KARNATAKA STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

Indian Institute of Science Campus, Bengaluru - 560012

LIST OF B.E. PROJECTS SANCTIONED UNDER 40th SERIES OF STUDENT PROJECT PROGRAMME: 2016 - 2017

102) SAPTHAGIRI COLLEGE OF ENGINEERING, BENGALURU

Sl No.	Project proposal Ref. No.	TITLE OF THE PROJECT	BRANCH	NAME OF THE GUIDE/S	STUDENT1 & TEAM LEADER	SANCTIONED AMOUNT (Rs.)
399)	40S_BE_0183	ISOLATION AND IDENTIFICATION OF MICROLABS FOR ABSORPTION AND CONVERSION OF AMMONIA, NITRATES AND NITROGEN USING AQUAPONICS SYSTEM	BIOTECHNOLOGY ENGINEERING	MRS. BLESSY BABY MATHEW, MRS. SARANYA D, MR. ANANDA H V, DR. ANANDA S	MR. MOHAN KUMAR N	6,500.00
400)	40S_BE_2312	FOREST MONITORING SYSTEM BASED ON GPRS AND POWERED BY IOT	ELECTRONICS AND COMMUNICATION ENGINEERING	PROF. SUMA V SHETTY	MS. MANASA J.	7,500.00

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

Title of the Project

ABSORPTION AND CONVERSION OF AMMONIA AND NITRITES BY USING *NITROBACTER* AND *NITROSOMONAS* IN AQUAPONICS SYSTEM FOR THE DEVOLOPMET OF PATHOS

Reference number- 40_BE_0183

Name of the College & Department

Department of Biotechnology, Sapthagiri College of Engineering, Bangalore-57.

Name of the student

Mr. Mohan Kumar N, Mr. Arun D K,

Mail-ID: - 1996sarun@gmail.com

Phone Num :- 9916866954

Name of the Guide

Mr. Ananda. H.V, Assistant Professor, Department of Biotechnology, Sapthagiri College of Engineering, Bangalore-57.

Mail ID: anandahv@sapthagiri.edu.in

Phone No: 09964262548

Acknowledgement:

1. Dr.Ananda S , Professor and HOD
2. Mrs.Blessy Baby Mathew, Assistant Professor
3. Mrs.Sharanya D, Assistant Professor

Keywords

Aquaponics, Aquaculture, Nitrite, Nitrate , Ammonia, nitrobacter, nitrosomonas, pathos

1. INTRODUCTION:

- Aquaponics is a food production system that combines intensive aquaculture (raising aquatic animals in tanks) with hydroponics (cultivating plants in a nutrient solution).
- In Aquaponic system, Fish feed passes through fish and provides nutrients for plant growth.
- Aquaponic systems are recirculation aquaculture systems that incorporate the production of plants without soil.
- Plants grow rapidly with dissolved nutrients that are excreted directly by fish or generated from the microbial breakdown of fish wastes.

3.10 Instruments Used:

Sl No.	Instruments		
1.	Hot air Oven	6	Fish tank
2.	Incubator	7	Motor
3.	Amonia test strips	8	Titration set up
4.	Autoclave	9	Thermometer
5.	Shaker	10	Buffers
		11	pH meter

Table No.1: Instruments utilized

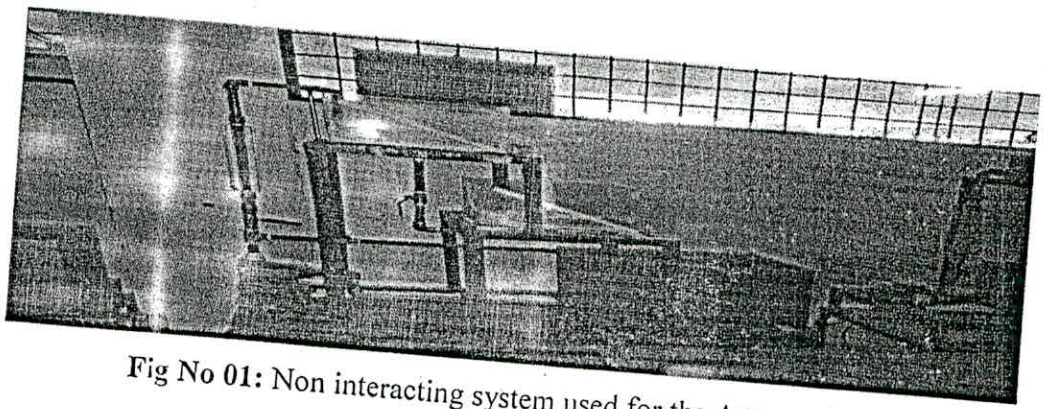
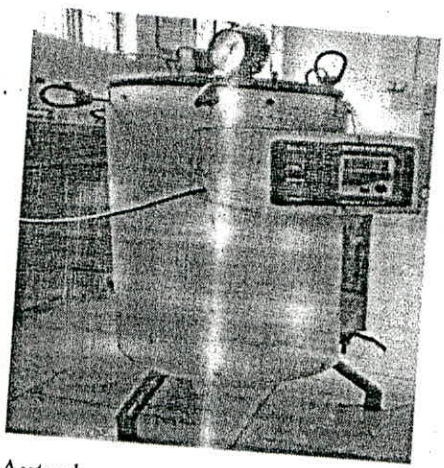
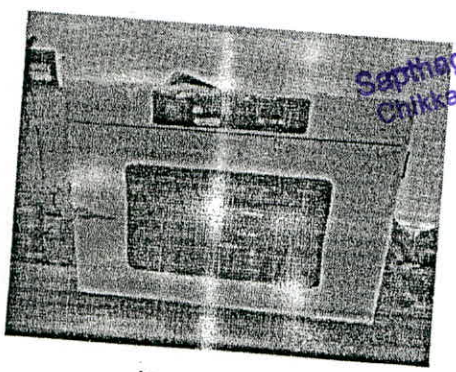


Fig No 01: Non interacting system used for the Aquaponics set up

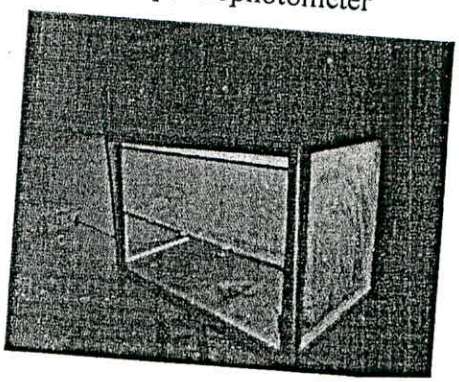


Autoclave

U V Spectrophotometer



Incubator



Karnataka State Council for Science and Technology

Indian Institute of Science Campus, Bengaluru - 560 012

Telephone: 080-2334 1652, 2334 8848, 2334 8849 ♦ **Telefax**: 080-2334 8840

Email: office@kscst.iisc.ernet.in, office@kscst.org.in ♦ **Website:** www.kscst.iisc.ernet.in, www.kscst.org.in

Dr. S. G. Sreekanteswara Swamy
Executive Secretary

27th March 2017

Ref: 7.1.03/SPP/1112

The Principal
Sapthagiri College of Engineering,
14/5, Chickasandra,
Hesaraghatta Main Road,
Bengaluru – 560 057

Dear Sir,

Sub : Sanction of Student Project - 40th Series: Year 2016-2017
Your Project Proposal Reference No. : 40S_BE_2312

Ref : Your Project Proposal entitled " **FOREST MONITORING SYSTEM BASED ON GPRS AND POWERED BY IOT**

I am happy to inform that your project proposal referred above, has been approved by the Secretary, KSCST for "Student Project Programme - 40th Series" and has been sanctioned with a budgetary break-up as detailed below:

Student / s	Ms. Manasa J. and others	**Budget**	**Amount (Rs)**
		Materials/Consumables	6,000.00
Guide/s	Prof. Suma V Shetty	Labor	1,000.00
		Travel	-
Department	Electronics And Communication Engineering	Miscellaneous	-
		Report	500.00
		TOTAL	7,500.00
	Rupees Seven Thousand Five Hundred		

The following are the guidelines to carryout the project work :

a) The project should be performed based on the objectives of the proposal sent by you.

b) The project should be completed in all respects and one copy of the hardbound report along with softcopy of the full report in a CD (.pdf format) should be submitted to KSCST.

c) Any change in the project title and objectives, etc., or students is liable to rejection of the project and the amount sanctioned needs to be returned to KSCST.

d) Please quote your **project sanction reference number printed above** in all your future correspondences.

e) **Important:** After completing the project, 2 to 3 page write-up (synopsis) needs to be sent by e-mail [spp@kscst.iisc.ernet.in] and should include following :

1) Title of the project
2) Name of the College & Department
3) Name of the students & Guide(s)
4) Keywords

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

5) Introduction / background
(with specific reference to the project, work done earlier, etc) - about 20 lines
6) Objectives (about 10 lines)
7) Methodology (about 20 lines)
(materials, methods, details of work carried out, including drawings, diagrams etc)
8) Results and Conclusions
(about 20 lines with specific reference to work carried out)
9) Scope for future work (about 20 lines).
(Note: The write-up (Synopsis) should be sent with the approval of project guide. The softcopy of the write-up, in MS Word format, should be sent by e-mail (spp@kscst.iisc.ernet.in). In your e-mail, please also include project proposal reference number and title of the project.)

e) Projects selected for Seminar / Exhibition will be awarded.

The sanctioned amount will be sent separately by our Accounts Department.

The sponsored projects evaluation will be held in the Nodal Centre and the details of the nodal centre will be intimated shortly.

