3.3.2

Books/Conferences/ Book chapters During Assessment Period: 2018-19 to 2022-23

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Books Published/ Papers published in Conferences

During Assessment Period: 2018-19 to 2022-23

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1	Dr. S.C.V Ramana Murty Naidu	Fluid Mechanics An Introduction	—	2023	978-93-90203-31-4
2	Dr. Kanchu Satyam	Cost Management a Perspective Approach	—	2023	978-93-93769-47-3
3	Dr. S.C.V Ramana Murty Naidu	Production and Operations Management	—	2022	978-93-95978-48-4
4	Dr. Kanchu Satyam	Production and Operations Management	—	2022	978-93-95978-48-4
5	Dr. S.C.V Ramana Murty Naidu	Emerging Trends in Mechanical Engineering	—	2022	978-93-5625-374-2
6	Dr. S.C.V Ramana Murty Naidu	Robotics		2022	978-93-91987-39-8
7	G. Vykunta Rao	—	A novel self maintained solar panel design & development	2021	978-1-6654-3919-0
8	K. Seetharamayya	—	Modeling of Load Frequency Control for A Hybrid Power System using PID Controller	2020	978-93-5407-727-2
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An Introduction

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Dr.SCV Ramana Murty Naidu
Dr.Prafulla Kumar Sahoo
Dr.M.Palpandi

Fluid Mechanics
An Introduction

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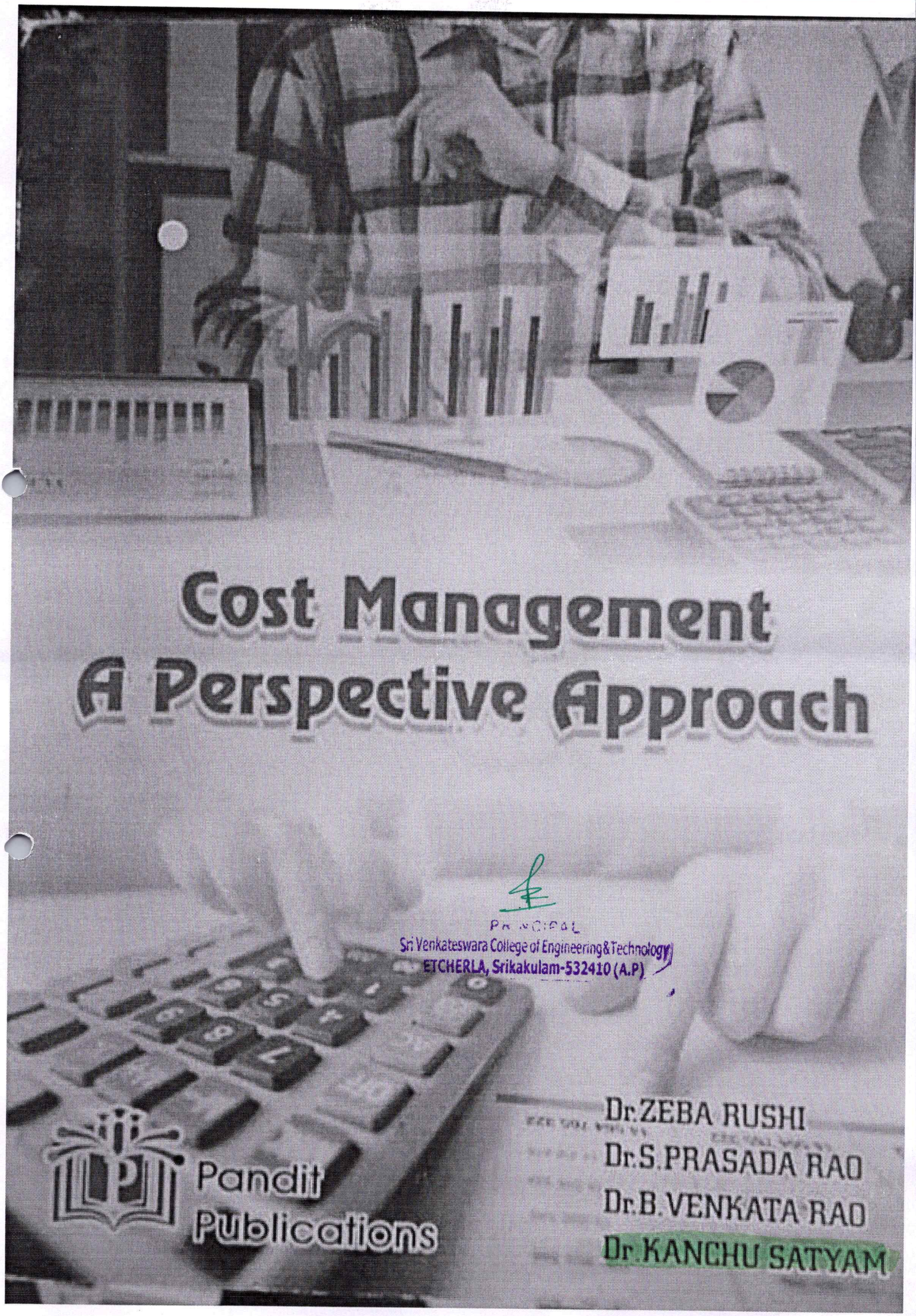

