



Sarvajani Education Society  
**SARVAJANIK UNIVERSITY**  
**Sarvajani College of Engineering and Technology**  
**Electrical Engineering Department**

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REPORT ON

INDUSTRIAL VISIT

AT

HYDRO POWER PLANT, UKAI

DATE: 17, April, 2025

ELECTRICAL ENGINEERING

DEPARTMENT

SCET

## **Industril Visit Detail**

Visit to: Ukai Hydro Power Plant

Location: Ukai, Gujarat

Date of Visit: 17 April-2025

Department: Electrical Engineering Department

Institution: Sarvajanik College of Engineering and Technology

Coordinator: Dr. Nilesh V. Shah

### **Faculty Members Joined for Visit:**

- 1) Dr. Nilesh V. Shah, Associate Professor
- 2) Prof. Naman Bahtt, Assistant Professor
- 3) Mr. Munjal Trivedi, Lab Assistant

### **Number of Students: 54**

B.Tech. IV Year [3 students]

B.Tech. III year [16 students]

B.Tech. II year [ 13 students]

B.Tech. I year [22 students]

**Report Prepared By:** Students of Electrical Engineering Department

**Compiled by:** Dr. Nilesh V. Shah, Associate Professor, EED

## **HYDRO POWER PLANT PROFILE:**

Power Plant Name: Ukai Hydro power plant

Address: Ukai Dam  
Gujarat, India

Work profile: Power generation and flood control

Installed capacity (300 Mw)

Conventional type power plant

Hydraulic head (190 ft to 110ft)

Storage capacity (46%)

**06:00 am**

The journey started from SCET,surat. The 54 students along with 3 faculties were ready for an exciting visit. Sharp at 06:30 am ,one bus of Ukai Dam arrived. It was about to getting afternoon but the students created a very energetic and disciplined environment. The bus were well maintained and comfortable. Within an two hour we were on power plant visit road and our speed geared up. We were yet to cover around 96 kms to reach our destination. After travelling this fun filled journey we were on the entrance to the plant.

Mr. R. N. Patel had appointed an Engineer for the visit. After security check at an entrance, all were allowed to enter the plant for the visit. Out of the four 75 MW plants one of the plant was running and luckily were able to see the synchronization by putting on another plant of 75 MW.

Engineers have demonstrated the working of tribune blades, Hydraulic mechanism, alternator etc in detail. The synchronization and control was also demonstrated in control room by Mr. Gamit.

The detail description of the Hydro plant is mentioned in the following section.

The Industrial visit had given practical exposure for the content of following subjects:

- (i) Power system-1--- BTech Sem-4
- (ii) Power System-II ---BTech Sem-5
- (iii) Interconnected Power System--- BTech Sem-6



❖ **Introduction of Ukai Dam:**

Ukai is the largest multi-purpose project under taken by the state government. Development of the lower Tapi is done by the Gujarat government in two stages. The kakrapar weir and the canals project having an estimated cost of Rs. 18/- crores form the first stage. This project was commissioned in the year 1954 and the canal system provided seasonal irrigation facilities to 2, 27,530 hectores (526,250 Acres) from the run of the river.

The Second stage is the Ukai Multipurpose project estimated to cost Rs. 136/- crores. The dam is located across the river Tapi about 29 K.M. upstream of the kakrapar weir.

The opening Ceremony was performed by Late Prime Minister Smt.Indira Gandhi in 1972.



□ **Dam Length:**

- (i) 4057.96 meters – Rolled filled earth embankment.
- (ii) 863.86 meters – masonry 4926.83  
meter total Dam Length

□ **Dam Height :** : 345 feet from river bed.

□ **Catchments area :** : 62225 Sq. K.M. (24025 miles.)

□ **Maximum possible flood :** : 21.16 lac cusec

□ **Reservoir:** : 120 K.M. Length and 5 K.M average width  
: 280 K.M. shoreline.

□ **Villagers area:** : 170 Villagers affected, 138 villagers shifted.

