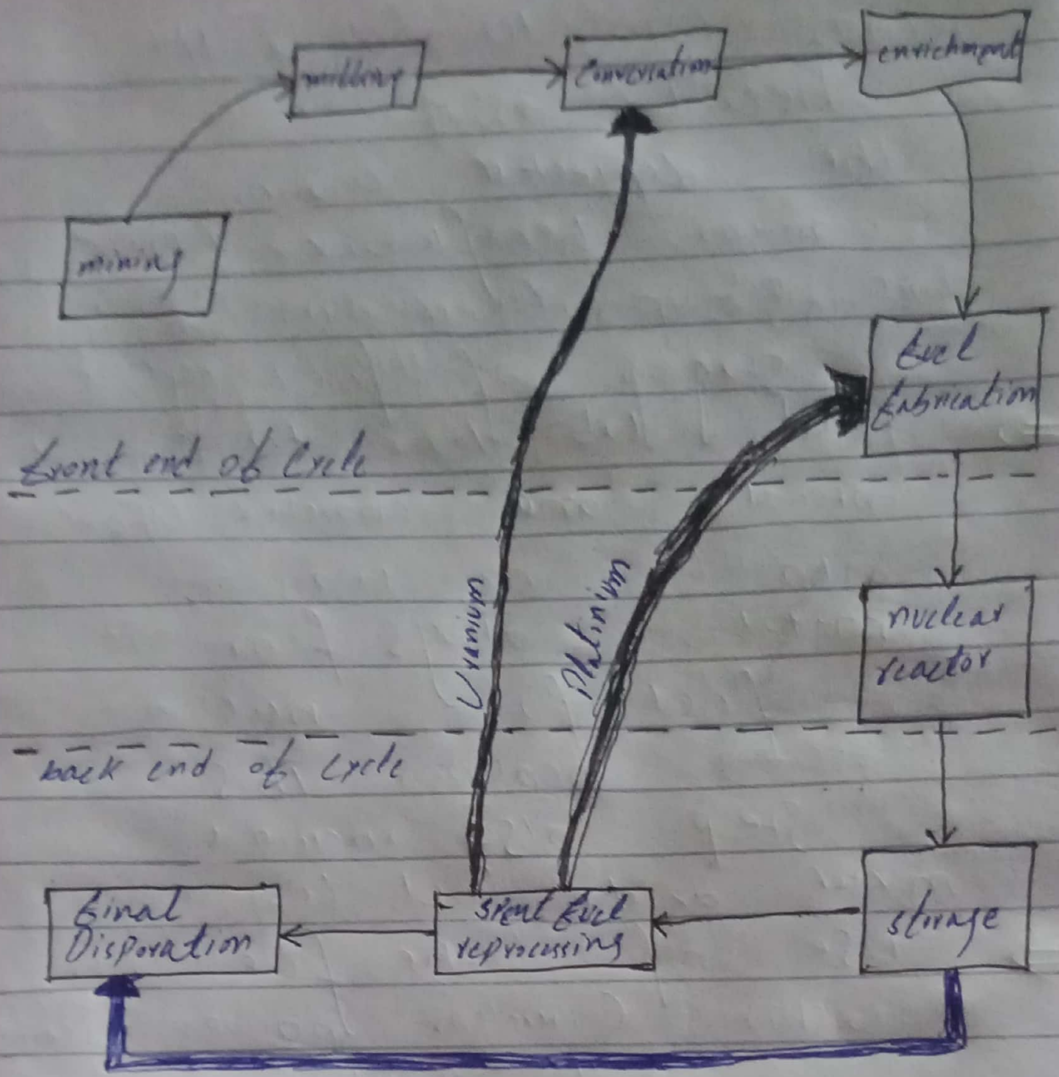
⇒ fuel Labrication to Convert natural and enriched UF_6 into UO_2 or uranium metal alloys for use as fuel for nuclear ~~reactors~~ reactors. This step also include mixed oxide fuel Labrication.

⇒ use of the fuel in reactor (nuclear power, research or naval population).

⇒ Interin Storage of spent nuclear fu

⇒ Reprocessing (or recycling) of level ~~waste~~ waste.

⇒ final disposition (disposal of used fuel or high level waste.


mining
milling
Conversation
enrichment
fuel fabrication
Front end of Cycle
nuclear reactor
Uranium
Platinium
back end of Cycle
Final Disporation
spent fuel reprocessing
storage

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