Cost Management
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Dr.S.PRASADA RAO
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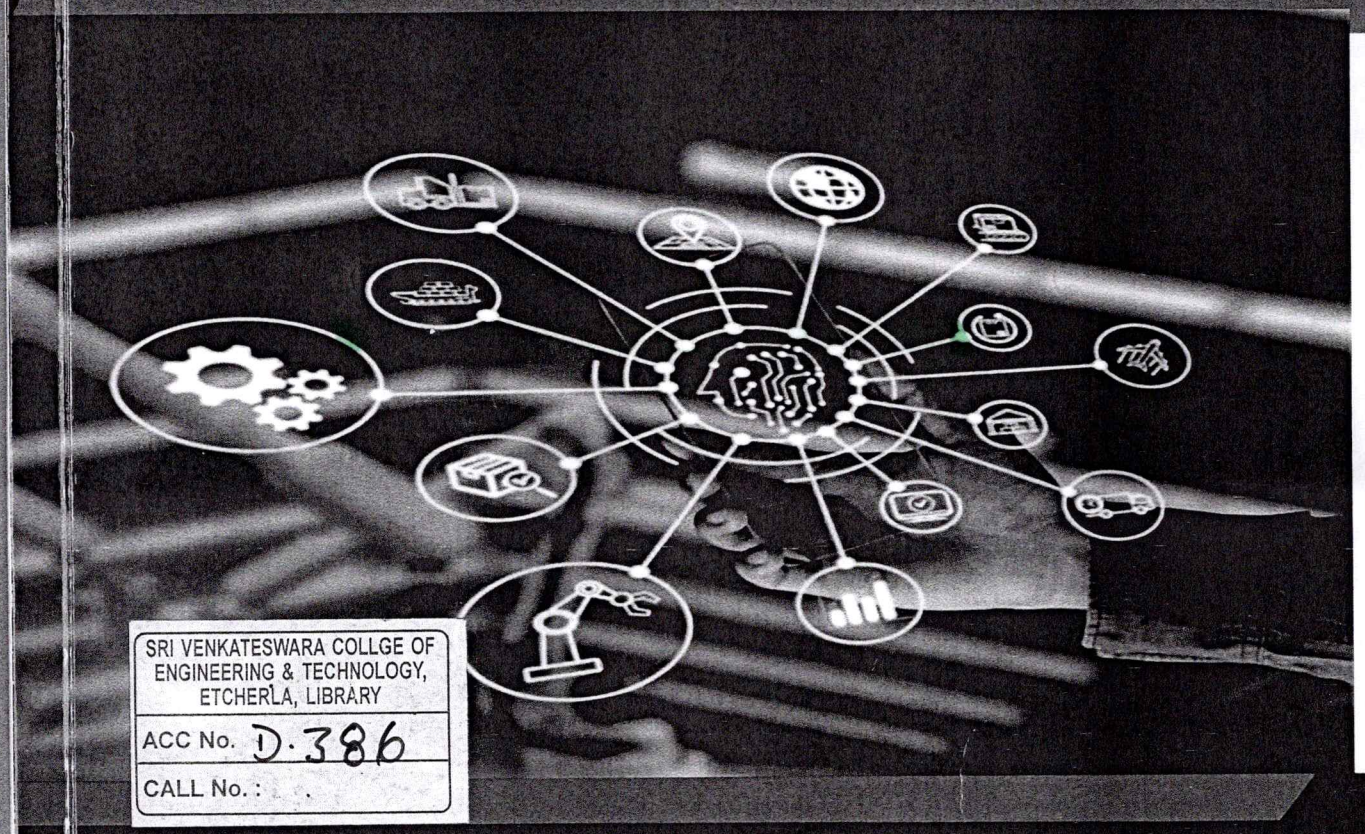

