

**FORM RDRM C**  
**PROPOSAL FOR APPROVAL FOR TAKING UP CONSULTANCY**  
Please refer to Statues SA38 for more details

**1. TITLE OF PROPOSED PROJECT:** Feasibility study of identifying Milk adulterant Spectral signature using NIR Spectrophotometer

**2. i)Principal Consultant**

- a. Name: Dr.Jivan S.Parab
- b. Designation: Associate Professor
- c. Department: Electronics Programme, School of Physical & Applied Science

**ii)Co-Consultant**

- a. Name: Dr.Marlon D.Sequeira
- b. Designation: Assistant Professor
- c. Department: Electronics Programme, School of Physical & Applied Science

**3. CLIENT:**

- a. Firm: Infinity Agrotech
- b. Address for Communication : 51A,Pilerne industrial estate,Pilerne-Goa
- c. Contact person in the Organization : Mr.Sanjeev Trivedi & Mr.Raj Kuncolienkar

**4. Names, Designation and Department of the staff members involved in this consultancy (including students)**

Mr.Arman Sheikh, M.Sc Electronics –II student

**5. Name and Address of Outside Expert (if any) involved in the Consultancy :Nil**

**6. Whether the Consultancy shall make use of any University facilities such as equipment or laboratory**

Jasco Spectrophotometer V770

**7. Time Schedule**

- a. Duration (Weeks, months or years) : 02 Months
- b. Starting Date: 24<sup>th</sup> March 2021

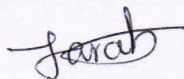
**8. Estimate of Charges**

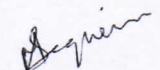
- a. Honoraria to consultant(s), staff of laboratory and others.  
Total Honoraria to Consultant : Rs.50,000 (Shared by both Counsultant)  
Student compensation:Rs.24,000  
University Share (as per SA38.2.vii) : Nil ( As Honoraria recived is less than 30%)
- b. Cost of materials used in carrying out consultancy.  
Spectroscopic Grade Dislled Water: Rs.2,000  
Glasswares: Rs.1,000  
Milk Samples :Rs. 2,000
- c. Computer charges.  
Rs. 1,000
- d. Charges for use of laboratory equipment and instruments.  
Rs.5,000
- e. T.A./D.A. for visits to sites.  
T.A : Rs.4000 ( To collect Milk samples to Farm & Visit to Client firm)
- f. Administrative/overhead charges to be paid to the University (@15%)  
@ 15 % on total of 1,04,500 = Rs.15,675
- g. Miscellaneous.  
Refrigerator : Rs.12,500  
Twist Coler Bag : Rs. 3,000

9. Give a brief description of the work to be done that includes scope of the work, Receivables from the client and Deliverables to the client. (As annexure I)

**Declaration by Consultant(s)**

- A. I/we shall ensure that the proposed consultancy project does not affect ~~my~~/our regular academic, research and related activities and other duties which are assigned to ~~me~~/us by the University.
- B. Number of Consultancies at present with ~~me~~/each one of us do not exceed four in number.
- C. This is to certify that there is no close relationship between ~~me~~/us and the client funding the consultancy project, or any vendor to whom payments are to be made from the consultancy project funds, or any such issue leading to conflict of interests.
- D. We have agreed to share the Honorarium as per following distribution.
- | Name                   | Proposed share |               |
|------------------------|----------------|---------------|
| 1. Dr. Jivan Parab     | (50%)          | consultant    |
| 2. Dr. Marlon Sequeira | (50%)          | co-consultant |
- E. I/we undertake to abide by all the provisions of Statute SA-38 in connection with the Consultancy project proposed herewith.

  
(consultant)

  
(co-consultant)

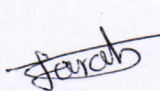
Signatures of Consultants

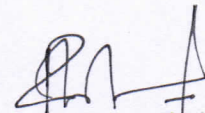
(separate forms may be submitted if the consultants are from different department)



**Declaration by Head of the Department**

- ✓ A. For the present consultancy the CLIENT Infinity Agrotech  
has requested the services of Dr. Jivan Parab (Associate professor)  
& Dr. Marlon Sequeira (Assistant professor)  
(letter may be placed for records) and these faculty members may be permitted to take up the consultancy work.
- B. Based on the expertise available in the Department, following member(s) of the Department have been assigned the present consultancy work.
- a. Dr. Jivan S. Parab
  - b. Dr. Marlon Sequeira
  - c.

