

**PANCHAKOT MAHAVIDYALAYA**  
**SARBARI, NETURIA, PURULIA**

Affiliated to Sidho Kanho Birsha University, Purulia



**Department of Physics**

Add-on/ Certificate Course  
**Energy Storage and Battery  
Technology**

Session: 2022-2023



# Brochure

## Panchakot Mahavidyalaya

SARBARI, NETURIA, PURULIA, WEST BENGAL



### Energy Storage and Battery Technology

Add On Course, Dept. of Physics

Duration: 30 hrs.

For detailed schedule log-on to: [www.panchakotmv.ac.in](http://www.panchakotmv.ac.in)

Course Coordinator: Dr. Jayanta Das, HOD, Dept. of Physics

#### Course Content:

- Module I:** Necessity of energy storage (5 hrs.)
- Module II:** Battery technology for energy storage (5 hrs.)
- Module III:** Working of electrochemical cells (5 hrs.)
- Module IV:** Lithium ion battery fundamentals (5 hrs.)
- Module V:** Future trends of battery technology (5 hrs.)
- Module VI:** Practicals (5 hrs.)

**Course Objective:** Participants will learn basic operating principles of battery design for maximizing energy and power density for applications.

**Course Outcome:** This add-on course will help students to develop their theoretical as well as practical knowledge on battery technology.

#### Who can participate?

Any student with basic knowledge in chemistry and physics.



To  
The Principal  
Panchakot Mahavidyalaya  
Sarbari, Neturia, Purulia

Applicant: Dr. Jayanta Das, Department of Physics

Subject: Proposal for 'Energy Storage and Battery Technology' for the session 2022-2023

Respected Sir,

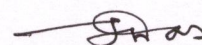
With respect to the above mentioned subject, I am submitting herewith the proposal to conduct the Add-On course in "Energy Storage and Battery Technology" by the department of Physics of our college. This course will create energy-utilization-awareness among the students, providing them practical knowledge of designing battery technology with the purpose to minimize environmental hazards.

Hope you will consider my application and I kindly request you to sanction the same.

Date: 16/03/2023

Place: PKMV  
Yours sincerely,

Physics



HOD,

Enclosure: (1) Proposal  
(2) Curriculum of the course



# PANCHAKOT MAHAVIDYALAYA

## SARBARI, NETURIA, PURULIA

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### Proposal for conducting Short Term Certificate Courses Session: (2022-2023)

#### 1. Details of the applicant department:

- I. Name of the college: Panchakot Mahavidyalaya,
- II. Address of the college: Sarbari, PO: Neturia, District: Purulia, Pin: 723121
- III. Name of the applicant department: Physics

#### 2. Details of the course proposed:

- I. Name of the course: Energy Storage and Battery Technology
- II. Target participants: Undergraduate students from any stream
- III. Duration of the course: 30 hrs.
- IV. Medium of instruction: English

#### 3. Details of the faculty:

- I. Whether the college provides degree related to the proposed course: No
- II. Whether the course is prepared by experts from related field: yes (by departmental faculty)
- III. Information of course coordinator:

Name	Department	Qualification
Dr. Jayanta Das	Physics	Ph.D. in Physics

#### IV. Details of faculty members to be appointed for this course:

Sr. No.	Name	Department	Qualification
1	Dr. Jayanta Das	Physics	Ph.D. in Physics
2	Chandra Prasad Singha	Physics	M.Sc. in Physics

#### 4. Details of the infrastructure needed/available for this course:

- I. Classroom: Available
- II. Books: Available in central library
- III. Computer facility: Computer lab and departmental computer facility



Signature of Course coordinator



# PANCHAKOT MAHAVIDYALAYA

## SARBARI, NETURIA, PURULIA

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### Department of Physics

#### Add-On Course on Energy Storage and Battery Technology Syllabus (2022-2023)

**Duration: 30hrs**

**Module I:** Necessity of energy storage, Introduction to types of batteries, primary and secondary, Batteries characteristics, free energy change, electromotive force of battery, ampere-hour, capacity, power, power density, energy density, efficiency, cycle life, tolerance to service conditions, performance characteristics (5 hrs.)