Please visit our website for further announcements / information and for any clarifications please email to spp@kscst.iisc.ernet.in

Thanking you and with best regards,

Yours sincerely,

(SGS Swamy)

Copy to:
1) The Head of the Department of
Electronics And Communication Engineering
Sapthagiri College Of Engineering,
14/5, Chickasandra,
Hesaraghatta Main Road,
Bengaluru – 560 057

2) Prof. Suma V Shetty
Department of Electronics And Communication Engineering
Sapthagiri College Of Engineering,
14/5, Chickasandra,
Hesaraghatta Main Road,
Bengaluru – 560 057

3) The Finance Officer, KSCST, Bangalore

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

A PROJECT REPORT

On

A Forest Monitoring System Powered By IOT

Submitted to

Visvesvaraya Technological University

Belagavi, Karnataka – 590018

In Partial fulfillment for the award of degree in

Bachelor of Engineering

During VIII Semester of

Electronics and Communication Engineering

*For the academic year **2016-17***

Submitted by

Manasa J	**1SG13EC050**
Harshitha R	**1SG13EC034**
Jayanthi Sri Haripriya	**1SG13EC035**
Aman Makrani	**1SG13EC013**

Under the guidance of

Prof. Suma V. Shetty

Assistant Professor, Dept.ECE

SAPTHAGIRI
College of Engineering
Creating Tommorow

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

2016-17

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SAPTHAGIRI COLLEGE OF ENGINEERING

14/5, Chikkasandra, Hesaraghatta Main Road, Bengaluru– 560057

SAPTHAGIRI
College of Engineering
Creating Tommorow

SAPTHAGIRI COLLEGE OF ENGINEERING

14/5, Chikkasandra, Hesaraghatta Main Road, Bengaluru– 560057

Department of Electronics and Communication Engineering

CERTIFICATE

Certified that the Project work entitled "**A FOREST MONITORING SYSTEM POWERED BY IOT**", carried out by **Ms. Manasa.J (1SG13EC050), Ms. Jayanthi Sri Haripriya (1SG13EC035), Ms. Harshitha.R (1SG13EC034), Mr. Aman Makrani (1SG13EC013),** bonafide students of 8th Semester Electronics and Communication Engineering in partial fulfillment for the award of **Bachelor of Engineering** in Sapthagiri College of Engineering of the Visvesvaraya Technological University, Belagavi during the year 2016-17. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The Project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for the said degree.

Suma V Shetty

Signature of the Guide
Mrs. Suma V.Shetty
Assistant Professor
Dept. of ECE,
SCE, Bengaluru

06/06/2017

Signature of the HOD
Mrs. Sandhya Rani M.H.
Associate Professor and HOD
Dept. of ECE,
SCE, Bengaluru

Head of the Department
Electronics and Communication
Sapthagiri College of Engineering
Bangalore-560 057

Signature of the Principal
Dr. Aswatha Kumar M
Principal
SCE, Bengaluru

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road
Bangalore-560 057

External Viva

Name of the examiners

1. P. Ayalya
2. Nagesh. R

Signature with date

28/6/17

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road
Bangalore-560 057

28/6

ABSTRACT

Forests are part of the important and indispensable resources for human survival and social development that protects the balance of the earth ecology. There is a need to design a smart and efficient Forest Monitoring System.

This project presents the prototype of a system for detection of any uncontrolled anthropogenic activities, smoke or fires in forests using sensors. The data from the sensors is processed in the microcontroller and is transmitted to the receiver unit through Zigbee network. The abnormalities alert the receiver unit and the pictures taken through camera are mailed.

This Forest Monitoring system prototype is designed and developed in an effort to improve the security level for valuable trees which have high demand in market like teak, Sandalwood, etc. This prototype is tested and demonstrated successfully for its functionality.

CHAPTER 6

IMPLEMENTATION AND RESULTS

The prototype of the system can be implemented in places where precious trees are planted, to prevent forest fires and other illegal activities.

6.1 Snapshots of IOT Working

Step1: IOT APP on the transmitter side.

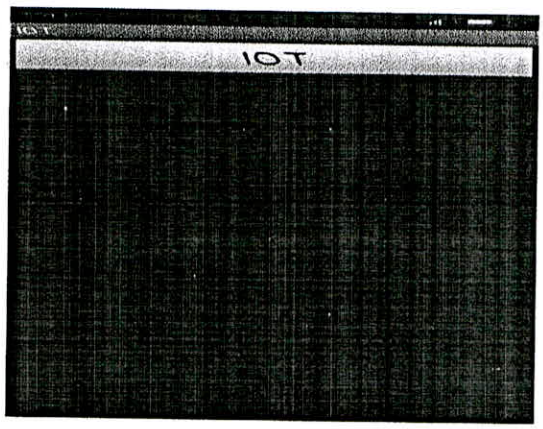


Fig 6.1: IOT APP on the transmitter side.

Step2: Option indicating to enter EMAIL ID on the transmitter side.

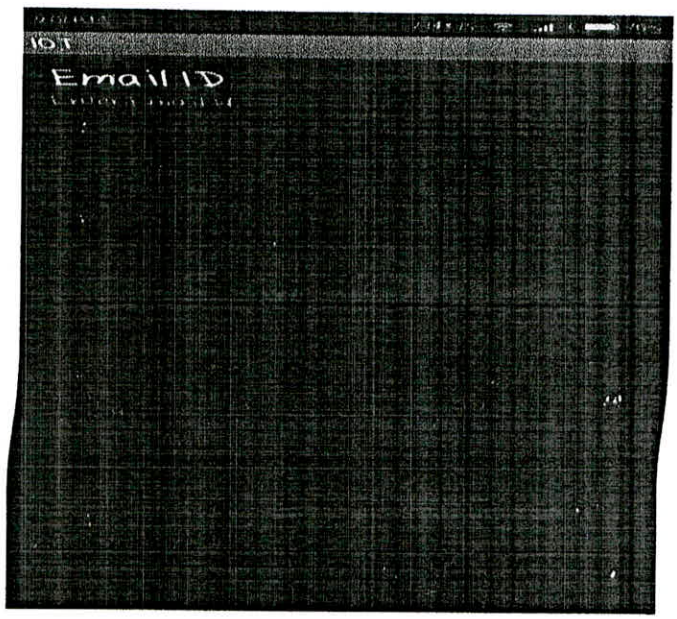


Fig 6.2: Option indicating to enter EMAIL ID on the transmitter side.

Karnataka State Council for Science and Technology

Indian Institute of Science Campus, Bengaluru - 560 012

Telephone: 080-2334 1652, 2334 8848, 2334 8849 ♦ **Telefax** 080-2334 8840

Email: office@kscst.iisc.ernet.in, office@kscst.org.in ♦ **Website:** www.kscst.iisc.ernet.in, www.kscst.org.in

Dr. S. G. Sreekanteswara Swamy
Executive Secretary

31st March, 2017

Ref: 7.1.03/SPP/1112

The Principal
Sapthagiri College of Engineering,
14/5, Chickasandra,
Hesaraghatta Main Road,
Bengaluru - 560 057

Dear Sir,

Sub : Sanction of Student Project (Biofuel) - 40th Series : Year 2016-2017
Your Project Proposal Reference No. : 40S_B_BE_049
Ref : Your Project Proposal entitled " **PERFORMANCE AND EMISSION ANALYSIS OF THE SINGLE CYLINDER SI ENGINE VARYING ETHANOL BLENDS WITH PETROL**

I am happy to inform that your project proposal referred above, has been approved by the Secretary, KSCST for 'Student Project Programme (Biofuel) 40th Series" and has been sanctioned with a budgetary break-up as detailed below:

Students	Mr. Hari S.V.	**Budget**	**Amount (Rs)**
	and others	Materials/Consumables	8,000.00
Guide/s	Mr. Raghuthama Rao P.	Labor	1,000.00
		Travel	-
		Analysis	-
Department	Mechanical Engineering	Miscellaneous	500.00
		Report	500.00
		TOTAL	10,000.00
	Rupees Ten Thousand		

The following are the guidelines to carryout the project work :

a) The project should be carried out based on the objectives of the proposal sent by you.

b) The project should be completed in all respects and **a) One copy** of the hardbound report **b)** Softcopy of the full report (including coverpages, abstract & preliminary pages in a CD (.doc and .pdf format)

c) The project report shall mention the name of **"Karnataka State Bioenergy Development Board and Karnataka State Council for Science and Technology"** as sponsored organisations in the title page. Project Title or the Objectives can be altered only with prior permission of KSCST. Any change in the project are strictly prohibited and liable for rejection and the amount sanctioned has to be returned back to KSCST.The fund is to be utilised only for the activities to which it has been released.

d) Please quote your **project sanction reference number printed above** in all your future correspondences

e) **Important:** After completing the project, 2 to 3 page write-up (synopsis) needs to be sent by e-mail [biofuelcell.kscst@gmail.com] and should include following points:

1) Title of the project
2) Name of the College & Department
3) Name of the students & Guide(s)
4) Keywords

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

BELAGAVI, KARNATAKA, INDIA

A PROJECT REPORT

ON

PERFORMANCE AND EMISSION ANALYSIS OF THE SINGLE CYLINDER SI ENGINE VARYING ETHANOL BLENDS WITH PETROL

Submitted in partial fulfillment for the award of the degree

BACHELOR OF ENGINEERING

IN

MECHANICAL ENGINEERING

Submitted by

1. S V HARI [1SG13ME098]
2. PRASANTH R [1SG13ME084]
3. MOHAN P [1SG13ME064]
4. VINOD RAJ P [1SG13ME122]

Under the Guidance of

Mr.P.RAGHUTHAMA RAO

Associate Professor,

SAPTHAGIRI

College of Engineering

DEPARTMENT OF MECHANICAL ENGINEERING

SAPTHAGIRI COLLEGE OF ENGINEERING

BENGALURU-560057

2016-2017

ABSTRACT

The performance & the pollution levels of the engine are studied. An already refurbished IC (petrol) engine & used ethanol blended fuels was checked for any damages/effects in the engine parts, & minor repairs were done and used for further tests. In this study the effects of petrol-ethanol blends such as Petrol, E20, E30, E40, and E50 and two different Compression ratios 11.03:1 and 11.19:1 on single cylinder four stroke air cooled Bajaj Pulsar 150 DTSi engine have been experimentally investigated. The experimental results showed that with the increase of ethanol blending leads to slightly decrease in the Engine power output and significantly increase the Specific fuel consumption (SFC). CO and HC emission decreases dramatically, CO2 and O2 emissions decrease significantly. When the engine was operating with E20 fuel at higher compression ratio (11.19:1), and Specific fuel consumption (SFC) increases with compared to lower compression ratio (11.03:1). Engine performance and CO_2, CO, HC, O_2 emissions for petrol and ethanol blended petrol with higher compression ratio (11.19:1) were increased significantly compared to lower compression ratio (11.03:1). But Exhaust emissions of E30 fuel with compression ratio 11.19:1 is very lower than E0 fuel with compression ratio 11.03:1. It was also observed that the increase of ethanol blending allows the engine to operate at higher compression ratio without knock occurrence. The engine performance and pollutant emission of the DTSi engine using petrol–ethanol blends (E0, E20, E30, E40, and E50)were investigated experimentally in Energy Conversion Lab.

