

# Sponsored Research (RESPOND)

## 1.0 Introduction

The Indian Space Research Organisation (ISRO) has evolved a programme through which financial support is provided for conducting research and development activities related to Space Science, Space Technology and Space Application to academia in India. This programme of Research Sponsored by ISRO is called RESPOND. In special cases research and development projects proposed by non-academic R & D laboratories can also be supported through this programme. The aim of RESPOND is to encourage quality research in areas of relevance to the Indian Space Programme.

The primary objective of the Indian Space programme is to harness the advanced research areas of space science and technology for national development and to derive the maximum benefit for the people of India. The Indian Space Programme includes the following major elements:

Demonstration of the feasibility of deriving from space science and technology-applications in space communications, long distance education, earth resources mapping/survey, meteorology and geodesy.

Development of indigenous capability for design and development of orbiting satellites for scientific research and space applications, sounding rockets and satellite launch vehicles.

RESPOND (Sponsored Research) programme started in the 1970s aims at encouraging academia to participate and contribute in various space related activities. Under RESPOND; projects are taken up by universities/academic institutions in the areas of relevance to Space Programme. Apart from this, ISRO has also set up Space Technology Cells at premiere institutions like Indian Institute of Technologies (IITs) - Bombay, Kanpur, Kharagpur & Madras; Indian Institute of Science (IISc), Bangalore and Joint Research Programme with University of Pune (UoP) to carry out research activities in the areas of space technology and applications. These STCs and JRP are guided by Joint Policy Committee's (JPC) chaired by Director/Vice Chancellor of the respective institution and with members from ISRO/DOS (Senior Scientists/Engineers) & the respective institution. Under the STC, projects are taken up by the faculty of the Institute (for more details visit: [www.csre.iitb.ac.in/isro\\_cell](http://www.csre.iitb.ac.in/isro_cell); [www.iitk.ac.in/dord/isro](http://www.iitk.ac.in/dord/isro); [www.kcstc.iitkgp.ernet.in](http://www.kcstc.iitkgp.ernet.in); [www.unipune.ac.in/isro](http://www.unipune.ac.in/isro) )

The main objectives of the RESPOND Programme is to establish strong links with academic institutions in the country to carry out research and developmental projects which are of relevance to space and derive useful outputs of such R&D to support ISRO programmes. RESPOND programme aims to enhance academic base, generate human resources and infrastructure at the academic institutes to support the space programme. The major activity of RESPOND is to provide support to research projects in wide range of topics in space technology, space science and applications areas to universities/ institutions. In addition conferences, workshops and publications, which are of relevance to space research, are also being supported.

## 2.0 Supported Areas of Research

Research proposals are supported by ISRO in any area of relevance to the space programme of which the following are few examples:

**2.1 Space Science:** Physics of the ionosphere and magnetosphere; meteorology, dynamics of the atmosphere; geophysics, geology; astronomy; cosmology; astrophysics; planetary and interplanetary space physics and climatology.

**2.2 Space Technology:** Rocket and satellite technology; propulsion systems design and optimization; aerodynamics and heat transfer problems related to space vehicles; guidance and control systems for launch vehicles and spacecraft; polymer chemistry, propellant technology; ultra-light-weight structure; satellite energy systems; space electronics, Space communication systems; orbital mechanics, computer sciences and new material development.

**2.3 Space Application:** Remote sensing of the earth's resources: space communication; satellite geodesy image processing, satellite meteorology including weather forecasting, Space Education and Ecology.

Some illustrative examples of specific problems in the above-mentioned areas can be made available by ISRO from time to time by sharing the titles of the old projects (list of projects from 2000 – March 2013 is given in Annexure-1). Proposers need not feel to be restricted in the selection of subjects, research areas etc for the proposals, but they need to demonstrate the intrinsic scientific merit. However, ISRO reserves the right to not to fund any proposal (s), if in its opinion, similar proposals are already funded or similar work is already done in ISRO.

*For more details visit:*

[www.sac.gov.in/respond](http://www.sac.gov.in/respond) ,

[www.vssc.gov.in/Activities/Respond](http://www.vssc.gov.in/Activities/Respond);

[www.nrsc.gov.in](http://www.nrsc.gov.in) > *Work with us*> *Collaborative Research*;

[www.prl.res.in](http://www.prl.res.in)>*opportunities*>*respond programme*)

## 3.0 Submission of Research Proposal

An individual or group(s) of scientists / engineers affiliated to any academic institution/autonomous R&D institutions and/or faculty members of recognized academic institutions and universities may submit proposals. The Principal Investigator(s) should be full-time employee(s) of the concerned institution. The Head of the academic institution must forward proposals with application for research grants. *Proposals from individuals not affiliated to any recognized institution will not be considered.*

The proposals should preferably be submitted in the areas of Space Science, Space Technology and Space Application. There is no last date for submitting proposals. Each proposal must name a Principal investigator who is a domain expert in the area to which the proposal belongs and who is a full time employee/faculty of the institution forwarding the application. There may also be co-investigator(s) from the same/different institutions working on the project. But satisfactory completion of a project will be the responsibility

of the Principal Investigator and her/his institution. Each proposal should provide the following information as:

- Detailed bio-data of all the investigators (Age also to be indicated) including publications/awards & recognition received.
- Contact details: address, email id, telephone/fax numbers of investigators and head of the institution forwarding the proposal.
- Brief description of the research proposed including the objectives and the scientific/application merits of the work.
- Description of the research methodology or techniques to be used for the proposed project.
- The extent of financial support needed from ISRO for executing the work within the shortest possible time.
- A list of research projects related to the proposal undertaken or carried out through funding by other Agencies.
- Name and address of the Scientist/Engineer with whom the PI had co-ordinated

Seven copies of the proposal on standard A4 size paper (297mmX210mm) should be prepared in the format attached to this brochure (Annexure). Please note that all the Forms - "Form-A", "Form-B", "Form-C" and the "Proposal Format" needs to filled appropriately

**Five copies** of the proposal, in the respective areas given below should be sent to one of the following ISRO Centers:

	<b>Topic</b>	<b>ISRO Centres</b>
1	<b>Space Sciences</b>	<b>Director</b> <b>Physical Research Laboratory</b> Navarangapura Ahmedabad 380 009. <a href="mailto:director@prl.res.in">email : director@prl.res.in</a>
2	<b>Atmospheric Sciences</b>	<b>Director</b> <b>National Atmospheric Research Laboratory</b> Gadanki- 517 112 Pakala Mandal, Chittoor Dist., Andhra Pradesh <a href="mailto:jayaraman@narl.gov.in">email: jayaraman@narl.gov.in</a>
3	<b>Rockets, launch vehicles and space technology including avionics</b>	<b>Director</b> <b>Vikram Sarabai Space Centre</b> ISRO P.O Thiruvananthapuram 695 022. <a href="mailto:director@vssc.gov.in">email: director@vssc.gov.in</a>

4	<b>Space Applications Space communications, Remote sensing and meteorology</b>	<b>Director</b> <b>Space Applications Centre</b> Jodhpur Tekra Ahmedabad 380 015 e-mail : <a href="mailto:director@sac.gov.in">director@sac.gov.in</a>
5	<b>Remote Sensing</b>	<b>Director</b> <b>National Remote Sensing Centre</b> ISRO, Dept. of Space, Balanagar, Hyderabad - 500 625 (A.P.) email : <a href="mailto:director@nrsc.gov.in">director@nrsc.gov.in</a>
6	<b>Satellite Technology</b>	<b>Director</b> <b>ISRO Satellite Centre</b> P B No. 1795, HAL Airport Road Vimanpura Post, Bangalore 560 017 email : <a href="mailto:director@isac.gov.in">director@isac.gov.in</a>
7	<b>Systems studies related to tracking, telemetry, telecommand and other ground instrumentation for satellites and launch vehicles</b>	<b>Director</b> <b>Satish Dhawan Space Centre, SHAR</b> Sriharikota P.O. 524 124 Nellore District. Andhra Pradesh email : <a href="mailto:director@shar.gov.in">director@shar.gov.in</a>
8	<b>Propulsion</b>	<b>Director</b> <b>Liquid Propulsion System Centre</b> Valiamala P.O. Thiruvananthapuram 695 547. email: <a href="mailto:director@lpsc.gov.in">director@lpsc.gov.in</a>

**Two copies of all the proposals must be sent to:**

**Scientific Secretary,**  
ISRO Hq, Department of Space,  
Antariksh Bhavan, New BEL Road  
Bangalore 560 231  
email : [scientificsecretary@isro.gov.in](mailto:scientificsecretary@isro.gov.in)

Proposals will be evaluated by domain experts (internal and/or external) for its novelty, usefulness to Indian Space Programme and other Scientific/ technical merits. The proposal may call for changes based on review and the PI will have to re-submit the proposal incorporating the recommended changes. Proposers are informed about the outcome of the evaluation of their research proposals.

