विज्ञान एवं प्रौद्योगिकी विभाग
DEPARTMENT OF
SCIENCE & TECHNOLOGY
सत्यमेव जयते

आज़ादी का अमृत महोत्सव

PANDIT DEENDAYAL ENERGY UNIVERSITY
A RESERVOIR OF KNOWLEDGE

PANDIT DEENDAYAL ENERGY UNIVERSITY

PDEU TEC
DST - PDEU
TECHNOLOGY ENABLING CENTRE

DST-TEC

DEPARTMENT OF SCIENCE AND TECHNOLOGY

TECHNOLOGY ENABLING CENTRE

VOLUME - II

2023

DEAR READERS,

Welcome to DST- TEC-PDEU TECHNOLOGY ENABLING CENTRE (TEC) an initiative by Department of Science and Technology (DST) at PDEU. We aim to collaborate industrial & academic institutions to conceptualize, build, transfer & commercialize the technologies developed. Our approach is to facilitate, validate & develop the indigenous technologies in the domains of Energy, Health and Water to contribute in accordance to global perspective.

We aim to nurture an ideology into a content that can be visualised in the form of a commodity and finally globalised to commercial sector, imparting financial and economic growth to our country.

DST TEC - PDEU

OUR VISION

We visualize ourselves to emerge as an empowered academician with biggest entrepreneurship that would represent a capitalized research icon for an academia industry collaboration and mobilize us to developed economy.

OUR MISSION

We aim to nurture an ideology into a content that can be visualised in the form of a commodity and finally globalised to commercial sector imparting financial and economic growth to our country.

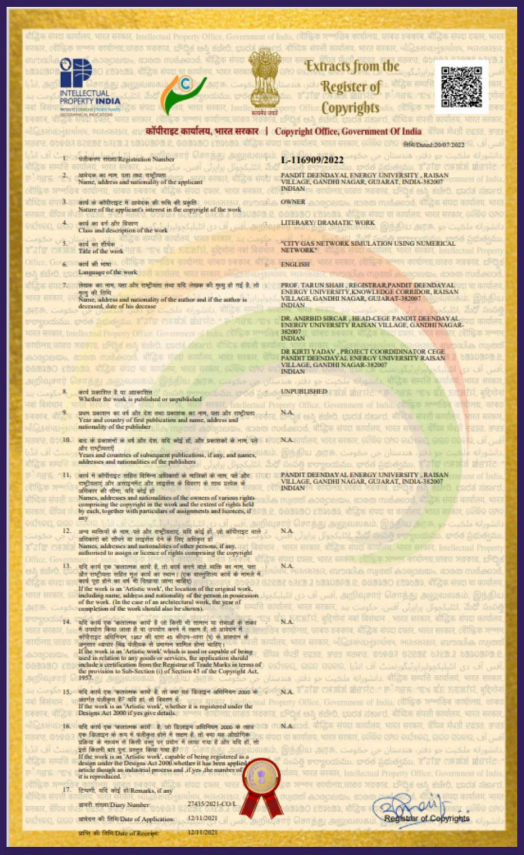
GLIMPSES OF IPR WORKSHOP ORGANISED BY DST-TEC-PDEU

An Intellectual Property Rights (IPR) session was successfully conducted on July 24, 2023, with the distinguished presence of Mr. Navdeep Shridhar, an eminent expert from the National Intellectual Property Awareness Mission (NIPAM). The session aimed to provide valuable insights into the significance of IPR to educate participants on various aspects of intellectual property protection. the session ended with a vote of thanks and e-certification to all the participants for their key attention and contribution towards making the event a grand one.

GLIMPSES OF 1ST PAG MEETING

The DST-Technology Enabling Centre (DST-TEC) organized a ground breaking conference on 25th July 2023, at the prestigious PDEU (Prestigious University). The conference aimed to foster collaboration, innovation, and knowledge exchange among industry experts and representatives from various institutes. The event was a resounding success, bringing together an esteemed gathering of professionals to explore the frontiers of technology and its transformative potential.