CHAPTER – 1

INTRODUCTION

1.1 Preamble

A challenge that humanity must take seriously is to limit and decrease the greenhouse effect caused by various human activities. A major contributor to the greenhouse effect is the transport sector* due to the heavy, and increasing, traffic levels. In spite of ongoing activity to promote efficiency, the sector is still generating significant increases in CO2 emissions. As transport levels are expected to rise substantially, especially in developing countries, fairly drastic political decisions may have to be taken to address this problem in the future. Furthermore, the dwindling supply of petroleum fuels will sooner or later become a limiting factor. An important step in efforts to solve the problem is to replace fossil source of energy with bio-energy. In the transport sector this means either introducing bio fuels and using adapted vehicles, or blending bio fuels with petroleum-based fuels for use with present vehicle fleets. The two alternatives are not, of course, mutually exclusive.

However, blending bio fuels with petroleum-based fuels for use by the present conventional vehicle fleets has the advantages that even using quite low blending concentrations will result in substantial total volumes of gasoline being substituted by bio fuels, and that the present infrastructure for distributing fuels can be used. Today, the transport sector is a major contributor to net emissions of greenhouse gases, of which carbon dioxide is particularly important. In Sweden this sector accounts for roughly 20 % of total energy consumption, and almost 50 % of the total emissions of carbon dioxide. The carbon dioxide emissions originate mainly from the use of fossil fuels, mostly gasoline and diesel oil in road transportation systems, although some originates from other types of fossil fuels such as natural gas and Liquefied Petroleum Gas (LPG). If international and national goals (such as those set out in the Kyoto protocol) for reducing net emissions of carbon dioxide are to be met, the use of fossil fuels in the transport sector has to be substantially reduced. This can be done, to some extent, by increasing the energy efficiency of engines and vehicles and thus reducing fuel consumption on a volume per unit distance travelled basis.

Since, the total transportation work load is steadily increasing such measures will not be sufficient if we really want to reduce the emissions of carbon dioxide. In order to reduce

absolute amounts of these emissions we have to go further and an additional measure that will be required is to replace fossil vehicle fuels with renewable ones. Primarily, especially in the short term, this means bio-based fuels. Probably the best candidate bio fuels to replace gasoline in the short term are alcohols. Alcohols can be blended with gasoline or used as neat fuel in both 3crganized spark ignition engines and compression ignition engines. In the medium term ethanol produced from grain will probably be the most important alternative fuel for replacing gasoline, and in the long term ethanol produced from cellulose might take over from grain ethanol. Today, ethanol accounts for a substantial part of the alternative fuel market, especially in Brazil, the USA and Sweden.

The advantages of ethanol are that it can:

- Provide a viable alternative to reduce the greenhouse effect.
- Be produced domestically, thereby reducing dependence on imported petroleum.
- Be easily mixed with gasoline.
- Be used (and already is on a wide scale) as an oxygenate in gasoline.
- Create new jobs in the country related to its production.

From an international perspective, most research up to 1990 was focused on blends of methanol and gasoline, but some studies were carried out on ethanol-gasoline blends. Since these studies were carried out in the USA, it can be assumed that they mainly included vehicles with efficient emission control systems, but at the same time technical features of cars in the USA have historically differed, at least in part, from those in Sweden. It should also be noted that for a long time 10% ethanol has been added to commercial gasoline in many parts of the USA. In the USA there is considerable experience of adding higher proportions of ethanol to gasoline than those allowed by gasoline regulations in Sweden (Europe).

The primary advantage of adding a bio based alcohol to gasoline is that it reduces net CO2 emissions but it also has other positive effects, such as increasing the octane value of the fuel and reducing the benzene content of the exhaust gases. The use of alcohol blended gasoline and neat fuel alcohols as substitutes for neat gasoline have become matters of interest in many countries. The International Energy Agency (IEA), established in 1974,

CHAPTER - 9

CONCLUSIONS AND FUTURE SCOPE

9.1 CONCLUSIONS

- The power generated by Ethanol blended Petrol is lower to maximum 17.28% and is expected due to lower colorific value of Ethanol compared to Petrol.
- SFC is higher for all blends to an extent of 51.51% maximum compared to Petrol which is also expected due to lower colorific value.
- With higher Compression Ratio the power generated as well as SFC showed improvement but is found always lower than pure Petrol. It is probably indicated that higher ethanol blends definitely need higher Compression Ratio to restore power levels to a great extent.
- This study clearly establishes the Ethanol blended Petrol reduces pollution levels in SI Engine exhaust gas emission for all blends tested.
- Optimum blend for both **C.R (11.03:1) & C.R (11.19:1)** is between **E20 - E30** with **76.86%** reduction in CO levels and least reduction in brake thermal efficiency.
- Blends up to **E30** can be used with minimum loss in brake thermal efficiency.
- Blends beyond **E20** have a significant reduction in CO emissions. However the loss in brake thermal efficiency is considerable.
- The CO_2 emissions decreases with increase in ethanol blend in petrol as shown in the data & graphs.
- The decrease in CO_2 emissions seen in our data is on par with the literatures of previously conducted researches.
- The oxygen levels slightly increases with the increase in percentage of ethanol blends. As the percentage of ethanol increases the air suction also increases which results in the better combustion. Due to which the oxygen level in exhaust increases.

Karnataka State Council for Science and Technology

Indian Institute of Science Campus, Bengaluru - 560 012

Telephone: 080-2334 1652, 2334 8848, 2334 8849 ♦ Telefax: 080-2334 8840

Email: office@kscst.iisc.ernet.in, office@kscst.org.in ♦ Website: www.kscst.iisc.ernet.in, www.kscst.org.in

KSCST

Dr. S. G. Sreekanteswara Swamy

Executive Secretary

31st March, 2017

Ref: 7.1.03/SPP/1112

The Principal,
Sapthagiri College of Engineering,
14/5, Chickasandra,
Hesaraghatta Main Road,
Bengaluru – 560 057

Dear Sir,

Sub : Sanction of Student Project (Biofuel) - 40th Series : Year 2016-2017

Your Project Proposal Reference No. : 40S_B_BE_064

Ref : Your Project Proposal entitled " **REDUCTION OF POLLUTION LEVELS IN THE ATMOSPHERE BY THE USE OF METHANOL BLENDED PETROL FUEL IN AUTOMOBILE IC ENGINE AND THE STUDY OF ITS EFFECTS ON THE PERFORMANCE OF THE ENGINE**

I am happy to inform that your project proposal referred above, has been approved by the Secretary, KSCST for "Student Project Programme (Biofuel) 40th Series" and has been sanctioned with a budgetary break-up as detailed below:

Student / s	Ms. Vidya S.	**Budget**	**Amount (Rs)**
	and others	Materials/Consumables	10,000.00
Guide/s	Mr. P. Raghuthama Rao	Labor	-
		Travel	1,000.00
		Analysis	-
Department	Mechanical Engineering	Miscellaneous	500.00
		Report	500.00
		TOTAL	12,000.00
	Rupees Twelve Thousand		

The following are the guidelines to carryout the project work :

a) The project should be carried out based on the objectives of the proposal sent by you.

b) The project should be completed in all respects and **a) One copy** of the hardbound report **b)** Softcopy of the full report (including coverpages, abstract & preliminary pages in a CD (.doc and .pdf format)

c) The project report shall mention the name of **"Karnataka State Bioenergy Development Board and Karnataka State Council for Science and Technology"** as sponsored organisations in the title page. Project Title or the objectives can be altered only with prior permission of KSCST. Any change in the project are strictly prohibited and liable for rejection and the amount sanctioned has to be returned back to KSCST.The fund is to be utilised only for the activities to which it has been released.

d) Please quote your **project sanction reference number printed above** in all your future correspondences.

e) **Important:** After completing the project, 2 to 3 page write-up (synopsis) needs to be sent by e-mail [biofuelcell.kscst@gmail.com] and should include following :

1) Title of the project
2) Name of the College & Department

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

Principal
Sapthagiri College of Engineering

A PROJECT REPORT
ON

REDUCTION OF POLLUTION LEVELS IN THE ATMOSPHERE BY THE USE OF METHANOL BLENDED PETROL FUEL IN AUTOMOBILE IC ENGINE AND THE STUDY OF ITS EFFECTS ON THE PERFORMANCE OF THE ENGINE

Project proposal ref. number : 40S_B_BE_064

Sponsored by KSCST

KSCST
KARNATAKA STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

Submitted by

1. VIDYA.S (1SG13ME119)
2. PREMANATH P PEDNEKAR (1SG13ME087)
3. NIKHIL UMADI (1SG14ME412)

Under the Guidance of

P. RAGHUTHAMA RAO
Associate Professor,

SAPTHAGIRI
College of Engineering
Creating Tommorow

DEPARTMENT OF MECHANICAL ENGINEERING
SAPTHAGIRI COLLEGE OF ENGINEERING
BENGALURU-560057

2016-2017

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

Principal
Sapthagiri College of Engineering
1415, Chikkasandra, Hesaraghatta Main Road
Bangaluru - 560 057

ABSTRACT

Methanol is an alternative, renewable, environmental friendly and economically attractive fuel, it is considered to be one of the most favorable fuels for conventional fossil-based fuels. Methanol has been recently used as an alternative to conventional fuels for internal combustion (IC) engines in order to satisfy some environmental and economic concerns. Because of a number of relatively large research projects that have been ongoing recently, much progress has been made that is worth reporting. This report systematically describes the methanol productions, including the productions from coal, natural gas, coke-oven gas, hydrogen, biomass etc. It introduces the potentials of methanol as a renewable resource of energy, taking into account the world supply and demand, economic benefits and the effects on human health and the environment. Thirteen methods of application such as methanol gasoline, methanol diesel blends etc. which can be used on the IC engines are summarized. Finally, it puts forward some of the drawbacks of use of methanol as automotive fuel. This project aims at:-

1. Reducing the pollution levels in the atmosphere caused by automobile emissions.
2. Determining the optimum Methanol blend in Gasoline.
3. Studying the performance of the IC Engine with Methanol blended Gasoline.
4. Studying the effects of Methanol blended Gasoline on the Engine components.

An old 4 stroke petrol engine is bought and refurbished & installed on a **MS fabricated base structure**. Emission tests are done for M6, M10, M15, M20, M25, M30, M35, and M40. Performance tests are done for M6, M10, M20, and M30. Percentages of methanol were prepared & kept ready. Using these mixed blends the performance tests & pollution levels' checking were done. The engine is rebored to the highest possible bore size for which the standard piston is available & the increased compression ratio is calculated. Emission tests are done on the rebored engine for M6, M10, M15, M20, M25, M30, M35, and M40. Performance tests are done for M5, M10, M20, and M30. Detailed graphs are for the above data and analyzed w.r.t performance & pollution level variations. Conclusions and future scope are drawn on the basis of these results and observation.