#### **4.0 Research Grants**

The institutions proposing a project for support are expected to commit the use of the existing infrastructure available with them. ISRO provides financial grants to support fellowship, materials, consumables, internal travel, testing charges, data etc. The fund for purchase of only essential minor equipments which are not available in the institution and would be useful for future projects will also be provided. There is no provision for

any kind of payment to the Principal Investigator (or other staff) belonging to the Institution. The allocated funds cannot be used for travel abroad for any reasons.

Guidelines governing the allocation of funds by ISRO are set out below. These may change from time to time.

- Grants for the purchase of equipment may be provided for the investigation. The equipment must be of a specialized nature, required exclusively for the project and is either not available at, or cannot be spared from, parent Institution for the project. Such equipment should be useful for new projects to be taken up in future. In this category, PC/Computer means desktop computer only.
- Appointment of approved Research Fellows to support PI in the project activities can be made by the Academic/Research Institution for the approved project. The services of supporting staff like administrative personnel, support technical staff, technicians & technical assistants, surveyor, data entry operators etc., will have to be exclusively sourced by the academic or research institution under taking the project and funds sanctioned under the project should not be diverted for the purpose. However, at the closure of the project, ISRO cannot assume any responsibility of providing continuity in employment either in the same or new project for the project staff. Such project staff who will have no claim whatsoever for recruitment in ISRO on any post.
- The selection and appointment of the above project staff is the responsibility of the Principal Investigator as per the rules in vogue in respective / academic research institutions. These should be made according to the normal selection procedures of the university or institution submitting the research proposal. The qualification/ experience required and the salary offered shall be as per ISRO norms and the selection should have the approval of the head of the institution according to the rules followed in the respective Institution.
- The research personnel who are associated with the project may be awarded ISRO's research Fellowships according to guidelines laid down by ISRO for this purpose. Details on the award of Research personnel are given in following sections.

Approved grant may be utilized for the following heads only:

- Purchase of books and scientific literature, which are essential for the investigation, and are not available in the concerned academic/research Institution. Subscription for Journals is normally not permitted and expenditure towards Journals cannot be charged to project. In the event of a particular Journal, which is not available in the academic/research, institution and which is very important and relevant to the investigation may be procured on single copy basis or Photostat copies only on prior approval of ISRO. Subscription to journals on a regular basis cannot be covered by these.
- Special consumable materials essential to the project.
- Computer time, observatory time and other services.
- Travel within India, in connection with the project or for attending seminars and symposia of relevance to the subject of the investigation.

- Miscellaneous expenses (contingency) such as typing charges, stationery, postage, etc.
- All requirements of foreign exchange for the purchase of equipment and/or consumables should be clearly identified and mentioned in the budget. The Academic Institution /Research Institution shall arrange to provide the required foreign exchange to the project and ISRO will provide equivalent money in Indian Rupees.
- No funds are available for international travel either partly or fully, for personnel connected with the project.
- ISRO does not provide funds in the project for printing any material in connection with the project.
- ISRO does not grant any funds for buildings and civil works for housing any equipment or personnel. However, charges for equipment installation can be provided only on specific approvals.
- All travel in connection with the project should be approved by the Principal Investigator according to the TA/DA rules of the concerned Institution. The mode of Journey including air-travel may also be approved by him so that the implementation of the project takes place in time subject to the condition that the institution has no objection to such an arrangement and that the travel expenses are contained within the budgetary provisions for the project approved by ISRO.
- The funds will be sanctioned under different specific heads and will normally be released by ISRO once in every year. Any reappropriation of funds among different approved heads has to be approved by the competent authority.
- If the total grant released to an Institution is not fully spent, the unspent balance will be deducted out of the approved budget earmarked for next immediate release.
- Any unspent grant at the end of the project will have to be returned to Pay and Accounts Officer, Department of Space, Antariksh Bhavan, New BEL road, Bangalore -560 231

#### **4.1 Terms and Conditions of ISRO Research grants**

1. ISRO reserves the right to revoke in whole or in part the funds approved for a project at any time without assigning any reason.
2. Approved funds must be utilized solely for the purpose for which they have been granted unless ISRO agrees otherwise. A certificate that the funds have been so used must be produced by the grantee Institution at the end of each year of support.
3. Acknowledgement of ISRO support must be made in all reports and publications arising out of an approved project/investigation. The Institution will take prior permission of ISRO before publishing any work based on an ISRO supported project. Such permission will not be unreasonably withheld.

4. Two copies of all publications resulting from the research conducted with the aid of the grants should be submitted to ISRO.
5. No investigator receiving a grant from ISRO may make commercial use of the results of the work through patents or otherwise. ISRO reserves the exclusive right to determine whether any patent shall be taken out and for which commercial use, if any, shall be made of any result of the investigations. All patents shall be in the name of ISRO and ISRO shall retain exclusive rights to commercially exploit them. The share, if any, for the royalty to the Investigator, the parent Institution and ISRO will be determined by ISRO.
6. The Principal Investigator is required to submit two copies of yearly reports indicating the progress of the work accomplished. He is also required to submit two copies of a detailed scientific/technical report on the results of the research and development work after the completion of the project. One copy of these reports should be sent to the address to which the proposal was sent and other to the scientific Secretary, ISRO Headquarters. Annual reports should be sent to enable release of funds for the subsequent year. The reports will become the property of ISRO.
7. ISRO may designate scientists/specialists to visit the Institution periodically, for reviewing the progress of work on an ISRO-funded project.
8. An inventory of items purchased from ISRO funds should be sent to ISRO giving the description of the equipment, brief specifications, cost in rupees, date of purchase and name of supplier along with a purchase certificate from the Head of the Institution. All items of equipment and non-consumable items costing more than Rs. 5,000 remain the property of ISRO and ISRO reserves and right to recall, transfer or dispose them off either during the tenure or on the termination of the project.
9. The accounts of the expenses incurred out of ISRO funds should be properly maintained and should be audited by an approved auditor. The final financial documents comprising of audited accounts statement and fund utilization certificate in duplicate, should be sent to ISRO at the end of each financial year of support. The final financial documents pertaining to the project should be sent to ISRO for every operational year of the project sufficiently in advance to enable the release of funds for the subsequent year. It is the responsibility of the institution to submit the Fund Utilization Certificate (FUC) and Audited Accounts Statement (AAS) to Pay and Accounts Officer (PAO), Department of Space at the end of 12 months from the date of drawl of grant(s) from ISRO for Research Projects and at the end of 6 months for Conferences/ Seminars/ Workshops/ Symposium etc. It is mandatory for all institutions drawing grants from Department of Space to submit all financial documents within the stipulated period and any delay in the submission of the financial documents for all grants drawn from Department to Pay and Accounts Officer (PAO), Department of Space will result in delay in release of funds. In such situations, the PI cannot seek extension of project or modification of objectives of the project.

10. The funds for the projects are released on annual basis. Further release of funds for ensuing year will be based on the technical performance of the project and utilization of the funds released for the project during the previous year. Any unspent balance shown in the reporting year, will be adjusted with the funds due for release during the next year.
11. If the total amount sanctioned is not spent during the whole period of support, the remainder amount must be surrendered to the Pay and Accounts Officer, Department of Space, within one month after completion of the project.
12. The Institution cannot divert the grants for a project to another institution if it is not in a position to execute or complete the assignment. In such a case the entire amount of the grant must be immediately refunded to ISRO.
13. A register of assets, permanent and semi-permanent, should be maintained by the Institution and this should be available for scrutiny by ISRO staff.
14. The assets acquired wholly or substantially out of an ISRO grant should not, without prior sanction, be disposed off or transferred to other agencies or utilized for purposes other than that for which the grant is sanctioned.
15. The terms and conditions of ISRO research grants are subject to change from time to time, but the funding of any project till its completion will be governed by the terms and conditions existed on the date of starting of the project, unless mutually agreed to otherwise. The academic institution/PI cannot claim revision of fellowships or any of its elements from a retrospective date.
16. ISRO reserves the right to transfer any approved project(s) from one institution to other institutions in the event of institution's inability to continue the project, PI leaving the institution etc.

## **5.0 Terms & conditions**

### **5.1 General Rules**

ISRO Research Fellowships, Research Associateships and Research Scientists hereinafter referred to as Fellowships/ Associateships/ Scientists are awarded for specific projects or Education/Research Schemes approved by ISRO. Change of level of Research Fellow, subsequent to the approval of the project will not be permitted.