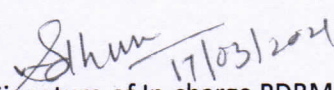
  
**Programme Director for M.Sc.Electronics**  
Signature of the Head of the Department  
Goa University, Goa

  
**DEAN**

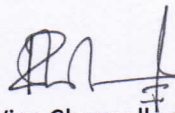
School of Phys.  
Goa University, Goa

The present consultancy project has been registered in RDRM and the reference number is

GU/D-RDRM/consultancy/Infinity Agrotech/JSP/SPAS-Electr./SG/2020-21.

  
Signature of In-charge RDRM

✓  
Approved/~~Not Approved~~

  
Vice Chancellor 17/3/2021

## ANNEXURE I

### Work To be done:

Identify spectral signature of the attached adulterant. Find wavelengths that are indicative of these material with NIR Spectrophotometer. Based on this spectral signature validation the detector and Sources will be selected

- **Finalizing Cuvvet:** Record the spectra of one of the adulterant with 10mm cuvette and 1mm cuvette
- We have to Identify the dissolving solvents for individual adulterants
- Adulterant Spectral recording and verifying with reference spectra ( As given Below)
- Detecting the lower limit of adulterant
- Making the Analysis report of above adulterant spectra's

### Receivable From the Client:

Client will provide Milk adulterant whose spectral signatures to be identified in NIR Region

### Deleiverable To the client:

- Adulterant spectral data with different concentration in distilled water as well as in Milk
- Spectral signature data to be provided in Excel format
- Finding the Low level detection of adulterant
- Making the consolidated report



Compose

Inbox 1,527

Starred

Snoozed

Important

Sent

Drafts 130

Categories

Follow up

Misc

Priority

More

Meet

New meeting

My meetings

Hangouts

J.S.



J Durga Prasad Rao, PhD Comp



Kevin D'Souza

## Inquiry for consultancy Project

Inbox x

Raj K

to me, Sanjeev

English

Marathi

Translate message

To

Dr..Jivran Parab

Goa University

We are a startup based at Pillerne, Goa.

Our Objective is to manufacture instruments for measuring quality of food grains and dairy products.

For our Project on Milk adulterant instrument, we require consultancy in following area

**Phase 1**-identify spectral signature of the attached adulterant as per attached list. Find wavelengths that are indicative of these material. You need to do this in a standard Jasco spectrometer available with you with limit of detection as attached..

**Phase 2**-based on test data of the sensor ,chemo metric analysis to be done and software to be developed to get results with 97 to 99 % accuracy.

**Phase 3**-adapat this software to the sensor selected by us for final instrument.

Please give us your commercial proposal for each phase separately. Right now we can concentrate on first two phases.

We require to complete this projects as soon as possible.

Please treat the project as confidential.

regards

Raj Kuncolienkar

Infiniti Agrotech

51A, Pillerne industrial estate

Pillerne-Goa

6 of 14,226

Mon, Mar 15, 5:26 PM (16 hours ago)

Turn off for: English

3/16/2021

List 9 Adulterants

IMG-20210219-WA0008.jpg

Ammonium sulphate	0.08%
Urea	0.10%
Maltodextrin	0.60%
Sugar	0.30%
salt	$\geq 0.2\%$
Melamine	$0.10 \pm 0.05$ (abs.)
Added Water	20%
Sucrose	$0.9 \pm 0.5$ (abs)
Nitrates ( Ammonium, Potassium, sodium)	$0.05 \pm 0.03$ (abs.)
Carbonates/Bicarbonate (ammonium, potassium,...)	$0.08 \pm 0.05$ (abs.)
Synthetic milk (veg. oil, urea, detergent, water)	$20 \pm 5$ (abs.)
Non-milk fat	$1.5 \pm 0.5$ (abs.)
Hydrogen Peroxide	$\geq 0.3\%$



## Feasibility study of identifying Milk adulterant Spectral signature using NIR Spectrophotometer

**Principal Consultant:** Dr. Jivan S. Parab , Associate Professor in Electronics, SPAS, Goa University  
**Co-Consultant:**Dr.MarlonSequeira, Assistant Professor in Electronics, SPAS, Goa University

**Phase 1-**identify spectral signature of the attached adulterant. Find wavelengths that are indicative of these material with NIR Spectrophotometer. Based on this spectral signature validation the detector and Sources will be selected