7.8 PERCENTAGE REDUCTION IN EMISSIONS FOR EACH BLEND FOR C.R 9.84:1

BLENDS	CO (%)	HC (%)	CO_2 (%)
M2	17.896	30.337	23.333
M4	57.240	12.359	14.00
M6	50.409	7.865	23.333
M8	52.185	37.078	12.00
M10	58.606	17.977	2.000
M15	65.027	164.044	308.00
M20	59.836	208.988	130.66
M25	72.404	889.887	352.0
M30	74.453	803.370	310.66
M35	76.366	682.022	245.33
M40	79.644	402.247	178.66

TABLE 7.8 Percentage reduction in emissions for each blend for C.R 9.84:1

CHAPTER - 8

CONCLUSIONS AND FUTURE SCOPE

8.1 CONCLUSIONS

- Optimum blend for both **C.R (9.673:1) & C.R (9.84:1)** is **M10** with **83.63%** reduction in CO levels and least reduction in brake thermal efficiency of **1.19%.**
- Blends up to **M10** can be used with minimum loss in brake thermal efficiency.
- Blends beyond **M10** have a significant reduction in CO emissions. However the loss in brake thermal efficiency is higher.
- The CO2 emissions increase with increase in methanol blend in petrol as shown in the data & graphs.
- The increase in CO2 emissions seen in our data is in par with the literatures of previously conducted researches. **(Reference: Paper by PhilipE Cassady, Mathematical Sciences Northwest, Inc.)**
- Higher C.R reduces pollution level significantly as per the data obtained from the experimental date of this projects investigation.
- From our results, we can safely say that up to **10%** of blend can be used in vehicles.

8.2 FUTURE SCOPE

Nowadays, the increase in emissions of the automobiles are a serious concern to humanity. Several regulations such as **Bharat 4 and 5**, have been laid by the government on the automobile manufacturers to keep pollution levels in check. However, the design constraints alone cannot bring down the emissions to the required level. This poses a need for alternate methods of reduction in emission such as using alcohol fuel blends. In future, necessary steps need to be taken by the government to make methanol blended fuels available at lower prices, support and improve the production method of methanol. The implementation of this will significantly reduce the consumption of fossil fuels worldwide and preserve the resources for future generations. More investigations are needed to effectively optimize methanol blends in petrol engines.

SAPTHAGIRI
College of Engineering
Creating Tomorrow

Sapthagiri College of Engineering

(Affiliated to Visvesvaraya Technological University, Belagavi & Approved by AICTE, New Delhi)
#14/5, Chikkasandra, Hesaraghatta Main Road, Bengaluru – 560057
Phone:080-28372800/1/2 www.sapthagiri.edu.in Fax: 080-28372797

Date: 26/09/2016

To,

The Principal,

Sapthagiri College of Engineering

Bangalore-560057

Sub- Sanction of Research grant for the research project "12 Minutes Energy"

With reference to the letter dated 9/9/2016 regarding the research funding, the management of Sapthagiri College of Engineering after discussions with principal and RDECI has sanctioned the Research grant of Rs.20,000 **(Rupees twenty thousand only) for** the research project "12 Minutes Energy" to be carried out by the department of Biotechnology.

Executive Director

Sri G.D. MANOJ
Executive Director
Sapthagiri College of Engineering
BENGALURU - 560 057.

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

Sapthagiri College of Engineering

(Affiliated to Visvesvaraya Technological University, Belagavi & Approved by AICTE, New Delhi)
#14/5, Chikkasandra, Hesaraghatta Main Road, Bengaluru – 560057
Phone:080-28372800/1/2 www.sapthagiri.edu.in Fax: 080-28372797

(18)

Date: 27/09/2016

To,

The Convener,

R&D, Entrepreneurship Committee & Incubation Center (RDECI),

Sapthagiri College of Engineering

Bangalore-560057

Sub- Sanction of Research grant Reg .,

The management of Sapthagiri College of Engineering has sanctioned the Research fund of Rs.20,000 (**Rupees twenty thousand only) for** the research project "12 Minutes Energy" to be carried out by the department of Biotechnology.

Principal

Sapthagiri College of Engineering
#14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

Copy To,

All Departments

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

Date: 09/09/2016

To,

The Principal,
Sapthagiri College of Engineering,
Bangalore-560057,

Through HOD & RDECI

From

Saranya D & Ananda H V
Departmentof Biotechnology
Sapthagiri College of Engineering
Bangalore-560057

Respected Sir,

Subject: Requisition for the financial assistance for carrying out research project

With respect to above subject, I request your kind self to provide finical assistance to carry out the project entitled **"12 minute Energy"**. The research proposal and budget split up has enclosed along with this letter. Kindly consider the requisition and do the need full.

Thanking you

Your's sincerely

A. V

SAPTHAGIRI COLLEGE OF ENGINEERING
Dept of Bio-Tech
BANAGLORE-57

RDECI:

Head of the Department
Dept. of Bio -Technology
Sapthagiri College of Engineering
No. 57/1, Chik... ...ara
Hesaraghatta Main Road
Bangalore -57

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta M...
Bengaluru - 560 ...

RESEARCH PROPOSAL

A. GENERAL INFORMATION

1	**About the project**		
a	Title of the project	:	**12 minute Energy**
b	Subject area as per instruction	:	Bio instrument , Chemicalengineering
2	**Details of Principal Investigator**		
a	Name	:	Dr. Ananda S/ Saranya D & Ananda H V
b	Qualification	:	Ph.D/M.Tech (Bio instruments)/M.Tech (Chemical Engineering)
c	Designation	:	Professor/ Assistant Professor/ Assistant Professor
d	Department	:	Biotechnology
e	Years of teaching/research experience	:	16/5/2
f	Email ID	:	hodbt@sapthagiri.edu.in anandahv@sapthagiri.edu.in
g	Cell Number	:	9900833873/9964262548
h	**Details of the Head of the Department**		
i	Name of the Head of the Department		Dr. Ananda S
j	Email ID	:	hodbt@sapthagiri.edu.in
k	Cell Number	:	9900833873/9964262548

Signature of the Investigator

SAPTHAGIRI COLLEGE OF ENGINEERING
Dept of Bio-Tech
BANAGLORE-57

Signature of Head of the Department

Head of the Department
Dept. of Bio-Technology
Sapthagiri College of Engineering
No. 57/1, Chikkasandra
Hesaraghatta Main Road
Bangalore-57

Principal
Sapthagiri College of Engineering
14/6, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

A. DETAILS OF THE PROJECT PROPOSAL

1.	**Title of the Project Proposal:**
	"12 minute energy" (A Manual energy consumption Reciprocating pump for both urban and rural areas)
2.	**Objectives of the proposal:**
	• Prototype preparation • Fabrication work • Optimization process
3.	**Background of the project:**
	Aquaponic is an integration of aquaculture and hydroponics. Aquaponics uses the symbiotic association of aquaculture and hydroponics in which plants feed on waste matter excreted by fishes. Simultaneously the vegetables purify the water that is utilized by the fishes. Microbes play a vital role in providing nutrition to plant. These microbes are present in the roots of the plant which transforms excreta of fishes and solid waste into substance that plants can feed upon for their metabolic activities. Aquaponics is a useful technology and widely developing. Aquaponics is gaining lot of attention because small space is used for cultivation and have a great harvest of healthier and organic vegetables which are devoid of soil borne disease On observing the frequent power failure and lack of electricity supply in rural areas, I am thinking of starting a project that is designing a novel reciprocating pump which uses manual energy as power instead of electricity. We can reduce the usage of electricity by using manual power. As such, I want to start a project by name "12 MINUTE ENERGY" in which we can pump 1000 liter of water to higher levels without using electricity in just 12 minutes. It will be a boon to rural areas and indirectly it will also help in maintaining the health of general public by pedaling for 12 minutes.

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

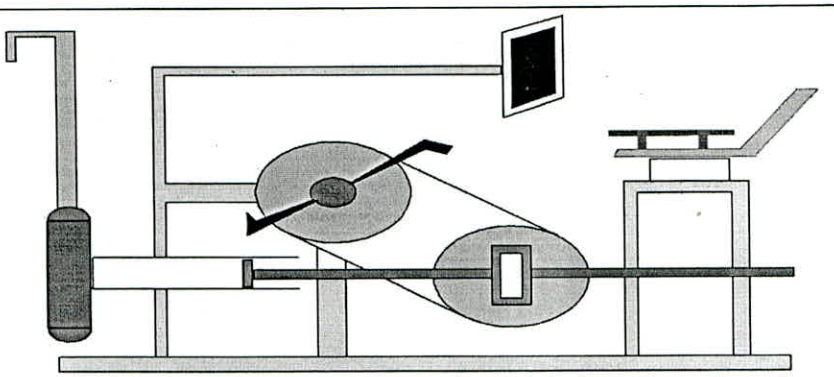


Fig 1: Outline of the product- 12 minute energy

4. Methodology :

HOW IT WORKS!!!

- A Pump lifts the water from lower reservoir to higher reservoir.
- The novel approach to lift water is the simplest manual operated reciprocating pump..
- As the cycle pedal rotates the crank shaft connected to the disc rotates & the piston moves backward & forward.
- During the suction stroke the piston moves left thus creating vacuum in the cylinder.

During the delivery stroke the piston moves towards right. The increase in pressure in the cylinder causes the suction valve to close & delivery valve opens. Water is forced in the delivery pipe.

5. Milestones with time schedule & work plan: 06 months

6. List of equipment required for Phase-II for Project Implementation

SL No.	Expenditure	Amount
1	Prototype	15000/-
2	Fabrication	10000/-
3	Scale up	25000/-
4	Miscellaneous	5000/-
5	Patenting	5000/-

7. Relevance, importance & application of the project:

- Pumping of 1000 liter of water in just 12 minutes without using electricity up to 3rd floor of Building.
- Transportation of water in rural areas.

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

10.	**Novelty/Uniqueness of the project proposal**	:	Innovative proposal

Name & Signature of the Principal Investigator (with seal)

Name & Signature of Head of the Department (with seal)

Head of the Department
Dept. of Bio-Technology
Sapthagiri College of Engineering
No. 57/1, Chikkasandra
Hesaraghatta Main Road
Bangalore-57

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road
Bangalore-560 057

Date: 01/10/2016

From,

Research and Development cell,
Sapthagiri College of Engineering,
Bangalore-560057.

To,

Principal investigator,
Sapthagiri College of Engineering,
Bangalore-560057.

Subject: Sanction of research grants Reg.,

The committee hereby informed that following project have been approved for the academic year 2017. The report and the outcome of the project have to be submitted to the committee after the completion of the project. The utilization certificate shall be given along with the final report.