The recipients of these Fellowships/ Associateships /Scientists are expected to conduct research work whole time under the Principal Investigator of the ISRO sponsored project. In special cases of individual Research Fellows/Associates, the candidates could be governed by the conditions of Research work as specified by the projects/ programmes/ schemes for which the Fellowships have been offered by ISRO.

ISRO may nominate a member in the committee(s) appointed by the institution in connection with the approved project.

The Fellows/ Associates/ Scientists, appointed for ISRO project, shall not be transferred from one institution to another.



The award of ISRO Fellowships/Associateships/ Scientists does not imply any assurance or guarantee by or from ISRO or any kind of employment to the beneficiaries.

Generally the upper limit for the period of Fellowships/ Associateships/ Scientists will be the same as that of the project. However, in exceptional cases, mainly to enable the Fellow to complete all formalities required for submission of doctoral thesis, ISRO may consider extension of the fellowship purely based on the merit on case by case basis. However, such extensions cannot be claimed as right by either fellow or PI.

Leave for a maximum period of 30 days in a year, in addition to general holidays, may be allowed to the Fellows/ Associates/ Scientists during the tenure of Fellowships/ Associateships/ Scientists by the appropriate authority in the university/institution. The general holidays, however, do not include the vacation period e.g., summer, winter and pooja vacations.

Monthly emoluments of the Fellowships/ Associateships/ Scientists will be paid by the concerned institution by utilizing the project grant.

**Note:** The scales of pay, service benefits, terms and conditions, etc for appointment are subject to revision from time to time by the Department of Space/Government of India.

## 5.2 Research Fellowships

Junior Research Fellow (JRF)/Senior Research Fellow (SRF)

Research Fellow	Qualification	1 <sup>st</sup> & 2 <sup>nd</sup> Yr (monthly emoluments)	Sub. Yr (monthly emoluments)
<b>Junior Research Fellow (JRF) leading to PhD</b>	(i) Post Graduate (PG) Degree in Basic Sciences. OR (ii) Graduate Degree in Professional Courses	Rs 16,000	Rs 18,000
<b>Junior Research Fellow (JRF) leading to PhD</b>	Post Graduate (PG) Degree in Professional Courses.	Rs 18,000	Rs 20,000

*Note: Henceforth, recruitment at the level of Senior Research Fellows(SRF) in the scheme has been discontinued*

In programmes where there is a need to engage research personnel at a level higher than JRF and such need has been accepted by the funding agency, the remuneration for such personnel may be fixed as indicated below

### 5.3 Research Associates (RA)

**Educational Qualification:** Doctorate (PhD/MD/MS/MDS) or equivalent degree of having 3 years of research, teaching and design and development experience after MVSc / MPharm / ME / MTech will be eligible for award as RA.

Sl. No	Category	Fellowship per month (Rs)
1.	Research Associate I (RA-I)	22000
2	Research Associate II (RA-II)	23000
3.	Research Associate III (RA-III)	24000

A candidate may be awarded one of the categories of these Research Associateships depending upon the merit of the candidate.

Note: - The stipend of research fellow/associate is exempt from the payment of Income tax as per the provision under 10(16) of the IT Act, 1961.

### 5.4 Research Scientists (RS):

It has been decided that in lieu of the prevalent practice, depending upon the need of individual project, Research Scientists could be appointed in such projects in any of the following grades:

Sl. No.	Scales (as per VI CPC)
1.	(PB-3) 15600-39100 + GP of Rs 5400
2.	(PB-3) 15600-39100 + GP of Rs 6600
3.	(PB-3) 15600-39100 + GP of Rs 7600
4.	Other scales below 15600-39100 + GP of Rs 5400 as recommended by VI CPC and approved by Govt. of India

### 5.5 Other benefits/ Service conditions:

**DA:** JRFs, SRFs and Research Associates will not be entitled to this allowance. The Research Scientists will get DA as per rates of Central Government as per rules of the local institutions where they are working.

**House Rent Allowance and Medical Benefits:** HRA and Medical benefits may be allowed to all categories viz., JRF/SRF, Research Associates and Research Scientists as per rules of the institutions where they are working. For this purpose, the fellowship amounts for JRF/SRF and Research Associates will be taken as Basic Pay.

**Leave and other service benefits:** JRFs/SRFs are eligible only for casual leave while Research Associates/Scientists are eligible for leave as per rules of the Institutions. Maternity leave as per Govt. of India instructions would be available to all female JRFs/SRFs/ RAs/RSs

However, participation by any of these categories in any scientific event in India or abroad will be treated as “on duty”. The travel entitlement for JRF/SRF/RA for participation in scientific events/ workshops In India will continue to be the same as earlier i.e., 2<sup>nd</sup> AC by rail.

**Bonus & Leave Travel Concession:** Not admissible to any category.

**Retirement Benefits:** These will not be applicable to JRFs / SRFs / Research Associates. Research Scientists who are appointed for the duration of the project in regular scales of pay as mentioned above may be allowed to be members of the Contributory Provident Fund/NPS of the institution.

**Encouragement for pursuing higher studies:** JRFs/SRFs may be encouraged to register for higher studies and the tuition fees to undertake these studies may be reimbursed from the contingency grant sanctioned under the project grant, if required.

**Benefits to Host Institutes:** Overhead expenses of 20% of the total project cost not exceeding Rs 3.00 lakhs may be permitted to the host institutions for meeting their costs including infrastructural facilities.

**Obligations of JRF/ SRF/ RA:**

- a) JRF/SRF/RA shall be governed by the disciplinary regulations of the host institute
- b) The JRF/ SRF/ RA must send a detailed consolidated report of the research work done during the entire period of Fellowship on completion of the tenure/ resignation at the earliest.

**Application for Grant of Funds**

1.	Name of the Institution with Full Address	
2.	Title of the Research Proposal	
3.	Name of the Principal Investigator (Address/Phone/E-mail)	
4.	Name(s) of other investigator(s) with the name(s) of their Institution	
5.	Proposed duration of Research Project	
6.	Amount of grant requested (in Rs.) 1 <sup>st</sup> Year, 2 <sup>nd</sup> Year, 3 <sup>rd</sup> Year Total	
	Manpower	
	Equipment	
	Satellite Data/Data	
	Consumables & Supplies	
	Internal Travel	
	Contingency	
	Others	
	Overheads	
	Total	
7.	a) Bio-data of all the Investigators (Format-A). b) Brief description of the Research Proposal with details of budget (Format-B). c) Declaration (Format-C).	
8.	I/We have carefully read the terms and conditions for ISRO Research Grants and agree to abide by them. It is certified that if the research proposal is approved for financial support by ISRO, all basic facilities including administrative support available at our Institution and needed to execute the project will be extended to the Principal Investigator and other Investigators.	
	<b>Name</b>	<b>Institution</b>
	Principal Investigator	
	Co-Investigator(s)	
	Head of the Department/Area	
	Head of the Institution	

## Bio-data of the Investigator(s)\*

1.	Name			
2.	Date of Birth (dd/mm/yyyy)			
3.	Designation			
4.	Degrees conferred (begin with Bachelor's degree)			
	Degree	Institution Conferring the degree	Field(s)	Year
5.	Research / Training / Teaching Experience (in chronological order)			
	Duration	Institution	Nature of work done	
6.	Major scientific fields of Interest			
7.	List of publications			
8.	Email id and Telephone /mobile number of PI with STD Code			
9.	Email id, telephone/mobile no. of the Head of the academic institution			

\* Bio-data for all the investigators should be given, each on a separate sheet.

### Proposal Format

1.	Title of the research proposal	
2.	<p><b>Summary of the proposed research</b></p> <p>A Simple concise statement about the investigation, its conduct and the anticipated results in no more than 200 words</p>	
3.	<p><b>Objectives</b></p> <p>A brief definition of the objectives and their scientific, technical and techno-economic importance.</p>	
4.	<p><b>Major Scientific fields of Interest</b></p> <p>A brief history and basis for the proposal and a demonstration of the need for such an investigation preferably with reference to the possible application of the results to ISRO's activities. A reference should also be made to the latest work being carried out in the field and the present state-of-art of the subject.</p>	
5.	<p><b>Linkages to Space Programme/Deliverables to ISRO on successful completion of the project</b></p>	
6.	<p><b>Approach</b></p> <p>A clear description of the concepts to be used in the investigation should be given. Details of the method and procedures for carrying out the investigation with necessary instrumentation and expected time schedules should be included. All supporting studies necessary for the investigation should be identified. The necessary information of any collaborative arrangement, if existing with other investigators for such studies, should be furnished. The principal Investigator is expected to have worked out his collaborative arrangement himself. For the development of balloon, rocket and satellite-borne payloads it will be necessary to provide relevant details of their design. ISRO should also be informed whether the Institution has adequate facilities for such payload development or will be dependent on ISRO or some other Institution for this purpose.</p>	
7.	<p><b>Data base and analysis</b></p> <p>A brief description of the data base and analysis plan should be included. If any assistance is required from ISRO for data analysis purposes, it should be indicated clearly.</p>	
8.	<p><b>Available Institutional facilities</b></p> <p>Facilities such as equipments, etc, available at the parent Institution for the proposed investigation</p>	