❖ **SPILL WAY**

- ❑ **Spill way Canal length:** = 1524 meter (5000')
- Width :** = 259 meter (850')
- Depth :** = 18.29 meter (60')
- ❑ **Spill way gates Numbers :** = 22
- Types:** = Radial Gates
- Area:** = 15.545 m x 14.783m (51' x 48.5')
- Weight :** = 100 Tones each
- ❑ **Discharge Capacity minimum:** = 49490 m<sup>3</sup>/sec (17.48 lac Cusec)
- Maximum :** = 59920 m<sup>3</sup>/sec (21.16 lac Cusec)
- ❑ **Over all crest length:** = 425.19 m

❖ **TAIL RACE CANAL:**

- ❑ **T.R.C. Length:** = 1220 m (4000')
- ❑ **T.R.C. Width:** = 30.5 m (100')
- ❑ **Discharge Capacity:** = 736.24 m<sup>3</sup>/sec (26000 Cusecs)
- ❑ **T.R.C. Water Level:**
- Maximum:** = 65.00 m (213')
- Minimum:** = 47.85 m (157')
- Normal :** = 48.35 m (159')

❖ **PEN STOCK:**

- ❑ **Numbers :** = 4
- ❑ **Diameter :** = 7.01 m (23')
- ❑ **Thickness:** = 18 to 22 mm
- ❑ **Length:** = 60

❖ **UKAI HYDRO SALIENT FEATURES: ( MAIN HYDRO)**

<b>Main Hydro</b> Total cost	22.87 Cr	
Commissioning date of <b>Main Hydro</b> Units		
Unit # 1 (75 MW)	08-07-1974	
Unit # 2 (75 MW)	13-12-1974	
Unit # 3 (75 MW)	22-04-1975	
Unit # 4 (75 MW)	04-03-1976	
Yearly Max. Generation (for Monsoon year)	1976-77	1261.217 Mus
Monthly Maximum Generation	August 2013	221.267 Mus
Daily Maximum Generation	25/9/1998	7.689 Mus

**Ukai Hydro Power Station has been declared 3<sup>rd</sup> best performing station in India during 2006-2007 year and awarded Bronze shield for the same by Ministry of Power, New Delhi.**

❖ **PENSTOCK GATES:**

4 Nos. one for each Penstock having 17 minutes opening time and 72 seconds closing time. Gates can be closed from hoist gallery and / or from power house control room. But gates can be opened from hoist gallery only.

❖ **TURBINE:**

- 1. Type** = Reaction type, Kaplan, vertical shaft, feathering propeller type.
- 2. Make** = Bharat Heavy Electricals ltd.
- 3. Head**
  - = 47.8 m (156.82 ft.) Rated head.
  - = 57.2 m (187.66 ft.) Max head.
  - = 34.4 m (112.86 ft.) Min head.
- 4. Output power**
  - = 1,05,000 Metric HP
  - = 1,20,750 Metric HP Max.
- 5. Speed** = 150 RPM (clockwise rotation)
- 6. Run away speed**
  - = 300 RPM with cam
  - = 350 RPM without cam
- 7. Water discharge** = 6000 cusec (101 m<sup>3</sup>/sec) at 75 MW.
- 8. Nos. of guide vanes** = 24 nos.
- 9. Size of guide vanes** = 6660 mm x 19.4 mm
- 10. Main shaft dia.** = 900 mm
- 11. Runner hub dia.** = 3160 mm
- 12. Runner blades** = 6 nos. Each having weight of 5 tones & design to withstand 1700 tones hydraulic.
- 13. Spiral inlet dia** = 6500 mm
- 14. Largest transport item of turbine** = inner top cover half size 6.1 m x 3.5 m x 3.0 m
- 15. Efficiency** = 98 % at the full water level

**16. Weight of turbine with shaft and runner disc** = 140 MT.

**17. Bearing:** turbine guide bearing 1 no having 8 nos. pads.

❖ **GENERATOR:**

**1. Nos. of generators** = 4 nos.

**2. Sr. no. of generators** = 3000107, 3000108, 3000109, 3000110  
respectively.

**3. Type** = G25 vertical umbrella type salient pole rated 83333 KVA  
, 0.9 p.f. 11 KV ( $\pm 5\%$ ) 3 phase 4370 AMPS.  
Rated KVAR 56000 at zero leading P.F.

**4. Make** = Bharat Heavy Electricals Ltd.

**5. Stator windings: slots** = 384, winding coils 384

Joint 1) series joint = 264  
2) Pole to pole joint = 108  
3) Bus bar joints = 12

Stator resistance per phase at  $20^{\circ}\text{C}$  = 0.003415 ohm. , Field resistance at  $20^{\circ}\text{C}$  =  
0.15 ohm.. Rotor excitation at no load & 100 % voltage = 608 amp. Rotor excitation at rated output  
& voltage = 1052 Amp. Excitation voltage = 180 v.