Sl. No	Principal Investigator	Department	Project entitled	Amount Sanctioned
1	Dr. Ananda S/ Saranya D / Ananda H V	BT	12 Minute Energy	20000/-

Convener

Copy To,

Principal
All Departments
IQSC

Principal
Sapthagiri College of Engineering
14/6, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road
Bangalore-560 057

Date: 16/1/2017

To,

Principal,
Sapthagiri College of Engineering
Bangalore-560057

Through HOD

From,

Saranya D & Ananda H V
Department of Biotechnology,
Sapthagiri College of Engineering
Bangalore-560057

Respected Sir,

Sub: Procurement of Instruments Reg.,

With reference to the letter received from R& D committee regarding approval of research project, we are here by requesting the procurement of the Digital Signature and fabrication for the research project entitled "**12 minutes Energy**" to carry out. This will enhance the research potential to contribute for the improvement in the field of biotechnology. Kindly consider the request and do the need full.

Thanking you,

Yours Faithfully,

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road
Bangalore-560 057

SAPTHAGIRI COLLEGE OF ENGINEERING
Dept of Bio-Tech
BANAGLORE-57

Head of the Department
Dept. of Bio-Technology
Sapthagiri College of Engineering
No. 57/1, Chikkasandra
Hesaraghatta Main Road
Bangalore-57

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

Date: 20/09/2017

To,

Research and Development cell,
Sapthagiri College of Engineering
Bangalore-560057

Through HOD

From

Saranya D & Ananda H V
Department of Biotechnology
Sapthagiri College of Engineering
Bangalore-560057

Sub: **Submission of report and utilization details**

With reference above cited subjected I am hereby enclosing project report entitled "**12 Minute Energy**" and utilization certificate. This for your kind information, please.

Sl No	Particulars	Quantity	Amount	Remarks
1	Fabrication	1	10,000/-	Purchased
2	Digital Signature	1	5,000/-	Purchased
3	Miscellaneous		5000/-	Purchased

Thanking You,

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road
Bangalore-560 057

Copy,

Principal

Head of the Department
Dept. of Bio-Technology
Sapthagiri College of Engineering
No. 57/1, Chikkasandra
Hesaraghatta Main Road
Bangalore-57

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

SAPTHAGIRI COLLEGE OF ENGINEERING
Dept of Bio-Tech
BANAGLORE-57

TRANSACTION DETAILS

PAYMENT SUMMARY

STATUS	AMOUNT	TRANSACTION ID	PAYMENT GATEWAY ID
SUCCESS	₹ 4029	913956084729	6040807681

COMPLETE THE BELOW STEPS

Application ID : 4263961,4263960

DOWNLOAD INSTRUCTION

DOWNLOAD APPLICATION

1. Download and print the above acknowledged application form
2. Paste your passport size photograph in the space indicated and sign across the photograph
3. Enclose the copy of the document proofs selected by you in the application form
4. Sign the application form at the place specified in the application form
5. Keep the copy of the document proofs ready for verification and pick up
6. Within few hours of the receipt of the document, You would receive an email for download of signature.
7. If you have selected token, it would courier to you shortly.

Note:

1. **All the supporting document proofs should be attested by Gazetted officer or Post Master or Bank Manager. No application would be processed without attestation.**
2. **Applicant signature should be in Blue Ink Only**
3. **Cross Signature across the photo is mandatory**

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Rd.
Bangalore-560 057

Where to find us

eMudhra Limited, Sai Arcade, 3rd Floor,
No.56 Outer Ring Road, Bangalore-103
CIN - U72900KA2008PLC060368
080-67405700
info@emudhra.com , sales@emudhra.com

SAMPLE INVOICE

Document No.

Date: 15-03-2017

SENDER:

Mr.PRADEEP KUMAR

EMUDHRA LIMITED
3RD FLOOR SAI ARCADE 56
OUTER RING ROAD
DEVARABEESANAHALLI
BANGALORE-560103
CON-080-67401400

CONSIGNEE:

ANANDA S
HOD, DEPT OF BIOTECHNOLOGY, SAPTHAGIRI COLLEGE OF ENGINEERING, HESARAGATTA MAIN ROAD, BANGALORE, BANGALORE, 560058 MOB - 9900833873

No.	DESCRIPTION	OTY	UNIT PRICE	TOT. VALUE
1	CRYPTO USB TOKEN	1NO	999	999
TOTAL				**999**

THE IS TO CERTIFY THAT THE MENTIONED CONSIGNMENT IS BEING SENT TO CONSIGNEE AFTER CALIBRATION. VALUE DECLARED FOR TRANSPORT PURPOSE ONLY AND HAS **'NO COMMERCIAL VALUE'**

For **EMUDHRA LIMITED**

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

eMudhra Limited #56, Sai Arcade, 3rd Floor,Outer Ring Road, Devarabeesanahalli, Bangalore - 560103	TIN: 29620818060 ST. Regn. No: AAACZ3347GST001 CIN: U72900KA2008PLC060368 PAN: AAACZ3347G

TAX - INVOICE

Billed To: **S Ananda** #194,Maddur Taluk,Thylur,Thyloor,Maddur,Mandya,Karnataka - 571433 **Mobile:** 9900833873 **Email Id:** ipranand@gmail.com	**Invoice No:** eMudhra/Online- ESIGN102127 **Date:** 16-Feb-2017

Sl No	Product Details	Unit Price(in Rs.)	Amount (in Rs.)
1	Unlimited eSign for 1 Year	Rs.500.00	Rs.500.00
		Sub Total	Rs.500.00
		Service Tax @ 14%	Rs.70.00
		Swachh Bharat Cess @ 0.5%	Rs.2.50
		Krishi Kalyan Cess @ 0.5%	Rs.2.50
		Total	Rs.575.00

E.&OE.

Total amount is rounded off to nearest rupees.

Amount in words: Five Hundred and Seventy Five Only

Payment Remarks
Online Payment:Transaction ID -ESIGN5827520170216093133

Signature Not Verified
Signed by:DS EMUDHRA LIMITED 3
Reason: eMudhra eSign Service
Location: Bangalore

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

SRI SRINIVASA EDUCATIONAL & CHARITABLE TRUST (R)

SAPTHAGIRI COLLEGE OF ENGINEERING

(Affiliated to Visveswaraya Technological University, Belgaum & Approved by AICTE - New Delhi)

UTILIZATION CERTIFICATE

Sl No	Particulars	Quantity	Amount
1	Fabrication		**10000**
2	Digital signature		**5000**
3	Miscellaneous		**5000**
		Total	**20,000**

Certified that Sapthagiri college of Engineering has provided partial financial support of **RS 20,000/-**(Twenty thousand only) towards12 Minutes Energyproject by BiotechnologyDepartment of Sapthagiri college of Engineering.

Certified that I have satisfied myself that condition on which the grant in aid sanctioned has been duly fulfilled and that I have excised the following check to see that the money was actually utilized for the purpose for which it was sanctioned.

Kinds of check exercised

1. Bills

M.A.S & CO. CHARTERED ACCOUNTANTS VERIFIED BANGALORE 26/02/20

Signature of the Principal with seal

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

Signature of Auditor with seal

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

ಕರ್ನಾಟಕ ನಗರ ಮೂಲಸೌಕರ್ಯ ಅಭಿವೃದ್ಧಿ
ಮತ್ತು ಹಣಕಾಸು ನಿಗಮ ನಿಯಮಿತ
ನೋಂದಾಯಿತ ಕಛೇರಿ : ನಗರಾಭಿವೃದ್ಧಿ ಭವನ
22, 17ನೇ 'ಎಫ್' ಅಡ್ಡರಸ್ತೆ, ಹಳೇ ಮದ್ರಾಸ್ ರಸ್ತೆ, ಇಂದಿರಾನಗರ
2ನೇ ಹಂತ, ಬಿ.ಎಂ.ಟಿ.ಸಿ. ಬಸ್ ಡಿಪೋ ಹತ್ತಿರ, ಬೆಂಗಳೂರು-560 038
ದೂರವಾಣಿ : 080-25196124-129 ಫ್ಯಾಕ್ಸ್ : 080-25196110

Karnataka Urban Infrastructure Development & Finance Corpn. Ltd.,
Regd. Office : Nagarabhivruddi Bhavan
22, 17th 'F' Cross, Old Madras Road, Indira Nagar
2nd Stage, Near BMTC Bus Depot, Bangalore - 560038.
Phone : 080-25196124-129 Fax : 080-25196110
E-mail : info@kuidfc.com, website: www.kuidfc.com

No.KUIDFC/FUNDS/RES/117/2016-17/1796

Date: 12.09.2016

To,

Mr.Ananda S,
Head of the Department,
Dept. of Bio Technology,
Sapthagiri College of Engineering,
#57/1, Chikkasandra, Hesaraghatta Mn Rd,
Bangalore-57.

Sir,

Sub : Development of Bio-resins and its use in processing of waste plastics and waste aluminium as composite laminates.

****

With regard to the above subject, the request of the research students (Akshay Kumar.R, Sagar.S, Chetan.S, Shivaraj.V) is accepted by KUIDFC and accordingly we have released a grant of Rs.50,000/- on 31.08.16, as first installment towards the said project research work.

A monthly brief status report may please be submitted to this office for our reference. On utilizing the released amount, a utilization certificate shall be furnished along with necessary bills, vouchers etc. These bills & vouchers shall be duly certified by the HOD.

Thanking you,

Yours faithfully,

General Manager
(Urban Affairs)

Prof Soumya to file

19/9/16

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

18

From,

07/09/2016

Akshay Kumar.R
Student
Department of Biotechnology
Sapthagiri College of Engineering
Bengaluru-57

To,
C.Karthikeyan
Project Management Expert
KUIDFC
Bengaluru-27

Respected Sir,

Sub: Biotechnology research centre.

With respect to the above subject, Dr.Ananda.S is the head of the department of the biotechnology research centre in our college. His personal bank account is considered as departmental account and all the funds are therefore credited officially to the heads account. Kindly release the fund to his account at the earliest. We would be grateful for this act of kindness.

Thanking You,

Yours Faithfully,
07/09/2016
AKSHAY KUMAR.R

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

From,

3/08/2016

Vinutha Moses
Assistant Professor
Department of Biotechnology
Sapthagiri College of Engineering
Bengaluru-57

Through,

Dr. Ananda.S
Professor & Head
Department of Biotechnology
Sapthagiri College of Engineering
Bengaluru-57

To,

C.Karthikeyan
Project Management Expert
KUIDFC
Bengaluru-27

Respected Sir,

Sub:Requisition to sanction 50,000/-a part of approved grant

With respect to the above subject, as we have started our research studies with extensive literature surveyand the experimental work on processing of waste plastics and development of bio resins from organic waste. We require, fund for the analytical studies and procurement of chemicals. We request your kind self to consider and sanction the first half grant of an amount of 50,000/-. For this act of kindness we would ever be grateful.