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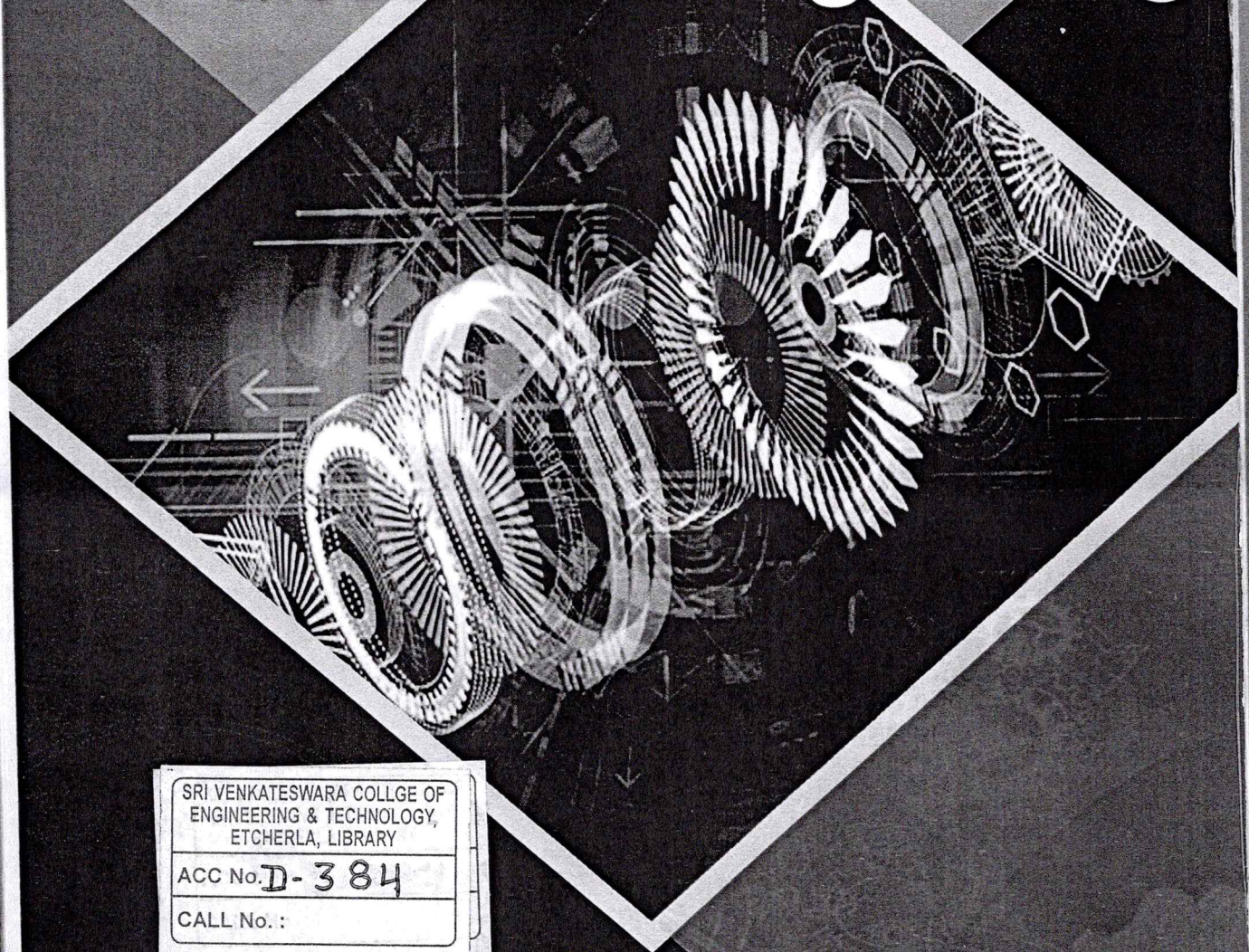

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ROBOTICS

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Dr. S C V Ramana Murthy Naidu
Dr. M. S. Nidhya
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in the 10th International Conference on advances in Computing & Communications (ICACC-2021) held at Rajgiri School of Engineering & Technology, Kochi, Kerala, India during 21-23rd October, 2021.

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A Novel Design and Development of Self Maintained Solar Panel

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***Abstract*— In this paper a novel design for the self onslaught and safeguarding of the solar panel is designed. Due to the declination of fossil foils, there is a large demand for the renewable energy sources (RES). Meanwhile, the solar based energy systems are more in practice comparing to the other type of renewable resources, even in our nation the estimated budget for the ministry of new & renewable energy in the year of 2020-2021 was nearly 13,726.4 Crore rupees, which is about 10% higher than that of the FY20. The utilization of highly spotless solar energy is no more a new breakthrough of the researchers of our present generations. Whereas, the past of solar energy conversation was so elongated, several and exhilarating. But the maintenance and safe guarding for the solar panels is the biggest task. It is more economic and complicated. In this design a novel prototype is developed for the self onslaught of roof top and domestic installed solar panels which are much cost effective compared to the present maintenance cost.**

***Index Terms*— Solar Energy, Temperature, Dust, Efficiency, Self Cleaning, Maintenance and Monitoring.**

I. QUESTION OF RESEARCH:

How the different climatic parameters influence on generation of electricity for the solar PV component, and most importantly impact of filth accretion on the PV solar Power loss.