**Module II:** Battery technology for energy storage, Construction, chemistry and technology of zinc-air battery, Zinc-HgO battery and their application, primary lithium batteries, soluble cathode cells, solid cathode cells, Lithium Manganese dioxide, solid electrolyte cells, Lithium polymer electrolyte battery, application, reserve battery- electrochemistry of perchloric acid cell- application (5 hrs.)

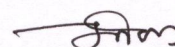
**Module III:** Working of electrochemical cells, construction, chemistry and technology of maintenance free lead acid battery, valve regulated lead acid battery, absorbed glass mat lead acid battery, comparison between lead acid battery and VRLA, (5 hrs.)

**Module IV:** Lithium ion battery fundamentals, Construction, electrochemistry and application of Nickel-Cadmium battery, Nickel metal-hydride battery, Lithium ion battery, construction, electrochemistry and application of liquid organic electrolyte cells, polymer electrolyte cells, lithium ion cells (5 hrs.)

**Module V:** Future trends of battery technology, Introduction, classification based on temperature and nature of electrolyte, working principle, components applications and environmental aspects of alkaline fuel cells, hydrogen –oxygen –alkaline fuel cell, Molten carbonate fuel cell, Polymer electrolyte membrane fuel cell, solid oxide fuel cell (5 hrs.)

**Module VI:** Practicals (5 hrs.)

**Assessment:** Written Test and/or Viva-Voce



Signature  
Course Coordinator



# PANCHAKOT MAHAVIDYALAYA

## SARBARI, NETURIA, PURULIA

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### Department of Physics

Add-On Course on Energy Storage and Battery Technology

Session: (2022-2023)

**Course coordinator:** Dr. Jayanta Das, HOD, Physics

#### Details of the Course

##### **Course Objective:**

- Introduce the various terms to understand the efficiency of batteries
- Know the relevant materials required to the construction of primary and secondary batteries
- Familiarize with the reactions involved to the charging and discharging process
- Emphasize on the need of fuel cells and the construction and functioning

#### Schedule

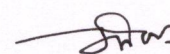
Day	Hours	Timing/Duration	Resource Person	Venue	Topic
1	02:30	4:00-6:30 PM	Dr. Jayanta Das (JD)	Dept ofPhysics	Module I
2	02:30	4:00-6:30 PM	Chandra Prasad Singha (CPS)	Dept ofPhysics	Module I
3	02	4:00-6:00 PM	JD	Dept ofPhysics	Module II
4	02	4:00-6:00 PM	CPS	Dept ofPhysics	Module II
5	01	4:00-5:00 PM	JD	Dept ofPhysics	Module II
6	02	4:00-6:00 PM	CPS	Dept ofPhysics	Module III
7	02	4:00-6:00 PM	JD	Dept ofPhysics	Module III
8	01	4:00-5:00 PM	CPS	Dept ofPhysics	Module III
9	02:30	4:00-6:30 PM	JD	Dept	Module IV



				ofPhysics	
10	02:30	4:00-6:30 PM	CPS	Dept ofPhysics	Module IV
11	02:30	4:00-6:30 PM	JD	Dept ofPhysics	Module V
12	02:30	4:00-6:30 PM	CPS	Dept ofPhysics	Module V
13	02	4:00-6:00 PM	JD	Dept ofPhysics	Module VI
14	02	4:00-6:00 PM	CPS	Dept ofPhysics	Module VI
15	01	4:00-6:00 PM	JD	Dept ofPhysics	Module VI

### Expected Outcome:

- Discuss the construction, electrochemistry, technology and application of selected primary batteries
- Discuss the construction, electrochemistry, technology and application of selected secondary batteries
- Explain the working principle, electrochemistry, technology and application of prominent fuel cells
- Evaluate different batteries and fuel cells in order to select suitable batteries and fuel cells for a particular application



Signature  
Course Coordinator



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Department of Physics  
Add-On Course on Energy Storage and Battery Technology

Session: (2022-2023)

Ref No:

Date: 24/03/2023


### Notice

The Department of Physics at Panchakot Mahavidyalaya is pleased to announce upcoming Add-On course on 'Energy Storage and Battery Technology' from 1/4/2023 to 13/5/2023 in offline mode.