	should be listed.				
9.	<b>Fund Requirement</b> Detailed year wise break-up for the Project budget should be given as follows:				
	<b>Fellowships*</b>	<b>1<sup>st</sup> Yr</b>	<b>2<sup>nd</sup> Yr</b>	<b>3<sup>rd</sup> Yr</b>	
	Research Scientist				
	Research Associate				
	Research Fellows				
	<b>Total</b>				
*Note: please specify the designation, qualification and rate of salary per month for each category					
		<b>1<sup>st</sup> Yr</b>	<b>2<sup>nd</sup> Yr</b>	<b>3<sup>rd</sup> Yr</b>	<b>Total</b>
	Equipment**				
	<b>Total</b>				
**Please specify the various individual items of equipment and indicate foreign exchange requirement, if any					
		<b>1<sup>st</sup> Yr</b>	<b>2<sup>nd</sup> Yr</b>	<b>3<sup>rd</sup> Yr</b>	<b>Total</b>
	Satellite data/data				
	<b>Total</b>				
		<b>1<sup>st</sup> Yr</b>	<b>2<sup>nd</sup> Yr</b>	<b>3<sup>rd</sup> Yr</b>	<b>Total</b>
	Consumables & Supplies				
	<b>Total</b>				
		<b>1<sup>st</sup> Yr</b>	<b>2<sup>nd</sup> Yr</b>	<b>3<sup>rd</sup> Yr</b>	<b>Total</b>
	Internal Travel				
	<b>Total</b>				
		<b>1<sup>st</sup> Yr</b>	<b>2<sup>nd</sup> Yr</b>	<b>3<sup>rd</sup> Yr</b>	<b>Total</b>
	Contingencies				
	<b>Total</b>				
		<b>1<sup>st</sup> Yr</b>	<b>2<sup>nd</sup> Yr</b>	<b>3<sup>rd</sup> Yr</b>	<b>Total</b>
	Others				
	<b>Total</b>				
		<b>1<sup>st</sup> Yr</b>	<b>2<sup>nd</sup> Yr</b>	<b>3<sup>rd</sup> Yr</b>	<b>Total</b>
	Overheads				
	<b>Total</b>				
10.	Whether the same or similar proposal has been submitted to other funding agencies of Government of India. If Yes please provide details of the institution & status of the proposal.			Yes/No	

\*\*Justify each equipment. If computer is proposed, only desktop has to be purchased not laptop

### Declaration

I/We hereby agree to abide by the rules and regulations of ISRO research grants and accept to be governed by all the terms and conditions laid down for this purpose.

I/We certify that I/We have not received any grant-in-aid for the same purpose from any other department of the central government/state government/public sector enterprise during the period to which the grant relates.

	Signature & Name	Designation
<b>Principal Investigator</b>		
<b>Head of the Department/Area</b>		
<b>Head of the Institution</b>		

**For more details contact:**

<b>Scientific Secretary, ISRO</b>	<b>Deputy Director, RESPOND</b>
Indian Space Research Organisation HQ Department of Space, Government of India, Antariksh Bhavan, New BEL Road, Bangalore 560 231 e-mail ID : <a href="mailto:scientificsecretary@isro.gov.in">scientificsecretary@isro.gov.in</a>	Indian Space Research Organisation HQ Department of Space, Government of India, Antariksh Bhavan, New BEL Road Bangalore 560 231 e-mail ID : ddrespond@isro.gov.in



## **Financial Support for Organizing Seminars/Symposia/Conference/Workshops etc**

Under RESPOND programme, financial support is provided to Academic Institutes, Universities, Technical Societies/Associations and others towards organizing Seminars/Symposia/Conference/Workshops etc with themes of relevance to ISRO. The request in the prescribed format (given in next Page) has to be sent along with brochures, letters etc to :

**Scientific Secretary, ISRO**  
Indian Space Research Organization HQ  
Department of Space, Government of India  
Antariksh Bhavan, New BEL Road  
Bangalore 560 231  
E-mail ID: [scientificsecretary@isro.gov.in](mailto:scientificsecretary@isro.gov.in)

**APPLICATION FOR THE GRANT OF FINANCIAL ASSISTANCE FOR ORGANISING  
SEMINARS/SYMPOSIA/CONFERENCE**

**SUBMITTED TO ISRO, DEPARTMENT OF SPACE  
GOVERNMENT OF INDIA**

Sl. No	Items	Details
1	Title of the Seminar/ Symposium/ /Conference	
2	Date(s) and Venue	
3	Name and address of the Institution/University/Scientific Society/ Association organizing the event	
4	Name of the <ul style="list-style-type: none"> <li>- Chairman</li> <li>- Organising Secretary/Convener</li> <li>- Joint Organising Secretary</li> </ul>	
5	a) Topics being covered  b) Relevance and importance of the topics in the context of national needs  c) Relevance and importance of the topics to ISRO	
6	How many delegates (National and Foreign) are expected to participate?	
7	For how many delegates TA/DA is offered and at what rate?	
8	What is the total income and expenditure budget? Please give the details under various heads.	
9	Details of grants requested/received from other agencies	
10	Grants requested from ISRO	
11	Whether grants have been received by your Institution / University / Scientific Society / Association earlier from ISRO?  If yes, give details; and whether Fund Utilization	

	Certificate/Audited Accounts Statement/Reports/Proceedings etc have been submitted?	
12	Name of the authority who will be responsible for submitting Fund Utilization Certificate/Audited Accounts Statement/Reports/Proceedings etc	
13	Name, Designation and address of the authority (with phone number, email id etc) in whose favour payment of grant is desired	
14	Any other information	

Place:

Date :

Chairman/Organising Secretary

Head of the Dept./Institution/ Registrar

*P.S. If the grant is sanctioned, Chairman/Organising Secretary/convener should at the earliest (in any case not later than 6 months from the date of the symposium/seminar/conference/workshop) submit detailed statement of income and expenditure for the event for which money is sanctioned. The income/expenditure statement shall be for the event only and should not include or merged with any other accounts of the society/organizing body.*

## Status of Ongoing RESPOND Programme

Projects and Institutions supported under the RESPOND Programme during 2012-13

Number of Projects Supported: 63

*Space Science : 14*

*Space Technology: 31*

*Space Application: 18*

Academic Institutions supported under the Projects

*Universities and Colleges 33*

*National Institutions : 11*

*Other Institutions: 3*

Supported activities of *Space Technology Cells: 5* at IITs (Bombay, Kanpur, Kharagpur and Madras) and IISc Bangalore and *Joint Research Programme* at University of Pune

Conferences/Symposiums supported: 49

Budget For the RESPOND Programme : ~15 Crores/year

### Annexure-1 : List of RESPOND Projects From 2000 - March 2013

Sl. No	Title of the Project
1.	Role of metal cyanogen complexes as prebiotic catalyst
2.	Two-Phase flows in composite domains under Microgravity conditions
3.	Auroral Electrodynamics by Kinetic Alfven Waves
4.	Mossbauer spectroscopic investigation of meteorites and correlation with their pre terrestrial history
5.	Study of meteorites and their impacts on earth
6.	Structure-property correlations in ultra high strength steels
7.	Development of linear motor
8.	Corrosion behaviour characterisation of 18 Ni 250 grade maraging steel in alkaline and neutral media
9.	Performance of Isogrid and some stiffening arrangement in composite arrangement in composite stiffened shells
10.	A Study of glass and silicon carbide fiber reinforced Al(6061) hybrid composite for space applications
11.	Micro level planning of forest resources development using high resolution satellite data
12.	Cotton Growth and Yield Modelling using Spectral-Agromet Observation and GIS
13.	Resources Utilisation Pattern and its Impact on the Biodiversity in the Lake Region of District Nainital, Kumaon Himalaya, Using RS & GIS
14.	Estimation of Rain parameters from Doppler Radars
15.	Indian concepts of cosmology
16.	Development of automated data analysis techniques for spectroscopic and photometric astronomical data
17.	Monsoon Onset Boundary Layer Experiment
18.	The diffused UV sky on Astrosat modelling
19.	Design and analysis of impact resistance structures
20.	Development of intelligent pressure sensors for dynamic environment
21.	Satellite Astrometry using Radio Interferometric Techniques
22.	VHF Radar measurement of momentum fluxes of gravity waves and tide over lower atmosphere over a tropical station