II. INTRODUCTION

The hefty extent of the universal energy stipulate for the aid of industrialization and developing for the improvement in the eminence of life has progressively more destruction in milieu resources worldwide [1]. In added to that, modern studies of investigation have noticed that the renewable energy sources are theoretically, technically and inexpensively viable to congregate all the universal needs and requirements [2], which could dole out of numerous persuade for further research and improvement of renewable energy sources RES's based equipment.

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The energy necessity of the humanity is ceaselessly developing. It is anticipated that by the focal point of our century the overall energy solicitation will at any rate twofold. This immense energy need and the genuine ecological difficulties should be conceivable to be enclosed by expanding electrical energy transformation from renewables, which solar energy is one [3].

Practically all the resources structures utilized in electrical power generation are of solar sources. Oil, coal, flammable gab and forest were initially delivered with methods for photosynthesis. Wind what's more; waves are because of temperature contrasts [4], [5] and [6]. Since the commencement, every novel practical energy structure added to the improvement of the general public [7].

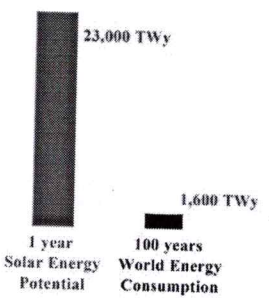

Fig. 1 Global Energy Utilization

The yearly solar energy capability of the earth is 23,000 TWy. 1,600 TWy ought to be the global energy utilization for a very long time (registered with the yearly utilization in 2009), as it is outlined in Fig: 1. For examination, the Earth's absolute limited energy assets (coal, uranium, petrol and petroleum gas) are of 1,655 TWy and the most positive thinker assessments of the energy that changed over yearly from non-sun oriented inexhaustible assets (wind, sea, biomass, hydro and geothermal) is just 94 TWy [8].

Encompassing study of all renewable energy resources RES's development procedures, among every one of RES's the solar energy have played the major role for altering the paradigms from federal power generation systems. But the maintenance of solar panel big task for the consumers. In generally a proprietor expend an average of 150$ to have their solar panel cleaning. Meanwhile depending upon the factors height of the home, roof slant and size of the system, most of the companies charge approximately $3 to $10 per panel. The special charges for nominal cleaning are within a range of $150 to $300. Yearly maintenances are usually $150 before the cost of cleaning.

In this paper with a simple technique and a major focal point is to reduce the cost of the maintenances for a consumer especially for the domestic utilization solar panels. The design and the edifice details are discussed in below sections.

III. Dust Impact on the Efficiency of Solar Panel

Various Research studies are conducted for the exploration of impact of dust on solar panels for all residential, industrial and panels installed in the paddy fields. Where, the dust is definite as small particulate material the dimension is below 500 micrometer (μm) in diameter. It include from birds urinals to little dusts, for example, microscopic organisms and microfibers isolated from the carpets, clothes and the small size dust from the construction sites. Various kinds of climatic and environmental changes like transportation, volcanic eruption, pollution and wind are able to rise up the dust and spread out into the atmosphere [9]. The defrayal of dust particles mostly relies on the dust parameters as (substance, dimension, shape, heaviness, etc…) along with the environmental features and conditions [10]. Based on the some investigative studies, the surface, tilt angle, speed of wind and humidity are also the possible reasons for the dust settlement on the panel [9] [11].

The average extensive range of performance reduction has been noted which also includes as the usual diminution of 3% with a peak of 7.6% in the time span of 45 days in Srikakulam, Andhra Pradesh, India. The same reduction in performance for 1% to 4.7% in 2 months in United States [12], 40% for 6 months in Saudi Arabia [13], 32% for 8 months again Saudi Arabia 9, in Kuwait based on tilt angle the reduction of 18% to 65% in 38 days period time.

The same related study done in Egypt 33.5% -65.8% reduced on performance in the duration of 1 to 6 months [14]. Along with the research the investigation that influence of air velocity, humidity and dust on panel performance [10]. In end of investigation shows the great conformation with outcome that the dust temperament and settlement on the panel surface will decreases efficiency of the PV panel.

IV. Related Work

Solar panel maintenance and services provided by the different companies are commonly seen in the every part of the world. A reminder, in the research study, that the challenging of their performance monitoring in discussion for dust presents many areas of countries. For instance, as the latest progress in Jordan [15], Iraq [16] Indonesia [17] and India [18]. Various outcomes are published in the same field.

Several other re-searchers revise the consequence of dust particles and impurities on the solar panel and the way to incorporate on it a Self Cleaning Control System (SCCS). In [19], a researcher stated a proposal by using a translucent fortification pane casing the solar cells with spraying device.

