# RESEARCH IN RABINDRANATH TAGORE UNIVERSITY & AISECT GROUP OF UNIVERSITIES

16

TAGORE UNIVERSITY





RESEARCH IN RABINDRANATH TAGORE UNIVERSITY & AISECT GROUP OF UNIVERSITIES





# AGU RESEARCH- A ROAD MAP FOR EXCELLANCE

Research, Skill, Innovations and Entrepreneurship are in the DNA of AISECT Group of Universities (AGU), which puts all the universities of AGU in a altogether different class as compared to other institutions. New Education Policy (NEP) 2020, ushered in a new era of Quality Research and Innovation with holistic approach in 2020, similarly Skill India Mission, focusing on the skill deficit, launched Skill India Mission in 2015, whereas Rabindranath Tagore University (RNTU) established several centers of research excellence to bring in culture of research and innovation amongst students and faculty with its inceptions itself in 2011 and introduced skill electives in the curriculum in 2013. Government of India announced Innovation Mission in 2017 to boost up entrepreneurship and startup, and RNTU became the first private university in central India to bag the first Atal Incubation Centre. For the kind of priority and programs of green initiatives operated in the campus, MNRE selected RNTU as one of the 17 campuses in entire India to award funds for building green campus. Pradhan Mantri Kaushal Kendra (PMKK) within the university campus, several big companies like DAIKIN, LUCAS-NUELLE, Microsoft, Micro focus, Tata, Frugal Labs, Intel etc establishing their industry centres in the AGU campuses, provide not only opportunities for skill development and making students industry ready, but also facilitate research and innovation. There is an unending list of such firsts in the domain of higher education for which credit goes to AGU. Such efforts of AGU is changing skyline of research and innovation in HEI's.

Over 200 research faculty, armed with PhD, long research experience and industry background, are the big asset and real strength of AGU research. For lit's capability and research potentials, AGU has bagged research projects funded by DST, DRDO, MNRE, MPCST and similar organizations. Most innovative initiative of AGU was the independent group titled Core Research and Innovation Group (CRIG), to provide internal funding for which a huge corpus of 1 Crore annually has been set up in the AGU. CRIG has its own advisory board of eminent specialists. It has funded over 23 research projects in last 4 years and financed over 70 patents. Multidisciplinary approach and collaborative research is another niche area of AGU research. AGU has large number of active research collaborations with universities, research organisations and industries within the country and abroad. There are over 15 International and 150 National active research collaborations of AGU. AGU is also very well known for meaningful mega research events in the form of international and national conferences, seminars and symposiums. The most interesting part of these events is that, they are not only in STEM topics, but also in humanities where Rabindranath Tagore Centres for Art & Culture is conducting research in languages, arts, history, yoga etc and providing real grounds for implementing the vision of 2020 motivating Indian youth to revisit the cultural roots of India. This catalogue provides a window to look in the rich research resources available at AGU interns of advanced equipments, laboratories, hardware & software packages and highly trained, experienced gualified research people.