Thanking You,

Yours Faithfully

Vinutha Moses

Research Students:

1. Akshay Kumar.R
2. Sagar.S
3. Chetan. S
4. Shivaraj. V

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

Research Head
Dr. Ananda.S

Head of the Department
Dept. of Bio-Technology
Sapthagiri College of Engineering
No. 57/1, Chikkasandra,
Hesaraghatta Main Road,
Bangalore -57

SAPTHAGIRI COLLEGE OF ENGINEERING
Dept of Bio-Tech
BANAGLORE -57

DC CUM CREDIT / CASH BILL

Mob : 9741816651

PUNITHA ENTERPRISES

No. 26, 10th Cross, Patel Channappa Indl. Estate,
Andrahalli Road, Near Padmavati Weight Bridge,
Peenya 2nd Stage, Bangalore - 560 091.

No. 979 Date: 31/10/11

To Cash.

Order / DC No..... Date.....

Sl. No.	Particulars	Qty.	Rate	Amount Rs.	Ps.
1	HD Red	20 Kg	100/-	2000	/-
2	LD M/c	20 Kg	95/-	1900	/-
3	Nylon 6 Black.	20 Kg	150	3000	/-
4	ABS 10 Kit	1 Kg	65	65	/-
5	Pvc 10 Kit	1 Kg	120	120	/-
6	P.P Black	1 Kg	100	100	/-
7	P.S Black	1 Kg	100	100	/-
			Total	7285	/-

For PUNITHA ENTERPRISES

Receiver's Signature

Welcomes You

DEVIKA GASOLENE PARK
MALLASANDRA
HESARGHATTA MAIN ROAD

Tel. No.: 9740952287

Receipt No.: J1945
Local ID : 00138530
FIP No. : 03
Nozzle No. : 03
Product : Petrol
Density : 748.4Kg/Cu.mtr

Preset Type: Amount
Rate : 071.29
Volume : 00007.01
Amount : 00500.00

Vehicle No.: Not Entrd
Mobile No : Not Entrd

Date : 24/10/16 Time: 15:09

CST NO :
LST NO :
VAT NO :

. & YOU! Please Visit Again..

SAMBASHIVA S.S
HPCL DEALER
TIN.NO.29981186171
80FEETROAD,KTTIGEPALAY.
BANGALORE.560091
Bill No. :155583
Transac.ID :
Vehicle No.:NotEntered
Date :30/10/16
Time :13:04:50
FP. ID :4
Nozzle No. :2
Fuel Type :MS
Density :----kg/m3
Preset val.:Rs.200
Rate :Rs.71.29
Sale :Rs.200.00
Volume :2.81Lts.
WEL COME

Welcomes You

DEVIKA GASOLENE PARK
MALLASANDRA
HESARGHATTA MAIN ROAD

Tel. No.: 9740952287

Receipt No.: J3633
Local ID : 00015666
FIP No. : 02
Nozzle No. : 02
Product : Xtra Prem
Density : 749.6Kg/Cu.mtr

Preset Type: Amount
Rate : 074.18
Volume : 00001.35
Amount : 00100.00

Vehicle No.: Not Entrd
Mobile No : Not Entrd

Date : 31/10/16 Time: 16:31

CST NO :
LST NO :
VAT No :

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Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road
Bangalore-560 057

Sri Padmavathi Weighers

No. 420, 5th Main, Sri Patel Channappa
Industrial Estate, Heganahalli, Peenya 2nd Stage,
BANGALORE – 560 078
Ph : 69572028

80 TONS CAPACITY ELECTRONIC WEIGH BRIDGE

SL. NO.	:	
DATE	:	3484
TIME	:	28/10/2016
RATE	:	10:21:49
VEHICLE NO.	:	20=00
PARTY	:	KA02C 8111
MATERIAL	:	
2ND WT.	:	LOAD
1ST WT.	:	
NETT WT.	:	825 kg

Certified by the Dept. of Legal Metrology
Government of Karnataka

ALL 24 HOURS SERVICE

Thank You Have a nice Day Visit Again

RETURNABLE DELIVERY NOTE

Sl. NO. : 247

DATE : 28/10/16

U. P. R. Ref.

57F (2) No. :

Date :

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Chikkasandra, Hesaraghatta Road
Bangalore-560 057

UOM	QUANTITY	REASON FOR
Kgs		for Grinding.

Umesh Auto.
Transporter

Receiver's Signature with Seal

For PROGRESSIVE INDUSTRIES

Please return the duplicate in token of having receiving the above goods

TIN : 29110066348

Our K.S.T No. 01002089
C.S.T. No. 01052081 } Dt. 04-01-1991

PROGRESSIVE INDUSTRIES

B-106, 3rd Stage, Peenya, Ind-Estate, Bangalore - 560 058.
Ph : Off. 28362591, Tele fax : 28363708, email :pgi_eth@vsnl.net

RETURNABLE DELIVERY NOTE

Sl. NO. : 247

DATE : 28/10/16

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

ty Code
s. Ponitha Enterprises
Bangalore.

P. O. No.

U. P. R. Ref.

From No. :

Date :

57F (2) No. :

Date :

PART No.	SN	DESCRIPTION	UOM	QUANTITY	REASON FOR
	1.	PP material (Housing)	Kgs		for Grinding.

Remarks :

Umesh Auto.
Transporter

Receiver's Signature with Seal

For PROGRESSIVE INDUSTRIES

Please return the duplicate in token of having receiving the above goods

TIN : 29110066348

Our K.S.T No. 01002089
C.S.T. No. 01052081 } Dt. 04-01-1991

जमापर्ची / PAY-IN-SLIP नकद / अंतरण / CASH/TRANSFER

भारतीय स्टेट बैंक STATE BANK OF INDIA

.....Hesarghalla..... शाखा / Branch

दिनांक / Date 29/11/16

खाते का प्रकार : बचत बैंक/चालू खाता/आवर्ती जमा/कैश क्रेडिट/सावधि ऋण/माँग ऋण

TYPE OF ACCOUNT : SB / CA / RD / CC / TL / DL

खाता संख्या Account No.

3	0	2	6	5	6	0	7	0	5	5	

के बैंक खाते में जमा करने हेतु I/ For the credit of the bank account of

.....Dhar Saceniya C.....

रुपए (शब्दों में)Amount in words. Rupees.....

.....thirteen thousand only.....

रोकड/चैकों का विवरण DETAILS OF CASH/CHEQUE	राशि / AMOUNT ₹	
	13,000	00
	/	
योग रुपये TOTAL	13 000	00

CODE113199005 / Sapthagiri

एसड्ब्ल्यूओ SWO

रोकड़ अधिकारी/पासकर्ता अधिकारी/ Cash Officer / Passing Officer

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Chikkasandra, Hesaraghatta Road
Bangalore-560 057

जमापर्ची / PAY-IN-SLIP नकद / अंतरण / CASH/TRANSFE

भारतीय स्टेट बैंक STATE BANK OF INDIA

Hesaraghatta ..... शाखा / Branch

दिनांक / Date .....

खाते का प्रकार : बचत बैंक/चालू खाता/आवर्ती जमा/कैश क्रेडिट/सावधि ऋण/माँग ऋण

TYPE OF ACCOUNT : SB / CA / RD / CC / TL / DL

खाता संख्या Account No.

३	०	२	६	३	६	०	७	०	३	३	

के बैंक खाते में जमा करने हेतु / For the credit of the bank account of

SBI

रुपए (शब्दों में) Amount in words. Rupees ..... Twenty Thousand Only

रोकड/चैकों का विवरण DETAILS OF CASH/CHEQUE	राशि / AMOUNT ₹	
	10000	00
योग रुपये TOTAL	20,000	00

CODE113199005 / Sapthagiri

एसडब्ल्यूओ SWO

रोकड़ अधिकारी / पासकर्ता अधिकारी
Cash Officer / Passing Officer

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta
Bangalore-560 057

Scanned with CamScanner

FORMATS FOR SUBMISSION OF PROJECTS

1. Research Title: "**Development of Bioresin and its Application in Processing of Waste Plastics and Waste Aluminium as Composite Laminates**
2. Broad Subject: Polymer Science

3. Duration in months. 24

4. Total cost. 1.02 Lakhs

5. FE Component. Nil

6. Principal Inv. Vinutha Moses

7. Designation. Assistant Professor

8. Department .Biotechnology

9. Institute Name. Sapthagiri College of Engineering

10. Address. #14/5, Chikkasandra, Hesaraghatta Main Road
Bangalore – 560057.

11. Telephone Fax Gram e-mail:

Tel: 080-28372800, 080-28372801,080-28372802
Fax: 080-28372797
EmailID: vinuthamoseschetan@sapthagiri.edu.in
Mosesvinutha777@yahoo.com

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1. Project summary

Accumulation of huge quantities of plastic wastes in landfills has become one of the major environmental problems, which has lead to search for a proper Solid Waste Management System. There are also currently huge quantities of long-life PVC materials used mostly in the construction sector, which will constitute this waste in the coming decades. Moreover, the ongoing growth in the production of PVC will also raise the quantity of the waste. Therefore, the amount of this waste will be huge in the near future. Water stored in plastic bottles are also a threat to human health. To minimize the threat of plastics in environment and health the present research studies focuses on developing a bioresin from kitchen organic and agro waste that would environmental friendly compared to synthetic resins, these resins are used as additives for different grades of processed recycled plastics and aluminium cans as composite laminates an alternate to wood requirement.

2. Key words: Plastics, Bioresins, laminates, Composites, Environment, Moisture absorption, Aluminium, Waste, Process.

3. Technical details: Handling and disposal of PVC waste has led to major environmental concern. The recycling of post-consumer PVC poses particular technical and financial problems. It has the lowest recycling rate among all plastics waste materials [10-13]. Incineration of PVC is not a sustainable option for the disposal because less energy can be generated and also contributes to the emission of undesirable gases such as hydrogen chloride and dioxin compounds [14, 15]. Therefore, finding alternative outlets to absorb the huge quantity of PVC waste is required in which safe disposal can be implemented. PVC materials are classified into plasticizer and rigid PVC. The plasticizer PVC contains additive materials up to 60% of its weight while rigid PVC contains few percentages. This enhances the physical and the mechanical properties of the rigid PVC. The rigid PVC has been used effectively in the different applications and has generated huge quantities of waste. This application may save energy and reduce the demand on primary mineral resources.