One more proposal that combination of 1-phase electric curtains to generate an eminence wave which can clear the dust on panel [20], monitoring & performance for the street lights [21]. Well all this schemes are expensive and more complexity for a household consumers and most importantly it applicable only for the cities and town, but not for the solar panels installed in the paddy fields which is impossible for the isolated areas.

In the added solution which is mostly used, is the SCS as proposed in the [15] [17] [18]. In this a current and voltage sensors are implanted for every solar panel based upon the data of the power generation will be communicated through the wireless transmission system. By knowing the data available for the current and voltage among the solar panel and batter, the SCS is capable, and send the signal data whether the cleaning is necessary or not. Thus, a labor-intensive cleaning as shown in the Fig: 2 can be worked out.

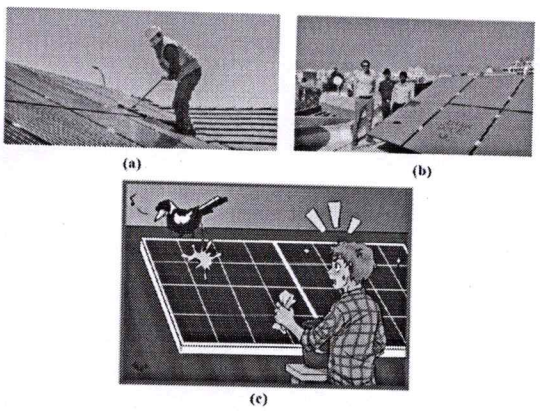

Fig. 2 Labor-Intensive Cleaning

In this work, we implemented a Secluded Self Control System (SSCS) for the remote monitoring and performance device for the roof top installed solar panels and the remote locations like the solar panels installed in t he paddy fields in order to bring a new innovation on their maintenance in Srikakulam, Andhra Pradesh, India. The work obtainable in this paper is whereas very useful throughout the different reasons.

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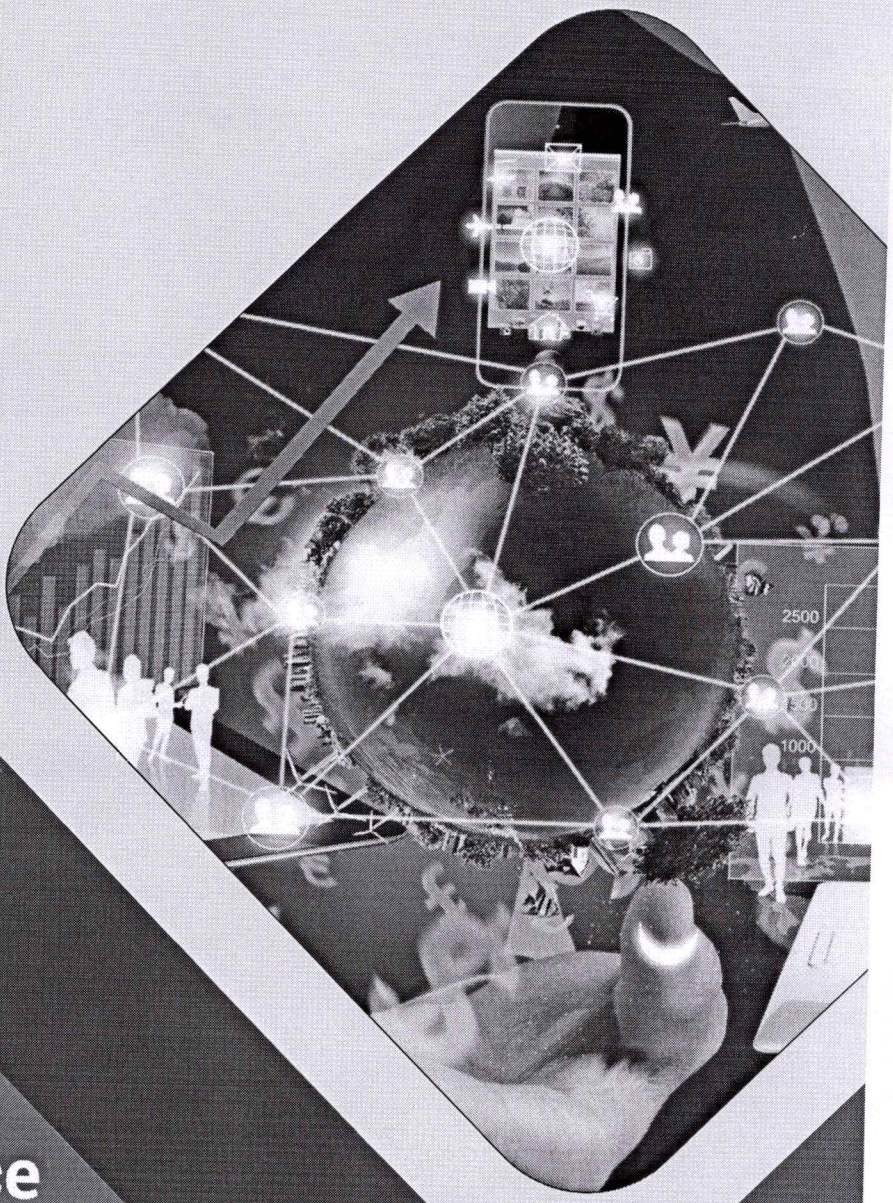