23.	A study of coupling between radiometer measured aerosols and RADAR sensed winds
24.	Studies of aerosols climatology and effects in relation to atmospheric aerosol research for GBP applications
25.	Synthesis of biomolecules during star formation and their detection with microwave and millimeter wave grating
26.	Quantifying the Methane flux from cattle manure dumps in the rural area
27.	Modulation of galactic cosmic ray intensity in the three dimensional heliosphere
28.	Development of image compression algorithms using EZW, SPIHT and PZW coding techniques
29.	Object based Software Fault Tolerant Architecture for Real Time application (SOFTART)
30.	Automatic generation of test vectors for VLSI design
31.	Buckling and non-linear post buckling analysis of stiffened composite shells based on wavelet Galerkin projection
32.	Search for potential electrode materials for Li-Ion
33.	Preparation and characterization of E-Glass fibre reinforces polyurethane matrix composites for space application
34.	Development of parallel / concurrent genetic algorithms for test cases / sequences generation of VLSI testing
35.	Use of Fibre Optic Sensors for strain displacement and load measurement data acquisition transmission through FO Glass
36.	Long term and short term short line changes and sedimentation pattern along the coast between Honnavar and Bhatkal, Uttara Kannada District Karnataka
37.	Estimation and modelling of suspended sediments, littoral, transport and coastal dynamics in the coastal waters off southern Karnataka
38.	Retrieval and budgeting of soil moisture and data monitoring from IRS-P4 (OCEANSAT-1) mission data-climate of Andhra Pradesh
39.	Study of mixed layer dynamics of the North Indian ocean using satellite data
40.	Analysis of the precipitation, surface wind and water vapour during the intensification of the tropical cyclones over Bay of Bengal using TRMM, MSMR and SSMI data
41.	Some studies on coastal upwelling phenomena along the Indian coasts using satellite and hydrographic data
42.	Design and development of RS based information system for marine Archaeology
43.	An ecological account of the faunal biodiversity of Sriharikota Island and its environment
44.	Estimation of precipitation over Andhra Pradesh from satellite IR and NW data
45.	Development of regional language interface for information retrieval from data base

46.	Development of RS & GIS based decision support from planning Mine closure for western coalfields
47.	Integrating RS data GIS & Hydrological modelling for assessment of rural water supplies
48.	Fractal image compression using neural network
49.	Prediction of offshore and near shore wave climate and sediment transport along the east coast of India using MSMR
50.	Satellite data compression and decompression
51.	National standard for digital geo-spatial metadata and software development for metadata toolbox
52.	Impact assessment of slope stability and sedimentation on land degradation processes in outer Garhwal Himalayan region
53.	Knowledge based processing of epigraphy texts
54.	Characterization of Aerosols
55.	Study of polarization properties of radiation emitted from accretion disks around compact objects
56.	Studies on aerosol monitoring and their impact on atmosphere
57.	Estimation of dissociation energy of diatomic molecules of interest in cometary studies
58.	Investigations of the structure and evaluation of selected interstellar bubble
59.	Identification and characterization of passive detection materials for heavy ion detection
60.	Study of short period gravity waves and associated momentum fluxes in the tropical middle atmosphere using MST radar & Lidar
61.	Development and characterization of organic and polymeric nonlinear optical materials relevant to space technology
62.	Design and development of active filters and oscillators to operate at low frequencies
63.	Photochemical metallodendritic supra- molecular assemblies as light harvesting antennas
64.	Precise location of INSAT using connected element interferometer

65.	An improved finite element model and solution procedure for damage tolerance analysis of spacecraft shell structures
66.	Design, development and realization of a ultra-high temperature sensor to measure very high process temperatures in applications like electron beam welding, vacuum brazing and annealing of metallic components
67.	Epoxy resin/engineering thermoplastic blends: miscibility phase morphology crystallization & ultimate properties
68.	Design, development and optimization of anodic bonding process for MEMS applications
69.	Development and performance analysis of silica/phenolic resin composites for usage in spacecrafts
70.	Short term risk assessment due to evolving debris clouds in low earth orbits
71.	Development of techniques for fabrication of PEEK/CF composites and characterization
72.	Mathematical modelling and computer simulation to predict friction and wear performance of solid lubricant coatings
73.	Studies on the damage mechanics of composite structures
74.	Applications of chaos theory to 2-D interpolation of irregular data set image compression
75.	Urban squalor has a facet of urban landscape: environment issue from Hyderabad
76.	Evolution of ground water potential zones using remote sensing and GIS techniques in the hilly terrains of Devak-rui watershed
77.	Visual Cryptographic Schemes
78.	Steganographic schemes for satellite images
79.	Development of an indigenous Block cipher scheme for ISRO
80.	Geotechnical investigation of land instability in Kohima Town and along national highway 39, between Chumukedima and Senapati
81.	Content based retrieval of remotely sensed data
82.	Reliability assessment of a solid rocket motor with limited data
83.	Evaluation of reliability of a unit of flight control software
84.	Computational intelligence approaches to design land cover classifiers with emphasize on universal land cover classifiers
85.	Land use planning and management of natural resources of Dhar district through remote sensing
86.	Identification of Palaeo-Channels and reconstruction of past fluvial system of Kerala Region through remote sensing applications
87.	Monitoring of flamingo's traditional ground and evaluation of alternate breeding ground for their conservation through remote sensing



88.	Dynamic modelling for pattern recognition using artificial neural networks
89.	Integrated coastal zone management and ecological evaluation of Vedaranyam coast using remote Sensing and GIS
90.	LITHYPER: Lithological Discrimination using Hyper spectral Data and its comparative evaluation with satellite data
91.	Development of land cover classification methodology with fusion of data from different sensors
92.	Study on intracratonic deformation and landform development in Central Aravalli terrain, Rajasthan using Space imagery
93.	Liquid sloshing in spherical tanks under microgravity conditions
94.	Plasma conditions in the inner corona
95.	Cosmic ray induced ionization changes and effects aerosol and cloud micro-physical properties
96.	Supramolecular organization in chemical evolution and origin of life
97.	Study of galactic ionized regions using radio recombination lines
98.	Studies of finite amplitude double layers in space plasma
99.	Development of a theoretical model for investigations of the Indian equatorial and low latitude ionosphere
100.	Studies on Volatile Organic Compounds (VOCs) in Chhattisgarh(Central India)
101.	High speed architectures for satellite image compression on reconfigurable platforms
102.	Effect of liquid propellant spillage on soil, groundwater and ecology and mitigation measures
103.	Deep Level Transient Spectroscopic (DLTS) study of radiation induced degradation of electronic devices
104.	Effect of ionized plasma medium on antenna structures mounted on re-entry vehicles
105.	Investigation of different neural network techniques for rocket trajectory estimation
106.	Formal specification – based object testing
107.	Software development for design and simulation of MOEMS based sensors
108.	Oxazolo (4,4-d) oxazole based liquid crystal line thermo sets for rocket applications
109.	Development and characterization of high temperature thin film thermocouples for aerospace applications
110.	Corrosion behaviour and characterization of Al alloy 2219 in different media under different conditions
111.	Heat transfer studies in a porous media
112.	Synthesis and electrical resistivity studies on filled skutterudites
113.	Thermal analysis of various elements in an enclosure accounting for shadowing effects

114.	Development of particulate reinforced Al MMCs with superior thermal properties for space applications
115.	Development of Al foam for structural application
116.	Development of a remote sensing and GIS based methodology for ground water Protection framework
117.	Deterministic predictions of meteorological parameters with a meso-scale model for operational applications
118.	Image fusion for improvement in quality and classification accuracy
119.	Estimation of sediment flux and shoreline change prediction along Godavari delta front
120.	RS-GIS studies for biodiversity characterization at landscape level in Jharkhand forests
121.	Development of site specific nutrient management through precision farming technology in rice-wheat cropping system
122.	Bayesian automated recognition of targets (BAPT) from remotely sensed airfield images
123.	Number theoretic approach to Cryptanalysis
124.	Development of space qualified high temperature super conducting thin film microwave applications
125.	Development of microwave dielectric resonators and high KMIC substrates
126.	Socio-cultural dynamics of water shed development programmes: a cross cultural study in India
127.	Participation and its impact on sustainability of natural resources: A sociological study in Mahbubnagar
128.	Remote sensing for identification and study of palaeochannels and archaeological sites
129.	Detection and impact assessment of Moisture stress on crop yield of Maize using remote sensing
130.	Soil, fertility assessment and nutrient management for optimum crop production using remote sensing and GIS
131.	Space Technology, forest and the people :A study of the Impact of RS technology on joint forest management
132.	High power radio propagation through plasma sheaths surrounding space vehicles
133.	MST Radar signal processing employing wavelet
134.	An integrated model for risk zone mapping of storm surge related hazards along the West Bengal Coast
135.	Ion exchange mechanism of the aerosols of lower tropospheric atmosphere in Chattisgarh region
136.	Radio, X-ray and Gamma-ray monitoring of micro-quasars
137.	Extraction of multispectral features from satellite imagery