COPYRIGHTS OF DST-TEC-PDEU



Extracts from the Register of Copyrights

कॉपीराइट कार्यालय, भारत सरकार | Copyright Office, Government Of India

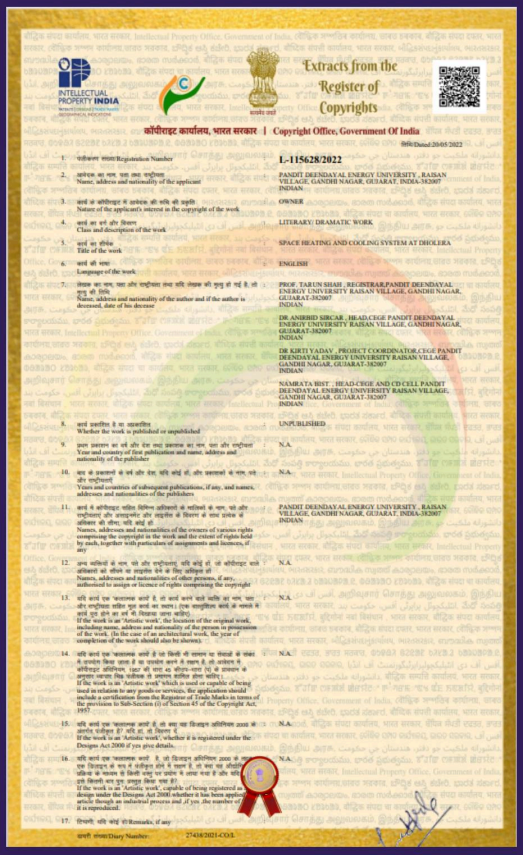
Diary Number: 27435/2021-CO/L

Date of Application: 12/11/2021

Date of Receipt: 12/11/2021

Registrar of Copyrights

CITY GAS NETWORK SIMULATION USING NUMERICAL NETWORK



Extracts from the Register of Copyrights

कॉपीराइट कार्यालय, भारत सरकार | Copyright Office, Government Of India

Diary Number: 27438/2021-CO/L

Registrar of Copyrights

SPACE HEATING AND COOLING SYSTEM AT DHOLERA

Extracts from the Register of Copyrights

कॉपीराइट कार्यालय, भारत सरकार | Copyright Office, Government Of India

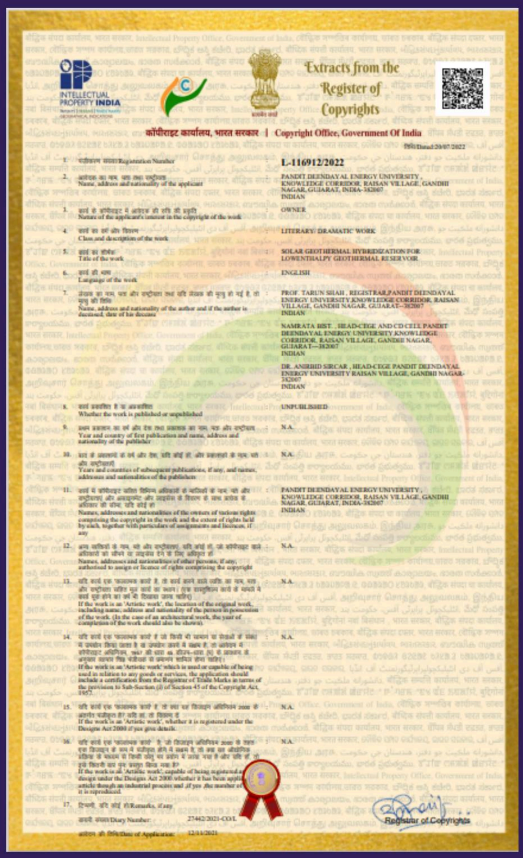
Diary Number: 27435/2021-CO/L

Date of Application: 12/11/2021

Date of Receipt: 12/11/2021

Registrar of Copyrights

DIRECT AND INDIRECT APPLICATIONS OF GEOTHERMAL ENERGY



Extracts from the Register of Copyrights

कॉपीराइट कार्यालय, भारत सरकार | Copyright Office, Government Of India

Diary Number: 27442/2021-CO/L

Date of Application: 12/11/2021

Registrar of Copyrights

SOLAR GEOTHERMAL HYBRIDIZATION FOR LOWENTHALPY GEOTHERMAL RESERVOIR

PRODUCT SHOWCASE BY PARTNER MSME

GOLD BIODIESEL CONCEPT UNDER THE UMBRELLA OF TEC-PDEU

MOU SIGNING WITH MSME

The day 15th September 2023 brought together a renowned academia PDEU to join hands with a key stakeholder Gold Medi-herb R&D, a leading MSME in the field of Health and Energy to flourish under the umbrella of DST-TEC-PDEU. This MoU signing between two different wings of the ecosystem roofed under DST-TEC-PDEU would facilitate the process of conversion of an innovation protocol to a commercial entity that would in turn boost the commercial viability and economic growth of the nation as a whole.

PRODUCT TRANSFER TO INDUSTRY BY DST-TEC-PDEU

DST-TEC –PDEU is a DST sponsored triple helix model at PDEU mentored under the supervision of Prof. (Dr.) S. S. Manoharan.