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MODELING OF LOAD FREQUENCY CONTROL FOR A HYBRID POWER SYSTEM USING PID CONTROLLER

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ABSTRACT:-Interconnected power system is plays one the of critical role in modern electrical power system Engineering.the power load demand varies randomly both area frequency and tie-line power interchange also vary. For interconnection of two or more areas in power system, frequency should be maintained within the scheduled value, which can be achieved by employing one of the most prominent techniques called as Automatic Load Frequency Control (ALFC). In ALFC, frequency can be controlled in three ways, namely Flat frequency regulation, Parallel frequency regulation and Flat tie-line loading. Among these controls, Parallel frequency regulation is commonly used method, because constant frequency can be maintained by equalizing the power generation with the power demand. The objectives of LFC are to minimize the deviations in these variables (area frequency and tie-line power interchange) and to ensure their steady state errors to be zero. In this area of energy crisis, renewable energy is the most promising solution to increasing energy needs. But the power production by these resources cannot be controlled unlike in thermal plants. As a result, standalone operation of renewable energy is not reliable. Hence grid-connection of these along with conventional plants is preferred due to the improved performance in response to dynamic load. In this paper a particle swarm optimization tuned Proportional Integral Derivative(PSOPID) controller has been proposed.Load frequency control including PID controller with PSO optimizing method is proposed in order to suppress frequency deviations for a power system involving wind, hydro and thermal plants owing to load and generating power fluctuations caused by penetration of renewable resources. The proposed system involving four thermal plants,wind farm and hydro plant will be modelled using MATLAB.

Keywords: - Automatic Load Frequency Control (ALFC), Hybrid power systems (Thermal and hydro, wind power plant),PID controller

I. INTRODUCTION

Generally, power system consists of three parameters which shall be within the limits for successful operation i.e. Frequency, Voltage and Load angle, among these frequency parameter plays vital role. Many different power frequencies were used in the 19th century. Very early isolated ac generating schemes used arbitrary frequencies based on convenience for steam engine, water turbine and electrical generator design. Frequencies between 16⅔ Hz and 133⅓ Hz were used on different systems (1).The main purpose of a power engineer is to provide power to the consumers reliably and economically with a better quality. Frequency and tie-line power should be kept within the limits by equalizing the power generation at the generating end and the power consumption at the load end, because there are two points available throughout the power system for keeping the frequency within the limits, one is at the generating end and the other is at the load end [2].

LPF problem arises when individual generation areas are interconnected by transmission lines called as tie-lines.Large-scale power systems are liable to performance deterioration due to the presence of sudden small load perturbation parameter uncertainties, structural variations, etc. Frequency deviation is undesirable because most of the AC motors run at speeds that are directly related to frequency (3), Thus it is imperative to maintain system frequency constant. This is done by implementing Load Frequency Control (LFC). There are many LFC methods developed for controlling frequency. They include flat frequency control (FFC), tie-line bias control (TBC) and flat tie-line control (FTC). In FFC, some areas act as load change absorbers and others as base load (4). The thermal areas have been modelled using transfer function. Speed governor, turbine and generator constitute the various parts namely the speed governing system, turbine model, generator load models (5).The Particle swarm optimization are tuned Proportional Integral Derivative (PSOPID) controller has been proposed.the proposed controller has been compared with the other classical controllers under different loading conditions(6-8).The main performance PID controller tuned with Particle swarm algorithm was better than classical controller in terms of transient stability. It is observed that fluctuations in frequency caused due to load variations are low with increase in penetration of renewable resources (9).The Load frequency control(LPF) including PSO-PID controller is proposed in order to suppress the frequency deviations for a power system involving wind, hydro and thermal plants owing to load and generating power fluctuations caused by penetration of renewable resources. A system involving four thermal plants, a wind farm and a hydro plant will be modelled using MATLAB simulation (10).

II.MODELING OF SINGLE AREA (THERMAL AREA) :

2.1 Mathematical model of Speed Governing System of Power System:

the mathematical model of speed governing system has command signal ΔPC initiates a sequence of events-the pilot valve moves upwards, high pressure oil flows on to the top of the main piston moving it downwards; the steam valve opening consequently increases, the turbine generator speed increases, i.e. the frequency goes up which is modelled mathematically (9)

$$\Delta Y_E(S) = [\Delta P_C(S) - \frac{1}{R}\Delta F(S)] \times (\frac{ksg}{1+Tsg5}) \qquad (1)$$

2.2. Specifications of Turbine models

The Turbine have Dynamic response of steam turbine is related to changes in steam valve opening ΔYE in terms of changes in power output. Typically, the time constant Tt lies in the range 0.4 to 2.5 sec.