	CONTENT	
1.	AGU- Universities of New India	1-3
	1.1 About AGU	
	1.2 What Research Means to AGU	
	1.3 Research Philosophy in AGU	
	1.4 Implementation of Research Philosophy in AGU	
2.	CRIG-AGU	4-10
	2.1 CRIG- A Unique Concept	
	2.2 Vision and Mission of CRIG	
	2.3 Research Values and Guiding Principles	
	2.4 Multidisciplinary Research	
	2.5 DRIC	
	2.6 Journals	
	2.7 Shodh Shikhar 2022	
3.	Centers of Research Excellence	11-21
	3.1 New Dimensions of Research	
	3.2 Categories of Research Centers	
	3.3 Technology Centers of Research Excellence	
	3.4 Skill Centers of Research Excellence	
	3.5 Cultural Centers of Research Excellence	
	<ul><li>3.5 Cultural Centers of Research Excellence</li><li>3.6 Some Significant Activities in Technology</li></ul>	
4.	<ul> <li>3.5 Cultural Centers of Research Excellence</li> <li>3.6 Some Significant Activities in Technology</li> <li>Atal Incubation Center (AIC) RNTU</li> </ul>	22-28
4.	<ul> <li>3.5 Cultural Centers of Research Excellence</li> <li>3.6 Some Significant Activities in Technology</li> <li>Atal Incubation Center (AIC) RNTU</li> <li>4.1 Introduction &amp; Services</li> </ul>	22-28
4.	<ul> <li>3.5 Cultural Centers of Research Excellence</li> <li>3.6 Some Significant Activities in Technology</li> <li>Atal Incubation Center (AIC) RNTU</li> <li>4.1 Introduction &amp; Services</li> <li>4.2 Hand Holding Support for a Successful Startup</li> </ul>	22-28
4.	<ul> <li>3.5 Cultural Centers of Research Excellence</li> <li>3.6 Some Significant Activities in Technology</li> <li>Atal Incubation Center (AIC) RNTU</li> <li>4.1 Introduction &amp; Services</li> <li>4.2 Hand Holding Support for a Successful Startup</li> <li>4.3 I4 Lab</li> </ul>	22-28
4.	<ul> <li>3.5 Cultural Centers of Research Excellence</li> <li>3.6 Some Significant Activities in Technology</li> <li>Atal Incubation Center (AIC) RNTU</li> <li>4.1 Introduction &amp; Services</li> <li>4.2 Hand Holding Support for a Successful Startup</li> <li>4.3 I4 Lab</li> <li>4.4 Resources in AIC</li> </ul>	22-28
4.	<ul> <li>3.5 Cultural Centers of Research Excellence</li> <li>3.6 Some Significant Activities in Technology</li> <li>Atal Incubation Center (AIC) RNTU</li> <li>4.1 Introduction &amp; Services</li> <li>4.2 Hand Holding Support for a Successful Startup</li> <li>4.3 I4 Lab</li> <li>4.4 Resources in AIC</li> <li>4.5 Our Partners</li> </ul>	22-28
4.	<ul> <li>3.5 Cultural Centers of Research Excellence</li> <li>3.6 Some Significant Activities in Technology</li> <li>Atal Incubation Center (AIC) RNTU</li> <li>4.1 Introduction &amp; Services</li> <li>4.2 Hand Holding Support for a Successful Startup</li> <li>4.3 I4 Lab</li> <li>4.4 Resources in AIC</li> <li>4.5 Our Partners</li> <li>4.6 Startups Associated</li> </ul>	22-28
4.	<ul> <li>3.5 Cultural Centers of Research Excellence</li> <li>3.6 Some Significant Activities in Technology</li> <li>Atal Incubation Center (AIC) RNTU</li> <li>4.1 Introduction &amp; Services</li> <li>4.2 Hand Holding Support for a Successful Startup</li> <li>4.3 I4 Lab</li> <li>4.4 Resources in AIC</li> <li>4.5 Our Partners</li> <li>4.6 Startups Associated</li> </ul> Research Resources	22-28 29-38
<b>4</b> . <b>5</b> .	<ul> <li>3.5 Cultural Centers of Research Excellence</li> <li>3.6 Some Significant Activities in Technology</li> <li>Atal Incubation Center (AIC) RNTU</li> <li>4.1 Introduction &amp; Services</li> <li>4.2 Hand Holding Support for a Successful Startup</li> <li>4.3 I4 Lab</li> <li>4.4 Resources in AIC</li> <li>4.5 Our Partners</li> <li>4.6 Startups Associated</li> </ul> Research Resources 5.1 The Nature of Research	22-28 29-38
4.	<ul> <li>3.5 Cultural Centers of Research Excellence</li> <li>3.6 Some Significant Activities in Technology</li> <li>Atal Incubation Center (AIC) RNTU</li> <li>4.1 Introduction &amp; Services</li> <li>4.2 Hand Holding Support for a Successful Startup</li> <li>4.3 I4 Lab</li> <li>4.4 Resources in AIC</li> <li>4.5 Our Partners</li> <li>4.6 Startups Associated</li> <li>Research Resources</li> <li>5.1 The Nature of Research</li> <li>5.2 Why Research in Necessary?</li> </ul>	22-28 29-38