Interested students are requested to contact the concerned teacher(s) of the department/course coordinator for further course details (such as course duration, schedule, module etc.) as well as enrollment in the course.



HOD, Department of  
Physics

  
Principal  
PANCHAKOT MAHAVIDYALAYA  
Sarbari • Neturia • Purulia  
Principal,

Panchakot Mahavidyalaya  
Sarbari, Neturia, Purulia



# PANCHAKOT MAHAVIDYALAYA

## SARBARI, NETURIA, PURULIA


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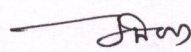
Department of ..... Physics .....

Certificate Course Name ..... Energy Storage and Battery Technology .....  
Session: (20.22.-20.23....)

### List of Enrolled Students

Sr. No.	Students Name	Roll Number	Semester	Student Signature
1	MUSKANI PASWAN	220000761	2	Muskan Paswan
2	GOLDI KUMARI	220001022	2	Goldi Kumari
3.	TAPAS KAIBARTA	220000079	2	Tapas Kaibarta
4.	SAMIRAN RAJAK	220000654	2	Samiran Rajak
5	HABIPADAMURHU	220000108	2	Habipadamurhu
6.	SUDESHNA PAL	210000120	4	S. Pal
7	Aparna Goswami	210000464	4	Aparna Goswami
8.	SONIYA MAJEE	210001223	4	Sonita Majee

  
Principal  
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Signature  
Course Coordinator



**PANCHAKOT MAHAVIDYALAYA**  
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Department of ..... Physics.....


Certificate Course : ..... Energy..... Storage and ..... Battery Technology.....

Session: (20.22.....-20.23.....)

**Attendance Sheet**

Sr. No.	Name of Student	Day and Month															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1)	MUSKAN PASHAN	A	b	A	p	A	p	A	p	p	A	p	p	A	p	A	
2)	GOLDI KUMARI	A	b	A	p	A	p	p	p	p	A	p	p	A	p	.	
3)	TAPAS KAIBARTA	A	p	A	.	A	p	A	p	p	A	p	p	A	p	A	
4)	SAMIRAN RAJAK	A	p	A	p	A	p	p	p	p	A	p	p	A	p	A	
5)	HARIPADA MURMU	A	p	A	p	A	p	A	p	p	A	p	p	A	p	A	
6)	SUDESHNA PAL	A	p	A	p	A	p	A	p	p	.	p	p	A	p	A	
7)	APARNA GUPTAI	A	p	A	p	A	p	.	p	p	A	p	p	A	p	A	
8)	SONIYA MAJEE	A	p	A	p	A	p	p	p	p	A	p	p	A	p	A	

  
Principal  
**PANCHAKOT MAHAVIDYALAYA**  
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Course Coordinator



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## SARBARI, NETURIA, PURULIA

Affiliated to Sidho Kanho Birsha University, Purulia

Department of ..... *Physics* .....

Certificate Course:


..... *Energy Storage and Battery Technology* .....


Session: (20.22...-20.23..)

### Result

Full Marks:

Sr. No.	Name of Student	Marks Obtained
1	MUSKAN PASWAN	A
2	GOLDI KUMARI	A
3	TAPAS KAIBARTA	A
4	SAMIRAN RAJAK	B
5	HARIPADA MURMU	A
6	SUDESHNA PAL	A
7	APARNA GHORAI	A
8	SONIYA MAJEE	B

  
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**PANCHAKOT MAHAVIDYALAYA**  
**SARBARI, NETURIA, PURULIA**  
Add On/ Certificate Course

Organized by: Department of *Physics*

### **CERTIFICATE OF COMPLETION**

Session: (20.22...-20.23...)

This is to certify that Mr./Ms *SAMIRAN RAJAK* .....  
of *Bengali (Prog.)* ..... Department has successfully completed Add

On/Certificate course entitled:

*Energy Storage and Battery Technology* .....

for session .....

*[Signature]*

Course Coordinator

*[Signature]*

HOD (Organizing Dept)

*[Signature]*

Principal

Principal

PANCHAKOT MAHAVIDYALAYA  
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