2.3. The Generator Load Models:

The increment in power input to the generator-load system is related to frequency change as

$$\Delta F(S) = [\Delta P_G(S) - \Delta P_D(S)] \times (\frac{kps}{1+Tps}) \qquad (2)$$

2.4 structure of Entire Thermal Area:

Typical values of time constants of load frequency control system are related a Tsg<Tt<Tps shows in the required block diagram below.

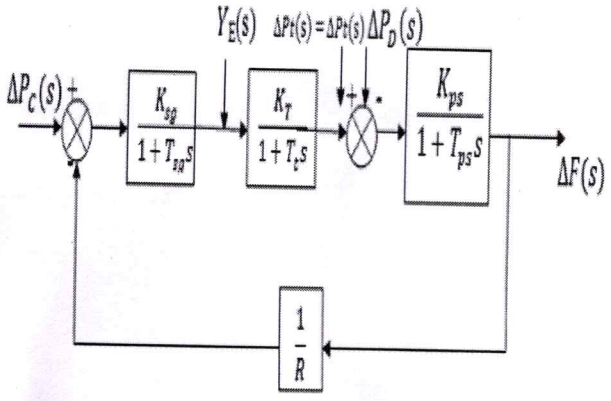

Fig.1 Block Diagram of Thermal

complete block diagram of an isolated power system comprising turbine, generator, governor and load is easily obtained by combining the blocks.

Area	Rated power	D(puMW/HZ)	H(s)	Kps ,Tps
Tp1	2000	.015	6	100,25
Tp2	1500	0.22	4	50.25
Tp3	650	0.35	3	35,50
Tp4	3000	0.1	7	152,30

Table.1: Parameters of Thermal Areas

III. MODELING OF HYDRO POWERPLANT AREA

Modeling of hydro and wind consists The representation of the hydraulic turbine and water column in stability studies is usually based on certain Assumptions. The hydraulic resistance is considered negligible. The penstock pipe is assumed inelastic and water incompressible. Also the velocity of the water is considered to vary directly with the gate opening and with the square root of the net head and the turbine output power is nearly proportional to the product of head and volume flow.

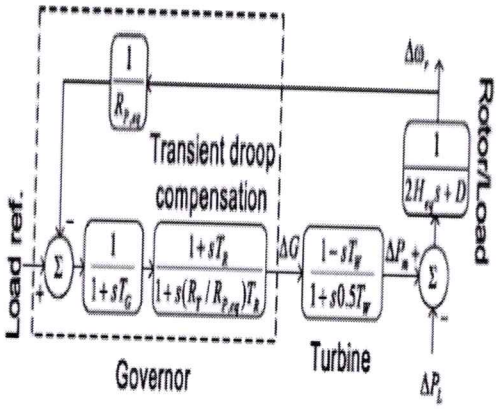

Fig.2 block diagram for hydro -wind area

Hydro plants are modelled the same way as thermal plants. The input to the hydro turbine is water instead of steam. Initial droop characteristics owing to reduced pressure on turbine on opening the gate valve has to be compensated.Hydro turbines have peculiar response due to water inertia; a change in gate position produces an initial turbine power change which is opposite to that sought. For stable control performance, a large transient (temporary) droop with a long resettling time is therefore required in the forms of transient droop compensation as shown in Fig.2 The compensation limits gate movement until water flow power output has time to catch up. The result is governor exhibits a high droop for fast speed deviations and low droop in steady state.

IV.LOAD FREQUENCY CONTROL FOR A TWO - AREA SYSTEM

Load frequency control of power system makes critical role in electrical engineering. Power system can be divided into a number of load frequency control areas interconnected by means of tie lines. The control objective now is to regulate the frequency of each area and to simultaneously regulate the tie line power as per inter-area contacts. With the primary LFC loop a change in the system load will result in a steady state frequency deviation, depending on the governor speed regulation. In order to reduce the frequency deviation to zero we must provide a reset action by introducing an integral controller to act on the load reference setting to change the speed set point. The integral controller increases the system type by 1 which forces the final frequency deviation to zero.

IOP Conference Series: Materials Science and Engineering

Influence of glass fibres in stone mastic asphalt

Influence of glass fibres in stone mastic asphalt

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Abstract. The study in this paper examines the effect of fibres on the stability of Stone Mastic Asphalt (SMA) mixture in flexible pavement. Two types of fibres namely Class-C Glass fibres(Glass – C), and Alkali Resistant Glass Fiber(ARGF) were used in this investigation. From the results, it was found that the addition of glass fibres showed the improvement in the properties of the stone mastic asphalt mix. The addition of fibres at 0.4% with 6% binder content results in increased stability values and low draindown values.
Keywords: Class-C Glass Fiber; Alkali Resistant Glass Fiber; Draindown; Stability.