4.	<ul> <li>3.5 Cultural Centers of Research Excellence</li> <li>3.6 Some Significant Activities in Technology</li> <li>Atal Incubation Center (AIC) RNTU</li> <li>4.1 Introduction &amp; Services</li> <li>4.2 Hand Holding Support for a Successful Startup</li> <li>4.3 I4 Lab</li> <li>4.4 Resources in AIC</li> <li>4.5 Our Partners</li> <li>4.6 Startups Associated</li> <li>Research Resources</li> <li>5.1 The Nature of Research</li> <li>5.2 Why Research in Necessary?</li> <li>5.3 When is Research Implemented?</li> </ul>	22-28 29-38
4.	<ul> <li>3.5 Cultural Centers of Research Excellence</li> <li>3.6 Some Significant Activities in Technology</li> <li>Atal Incubation Center (AIC) RNTU</li> <li>4.1 Introduction &amp; Services</li> <li>4.2 Hand Holding Support for a Successful Startup</li> <li>4.3 I4 Lab</li> <li>4.4 Resources in AIC</li> <li>4.5 Our Partners</li> <li>4.6 Startups Associated</li> <li>Research Resources</li> <li>5.1 The Nature of Research</li> <li>5.2 Why Research in Necessary?</li> <li>5.3 When is Research Implemented?</li> <li>5.4 Resources</li> </ul>	22-28 29-38
4.	<ul> <li>3.5 Cultural Centers of Research Excellence</li> <li>3.6 Some Significant Activities in Technology</li> <li>Atal Incubation Center (AIC) RNTU</li> <li>4.1 Introduction &amp; Services</li> <li>4.2 Hand Holding Support for a Successful Startup</li> <li>4.3 I4 Lab</li> <li>4.4 Resources in AIC</li> <li>4.5 Our Partners</li> <li>4.6 Startups Associated</li> <li>Research Resources</li> <li>5.1 The Nature of Research</li> <li>5.2 Why Research in Necessary?</li> <li>5.3 When is Research Implemented?</li> <li>5.4 Resources</li> <li>5.5 Some Prominent Research and the search of AGU</li> </ul>	22-28 29-38
4.	<ul> <li>3.5 Cultural Centers of Research Excellence</li> <li>3.6 Some Significant Activities in Technology</li> <li>Atal Incubation Center (AIC) RNTU</li> <li>4.1 Introduction &amp; Services</li> <li>4.2 Hand Holding Support for a Successful Startup</li> <li>4.3 I4 Lab</li> <li>4.4 Resources in AIC</li> <li>4.5 Our Partners</li> <li>4.6 Startups Associated</li> <li>Research Resources</li> <li>5.1 The Nature of Research</li> <li>5.2 Why Research in Necessary?</li> <li>5.3 When is Research Implemented?</li> <li>5.4 Resources</li> <li>5.5 Some Prominent Research resources</li> <li>5.6 Experimental Research Resources</li> </ul>	22-28 29-38
4. 5.	<ul> <li>3.5 Cultural Centers of Research Excellence</li> <li>3.6 Some Significant Activities in Technology</li> <li>Atal Incubation Center (AIC) RNTU</li> <li>4.1 Introduction &amp; Services</li> <li>4.2 Hand Holding Support for a Successful Startup</li> <li>4.3 I4 Lab</li> <li>4.4 Resources in AIC</li> <li>4.5 Our Partners</li> <li>4.6 Startups Associated</li> <li>Research Resources</li> <li>5.1 The Nature of Research</li> <li>5.2 Why Research in Necessary?</li> <li>5.3 When is Research Implemented?</li> <li>5.4 Resources</li> <li>5.5 Some Prominent Research resources</li> <li>5.6 Experimental Research Resources</li> <li>Research Projects</li> </ul>	22-28 29-38 39-42
4. 5.	<ul> <li>3.5 Cultural Centers of Research Excellence</li> <li>3.6 Some Significant Activities in Technology</li> <li>Atal Incubation Center (AIC) RNTU</li> <li>4.1 Introduction &amp; Services</li> <li>4.2 Hand Holding Support for a Successful Startup</li> <li>4.3 I4 Lab</li> <li>4.4 Resources in AIC</li> <li>4.5 Our Partners</li> <li>4.6 Startups Associated</li> <li>Research Resources</li> <li>5.1 The Nature of Research</li> <li>5.2 Why Research in Necessary?</li> <li>5.3 When is Research Implemented?</li> <li>5.4 Resources</li> <li>5.5 Some Prominent Researchers of AGU</li> <li>5.6 Experimental Research Resources</li> <li>6.1 Introduction</li> </ul>	22-28 29-38 39-42
4. 5.	<ul> <li>3.5 Cultural Centers of Research Excellence</li> <li>3.6 Some Significant Activities in Technology</li> <li>Atal Incubation Center (AIC) RNTU</li> <li>4.1 Introduction &amp; Services</li> <li>4.2 Hand Holding Support for a Successful Startup</li> <li>4.3 I4 Lab</li> <li>4.4 Resources in AIC</li> <li>4.5 Our Partners</li> <li>4.6 Startups Associated</li> <li>Research Resources</li> <li>5.1 The Nature of Research</li> <li>5.2 Why Research in Necessary?</li> <li>5.3 When is Research Implemented?</li> <li>5.4 Resources</li> <li>5.5 Some Prominent Researchers of AGU</li> <li>5.6 Experimental Research Resources</li> <li>6.1 Introduction</li> <li>6.2 Externally Funded Projects</li> </ul>	22-28 29-38 39-42