The reuse of plastic wastes is considered the best environmental alternative method for the disposal. The large quantities of concrete composite materials required in civil engineering applications are potentially the major areas for the reuse of the plastic waste. Many research works have been reported about utilization of plastic waste for replacement of fine and coarse aggregate in concrete mixture without sorting [16-19]. Utilization of recycled polyethylene terephthalate, polycarbonate and melamine in the concrete composite have been investigated separately [20-24]. Kou and his coworkers have studied the use of PVC waste for partial replacement of river sand as fine aggregate [25].

Marzouk et al [26] reported that the plastic bottles shredded into small (PET) particles may be used successfully as sand-substitution aggregates in cementitious concrete composites which appear to offer an attractive low-cost material with consistent properties. Ismail and Al-Hashmi [27] demonstrated that using waste iron filings as partial replacement of fine aggregate in concrete mixes offers higher strength values than that for the plain mixes. The results of the study carried out by Kou et al. [28] revealed that the workability, compressive strength, and tensile splitting strength of lightweight aggregate concretes that are prepared with recycled plastic waste were reduced. Very limited studies explored the combined effects of mixed waste materials on the mechanical behavior of concrete mixes. In view of the fact that iron and plastic wastes are widespread types of non-biodegradable solid wastes derived as discarded materials from several industrial processes[29], the knowledge of their combined influence on the strength properties of concrete is worth to be considered[30].

4. Introduction

4.1. Origin of the proposal

Solid waste is essentially waste produced in our homes, businesses and industrial sources. Globally waste production is growing in volume and in toxicity [1]. Most of the solid wastes are biodegradable like food waste, green waste, wood, paper, plastic containers, bottles and cans[2].The used cars ,electronic goods and some of the household plastics are not biodegradable, which means they do not get broken down through inorganic or organic processes. Thus, when they accumulate they pose a health threat to people, decaying wastes attract household pests and result in urban areas becoming unhealthy , dirty and unsightly places to reside in. It causes damage to terrestrial organisms, while also reducing the uses of the land for other, more useful purposes[3].More and more of our everyday products contain toxic chemicals, such as mercury or PBDEs (flame retardant chemicals) and these toxic products are combined with a plethora of other chemicals, which eventually impact public health and the environment. There are numerous solid waste facilities in India and abroad including landfills, incinerators and a growing number of transfer stations, solution to plastic waste is still a challenge to be met. Many of the older facilities run by municipalities have been closed down because of environmental concerns, paving the way for the waste industry, to market their "state-of-the-art" management and facilities [4].Plastic waste is a threat that is of great concern to the researches to refuse and reuse. The man-made systems emphasize the economic value of materials and energy where production and consumption are the dominant economic activities. Such systems tend to be highly destructive for the environment as they equire massive consumption of natural capital and energy, return the end product (waste) to the environment in a form that damages [5]. The resources and space are finite and are ultimately not sustainable. The presence of waste is an indication of overconsumption and that materials are not being used efficiently. This is carelessly reducing the Earths capacity to supply new raw materials in the future. The capacity of the natural environment to absorb and process these materials is also under stress. Valuable resources in the form of matter and energy are lost during waste disposal, placing a greater burden on the ecosystems. The main problem is the sheer volume of waste being produced [6].

5. Definition of the problem:

- Plastic reduction, reuse and recycling are the preferred options for managing waste.
- They reduce or prevent green house gas emissions.
- Reduce the demand for waste landfill space
  Recycling is predominant, production and decomposition are well balanced and nutrient cycles continuously support the next cycles of production
- Strategy clearly related to ensuring stability and sustainability in natural systems

.6. Objective

1. To determine the melting point of different grades of plastic and aluminium granules by Differential Scanning Colorimetry.
2. To study changes in physical and chemical properties of materials by thermal gravimetric analysis (TGA).
3. To carry out composition analysis.
4. To measure the thickness of the laminates using Vernier Callipers
5. To calculate Global Weight Fraction and evaluate Local Weight Fraction by Burnout test
6. To study the morphology of the Composites by SEM Analysis

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7. To determine the mechanical properties of the composites by Tensile strength, Bending and Impact Strength. Analysis

8. Moisture Absorption Studies for Plastics under normal and saline conditions.

9. Characterization Studies of the bio synthesized resin from latex- DSC, TGA and FTIR

7. Review of status of Research and Development in the subject

7.1. International status:

More and more of our everyday products contain toxic chemicals, such as mercury or PBDEs (flame retardant chemicals) and these toxic products are combined with a plethora of other chemicals, which eventually impact public health and the environment. There are numerous solid waste facilities in India and abroad including landfills, incinerators and a growing number of transfer stations, solution to plastic waste is still a challenge to be met. Many of the older facilities run by municipalities have been closed down because of environmental concerns, paving the way for the waste industry, to narket their "state-of-the-art" management and facilities [4].Plastic waste is a threat that is of great concern to the researches to refuse and reuse. The man-made systems emphasize the economic value of materials and energy where production and consumption are the dominant economic activities.No target as such is achieved in this area.

7.2. National status:

There is a lot of work going on with no satisfactory results more work is concentrated on biocomposites than composites.

Novelty Importance of the proposed project in the context of current status:

It can be used as an alternative to woods with more efficiency and durability.The novelty of this work it can also be used to make marine and aircraft bodies and so the moisture absorption testing is one at normal and saline conditions.

The following questions will be answered in this study:

1. Can the processing of plastics provide efficient reusable composites, without much operating cost on large scale?
2. Can the utilization of maximum plastics and cans be a solution to waste disposal crisis?
3. Can recycled plastic composites and recycled aluminum composites show excellent material properties?
4. Can Plastic reduction, reuse and recycling be the preferred options for managing waste.
5. Do they reduce or prevent greenhouse gas emissions.
6. Do they Reduce the demand for waste landfill space
7. Is the Strategy clearly related to ensuring stability and sustainability in natural systems

8. Work plan:

Sl. No.	Milestone	Target Time	Work Elements	Responsible Organisation
1	**Collection of different grades of waste plastics and aluminium cans and development of bioresin**	1st to 4th month	Collection from domestic source, canteen and Cafeteria. Collection of kitchen organic and agro waste and develop bioresin.	SCE, Bangalore
2	**Segregation and Pretreatment and Mechanical Process of the Separated Plastic Codes and Aluminium Cans**	5th to 12th Month	the plastics of its kind and aluminium granules are treated and mechanically processed into dried granules	SCE, Bangalore /M.S.R.I.T, Bangalore/ Peenya Industry
3	**Characterization Analysis**	13th to 16th month	Bioresins –Sem ,TGA Differential Scanning Colorimeter (DSC)-To determine the melting point. Thermo gravimetric analysis or thermal gravimetric analysis (TGA) – To study changes in physical and chemical properties of materials, such as second-order phase transitions, including vaporization, sublimation, absorption, adsorption, desorption, chemisorptions, desolvation (especially dehydration), decomposition, and solid-gas reactions (e.g., oxidation or reduction). Composition Analysis or FTIR-To determine the carbon, hydrogen ash content and others.	SCE, Bangalore /M.S.R.I.T, Bangalore/Analytical Labs
4	**Injection moldings.**	17th to 19th month	The characterized plastic granules of each grade will be melted at the determined temperature and made into a lamina of 2x2 m and 2mm thickness	SCE, Bangalore /M.S.R.I.T, Bangalore
5	**Preparation of Laminates**	20th to 22nd month	The laminates of each of its kind will be made by Resin Layup process using bio resin additive synthesized in the lab from latex .The excess of resin will be removed by vacuum bag moulding.	SCE, Bangalore /M.S.R.I.T, Bangalore

			. Moisture Absorption Studies for Plastics- post cured and unpost cured samples (cut into25x25mm) in normal and saline conditions.	
6	**Characterization Analysis**	23rd to 24th month	Thickness of the Laminate Global Weight Fraction Morphology of the Composites –SEM Analysis Mechanical properties of the composites by Tensile , Bending Analysis and Impact Strength.	SCE, Bangalore /M.S.R.I.T, Bangalore

9. Methodology

1. **Collection of the Waste**

25 kg of waste plastics and aluminum cans will be collected from domestic dry waste, industries, cafeterias and canteens that include Polyethylene Terephthalate (PET), Low Density Poly Ethylene (LDPE), Poly Vinyl Chloride (PVC), High Density Poly Ethylene (HDPE), Polypropylene (PP) and Polystyrene (PS) and also waste cola cans

2.**Segregation and Pretreatment and Mechanical Process of the Separated Plastic Codes and Aluminium Cans** Once the plastics of its kind and aluminium granules are treated and mechanically processed the dried granules are sent for analysis.

3.Characterization Analysis

1. Differential Scanning Colorimeter (DSC)-To determine the melting point.
2. Thermo gravimetric analysis or thermal gravimetric analysis (TGA) – To study changes in physical and chemical properties of materials, such as second-order phase transitions,
   including vaporization, sublimation, absorption, adsorption, desorption, chemisorptions, desolvation (especially dehydration), decomposition, and solid-gas reactions (e.g., oxidation or reduction).
3. Composition Analysis or FTIR-To determine the carbon, hydrogen ash content and others.

The characterized plastic granules of each grade will be melted at the determined temperature and made into a lamina of 2x2 m and 2mm thickness by injection moldings.

