



BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
YELAHANKA - BANGALORE - 64
DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Activity Report

Activity Title	Industrial Visit
Title	Nuclear Power Plant visit
Brief Description	Outcome Based Education (OBE) is a method of teaching that emphasises what students can actually do after they are trained. Decisions on teaching and learning are made based on how best to facilitate the desired outcome which in turns leads to planning process that is different from traditional educational planning. In OBE, the desired outcome is first identified before the curriculum is created to support the intended outcome. Department of EEE, has made mandatory to organize industrial visits to all semesters for the better visualization of core subjects. This also facilitates "see and learn" kind of objective.
Intended Students	IV th Semester.
Prepared by	Mr. Ozwin Dominic Dsouza
Date	06.05.2017 (Two Day)

Executive Summary

" Industrial Visit to KAIGA Atomic Power plant) "

Date: 06.05.2017 (Two Day)

Time : 6.00 AM(from college started)

Venue: Kaiga Power station

Audience: IVth SEMEEE

Speaker: Mr. Ozwin Dsouza, Mrs. Shilpa G, Mr. Babu Naik G

Introduction:

An industrial visit was organized for 4th semester students of Electrical Engineering stream in the area of power generation. This visit was carried out on 06.05.2017 at KAIGA ATOMIC POWER STATION, Kaiga and Karnataka State.

This Industrial visit was attended by 40 students and 04 Faculty members.

M/s Kaiga Atomic Power Station is a fully owned enterprise of Nuclear Power Corporation of India (NPCIL). The Nuclear Power Corporation of India Limited (NPCIL) is a government-owned corporation of India based in Mumbai in the state of Maharashtra. It is wholly owned by the Central Government and is responsible for the generation of nuclear power for electricity. NPCIL is administered by the Department of Atomic Energy, Govt. of India (DAE).

NPCIL was created in September 1987 under the Companies Act 1956, "with the objective of undertaking the design, construction, operation and maintenance of the atomic power stations for generation of electricity in pursuance of the schemes and programmes of the Government of India under the provision



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of the Atomic Energy Act 1962." All nuclear power plants operated by the company are certified for ISO-14001 (Environment Management System).

NPCIL was the sole body responsible for constructing and operating India's commercial nuclear power plants till setting up of BHAVINI (Bharatiya Nabhikiya Vidyut Nigam) in October 2003. As of 10 August 2012 the company had 21 nuclear reactors in operation at seven locations, a total installed capacity of 6780 MWe.

The various plants owned by NPCIL are listed below:

Fully functioning Plants:

Unit	Type	Capacity (MWe)	Since
TAPS-1 (Tarapur, Maharashtra)	BWR	160	28-Oct-69
TAPS-2 (Tarapur, Maharashtra)	BWR	160	28-Oct-69
RAPS-1 (Rawatbhata, Rajasthan)	PHWR	100	16-Dec-73
RAPS-2 (Rawatbhata, Rajasthan)	PHWR	200	01-Apr-81
MAPS-1 (Kalpakkam, Tamil Nadu)	PHWR	220	27-Jan-84
MAPS-2 (Kalpakkam, Tamil Nadu)	PHWR	220	21-Mar-86
NAPS-1 (Narora, Uttar Pradesh)	PHWR	220	01-Jan-91
NAPS-2 (Narora, Uttar Pradesh)	PHWR	220	01-Jul-92
KAPS-1 (Kakrapar, Gujarat)	PHWR	220	06-May-93
KAPS-2 (Kakrapar, Gujarat)	PHWR	220	01-Sep-95
KGS-2 (Kaiga, Karnataka)	PHWR	220	06-May-00
RAPS-3 (Rawatbhata, Rajasthan)	PHWR	220	01-Jun-00
KGS-1 (Kaiga, Karnataka)	PHWR	220	06-Nov-00
RAPS-4 (Rawatbhata, Rajasthan)	PHWR	220	23-Dec-00
TAPS-4 (Tarapur, Maharashtra)	PHWR	540	15-Sep-05
TAPS-3 (Tarapur, Maharashtra)	PHWR	540	18-Aug-06
KGS-3 (Kaiga, Karnataka)	PHWR	220	06-May-07
RAPS-5 (Rawatbhata, Rajasthan)	PHWR	220	04-Feb-10
RAPS-6 (Rawatbhata, Rajasthan)	PHWR	220	31-Mar-10
KGS-4 (Kaiga, Karnataka)	PHWR	220	27-Nov-10
KKNPP-1 (Kudankulam, Tamil Nadu)	VVER	1000	22-Oct-13
KNPP-2 (Kudankulam, Tamil Nadu)	VVER	1000	Jul-16
Total Capacity		6780	