7. Patents 7.1 AGU Perspective	43-46
<ul><li>7.2 Core Disciplinary Patents</li><li>7.3 Multidisciplinary Patents</li></ul>	
<ul> <li>8. Research Paper Publication</li> <li>8.1 Parameters of AGU</li> <li>8.2 Research Paper Writing Skills</li> <li>8.3 Analysis</li> </ul>	47
<ul> <li>9. Book / Book Chapters Published</li> <li>9.1 Parameters of AGU</li> <li>9.2 Sharing Knowledge with Society</li> <li>9.3 Analysis</li> </ul>	48
<ul> <li>10. Consultancy at AGU</li> <li>10.1 Introduction</li> <li>10.2 Consultancy Services</li> <li>10.3 Stream Wise Areas of Consultancy</li> <li>10.4 Consultancy Capabilities</li> <li>10.5 Consultancy Generated</li> </ul>	49-56
<b>11. Collaboration &amp; MoU for Research</b> 11.1 Means to AGU11.2 Active International Collaboration & MoU's11.3 Activities as per Collaborations & MoU11.4 Active National Collaboration & MoU's	57-59
<ul> <li>12. Events</li> <li>12.1 AGU Dimensions</li> <li>12.2 Learning Throughout the Year</li> <li>12.3 Types of Research Events and Their Analysis</li> </ul>	60-65
<ul> <li>13. AGU Publications (Inhouse publication)</li> <li>13.1 Introduction of AGU Publication</li> <li>13.2 Electroniki Apke Liye</li> <li>13.3 CRIG Bulletins</li> <li>13.4 Katha Madhya Pradesh</li> <li>13.5 Kathadesh</li> <li>13.6 Happy Harda, Horizon, Samarth Bharat and Aviral</li> </ul>	66-68
14. Awards	69-70
Annexure-1 Consultancy Policy	71
Annexure-2 Publication Policy	73
Annexure-3 Research Policy	75