138.	Origin of life and evolution of function in biological macromolecules: functional implications of gene duplication during evolution
139.	Modeling and calculations on atomic-molecular collision processes relevant in planetary and astrophysical systems
140.	Mathematical modelling of smart material in a poorly electrically saturated composite materials
141.	Study of minor bodies of solar system by simulating laboratory data to match with spacecraft observations
142.	CPLD based control and introducing system for Indian MST radar transmitter
143.	MST radar signal processing using wavelets and harmonic decomposition
144.	Investigation of tropical convection through observations of gravity waves and troposphere-stratosphere exchange of various parameters
145.	Role of metal oxides as Catalyst in chemical evolution and origin of life
146.	Observations of Shallow and Deep convection and their role in generation of gravity waves using Indian MST Radar
147.	Study of ionospheric scintillation (UHF and VHF) and TEC at the Crest of the Appleton anomaly at Udaipur
148.	Analysis of PIV and PLIF Images for fluid flow characterization and visualization
149.	Wavelet based vibration monitoring in flight/space vehicles
150.	Spray formation with a generic pressure swirl atomizer for air breathing and cryogenic propulsion systems
151.	Optimization of Weld parameters of Al-Li alloys including weld repair protocol
152.	Evaluation of thermal properties of E-glass short fibre and silicon carbide Reinforced hybrid MMC for space Applications
153.	Study on improvement of surface finish in EDM Drilling process by means of electrode rotation
154.	Development of nanocrystalline Al <sub>2</sub> O <sub>3</sub> dispersed Cu-Matrix composites
155.	Investigation of flow field interaction around protrusions at supersonic speeds
156.	Fibre reinforced composites joints
157.	Evaluation of Coconut Oil as metal working fluid in the machining of AISi 304/314 in respect of reducing chatter
158.	Investigation of Titanium Lined composite pressure bottles
159.	Automated design methodology for aero- space structures subjected to severe thermo mechanical loads
160.	Compressible viscous flow calculations using the mesh less solver LSFD-U
161.	Synthesis of novel thermo-responsive polyurethanes cross linked with hyper branched polymers
162.	GENSOLV: A software tool for genetic optimization of launch vehicles
163.	Development of Transducer from conducting composite

164.	Six degree of freedom modelling and closed loop robust control of a reusable winged body satellite launch vehicles
165.	Laser processing of Ceramic Coatings on Aluminium, Titanium and Related Aerospace alloys
166.	Synthesis of cristobalite from silica precursors and study of its reinforcing properties in polysiloxane networks as relevant to space applications
167.	Development and implementation of JPEG 2000 image compression algorithm for Monochrome and color images in ADSP
168.	Preparation and Property Evaluation of Beryllium based metal matrix composites for light weight and high strength structural Application
169.	Dynamic Modelling and simulation of multi body satellite systems
170.	Study of Vector Plasma Drift at the Equatorial Ionosphere
171.	Automated Interpretation of Industrial radiographs using ANN
172.	Development of Fast and Effective cryptographic techniques
173.	Advanced techniques for content based retrieval of digital multimedia databases
174.	Space weather effects and their modelling with respect to Indian Geo-stationary satellites during 2000-2004
175.	Site selection for mini hydel project using RS and GIS in the Kalimpong sub-division of West Bengal
176.	Study of rain bearing monsoon clouds using INSAT Data
177.	Intraseasonal oscillation of precipitation and its coherence with circulation during monsoon using TMI data
178.	Numerical simulation of atmospheric dispersion for Kerala Coast
179.	Vertical structure and dynamics of tropical mesoscale convective systems observational and modelling studies
180.	Crustal deformation studies on seismically active N45° E Fault zone of southern granulite terrain in TN, using GPS aided geodetic techniques
181.	Study of higher order modes in micro strip antennas
182.	Detection of weeds for precision crop management using Remote sensing technique
183.	Assessment of salt affected and water logged areas in Upper Krishna project
184.	Influence of Forest Cover Change on watershed functions in Western Ghats
185.	Investigations into some ecological aspects of Sriharikota Island:(1) plant animal relationships with special reference to food plants of birds and mammals (2) Ecology of slender loris (Loris Tardigradus) with special reference to vegetation types
186.	Multi-seed classification for multi spectral satellite images based on fuzzy logic minimum distance classifier
187.	Crown counts of trees growing in Shoolpaneshwar sanctuary by using Hyper-spectral sensing

188.	To delineate multipurpose tree communities using multi concept remote sensing data as a pilot R&D for future Indian Remote Sensing Satellites
189.	Legal regime on asset based financing and leasing of mobile equipments in space and protection of International Interest thereof: study with reference to UNIDROIT convention and its draft protocol from the perspective of India
190.	Modelling of ground water pollution through RS & GIS – A case study for Cauvery basin from Mettur Reservoir to Erode Town
191.	Wavelet based urban change detection technique for RS data and Database creation using GIS
192.	Detection of pests and diseases for precision crop management using RS Techniques
193.	Research activities related to NMRF at the advanced centre for atmospheric sciences (NMRF)
194.	Development of artificial neural network scheme to TAUDEX satellite
195.	A study on the variability of total electron content near the crest of the equatorial anomaly in the Indian zone
196.	Analytical modelling and numerical simulations of the quasi periodic oscillations of black hole candidate
197.	Study of grain chemistry in relation to the formation of complex molecules in collapsing molecular clouds
198.	Anomalous phenomenon C <sub>3</sub> H and C <sub>3</sub> D cyclic molecules
199.	Spectral and temporal analysis of the observed data from two black hole C candidates
200.	Fabrication and characterization of Organic Solar Cells(OSC)
201.	Elastomer-based polymer nano composites for control system bladders
202.	Numerical and experimental analysis of carbon phenolic composite shells under impact
203.	Finite element model updating based on experimental test results
204.	Development AO and VUV radiation resistant polyimides
205.	Stress corrosion studies on Al-alloys (like Al-7075 - T 7351 and Al 7075 - T651)
206.	Development of emulsion polymerization process for acrylonitrile-methyl acrylate - itaconic acid terpolymers
207.	Conversion of light to electricity by the photo-sensitization of nano-crystalline TiO <sub>2</sub> by light harvesting metallodendritic supramolecular assemblies
208.	Nano powdered filled conductive polymer composites for space applications
209.	Theoretical and experimental investigation of thermal contact resistance at the interfaces of thermal insulation systems and structural assemblies
210.	Laser Assisted Disposition(LAD) of thermal barrier coatings for space shuttle applications
211.	Toughening studies of epoxy (DGEBA) resins

212.	Development of polymer woven glass based low permittivity and low loss microwave substrate
213.	Segmented Polyurethane (SPU) based nano-composites from functionalized nano-clays with special reference to fire and flammability properties
214.	Safe and effective water harvesting site selection model based on critical slope analysis using remote sensing
215.	Development of EMI shielding/static charge dissipating materials from electrically conducting PANICNs for space applications
216.	Inverse heat conduction
217.	Effect of processing on properties of polymer composites by microwave curing
218.	Synthesis and characterization of organophilic nano clays
219.	Development of non-linear membrane elements with wrinkles and slack regions for design/ analysis of inflatable structures
220.	Development of pulse tube cryocooler
221.	Remote sensing based analysis of vegetation succession/recovery in the event of fire damage in Bhadra Wild life Sanctuary of Western Ghats
222.	Monitoring of post -tsunami malariogenic conditions in Car Nicobar Island using satellite remote sensing
223.	Development of a simulator for airborne altimetric LIDAR
224.	Precision farming techniques in sugarcane cultivation
225.	Mapping and exploration of low-grade iron ore deposits in the Northern districts of Tamil Nadu State, India
226.	A cost effective smart antenna for mobile broadband applications
227.	Analysis of errors made by operators during digital mapping from cognitive style perspective
228.	Bioremediation of water contaminated with industrial effluents
229.	Development of protocol for vector borne schistosomiasis using remote sensing and GIS
230.	Quantitative study of evolution of mesoscale convective system by Doppler weather radar and its application in precipitation now casting
231.	Analysis of satellite derived wind and wave parameters for coastal waters off Karnataka
232.	Design and development of high power solid state transmit receive module at HF/VHF frequencies
233.	Effect of solar output and its variations near geo-space environment
234.	Three dimensional simulation of convection in stellar convection zones
235.	Investigation of collective processes in laboratory dust plasma
236.	Study of correlation between ionospheric activities with earthquakes by monitoring Very Low Frequency (VLF) signals
237.	Morphological and spectral properties of the hot gas in early type galaxies