### LIST of Adulaterent used in Milk:

Ammonium sulphate	0.08%
Urea	0.10%
Maltodextrin	0.60%
Sugar	0.30%
salt	$\geq 0.2\%$
Melamine	$0.10 \pm 0.05$ (abs.)
Added Water	20%
Sucrose	$0.9 \pm 0.5$ (abs
Nitrates ( Ammonium, Potassium, sodium)	$0.05 \pm 0.03$ (abs.)
Carbonates/Bicarbonate (ammonium, potassium,...)	$0.08 \pm 0.05$ (abs.
Synthetic milk (veg. oil, urea, detergent, water)	$20 \pm 5$ (abs.)
Non-milk fat	$1.5 \pm 0.5$ (abs.)
Hydrogen Peroxide	$\geq 0.3\%$

### Budget

	Details	Cost in Rs	Total in Rs	Justification
Equipment	Refrigerator	12,500	12500	To store adulterant and Milk sample
Manpower	Student Assistance	@12000 for 2 months	24,000	Required to perform the experimentation
Milk Adulterants	Will be provided by Infinity Agrotech			
Glassware		1000	1000	
Klinde Twist Cooler Bag		3000	3000	To preserve the Milk in transit from farm to Lab
Travel		4000	4000	To get Milk samples from farm & visits
Spectroscopic Grade Distilled Water & Solvents		2000	2000	
Consultant Fee/Honoraria( Dr.Parab&Dr.Marlon)		50000	50,000	Shared by Both Consultants
Computer Charges		1000	1000	
Equipment Charges		6000	5000	
Milk samples		2000	2000	
University Share			Nil	Honorarium Amount is less than 30% of Gross Salary
<b>Total</b>			<b>1,04,500</b>	
Overhead Charges(@15%)			15,675	
<b>Final Total</b>			<b>1,20,175</b>	



### Experiment Design steps:

#### Adulterant Spectral Signatures:

- Before starting the adulterant spectra recording, We need to verify the standard solution spectra. If it is not proper, we need to calibrate the spectrophotometer.
- **Finalizing Cuvvet:** Record the spectra of one of the adulterant with 10mm cuvette and 1mm cuvette
- We have to Identify the dissolving solvents for individual adulterants
- Adulterant Spectral recording and verifying with reference spectra ( As given Below)
- Detecting the lower limit of adulterant

Adulterant 1: taking spectra of 1%,5%,10,20,30,40,50 (weigh and recording on spectrophotometer)

Adulterant 2: taking spectra of 1%,5%,10,20,30,40,50%

Adulterant 3: taking spectra of 1%,5%,10,20,30,40,50%

Adulterant 4: taking spectra of 1%,5%,10,20,30,40,50%

Adulterant 5: taking spectra of 1%,5%,10,20,30,40,50%

Adulterant 6: taking spectra of 1%,5%,10,20,30,40,50%

Adulterant7: taking spectra of 1%,5%,10,20,30,40,50%

Adulterant 8: taking spectra of 1%,5%,10,20,30,40,50%

Adulterant 9: taking spectra of 1%,5%,10,20,30,40,50%

Adulterant 10: taking spectra of 1%,5%,10,20,30,40,50%

Adulterant 11: taking spectra of 1%,5%,10,20,30,40,50%

Adulterant 12: taking spectra of 1%,5%,10,20,30,40,50%

Different concentration adulterant spectra's are recorded to see the behavior of adulterant spectra ( To see the Absorption is increasing or decreasing)

- Making the Analysis report of above adulterant spectra's
- **we may need to record spectra with Integrating spear attachment of spectrophotometer if it doesn't give good spectral signature with transmissive mode( Cuvette)**

### Milk Spectral signature Individually and with adulterants:

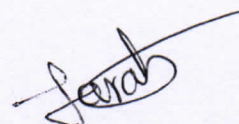
As discussed with, we understood that we need to record the spectra of raw dairy milk (test on Cow, Hybrid cows and Buffalo milk)

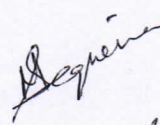
- Recording the Milk spectra to get spectra & verify with standard spectra
- Check if dilution is required to get the correct milk spectra
- Adding Individual adulterant to milk and taking their spectra
- Adding adulterate 1+ adulterant 2 in milk and taking spectra
- Above process will continue
- Adding all adulterant in milk and taking spectra

### Final Analysis and Report Preparation

### Work Plan:

Activities	Days							
	1-8	9-16	17-24	25-31	32-37	38-45	46-53	54-60
Calibration of instrument Understanding the process of Experimentation								
Recording Individual adulterant Spectra								
Milk with Adulterant Spectral recording								
Result Analysis & Conclusion								

  
Dr. Jivan Parab

  
Dr. Marlon Sequeira