# 1 AGU – UNIVERSITIES OF NEW INDIA

### **1.1 ABOUT AGU**

Seeds of AISECT Group of Universities (AGU) were sowed in early eighties when AISECT Network was emerging as the leaders for skill development and distance learning. Over the years AGU have grown in to five premier universities known for their commitment for affordable quality education, research, skill and entrepreneurship. Their initiatives in research, innovation and entrepreneurship have been acclaimed at international and national levels with many prestigious awards. Most of these, AISECT Group of Universities are located in the rural and tribal belts, and the First Private Universities in the respective region or state. These premier universities have been named after international personalities in the field of science & engineering, literature and culture, Dr. CV Raman and Rabindranath Tagore:

- Dr. C.V. Raman University, Bilaspur, Chattisgarh (CVRU, Bilaspur)
- Rabindranath Tagore University, Bhopal, Madhya Pradesh (RNTU, Bhopal)
- Dr. C.V.Raman University, Vaishali, Bihar (CVRU, Vaishali)
- AISECT University, Hazaribagh, Jharkhand (AU, Hazaribagh)
- Dr. C.V.Raman University, Khandwa, Madhya Pradesh (CVRU, Khandwa)



# AGU STRENGTH

- 5 Premier Universities
- 39 Advanced Research Centers
- 200 + Research Faculties with Ph.D.
- 25K +Students
- 1.5K + Faculty
- 300 + Labs

### **AGU-THE CUTTING EDGE**

- ✓ NIRF Ranking
- ✓ NAAC Accreditation
- ✓ Atal Incubation Center by Neeti Aayog Gol
- ✓ PMKK within campus
- ✓ 8 + world class Industry Centers
- ✓ Publishing two Research Journals Anusandhan and Shodhaytan
- ✓ 45 Active Start ups
- ✓ 115 patents of social concerns
- ✓ Rs. One Cr. Annual research fund
- ✓ Huge International Center for Arts Culture and literature
- ✓ International Association ISWEES
   Water Energy Envir & Society



# **1.2 WHAT RESEARCH MEANS TO AGU**

Research is generally perceived as a process of collection of information, data, their systemic analysis in order to increase understanding of the subject and find answer to some questions or arrive at conclusion on topic of interest. At AGU, it is expected that successful research would lead to a new knowledge or a new system, or a new process or a new technology or improved knowledge/process/system/technology. Outcome of research would also benefit the society, as AGU strongly feels that research should not only enrich the knowledge and reach to library for the benefit of others but research outcome should also travel from lab to land and benefit the common man directly or indirectly.

# **1.3 RESEARCH PHILOSOPHY IN AGU**

At AGU, research philosophy has four pillars. The first pillar is Positivist Research Philosophy i.e. understanding a problem in an objective manner where researcher disassociates from his/her personal values. The second pillar is Interpretive Philosophy where problem is looked in subjective manner. The third pillar Pragmatist Research Philosophy where researcher deals with actual facts and figures which help in deciding the methodology. The fourth pillar is of Realism Research Philosophy which can be direct realism i.e. take things on face values or critical realism i.e. things could be deceptive. These pillars provide right kind of environment and support to conduct the research in an effective manner based on kind of research problem and objectives. The research problem and objective together with the research philosophy will help deciding the methodology i.e. Qualitative, Quantitative Exploratory, Descriptive, Case Study or Survey Methodology. Whatever may be philosophy or combination of more than one philosophy, AGU strongly believes on a realistic and meaningful, literature and status survey to find the real research gap and research direction, before the researcher frames research guestion and objectives. Ethics in research is the biggest concern for AGU. It is not only software through which normally the research work goes to ascertain plagiarism but also AGU insists on honesty in data, results and analysis, objectivity to avoid bias and ensure integrity, carefulness and also concern for Intellectual Property and above all, respect and fairness in entire research process.



### **1.4 IMPLEMENTATION OF RESEARCH PHILOSOPHY IN AGU**

To ensure meaningful research, the 🔨 🇨 ecosystem at AGU is multilayered, A Research and Development Department (RDD) under the Vice Chancellor looks after administrative, logistic and documentation aspects of Ph D research 2009 in every AGU University. Respective teaching departments of the University (UTDs) look after supervision and technical support for PhD. There are number of Research Centers in each AGU universities, which have independent Coordinators/Directors, who look after research projects funded from outside or funded by the University itself. A Core Research and Innovation Group (CRIG) is



the apex body to provide internal funding for research projects and supervise/ coordinate all research projects in AGU.

Collaboration and sharing of, research resources and expertise with others can go a long way in making research more meaningful and effective. AGU is therefore always open for collaboration with other HEIs, Industries and having Research Organizations. AGU is also an opinion that research at HEIs should support and accelerate Government's development programmes. It should help solving problems of the society and problems related to environment and ecology to assist industries, farm sector and corporates with research based solutions.