238.	Study on different heating and synchronized measurement techniques for infrared thermography applied to NDE of honeycomb composite spacecraft components
239.	Development of multi- frequency SODAR for temperature profile measurements
240.	64 Bit architecture for space applications-A study
241.	Extruded Al6063 - TiB <sub>2</sub> composites for space applications
242.	Development of artificial intelligence for interpretation of ultrasonic test data
243.	Simulation of multistage deep drawing of inconel alloy for aerospace applications
244.	MEMS based micro propulsion devices for microsatellite programme
245.	Development of nano structured binary spinal sulphide for hydrogen generation using solar energy
246.	Restoration and deblurring of images using blind deconvolution techniques
247.	Micro resonating differential pressure sensor; simulation and electronic interface design
248.	Uncertainty analysis of chain error in instrumentation system
249.	Control of flexible and re-configurable parabolic antenna using SMA based smart actuators
250.	Urban disaster management and emergency response
251.	Development of multi modal interface for information retrieval in regional language from database
252.	Archaeological investigations using remote sensing techniques
253.	Detecting, locating, identifying and documentation of the monuments and cities of the eastern Vindhya using Remote Sensing
254.	Dynamics of urban pollution: A curative strategy using RS and GIS techniques - A case study of mega city of Delhi
255.	North-Eastern Regional Institute of Water & Land Management
256.	Reconstruction of 3D objects from stereo space imagery for development city models
257.	Classification of hyperspectral remote sensing data to discriminate between crop condition, variety and stage
258.	Synthesization and characterization of lead zirconite titanite polymer composites for high range pressure sensor and accelerometer
259.	MST Radar observations of meteors and the investigations of equatorial E-region electro-dynamics
260.	Studies of ionospheric and magnetosphere interaction: role of dust due to meteor showers and Kelvin - Helmholtz instability on the ground magnetic field variations
261.	Development of machine learning tools for astronomy research

262.	Optical spectroscopic study of Polycyclic Aromatic Hydrocarbon (PAH) stars
263.	Interpretation of the observed extinction in the optical UV region from TAUVEX and Astrosat UVIT satellite data base
264.	On the application of wavelet analysis to identify geo-magnetic jerks in the Long period global magnetic Observatory Data
265.	Hematite water systems on Mars and its possible role in chemical evaluation
266.	Polymer nanocomposites for Inflatable Space Structures (ISS)
267.	Investigation of heat transfer phenomenon at high heat flux in nucleate flow boiling
268.	Modelling and characterization of fracture toughness of metal matrix composites
269.	Non-linear stability of L4 in the circular and elliptic restricted three body problem for radiated axes symmetric rigid primaries with resonances
270.	Design and fabrication of polymeric modulator for space technology applications
271.	Development of ultrafine grain aluminium alloy and composites through Equal Channel Angular Pressing (ECAP) for space applications
272.	Comparative computer base simulation studies on the evaluation of sensor fault detection and isolation in DC motor position servo system
273.	Development of nano particles of (Ba, Sr, Ca) TiO <sub>2</sub> and their combinational ceramic oxides through a novel modified combustion process for microwave applications
274.	Development of TiAl based intermetallic intermetric composites for prospective space applications
275.	Development of high performance, impermeable membrane from halo butyl nano composites for space applications
276.	Characterization, optimization and fabrication of ferromagnetic shape memory alloys for electromagnetic actuator applications
277.	Space Education for school and communities
278.	Study and optimization of micro strip antenna system to receive satellite link from moving trains
279.	Flood risk modelling using satellite remote sensing data for optimal crop planning
280.	Analysis and design of wide band microstrip patch radiator
281.	Development of image and signal processing algorithms on leading DSP processors and development of special purpose FPGA for co-processing
282.	Investigation on multiband fractal antenna for satellite applications
283.	Development of remote sensing and GIS based approach for flood forecasting and warning for lower Tapi basin
284.	Design and development of 32-bit RISC processor based IP code for space application
285.	Theoretical studies of cosmic molecules a quantum chemical approach
286.	Parametric Processes in the radio wave heating of the ionosphere
287.	Numerical simulation to study solar wind turbulence and coronal heating



288.	Electro-hydro-dynamics in stability in the microgravity environment at the interface of the poorly conducting fluid bounded by rigid surface
289.	Study of environment at multiwave length properties of Active Galactic Nuclear (AGN) and Ultra Luminous X-ray(ULX)
290.	Spatial and temporal variability of total ozone - special reference to the Indian scenario during the Asian summers monsoon circulation
291.	Very low frequency (VLF) wave phenomena in magnetosphere ionosphere coupling
292.	Mathematical modeling of electromagnetic waves and stability in Chiral fluids with emphasis on developing efficient antenna and artificial organs
293.	Photometric and spectroscopic studies of galaxies in deep survey fields
294.	Physics and application of electron rich dusty plasmas
295.	Experimental investigation of SMA actuated flexible structure under piece wise output feedback control
296.	Development and characterization of carbon fiber/epoxy laminate filled with Carbon Nano Tubes (CNTs) for composite structure for LV and Satellites
297.	Novel contact and non contact based liquid level sensing using MEMS technology
298.	Photo Thermal Deflection (PTD) for non-destructive testing of space vehicle components
299.	Development and characterization of multilayer thermal barrier coatings of Hafnium carbide (HfC) and Silicon carbide SiC for aerospace application
300.	Development of new thermoset polyimides for PMR-15/BMBZ-15 replacement
301.	Morphodynamic study of the Diga coast of West Bengal for sustainable development and erosion mitigation using RS and GIS techniques
302.	Design optimization of multilayer micro strip antennas using artificial neural networks
303.	Efficient download transmission, error correction and encryption techniques for IRNSS data
304.	Application of RS techniques in assessment of landscape dynamics along the Indo Myanmar ranges
305.	Geospatial technology for mineral exploration program in Singhbhum shear zone of Jharkhand
306.	Study on the coherent structures of dust -ion-acoustic nebulons in interstellar space plasmas as well as on the surface of moons and rotating stars
307.	Study of the spectral and temporal properties of X-ray binaries
308.	Study of space weather and equatorial spread F(ESF) using total electron content (TEC) measurement through a network of global positions system (GPS) receivers
309.	A study of variability of post-sunset total electron content and scintillation near the crest of the equatorial anomaly in the Indian Zone
310.	ARM processor based control and monitoring system with remote interface for radar transmitter and T/R modules
311.	Establishing an antenna and RF laboratory

312.	Electro chemical deposition of aluminium lithium alloys for cryo and space application
313.	Analysis and evaluation of multilayer shear damped disco-elastic treatments of launch vehicle application
314.	Implementation of MPEG advanced audio coding decoder
315.	Morpho-tectonic evolution of the KOSI river basin, Bihar using RS data
316.	Active vibration control of laminated shells
317.	Study and development of image compression algorithms for satellite images
318.	Analysis of radiation from multi device high gain amplifier and interaction of active MMIC with package/housing - theory analysis and measurement
319.	Design and implementation of security attributes driven energy - efficient link layer architecture for wireless sensor networks
320.	Diurnal variation in hydrographic condition in the near shore regions off Honnavar, Central West Coast of India; implications on application of OCM for pollution dispersion studies
321.	Monitoring peri urbanization of Bangalore city - applying GIS and RS
322.	Designing of Spatial Light Modulators (SLMs) based on Nematic Liquid Crystals doped with non-mesogenic molecules (polymers, nano-particle and dyes)
323.	Design and development of a miniaturized Dual-Band/Tri Band antenna using Negative Refraction Index technique
324.	Electron scattering and atomic molecular processes in planetary and outer space environments: theoretical investigations
325.	Lower Atmosphere-Mesosphere Thermosphere/Ionosphere coupling studies using DWR data over Sriharikota, MST radar data over Gadanki and geomagnetic data from Indian network stations
326.	Study of ionospheric behaviour during total solar eclipse of July 2009 using the characteristics of Very Low Frequency (VLF) signals
327.	A theoretical and spectroscopic study of the mechanism of formation of prebiotic molecules and amino acids in the interstellar medium
328.	Study of Chromospherically Active Stars (CAS)
329.	Propagation and near-earth manifestations of Solar Coronal Mass Ejections (CMEs)
330.	Developing analytic formulas for extinction spectra of the major interstellar dust components
331.	Modelling simulation and control of space robots
332.	Embedded fiber optic sensor based instrumentation system for structural health monitoring
333.	Strengthening of aluminium alloy 6061- Carbon Nanotubes Composites
334.	A critical investigation on effects of interleaving on de-lamination fracture toughness and fuel permeability under extreme thermal stresses and low velocity impact