Prof. (Dr.) Anirbid Sircar who is the Coordinator of the centre and his team has successfully mined several technologies and prototypes in different Institutes of the region and is continuously engrossed to do so at an unprecendeted scale. The remarkable achievement of the centre witnessing a novel healthcare product 'Ayuwell Psorofin Capsules' transfer by one of the renowned Healthcare Company Ayuwell Herbs Pharma Pvt. Ltd. under the umbrella of DST-TEC-PDEU to Badrikashram Pharmacy is an iconic step that would revolutionarise the futuristic scope and turnover of the grassroots R & D products to boost the economic as well as social framework of the nation as a whole.

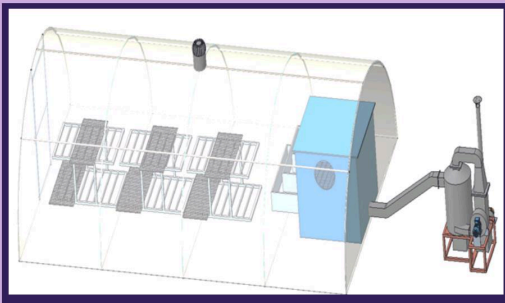
boost the economic as well as social framework of the nation as a awhole. It is noteworthy to mention that Mr. Ankit Soni of Ayuwell Herbs Pharma, Dr. Roshni Kumari of TEC-PDEU and Mr. Vinod Diwakar of Badrikashram played crucial roles in successful transmission of the product to the market for healthcare services.

EMERGING TECHNOLOGY UNDER TEC-PDEU

HYBRID SOLAR-BIOMASS TUNNEL DRYER

- Solar-biomass hybridization represents a promising synergy between two renewable energy sources—solar power and biomass energy.
- This innovative approach combines the strengths of both technologies to create a more reliable and efficient energy generation system.
- Solar-biomass hybridization for drying agricultural products represents a cutting-edge and sustainable solution to address the challenges faced by farmers and food processors in preserving grains while minimizing energy costs and environmental impacts. This innovative approach combines the natural power of the sun with the energy density of biomass to optimize the drying process.
- Hybrid Solar-Biomass dryer gives faster drying rates by heating the air to 10–30 ^{0}C above ambient, which causes the air to move faster through the dryer, reduces its humidity, and deters insects.