Where,

BWR : Boiling Water reactor

PHWR : Pressurised Heavy Water Reactor

VVER : water water Energetic Reactor

EPR : European Pressurized Reactor

LWR : Light water Reactor

ESBWR: Economic Simplified Boiling Water Reactor

Under construction:



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Unit Under Construction	Type	Capacity	Expected Date
		(MWe)	
KAPS-3 (Kakrapar, Gujarat)	PHWR	700	2018
KAPS-4 (Kakrapar, Gujarat)	PHWR	700	2019
RAPS-7 (Rawatbhata, Rajasthan)	PHWR	700	2018
RAPS-8 (Rawatbhata, Rajasthan)	PHWR	700	2019
Total Capacity		2800	

Proposed:

Power Plant	Type	Capacity	Expected Commissioning Date
		(MWe)	
Jaitapur in Maharashtra	EPR	9900 (6x1650 MW)	2019
Gorakhpur in Haryana	PHWR	2800 (4x700 MW)	2021
Mithi Viridi in Gujarat	LWR	6000 (6 x 1000 MW)	
Kovvada in Andhra Pradesh	ESBWR	6000 (6 x 1000 MW)	
Chutka in Madhya Pradesh	PHWR	1400 (2 x 700 MW)	
Bhimpur, Shivpuri in Madhya Pradesh	PHWR	2800 (4 x 700 MW)	
Total Capacity		28900	

Operating Performance:

The nuclear power gross generation of 40001 MUs was achieved in the year 2016-17. NPCIL has set several records in the safe operation of nuclear power plants. So far NPCIL has consistently maintained overall availability factor of reactors above 80% for several years.

Safety Performance:

NPCIL has about 48 years of experience in safe operation of nuclear power plants, with motto of 'Safety first and Production next'. The Environmental Management System (EMS) and Occupational Health and Safety Management System (OHSMS) as per ISO-14001: 2004 and IS-18001: 2007 respectively are maintained at all the stations. By following the principle of ALARA (As Low As Reasonably Achievable) and maintaining the highest standards of safety within the Nuclear Power Plants (NPPs), the occupational exposures of employees of the company at various NPPs are maintained well below the values specified by the regulator, Atomic Energy Regulatory Board (AERB). The environmental releases of radioactive effluents from NPPs are maintained significantly low (average less than 1% of the limits specified by AERB). NPCIL contributed in enhancing safety & reliability of nuclear power plants globally through its active participants in World Association of Nuclear Operators (WANO), Candu Owners Group (COG), IAEA and other international organizations. NPCIL units have received several safety awards from various national agencies like AERB, NSCI, Gujarat Safety Council, National Safety Council-Mumbai and DGFASLI.



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Biodiversity Conservation:

NPCIL has voluntarily taken up Environment Stewardship Programme (ESP), besides fulfilling regulatory and statutory requirements. The programme focuses on the scientific study of bio-diversity, particularly avifauna, within and around Exclusion Zones (EZs) of Indian nuclear power plants for the conservation and improvement of habitat in association with nature conservation institutions. As a part of ESP, the company has published three coffee table books viz. "Our Flying Guests" on the birds found within and around all the Indian nuclear power plants, "7 Edens and 70 Fairies" on the butterflies of Indian NPPs and "The Realms of Flowers" a book on the flowers of Indian NPPs and "Fliers of Our Courtyards" a book on some birds of Indian NPPs.

Public Outreach Programme:

Recognising the need of reaching out to people around its sites and sharing the information on nuclear power to generate correct perspective about nuclear power, NPCIL scaled up its Public Awareness programmes in a structured manner using a multipronged approach. Through several modes of communication, dissemination of accurate information on nuclear power to different target groups is being done regularly.