1. Introduction

Stone Matrix Asphalt (SMA) is a mixed proportion of the coarse aggregate with fine aggregate and the bitumen to obtain the strong and durable mix to withstand the traffic loads. As the SMA offers rut resistance, durable and textured surface course, it has been successfully utilized in many of the developing countries. SMA consists major portion of coarse aggregates. SMA has a typical composition consisting of coarse aggregate of 70−80%, filler of 8−12%, a binder of 6.0−7.0%, and fibre of 0.3 - 0.5%. Aggregate grading, filler, binder, proportion and the type of stabilizer additive will determine the stability of the mix. The interlocking and binding properties of the SMA Mix are influenced by the type of fibre used. The binding, as well as the property of interlocking, are influenced by the type of fibre used in SMA. Fibre affects the asphalt in its properties like Penetration, Ductility of the Mix, also affect the rut Resistance.

The Fibres utilization in the Stone Mastic Asphalt helps in the reduction of the Draindown, which also affects the stability of the mix. In this, the Paving Mixes were examined in terms of Stability, Void filling Resistance to Displacement and its Consistency (Bhanu and Venkateswara Rao (2016) [1]). The performance of SMA with various types of fibres was studied in the earlier investigations. Bindu et al (2010) [2] has conducted the experimental investigation with waste plastic as the stabilizer in the SMA from 0-12%. Laboratory tests like Marshall Stability and draindown were conducted and concluded that 10% of plastic waste increased stability and also reduced the draindown. Ahmadinia et al (2011) [3] has studied on Stone Mastic Asphalt properties using plastic waste bottles as additive. From the experimental investigation, it was come to know that up to 0.4% addition of additive increased the stability and further addition decreases significantly. Moghaddam et al (2012) [4] has studied regarding the properties of SMA containing waste polyethylene terephthalate. From the test results indicated that 0.4% addition of waste polyethylene terephthalate has increased the stability. Suresh et al (2013) [5] studied on the performance of modifying strength parameters using glass fibres of lengths 0.3 millimeters and 0.6 millimeters. From the test results of stability and penetration, it was found that fibres with 0.3 mm lengths performed better results compared to the mix with 0.6 mm lengths. Thanh et al (2013) [6] has studied the influence of three different types of fibres in stone mastic asphalt. The fibres used are lignin. Mineral and polyester fibres respectively. From the Marshall stability and rutting tests,

it was identified that mineral fibre has increased the properties compared to the lignin and polyester fibres.

2. Properties of Different Materials Using Different Test Methods

2.1 Identification of Material Properties

In this experimental investigation, the coarse and fine aggregates used were used from the near quarry. The aggregate particle size is ranging from between 75μ to 13.2 millimeters. Different test methods are conducted to the collected aggregates to determine their properties are shown below.

Table 1. Different Aggregate Properties (as per IS 2386 1963 [7])

Characteristic Property	Parameter	Result Obtained (%)
Strength	Impact Value	17.7
	Abrasion Value	18
	Crushing Value	25.3
Particle shape	Combined Index of Elongation and Flakiness	26.7
Water Absorption	Water Absorption	0.5

The grade of bitumen is VG – 30, which is brought from HPCL, Vizag. 1.02 is the obtained specific gravity. The properties of bitumen are mentioned below.

Table 2. Bitumen properties

Characteristic Property	Method Obtained	Result
Test for Penetration	IS 1202 [8]	64
Test for Softening Point	IS 1205 [9]	50
Test for Ductility	IS 1208 [10]	Greater than 100

The glass fibres used in this investigation are obtained from Ashwin ceramics and reliance industries and their properties are mentioned below.

Table 3: Properties of Fibres

Property	Glass – C Fibre	Alkali resistant glass Fibre
Density	2.70	2.60
Tensile strength	3600 MPa	3500 MPa
Elastic modulus	760 GPa	740 GPa
Abrasion	High resistance	High resistance

2.2 Aggregate Gradation

Stone mastic asphalt mixes were prepared using IRC SP 79 2008 [11] of SMA gradation. It is represented in figure 1.

2.3 Procedure for the Preparation of SMA Specimens

As per standard specifications of AASHTO MP8 [12], the stone mastic asphalt mixes were designed. Two different fibres were used to prepare two different mixes. The percentage of fibre addition is obtained from the draindown test. For the first mix Glass - C type fibre is used as a stabilizer additive. In case next mix alkali-resistant glass fibre is added as the stabilizer additive. For the determination of