The total energy required for drying	:	$Q = M_d \times C_d \times (T_2 - T_1) + M \times C_p \times (T_2 - T_1) + M_w \times \lambda$	Q: Total energy required for drying of selected product (kJ) C_d: Specific heat of product (kJ kg^{-1} ^{0}C^{-1}) C_p: Specific heat of water (kJ kg^{-1} ^{0}C^{-1}) λ: Latent heat of vaporization of water (kJ kg^{-1}) T_1: Ambient air temperature (^{0}C) T_2: Temperature inside the solar tunnel dryer (^{0}C)
Collector area of solar tunnel dryer required for drying	:	$Ac = \frac{Q_t}{I \, X \, \eta \, X \, 0.68}$	Ac: Collector area of solar tunnel dryer required (m^2) η: Overall thermal efficiency of solar tunnel dryer, % Q_t: Energy required per hour for drying of selected product (kJ h^{-1} m^{-1}) I: Global solar radiation for Akola region (kJ h^{-1} m^{-1})
Mass of air needed for removing Mw, kg of water	:	$q_a = \frac{M_w \, X \, \lambda}{\rho_a \, X \, C_a X \, (T_3 - T_1)}$	M_w: Mass of water to be removed (kg) T_1: Ambient air temperature (^{0}C) T_3: Temperature inside the chimney of dryer (^{0}C) λ: Latent heat of vaporization of water (kJ kg^{-1}) C_a: Specific heat of air (kJ kg^{-1} ^{0}C^{-1})
Heat transfer coefficient, (h_o)	:	$ho = \frac{N_u X \, K}{d_e}$	K: Thermal conductivity N_u: Nusselt number d_e: Pitch arrangement
Drying efficiency (η)	:	$\eta \, \% = \frac{(M \times \lambda)}{(S \times A) + (C \times m)} \times 100$	M = Mass of water evaporated, kg λ = Latent heat of vaporization, MJ kg^{-1} S = Total solar radiation, MJ m^{-2} A = Area, m^2 C = Calorific value of biomass, MJ kg^{-1}. m= Mass of biomass used, Kg.



ISOMETRIC VIEW HYBRID SOLAR-BIOMASS TUNNEL DRYER

Advantages:

- Faster drying rates
- Protection over rain, contamination, undesirable quality change, and non-uniformity of dried products
- Continuous drying
- Possible to use during night-time or off-solar time
- Biomass is locally available and the cheapest source of energy
- Economically feasible

Team at PDEU - Technology Enabling Centre

PROF(DR). S. SUNDARMANOHARAN,
Director General, PDEU & Mentor-TEC

- Domain: Nanodevices, coating, drug delivery
- Patents : 35
- Innovative
- Products: ICU ventilator, cardiovascular stent

PROF(DR). ANIRBID SIRCAR
DIRECTOR, SOET, PDEU,
PI-TEC

- Domain: Petroleum exploration, Geothermal energy and Gas Technology
- Patents : 17
- Publication: 110 scopus indexed projects
- Funded Projects: 14

PROF(DR). SURENDRA SINGH KACHWAHA
PROFESSOR, SOT, PDEU, CO-PI -TEC

- Domain: Biofuels, Wind energy, thermal engineering
- Patents : 09
- Innovative
- Products: 100 L biodiesel reactor

MR. ABHINAV KAPADIA
CHIEF FINANCE OFFICER AT PDEU,
CO-PI-TEC
DIRECTOR PDEU IIC

- Domain: Enterpreneurship & Innovation
- Expertise: Mentored 100+ Startups at Incubation Centre

DR. ROSHNI KUMARI
RESEARCH ASSOCIATE-II,
TEC-PDEU

MR. ROHIT PAWAR
SRF,
TEC-PDEU

MR. SOURAV SANTARA
JRF,
TEC-PDEU

OUR PAG MEMBERS

DST NOMINATED OFFICIALS

PROF (DR). RAJA P PAPPU
TEC COORDINATOR, GITAM UNIVERSITY

PROF (DR). ANITA AGGARWAL
SCIENTIST F, DST

DR. KRISHNA KANTHPULICHERLA
SCIENTIST D, DST

UNIVERSITY MEMBERS

DR. PURTI BILGAIYAN
KARNAVATI UNIVERSITY
GANDHINAGAR, GUJARAT

PROF. BHAWESH PARMAR
L.D ENGINEERING COLLEGE
AHMEDABAD, GUJARAT

DR. RAWESH KUMAR ASSOCIATE
PROFESSOR DEPT. OF CHEMISTRY
INDUS UNIVERSITY

PROF. GHANSHYAM PARMAR
DEPT. OF BIOMEDICAL ENGINEERING
GEC, GANDHINAGAR

SEARCHING FOR TECHNOLOGY DEPLOYMENT, FIELD TRIALS, COMMERCIALISATION

Contact
Prof (Dr). Anirbid Sircar
Director, SoET, PDEU, PI-TEC
Emai ld: Anirbid.Sircar@spt.pdpu.ac.in