Kaiga Atomic Power Plant

Following facts of Kaiga Power plant is given below:

1. Location: Kaiga Dist., Uttar Kannada, State Karnataka
2. Reactor Type and generating capacity:

Unit	Reactor Type	Capacity(MWe)	Date of Commercial Operation
1	Pressurised Heavy Water Reactor(PHWR)	220	November 16, 2000
2	Pressurised Heavy Water Reactor(PHWR)	220	March 16, 2000
3	Pressurised Heavy Water Reactor(PHWR)	220	May 6, 2007
4	Pressurised Heavy Water Reactor(PHWR)	220	January 20, 2011

3. Cumulative Generation upto September - 2017 (Since Commercial Operation):

Unit	Cumulative Generation(MUs)
1	24381
2	24867
3	13378
4	10983

4. Generation Statistics during the Current Financial Year (2017-18):

Unit	Gross Generation(MUs)	Capacity Factor (%)	Period
1	963	100	Apr 2017 - Sep 2017



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1	157	99	Sep 2017 - Sep 2017
2	924	96	Apr 2017 - Sep 2017
2	157	99	Sep 2017 - Sep 2017
3	951	98	Apr 2017 - Sep 2017
3	156	99	Sep 2017 - Sep 2017
4	1033	107	Apr 2017 - Sep 2017
4	169	107	Sep 2017 - Sep 2017

5. Previous Years Generation Statistics:

Unit	Year	Gross Generation(MUs)	Capacity Factor(%)	Availability Factor(%)
1	2016-2017	1742	90	91
1	2015-2016	1918	99	96
1	2014-2015	1695	88	100
1	2013-2014	1587	82	92
2	2016-2017	1708	89	88
2	2015-2016	1834	95	92
2	2014-2015	1450	75	88
2	2013-2014	1740	90	99

Activity Outcome

A01	Understand reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues
A02	Understand the impact of the professional engineering solutions in societal and environmental contexts.
A03	Function effectively as an individual, and as a member or leader in diverse teams.
A04	Apply effective communication skills to comprehend and write effective reports of the visit.



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AOs and POs Mapping:

AOs/POs	PO6 (The engineer and society)	PO7 (Environment and sustainability)	PO9 (Individual and team work)	PO10 (Communication)
AO1	2			
AO2		2		
AO3			2	
AO4				2
PSO:1	Analyze and Design Electrical Power Systems.			

- AO1 and AO2 are framed by keeping the industrial visit in mind. These AO's are implemented by physically visiting the plant and interacting with the engineers at the power plant.
- AO3 and AO 4 are realised by involving the students in planning and execution of Industrial visit by putting them in the following groups,

Planning group: Takes care of documentation part of the visit in consultation with the faculty.

Transportation Group: Takes care of identification of mode of transport, by selecting appropriate transport agency.

Finance group: Plan and raise the necessary budgetary requirements for the visit. This committee also sets the possible per head tour cost.

Hospitality group: Takes care of refreshment along the journey.

Impact Analysis:

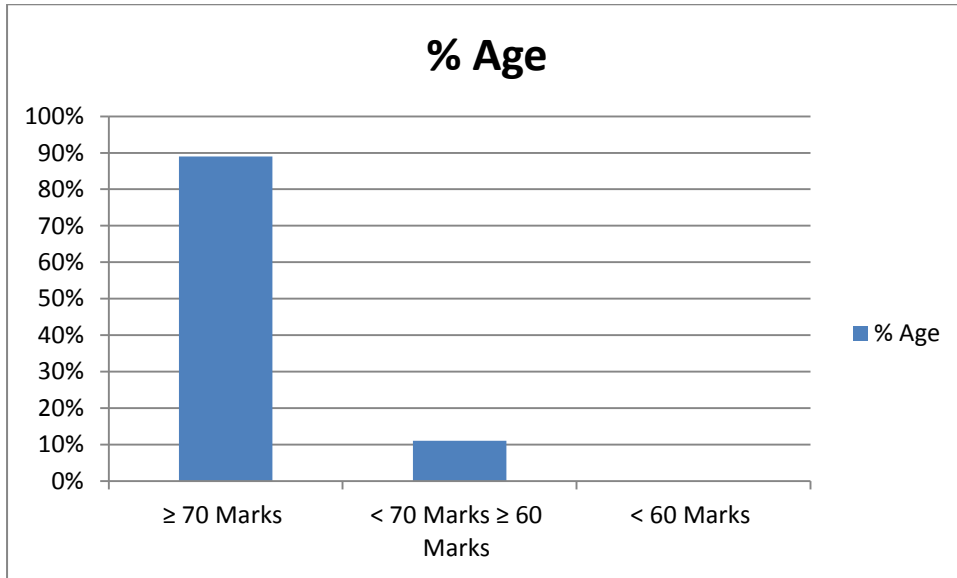
Grade:1	More than 50% of students scores 60% of marks
Grade:2	More than 60% of students scores 60% of marks
Grade:3	More than 70% of students scores 60% of marks

Total number of students attended the visit: 37

More than 70% of students scores 60% of marks: 33



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Staff Coordinators

HOD, EEE Dept.