	conditions
335.	Impact of land use/land cover changes on the hydrologic regime in Western Ghats – A case study in Netravathi basin, using RS and GIS
336.	Design feasibility study and realization of a single directional antenna for L & S bands
337.	Optical cluster detection over high resolution satellite imagery and its applications
338.	Information extraction from multipolar radar data
339.	Analysis of micro strip radiator using particle swarm optimization technique
340.	Multi-criteria spatial system for evaluating environmental impacts of land use change in Urban and peri-urban limits using remote sensing and GIS
341.	Study of Radar Bright Band Height
342.	Spatial characterization studies of clear and fracture pattern in coal formations from Godavari Valley coal basin to evaluate the zones of coal bed methane migration and accumulation using RS & field studies
343.	Predicting flood inundation using RS and GIS following: A case study of North Bengal
344.	Modeling of raindrop - size distribution and Attenuation at SHF/EHF band for Indian regions
345.	Earthquake damage scenario analysis for Chennai city using remote sensing and GIS techniques
346.	Analysis and development of matched feed for offset parabolic antenna system
347.	Investigations on the role of aerosol, cloud and water vapor on the precipitation characteristics of Indian Summer Monsoon
348.	Measuring fundamental properties of compact objects and underlying accretion process
349.	Technique Development (Training & Genetic Algorithm methods) for improved satellite rainfall estimation over India
350.	Computational fluid dynamics analysis of ejector - diffuser system used for testing of rocket engines in low pressure environment
351.	Design and analysis of light weight 5-axis robotic manipulator with indexing type end effector
352.	Development of a computational tool for the analysis of hypersonic flow using Direct Simulation Monte Carlo (DSMC) method
353.	Study of flow field inside air intake with flow control
354.	Development of electro catalysts for PEM water Electrolyser for production of pure hydrogen and oxygen
355.	Development of stable Pt and Ni doped nanostructured ternary semiconductor catalysts for Solar hydrogen production by water splitting
356.	Study of parametric sensitivity of water permeation in Fuel Cell Proton Exchange Membranes

357.	Automated disposition of weld radiographs based on given specification and performance enhancement of the existing developed system
358.	Evaluation of Ti-15-3 Beta Titanium alloy for high strength fasteners for space applications
359.	Study of Chaos and its applications in communication: implementation using DSP Processor
360.	Feasibility studies on biological reduction of ammonium perchlorate from APEP effluent using a Perchlorate reducing microbial culture
361.	Development of Advanced Texture classifier for remotely sensed data using photometric stereo-A case study of Alagar Hills, Madurai District
362.	Friction Stir welding (FSW) of Aluminium Alloy used in space applications (6061 T6, 2195 & 7050)
363.	Analysis of positioning errors in GPS ground control surveys from cognitive psychology perspective - An intervention to reduce such errors & improve accuracy
364.	Development of advanced nano ZnO sensors for atmospheric and environmental monitoring
365.	Satellite based assessment of fire severity and validation in Uttarakhand
366.	Design and demonstration of a set of algorithm for high reliability wireless data acquisition and control
367.	Development of advanced fractional transform based algorithm for satellite image compression, encryption, digital watermarking and image matching applications
368.	Design and Analysis of Frequency Selective Surface at Ka/Ku Band for Reflection and S Band for Transmission
369.	CDMA code design, link level simulation and interference analysis for IRNSS based SatNav receivers
370.	Implications of satellite imagery on cultural heritage resource management
371.	Atmospheric Boundary Layer (ABL) & Cloud characteristics and monitoring of aerosol over Cochin
372.	Spatial & temporal variability of total ozone over the Tropics-Special reference to the Indian Scenario during the Asian summer monsoon circulation
373.	Waves & instabilities in Space Plasmas
374.	Study of correlated Ultra-violet and X-ray Emission from X-ray Binaries
375.	Development of cloud cover information over the Indian region using geostationary satellite INSAT/Kalpana/METEOSAT cloud image data
376.	Study of the Interstellar processes leading to the deuterium enrichment
377.	Interaction of electromagnetic wave with high energetic plasma in Uranus
378.	Surface measurements of atmospheric radioactivity and its influence on electrical conductivity of earth's atmosphere
379.	Studies on the dynamics of the upper atmosphere over low latitude by Global Positioning System (GPS) data.
380.	Study of Chaos & its applications in communication: implementation using DSP Processor
381.	Development of prototype MPD Thruster

382.	Design and prototype model development of directional conical coverage choke ring antenna for RF and multipath mitigation
383.	Development of Hydroxyl Ammonium Nitrate (HAN) monopropellant system
384.	Thermal response of sandwich honeycomb panels under transient heating condition (theoretical analysis)
385.	Heat flux estimation using transient temperature measurements
386.	Nanomechanical characterization of carbon carbon composites
387.	Hardware implementation of image enhancement using wavel/Retinex algorithms
388.	Panchromatic images, image segmentation using level sets, active contour models
389.	Spatio-Temporal monitoring of soil moisture dynamics and crop growth
390.	Intelligent satellite image retrieval and analysis based on ontology approach
391.	Classification of forest types and estimation of tree heights from Space Borne Polarimetric SAR data
392.	AWiFS based Spectral Biomass Model for Tiruvannamalai District
393.	Development of algorithms for Narrow Band Interference in IRNSS received signal
394.	GIS Based early warning Landslide susceptibility model using data mining classification approach
395.	High resolution Indian Ocean state estimation
396.	Design, development and hardware implementation of BPSK, QPSK and other modulation schemes as part of Software Defined Radio (SDR)Cognitive Radio (CR), for use in SATCOM terminals
397.	Radio Frequency (RF) Local Area Network (LAN) for Satellite
398.	Feasibility studies on enhancing detector efficiency with structured plasmonic films
399.	Dual blind detection robust watermarking for multimedia security
400.	Study of the biodiversity of Kodachadri hill range in Mookambika Wild Life Sanctuary
401.	Development of approaches for geometric, radiometric and atmospheric correction of remote sensing data products for multi-date data analysis
402.	Grid based application development for satellite image processing
403.	3D Reconstruction and software development for city model generation from satellite images
404.	Production of hydrophobic nano silica from rice husk/commercial grade precipitated silica for reinforcement of rocket insulation rubber and thermal protection of reusable launch vehicles
405.	Wavelet based image compression/decompression with pipelined architecture on FPGA
406.	Development of image processing method for assessing content of Trees Outside Forests (TOP) using IRS high Resolution Satellite images

407.	Condition monitoring and health assessment for bearings of cryogenic engine turbo pump
408.	Design and simulation of a new energy efficient ML-MAC wireless sensor protocol
409.	Analysis of dielectric resonator antenna array
410.	Development of bulk heterojunction solar cell based on nanostructured conducting polymer inorganic hybrid composites for harnessing broad band solar spectrum
411.	Polymerization of Biomolecules on Metal Oxide Surfaces Implication in Origin of Life
412.	Elliptic Curve Cryptography
413.	Energy dependence of the X-ray variability of neutron star and black hold binaries
414.	Study and simulation of landing dynamics of a lunar soft Lander
415.	Study and implementation of advanced low bit rate audio encoding and decoding algorithms
416.	Whole field strain measurement using Digital Reflection Photo elasticity
417.	Conformal array synthesis using evolutionary algorithms for the generation of a shape beam antenna for data transmission
418.	Satellite Radar and Lidar based studies on vertical coupling of atmospheric dynamics and ionospheric electro dynamics
419.	VHDL implementation of efficient Trelli's coded spatial modulation scheme for MIMO communication
420.	Study of the dynamical processes in the Solar Atmosphere
421.	Dimensionality reduction of Hyperspectral remote sensing data
422.	Robust Video Streaming using H.264 Scalable Video Coding over Mobile Broadband Networks
423.	Design and development of low insertion loss narrow band surface acoustic wave (SAW) filters on Quartz substrate at VHF & VHF for satellite communication
424.	Simulation & analysis of system design requirements for ground to satellite & inter-satellite free space optical communication link
425.	Tin-based composites as High-capacity Lithium-Alloy anodes for Li-ion Batteries
426.	Feasibility studies on development of surface integrity and strength characteristics of rapid prototyped components to enable their direct applications in design and development activities of payload for spacecraft
427.	Development of dispersion process of high solid containing propellant slurry with Nano Al Particles
428.	Development of piezo electric actuator for micro positioning of space structures

429.	Study of pollution mechanisms in urban aquifers of Bruhat Bengaluru Mahanagara Palike (BBMP) area by integrated geophysical, Remote Sensing and GIS Techniques
430.	Wave modeling for North Indian Ocean using SAR and MIKE-21
431.	Development of III - Nitrides thin film(s) for high frequency SAW device applications
432.	Synthesis, characterization and application of a novel metal complex photo catalyst system for carbon dioxide splitting