



**INDIAN INSTITUTE OF TECHNOLOGY ROORKEE  
DEPARTMENT OF HYDRO AND RENEWABLE ENERGY**

**Course Schedule - Training of Trainers under Jal Urja Mitra Programme**

*(As on Jan 23, 2023)*

Session Day	9:30 – 10:30	10:30-11:00	11:00 – 12:00	12:05 – 13:10	13:15-14:15	14:15 – 15:15	15:15-15:30	15:30 – 17:00
<b>18/01/23 Wednesday</b>	<p>Role and Responsibilities of a Small Hydropower Plant O&amp;M Technician (Jal Urja Mitra)-</p> <p>Introduction to Small Hydro Power (SHP) and Working principles of a hydro power plant (AK1/4/RPS1/4/YK1/2)</p>	TEA BREAK	<p>Components and Layout of Small Hydro Power (SHP) Plant-</p> <p>Flow characterization and estimation of power generation potential of different SHP Functions of various components of a civil structure of a SHP (AK)</p>	<p>Functions of various components of H&amp;M works, Types of turbines and drive systems, their components (such as runner, casing nozzle/guide vanes, belts and pulleys etc.) along with their usage.</p> <p>Governor, OPU, guide apparatus (RPS ¾ /SKT 1/4)</p>	LUNCH BREAK	<p>Generators, Control, Monitoring and reporting,</p> <p>(SKT)</p>	TEA BREAK	<p>LAB VISIT</p> <p>Visit to different turbine models (HRD Lab), different gates and penstock (Irrigation Workshop) and canal aqueduct (total 2 hrs)</p>
<b>19/01/23 Thursday</b>	<p align="center">Visit to Manal (high head) – commissioned in 2007 and is a modern plant in Himachal Pradesh near Paonta Sahib(YK/SVD/AV) Departure at 8:30 am</p>							
<b>20/01/23 Friday</b>	<p>Start and shut down SHP plant-</p> <p>Pre-start conditions</p> <p>Standard Operating Procedure (SOP) before and while starting SHP plant.</p> <p>(SVD)</p>	TEA BREAK	<p>SOP for synchronizing of unit with grid and while unit is generating</p> <p>Steps and procedure of normal shut down of SHP plant.</p> <p>Reasons and steps for special or urgent shut down of SHP plant.</p> <p>(SVD)</p>	<p>Functioning of governors, oil pumping unit (OPU) Hydroelectric generator (Induction and Synchronous).</p> <p>Compressors, compressed air system, cooling water system,</p> <p>Unit control board configurations and control circuitry configurations (SKT)</p>	LUNCH BREAK	<p>Typical motors used in pumps and electrical cranes.</p> <p>Steps for drainage and dewatering of pumps</p> <p>Different types of bearings, their fittings and shaft alignment.</p> <p>Usage and functioning of tapered locking sleeves and tapered adapter sleeves.</p> <p>(SKT)</p>	TEA BREAK	<p>LAB VISIT</p> <p>(Start and shut down SHP plant)</p>



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<b>21/01/23 Saturday</b>	Different methods for performing SHP plant construction.  Use of construction material during maintenance of the system (YK)	TEA BREAK	O&M procedures of AVR, excitation systems. Power Transformer and HVAC. Typical operation and functioning of LV switchgear, Battery and battery chargers. DC distribution boards, Inverters, UPS, DG sets and LVAC loads at SHP stations such as illumination etc. (SVD) (RS)	Operate the Hydro-mechanical and Civil Systems in a Small Hydro Plant  Channel/ pipe/ tunnel, desilting tank, forebay, penstock, and surge tanks, anchor block and saddles, branching and tail race channel (NKY/YK)	LUNCH BREAK	Inspection procedure of hydro-mechanical equipment of SHP plant (NKY)	TEA BREAK	LAB VISIT  (Operate the Electro-Mechanical System in a Small Hydro Plant) (SKT) (HJ)
<b>22/01/2023 Sunday</b>	HOLIDAY							
<b>23/01/23 Monday</b>	Testing of various meters, instruments, devices, scanners, transducers, switchboards etc. ( SVD) (RS)	TEA BREAK	Application of protection systems for SHP stations: isolators, circuit breakers, grounding for switchyard equipment (SKT) (RS)	Community and wider use of SHP other than grid (YK)	LUNCH BREAK	LAB VISIT  (Hydro-mechanical and Gates, Penstocks, Valves Systems in a Small Hydro Plant) (SKT/SVD)	TEA BREAK	LAB VISIT  (Maintain the Electro-Mechanical System) (SKT/SVD) (RS)
<b>24/01/23 Tuesday</b>	Workplace Safety and Hygiene- Typical hazards, risks or breaches in site safety of SHP plants Health and safety roles and responsibilities of SHP personnel (SVD)	TEA BREAK	Inspection procedure of hydro-electrical equipment of SHP plant  Inspection of switchyard (SKT) (HJ & RS)	Interaction with participants (AK)	LUNCH BREAK	Standard operating techniques to maintain and inspect hydroelectric generators at site such as drying out and testing generators before commissioning.  Various faults and abnormalities in the SHP system such as vibrations and unexpected noises. Causes of overheating and its prevention (SKT) (HJ)	TEA BREAK	LAB VISIT  (Maintain the Electro-Mechanical System) (SVD) (RS)



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<b>25/01/23 Wednesday</b>	Steps of inspection process for different components of civil structure of SHP plant.  (YK)	TEA BREAK	Channel/ pipe/ tunnel, desilting tank, forebay and surge tanks, anchor block and saddles, branching and tail race channel  Different methods for performing SHP plant construction.  Use of construction material during maintenance of the system (YK)	Switchyard single line diagram, equipment and transmission system (SKT) (RS & HJ)	LUNCH BREAK	Effective and Efficient Working Practices- Effective communication, collaborative working with clients, team members, and other working personnel  Escalation mechanism, grievance redressal mechanism and conflict resolution (SVD)	TEA BREAK	LAB VISIT (Workplace Safety and Hygiene & Efficient Working Practices) (SVD) (RS & HJ)
<b>26/01/23 Thursday</b>	Visit to Mohammadpur Power House, Canal 3 x 3.3 MW, Renovated and Modernised in 2011 in Uttarakhand (SKT/SVD) Departure at 10 am							
<b>27/01/23 Friday</b>	Visit to Yamunanagar canal SHP (16 MW), commissioned in 1986 and require renovation and modernisation in Haryana(SKT/SVD) Departure at 8:30 am							
<b>28/01/23 Saturday</b>	Visit to Gogoal plant, Haridwar.(SKT) Departure at 8:30 am					Evaluation and feedback		

SPK shall assist coordination work.

Arun Kumar  
Course coordinator

AK – Prof. Arun Kumar  
RPS- Prof. R.P.Saini  
RS-Prof. Rhythm Singh  
HJ – Prof. Himanshu Jain  
SKT- Shri S.K.Tyagi

SVD – Shri S.V.Dinkar  
NKY – Shri N.K.Yadav  
YK – Shri Yogeshwar Kumar  
SPK – Shri Surya Prakash Kushwaha  
AV – Shri Ashutosh Vashishtha