**6. Speed** = 150 RPM.

**7. Overall dia.** =  $4127.5 \times 2 = 8255.0$  m

**8. Heaviest package for shipment**

Thrust bearing housing size 04. 34 m long x 4.12 m width x 2.6 m high having weight 55 tones.

**9. Weight of generator side** = 275 MT.

**10. Heaviest assembly to be lifted by crane rotor weighting:** = 220 tones.

**11. Bearing** = 1 no. - Thrust bearing having 12 pads.  
1 no. - Generator guide bearing having 24 Pads.



❖ **SPILL WAY:**

1. **Spill way Chanal Length** = 1524 Meter, Width = 259 Meter, Depth = 18.29 Meter.
2. **Spill way Gates :**
  - (1) Numbers = 22 nos.
  - (2) Types = Redial Gates.
  - (3) Area = 15.545 m x 14.783 m.
  - (4) Weight = 100 Tones Each.
3. **Discharge Capacity** = 49490 m<sup>3</sup>/sec., Maximum = 59920 m<sup>3</sup>/sec.
4. **Over all crest length** = 425.195 m.

❖ **TAIL RACE CANAL:**

1. **T.R.C. Length** = 1220 m.
2. **T.R.C. Width** = 30.5 m.
3. **Discharge Capacity** = 736.24 m<sup>3</sup>/sec.
4. **T.R.C. Water level**  
= 65.00 m. Maximum.  
= 47.85 m. Minimum.  
= 48.35 m. Normal.
5. **PEN-STOCK (4 Nos.)**
  - (1) Diameter: 7.01 m (23').
  - (2) Thickness: 18 to 22 mm.
  - (3) Length: 60 m.

❖ **PENSTOCK GATES:**

4 Nos. one for each penstock having 17 minutes opening time and 72 seconds closing time. Gates can be closed from Hoist gallery and/ or from power house control room. But gates can be opened from Hoist gallery only.

❖ **SWITCHYARD 220KV lines:**

1. Achhalia feeder-1
2. Achhalia feeder-2
3. Hydro – Thermal tie feeder-1
4. Hydro – Thermal tie feeder-2

❖ **66 KV Lines:**

1. Songadh -1
2. Songadh -2
3. Nizzer
4. Sagbara
5. Vadibhesrot

**Layout of switch-yard is attached herewith.**

### **CONCLUSION:**

The power plant visit of Ukai Dam in Gujrat was very informative and helpful in providing real life exposure to us. The state of the art system at ukai dam and their automation by using IT to improve decision making and efficiency. Power plant visit proved to be learning and fruitful experience for both students and faculty members.

Glimpe of the Event:







## List of Students & Faculty of Industrial Visit

**SARVAJANIK COLLEGE OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF ELECTRICAL ENGINEERING**

**List of Students Attending Industrial Visit at Ukai Hydro and Thermal Plant**

**Date: 17-April-2025**

### **Btech Sem-4**

SR.NO.	ENROLLMENT NO.	STUDENT NAME	Mobile No.	Sign
1	ET23BTEL003	CHAUHAN JAINAM KANIUBHAI	9023959690	
2	ET23BTEL006	GAJJAR SARVAGNA	9978459144	
3	ET23BTEL011	RAKTIM PANRUI	8980377429	
4	ET23BTEL013	SOLANKI HARSHVARDHAN	9328469659	
5	ET23BTEL014	YUG AGARWAL	9879928249	
6	ET24BTEL801	ABHIJITH SANTOSH	8238301035	
7	ET24BTEL802	CHOUDHARY RITIK	7046447874	
8	ET24BTEL803	HINGU YASH	9429735928	
9	ET24BTEL810	NAYAN SURTI	9638531783	
10	ET24BTEL811	SURTI MEET		
11	ET24BTEL812	TAYADE KUNAL		
12	ET24BTEL814	ZAVEKI HARSHAL		
13	ET24BTEL901	KANHAI TRIVEDI		