5. Preparation of Laminates

The laminates of each of its kind will be made by Resin Layup process using bio resin additive synthesized in the lab from latex .The excess of resin will be removed by vacuum bag moulding

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10. Time Plan

Activities/ Milestones	1-4	5-12	13-19	20-22	23-24
Collection of plastics, organic and agro waste and development of bioresins					
Segregation and Pretreatment and Mechanical Process					
Characterization Analysis					
Injection moldings					
Preparation of Laminates					
Characterization Analysis					

11. The development "Outcomes" and "Outputs' of the project:

The proposed work aims at an alternative for managing plastic and metal waste. The outcomes expected will provide a solution to recycle plastic metal waste effectively. Following results are expected from the work- Composite laminates will be prepared using the waste plastic and cans with bio resins.The properties analyzed will be compared to that of virgin plastics and aluminium

12. BUDGET ESTIMATES: SUMMARY

Sl. No.	Item	To be filled by PI
		Amount (Rs.)
1	Contingency	1000/-
2	Chemicals, Glass wares, Plastic wares, Biological Specimen	1000/-
Total		2000/-

Sl. No.	Name of the Equipment	Unit price	Total Unit/ Quantity	Estimated Cost
1	Injection moldings vacuum bag moulding	500	60	30000
2	Colorimeter analysis	1000/-	20	20000
3	Differential Scanning	1000/-	20	20000

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4	Thermo gravimetric analysis	1500/-	10	15000
5	Composition Analysis or FTIR	1500/-	10	15000
	100000+2000	102000/-		

1. EQUIPMENT SPECIFICATIONS

Sl. No.	Name of Equipment & Accessories	Quantity	Details of Technical Specification as indicated/proposed in the e-procurement document
1	Injection moldings vacuum bag moulding	1 1	2x2 m size 6 composites of 2mm thick [6 grades] 6 layers of same grade reinforced
2	Plastic crusher and grinder	1	model: VTM-12" / VTM-16" / VTM-18" / VTM-20" / VTM-2 Power Required: 5 HP 3.75 KW / 7.5 HP 5.6 KW / 10 HP 7.5 KW / 15 HP 11.25 KW / 25 HP KW Length of Blades: 12" / 16" / 18" / 20" / 25" No. of Blade: 5 / 5 / 5 / 5 / 5 Throat Size: 12"X 12" / 16" X16" / 18" X 18" / 20" X 20" / 25" X 2 Grinding capacity: 60 to 90 kqs/hr / 90 to 120 kqs/hr / 90 to 140 kqs/hr / 140to 180 kqs/hr / 275 t kqs/h

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3	Differential Scanning Colorimeter analysis	1	LINSEIS High Temperature DSC HDSC PT1600 • Temperature range RT up to 1400 °C • Heating and cooling rates 0,1 up to 50 °C/min • Temperature accuracy +/-0,5 °C • Resolution 0,3 µW • Atmospheres inert • Vacuum 10-2 Pa • Crucibles Al2 O3 0,12 ml, Platinum 0,12 ml
4	Thermo gravimetric analysis	1	Make/Model :Perkin Elmer, Diamond TG/ Flexible axial and radial view instrument, with high concentration :Ambient – 1200°C :165 to >1000nm TG Measurement Range :200 mg TG Sensitivity :0.2 mg DTA measurement Range :±1000mV DTA Sensitivity :0.06mV
5	Composition Analysis or FTIR	1	Make/Model :Perkin Elmer, Diamond TG/ Flexible axial and radial view instrument, with high concentration :Ambient – 1200°C :165 to >1000nm TG Measurement Range :200 mg TG Sensitivity :0.2 mg DTA measurement Range :±1000mV DTA Sensitivity :0.06mV
6	Computers -laptop	1	Fugitsu SATA; 5400 rpm; 1 TB; 2.5-inch; S.M.A.R.T. SATA; 5400 rpm; 500 GB; 2.5-inch; S.M.A.R.T. SSHD; 5400 rpm; 500 GB / 8 GB SSD Cache; 2.5-inch; S.M.A.R.T. SSD SATA III; 128 GB; 2.5-inch SSD SATA III; 256 GB; 2.5-inch SSD SATA III FDE; 256 GB; 2.5-inch SSD SATA

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14. Infrastructural Facilities:

Sr. No.	Infrastructural Facility	Yes/No/ Not required Full or sharing basis
1.	Workshop Facility	Yes
2.	Water & Electricity	Yes
3.	Laboratory Space/ Furniture	Yes
4.	Power Generator	Yes
5.	AC Room or AC	Yes
6.	Telecommunication including e-mail & fax	Yes
7.	Transportation	Yes
8.	Administrative/ Secretarial support	Yes
9.	Information facilities like Internet/ Library	Yes
10.	Computational facilities	Yes
11.	Animal/ Glass House	Yes
12.	Any other special faciity being provided	Yes

15. Equipment available with the Institute/ Group/ Department/ Other Institutes for the project:

Equipment available with	Generic Name of Equipment	Model, Make & year of purchase	Remarks including accessories available and current usage of equipment
PI's Department	UV-Visible spectrophotometer	ELICO BL 198,	Yes
	PCR	Astec	Yes
	Gel Documentation	Vilber Lourmat,	Yes
	Cold centrifuge	Remi	Yes
	Electrophoresis	Genei	Yes
	Fermentor	Scigenics Bioferm LS1	Yes

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	Hot air oven,	Indigenous	Yes
	Reverse osmosis unit,	Borosil	Yes
	Incubator,	Indigenous	Yes
	Autoclave	Indigenous	Yes
	Colorimeter- ELICO CL 157,	Indigenous	Yes
	Batch orbital shaker	Scigenics Biotech,	Yes
	pH meter	ELICO LI 127	Yes
	Deep freezer, refrigeration system and	Blue star	Yes

Signature of the Applicant

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List of Programme Advisory Committees

Chemical Sciences (3 PACs)

i) Inorganic Chemistry
ii) Organic Chemistry
iii) Physical Chemistry

Earth & Atmospheric Sciences (2 PACs)

i) Atmospheric Science
ii) Earth Science
iii) Himalayan Glaciology

Engineering Sciences (4 PACs)

i) Chemical Engineering
ii) Electrical, Electronics and Computer Engineering
iii) Materials, Mining and Mineral Engineering
iv) Mechanical & Manufacturing Engineering & Robotics
v) Civil & Environmental Engineering

Life Sciences (4 PACs)

i) Animal Sciences
ii) Biophysics, Biochemistry and Molecular Biology
iii) Health Sciences
iv) Plant Sciences

Mathematical Science (1 PAC)

Physical Sciences (3 PACs)

i) Condensed Matter Physics and Materials Science
ii) Lasers, Optics, Atomic and Molecular Physics
iii) Plasma, High Energy, Nuclear Physics, Astronomy & Astrophysics and Nonlinear dynamics

SRI SRINIVASA EDUCATIONAL & CHARITABLE TRUST (R)

SAPTHAGIRI COLLEGE OF ENGINEERING

(Affiliated to Visveswaraya Technological University, Belgaum & Approved by AICTE - New Delhi)

AUDITED UTILISATION CERTIFICATE

1. Title of the Project/ Scheme: **Development of Bioresin and its use in processing of waste plastics and waste aluminum as composite laminates**

2. Name of the Institution: **Sapthagiri college of Engineering**

3. Name of the Principal Investigator: **Dr Ananda S**

4. Funded Agency: Karnataka Urban infrastructure Development and Finance Corpation Ltd.,

5. Amount received during the financial year i. Amount : **50,000**

(Please give letter/order no and date) ii. Letter/Order No:

KUIDFC/Funds/RES/117/2016-17/1796

iii. Date: 12-09-2016

6. Total amount that was available for expenditure: **Rs. 50,000**

(Excluding commitments) during the financial year

7. Balance amount available if any: **Nil**

8. Unspent balance refunded, if any (please give details of cheque no etc.): **Nil**

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UTILISATION CERTIFICATE FOR PROJECT

Order no/Letter Date	Amount
Letter Dated:KUIDFC/Funds/RES/117/2016-17/1796	
Total amount utilized	**50,000**

Certified that **Rs 50,000** of grants-in-aid under (project) was released by Karnataka Urban infrastructure Development and Finance Corpation Ltd.,in favor of **Dr Ananda S, Head and Prof Department of Biotechnology** Vide letter/ order No KUIDFC/Funds/RES/117/2016-17/1796 as stated above during the year 2016-2017. The above grant was sanctioned towards **project.** The sum of Rs 50,000 has been utilized for the purpose of which it was sanctioned and there is no remaining amount left at the end of the year. Expenditure incurred for the purpose for which the grant was sanctioned is verified with the vouchers produced before me.

Certified that I have satisfied myself that the grants in aid was sanctioned have been fulfilled and that I have exercised the following checks to see that the money was actually utilized for the purpose for which it was sanctioned.

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Statement of Expenditure

Bill No	Particulars	Amount (Rs)
	Sample characterization	
1	PP Material Housing	15867
2	PP Materials	7285
3	**Characterization Studies**	**5000**
4	**Glass wares**	**5000**
5	**Sox let Appartus**	**7000**
6	**Stationary**	3000
7	**Travel**	5000
8	**Preparation of project report (5)**	2000
	Grand total (B)	**30152**

Signature:
Designation:
Date:
Place:

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Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bangaluru - 560 057

CERTIFICATE

Certified that I have verified the disturbance of Rs 50,000, Fifty thousand towards project as mentioned above. We have exercised the verification of vouchers and supporting documents to see that the money was actually utilized for the purpose for which it was sanctioned.

Signature of Principal Investigator

SAPTHAGIRI COLLEGE OF ENGINEERING
Dept of Bio-Tech
BANGALORE-57

Signature of the Principal

Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

MAS & CO.
VERIFIED
BANGALORE
CHARTERED ACCOUNTANTS

Place: Bangaluru

Signature of Chartered Accountant
(Seal)
(FRN and M.NO)

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesaraghatta Main Road
Bengaluru - 560 057

KSCST PROJECTS

UTILIZATION CERTIFICATE

KSCST Student project program 40th series -2016-2017

Sl No	Lettered NO and Date	Amount	
1	7.1.03/SPP/1112	6,500/-	Certified that KSCST has provided partial financial support of **RS 36000/-** towards Biofuel and SPP student project program 38th series Sum of **Rs 36000/-** only has been utilize for the purpose Biofuel and SPP student project program for which it was sanction
2	7.1.03/SPP/1112	7,500/-	
3	7.1.03/SPP/1112	10,000/-	
4	7.1.03/SPP/1112	12,000/-	

Certified that I have satisfied myself that condition on which the grant in aid sanctioned has been duly/are be fulfilled and that I have excise the following check to see that the money was actually utilized for the purpose for which it was sanctioned.

Kinds of check exercised

1. Cash book
2. Vouchers

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road
Bangalore- 560 057

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road
Bangalore- 560 057

Sl. No	Project proposal ref no	Title of the project	Dept./Guide	Amount Sanction by KSCST	Amount utilized by the college	Balance if any to be refunded to KSCST
1	40S_B_0183	Isolation & identification of Micro labs for absorption and conversion of ammonia, nitrates and nitrogen using Aquaponics system	BT/ Prof. Saranya D / Prof. Ananda H V/ Prof. Blessy Baby Mathew	6,500/-	6,500/-	0
2	40S_B_2312	Forest Monitoring System based on GPRS and powered by iot	EC/ Prof. Suma V Shetty	7,500/-	7,500/-	0
3	40S_B_049	Performance and emission analysis of single cylinder si engine varying ethanol blends with petrol	ME/ Prof. Raghuthama Rao	10, 000/-	10, 000/-	0
4	40S_B_064	Reduction of pollution levels in the atmosphere by the use of methanol blended petrol fuel in automobile IC engine and study of its effects on the performance of the engine	ME/ Prof. Raghuthama Rao	12,000	12,000	0

MAS & CO. CHARTERED ACCOS. VERIFIED BANGALORE 26/2/2020

Signature of the Principal with seal

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road
Bangalore- 560 057

Date:

Signature of Auditor with seal

Date:

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road
Bangalore- 560 057