

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

1. **TITLE OF PROPOSED PROJECT:** Detection of Milk adulterant using Chemometric Spectral Data Analysis
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 (If required for Validating the spectral Results)
Desktop Computer for Chemometric Implementation
7. **Time Schedule**
 - a. Duration (Weeks, months or years) : 04 Months
 - b. Starting Date: 1st July 2021
8. **Estimate of Charges**
 - a. Honoraria to consultant(s), staff of laboratory and others.

Total Honoraria to Consultant : Rs.70,000 (Shared by both Consultant)
Student compensation: Rs.80,000
University Share (as per SA38.2.vii) : Nil (As Honoraria received is less than 30%)
 - b. Cost of materials used in carrying out consultancy.

Nil
 - c. Computer charges.

Rs. 8,000
 - d. Charges for use of laboratory equipment and instruments.

Nil
 - e. T.A./D.A. for visits to sites.

T.A : Nil
 - f. Administrative/overhead charges to be paid to the University (@15%)

@ 15 % on total of 1,58,000 = Rs.23,700
 - g. Miscellaneous.

Nil

Final Total: Rs.1,81,700/-

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.
- Dr. Jivan S. Parab
 - Dr. Marlon Sequeira
 -

Parab

[Signature] 11/7/2021
DEAN

Signature of the Head of the Department

School of Physical and Applied Sciences
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-Electro/01/2021-22

[Signature] 02/07/2021
Signature of In-charge RDRM

Approved/Not Approved


[Signature]
Vice Chancellor 8/07/2021

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
Signatures of Consultants


(Co-Consultant)

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

ANNEXURE I

Work To be done:

Developing an Various chemometric data analysis techniques to find out the presence of adulterant in Milk.

- Once data is received data has to be formatted as per PLS requirement
- Applying Preprocessing technique
 - Data Transformation
 - Baseline correction
 - Smoothing with savitzy golay
 - Differentiation
 - Pretreatment of data
- Perform PCA (with different factors)
- Finding the correlation in spectral adulterated milk data
- Implementation of PLSR algorithm
- Trying LOD prediction
- PLSR cross validation
- Implementation of PLS-DA classification model
- Achieving adulterant Classification accuracy greater than 96.
- Making the Analysis report of above adulterant spectra's
- Repeating the above on another milk variant
- Repeating the above on Transmissive data

Receivable From the Client:

Client will provide Spectral data of both pure and adulterated milk in transmissive and Reflective data

Deleiverable To the client:

- Analysis of adulterated data with correlation
- LOD prediction results
- PLSR cross validation results
- Milk adulterated classification analysis
- Making the consolidated Analysis report

Budget

	Details	Cost in Rs	Total in Rs	Justification
Manpower	Student Assistant	@20000 for 4 months	80,000	Required to perform the Analysis
Consultant Fee/Honoraria (Dr.Parab&Dr.Marlon)		70000	70,000	Shared by Both Consultants
Computer Charges		8000	8000	
University Share			Nil	Honorarium Amount is less than 30% of Gross Salary
Total			1,58,000	
Overhead Charges(@15%)			23,700	
Final Total			1,81,700	

DATA Analysis work flow:

- Once data is received data has to be formatted as per PLS requirement
- Applying Preprocessing technique
 - Data Transformation
 - Baseline correction
 - Smoothing with savitzky golay
 - Differentiation
 - Pretreatment of data
- Perform PCA (with different factors)
- Finding the correlation in spectral adulterated milk data
- Implementation of PLSR algorithm
- Trying LOD prediction
- PLSR cross validation(k-fold)
- Implementation of PLS-DA classification model(Bi class)
- Achieving adulterant Classification accuracy greater than 96.
- PLDA/ Sparse PLS-DA for mostly multiclass classification (if above doesnot work)
- Making the Analysis report of above adulterant spectra's
- Repeating the above on another milk variant
- Repeating the above on Transmissive data

Final Analysis and Report Preparation