### **Btech Sem-6**

14	ET21BTEL007	JAYNIKA VIJAY JEEWA	9638306657	
15	ET21BTEL023	PATEL NOAMAN SALIMBHAI	9016661945	
16	ET21BTEL024	PATEL VRAJKUMAR PRAVINBHAI	9033117779	
17	ET21BTEL030	SHUKLA MAHARSHI	9825967403	
18	ET21BTEL031	SIDDHPURIA MAULINI UDAYKUMAR	9974189502	
19	ET22BTEL001	ABHILASH BANERJEE	9558524399	
20	ET22BTEL002	DEVANI DHRUV MANOJBHAI	6358175174	
21	ET22BTEL003	HARSHAL ANISH KABRAWALA	9484448889	
22	ET22BTEL005	JOSHI AADITYA PARESHKUMAR	9870000146	
23	ET22BTEL008	PATEL ABHI CHHAGANBHAI	8849454896	
24	ET22BTEL009	PATEL JAY DHARMESHBHAI	9408721790	
25	ET22BTEL010	PATEL MANAN UTTAMBHAI	8141077818	
26	ET22BTEL011	PATEL MOHIT BRIJESHKUMAR	8160990806	
27	ET22BTEL014	VERMA JIGARKUMAR	9913453274	
28	ET23BTEL801	AMIT KUMAR	6005389418	
29	ET23BTEL805	PATEL SHUBHAM UMEDBHAI	6359736349	

### **Btech Sem-2**

30	ET24BTEL001	AMBADATH ADITYA SUNIL	9016005421	
31	ET24BTEL002	BHANABHAGVANWALA MOHIT ALPESHKUMAR	9099056532	
32	ET24BTEL003	BHAVYA THARAKAN	8849065660	
33	ET24BTEL004	DHRUTIBEN RAKESHKUMAR PARMAR	9825768928	



34	ET24BTEL007	DURVA PATEL	9099075533	<i>Durva Patel</i>
35	ET24BTEL008	GANDHI AYUSH HITESHKUMAR	8160131847	
36	ET24BTEL009	GANDHI PRISHA PARAGBHAI	9408334563	<i>P. P. Gandhi</i>
37	ET24BTEL011	JASH AMISHKUMAR PATEL	9825939384	
38	ET24BTEL012	KAPADIA KALYAAN SNEHAL	9033095534	<i>Kalyaan</i>
39	ET24BTEL013	KHANDWALA KAVYA DHARIT	9727039190	<i>Kavya</i>
40	ET24BTEL014	KHILAWALA UJVAL VIMALKUMAR	8141680005	<i>Ujval</i>
41	ET24BTEL019	PARMAR PRAKASH CHANDUBHAI	7874432985	<i>Prakash</i>
42	ET24BTEL020	PATEL DAKSH RAKESHKUMAR	7046030116	
43	ET24BTEL021	PATEL JIYA VASANTBHAI	9601404051	<i>Jiya Patel</i>
44	ET24BTEL022	PATEL KRISH JITENDRA	9824227047	<i>Krish</i>
45	ET24BTEL024	PATEL VISHVAKUMARI NAVINBHAI	9725107445	<i>Vishva</i>
46	ET24BTEL025	REVATHY NAIR	9104861308	<i>Revathy</i>
47	ET24BTEL026	SHAH LUCKY LALITKUMAR	7861070770	<i>Lucky</i>
48	ET24BTEL029	VAGHASIYA DEVAM JAGDISHBHAI	9512327421	<i>Devam JV</i>
49	ET24BTEL032	VEER SHAH	9737927226	<i>Veer</i>
50	ET24BTEL033	YASH AMIT JINWALA	9499774999	<i>Yash</i>
51	ET24BTEL034	YASHASVI PANKAJ AGARWAL	8905566798	<i>Yashasvi Agarwal</i>
<b>Btech Sem-8</b>				
52	ET21BTEL004	Tej Desai	7984841773	
53	ET21BTEL011	Hitarth Lekhadiya	6354285443	<i>H. N. L.</i>
54	ET21BTEL019	Jaimin Patel	9099716369	<i>Jaimin</i>
<b>Faculty Member</b>				
55	Associate Professor	Dr. Nilesh V. Shah	9427808978	<i>Nilesh</i>
56	Assiastant Professor	Prof. Naman Bhatt	9879489915	<i>Naman</i>
57	Lab Assistant	Mr. Munkal Trivedi	9824733779	<i>Munkal</i>