## SOME IMPORTANT INDUSTRY CENTERS IN AGU



# 2 CRIG-AGU

### 2.1 CRIG – A UNIQUE CONCEPT

CRIG (Core Research and Innovation Group) was established in 2017 to help developing research facilities and build up an environment for research, innovation, skill development, consultancy and entrepreneurship in five AISECT Group Universities. It proved to be a force multiplier and the best example of collaboration and synergy, where men and material resources of five universities came together in multidisciplinary, multi-institutional mode; for not only the best and optimum use of resources, but also to generate excellent spirit –de-corps and show how one plus one becomes eleven. Since then, many other international and national organizations from academia and industries have been brought in the fold through MoUs for research projects and activities. Advisory panel of 25 national and international renowned experts from various fields are also part of this big network. Seed money of annual Rs. One Crore and attractive incentives are changing the research sky line in AISECT Group of Universities with unprecedented number of projects, papers, books, events, consultancies and innovation during last five years.

### **CRIG – ADVISORY BOARD**

Shri Santosh Choubey, Chancellor, RNTU Prof. Vijay Kant Verma, Chancellor, CVRU, Vaishali, Bihar Prof. Bramh Prakash Pethiya, VC, RNTU, Bhopal, (M.P.) Prof. Ravi Prakash Dubey, VC, CVRU, Bilaspur, (C.G.) Prof. Vimal Kumar Sharma, VC, CVRU, Vaishali, Bihar Prof. Pramod Kumar Naik, VC, AU, Hazaribagh, Jharkhand Prof. Amitabh Saxena, VC, CVRU Khandwa, (M.P.) Dr. Mohamed Ouessar, IRA, Tunisia Mr. Richard Hopkins, ORCA, Australia Prof. S Sapra UCF, USA Prof. FJ Manjon UPV, Spain Prof. Weicheng W U, ECUT, China Prof. Joel Kibiiy, Moi University, Kenya Prof. M. Sundarrajan, (Science) Prof. Salim Abbas Bhai Chaniwala (Energy) Prof. Tarun Pandya (Management) Prof. Vimal Kumar Sharma (Science) Prof. Murali Mantrala (Management) Prof. Sandhya Chaturvedi (Sociology) Dr. Ram Narayan Yadav (Environment) Prof CK Ghosh (Engineering) Maj Gen Chaturvedi (Technology) Dr. Shanbhu Ratan Awasthi (Renewable Energy) Dr. Dinesh Kumar Soni (Engineering) Dr. Anil Kurchania (Agriculture)



### 2.2 VISION & MISSION OF CRIG

# VISION

The Core Research & Innovation Group (CRIG) of AISECT Group of Universities (AGU) will develop, an effective environment for meaningful research and innovation, in all constituent Universities of AGU in development of research projects, development of research facilities, publication of research work, help in organizing research related events/activities and promotion of innovative ideas for research.

# MISSION

- To develop a culture of research and innovation amongst faculty, researchers and students in AISECT Group.
- To help AGU in building centers of Research Excellence in constituent Universities in their respective area of expertise and to help in exploring new frontiers of research.
- To invest in promising research work and researchers through internal funding.
- To motivate researchers in AGU to take up projects, which are of social and national relevance and explore for external funding agencies.
- To develop own research journals and to take up publication of quality research material for publication in these journals and make effort for indexing and recognition.
- To assist AGU constitutes in organizing national and international research events in order to improve quality of research and to build a motivational research environment amongst faculty and students.
- To enhance researchers abilities through exploring untouched areas of research.
- To create research friendly administration and infrastructure in AGU.
- To raise the need of research community.
- To broaden the AGU research activities through collaboration with other research organizations and institutes in India and abroad.
- To Support and promote AGU for developing strong infrastructure for multidisciplinary research project.





## 2.3 RESEARCH VALUES AND GUIDING PRINCIPLES

- We believe and committed to treating our researchers as valued colleagues, guided by motivating environment through open communication, collaboration, partnership, integrity and respect in order to achieve our common goals.
- We encourage innovation, solution-based thinking, flexibility and adaptability in research to meet with our mission.
- We make our decisions with openness and honesty, and with innovative research proposals to enhance the value of the CRIG in AGU campuses.
- We encourage and promote open and two side communication between CRIG and universities.
- We build strong relationships with existing and potential sponsors.
- We represent a research community, which believes to share the benefits of research to the state, the nation and the world.
- We are committed to develop wide range of resources and strategies to provide the highest level of quality in social research.
- We see our role in the future of the AGU as making it easier for researchers to carry out their research by being responsive, proactive and innovative.
- We are committed to supporting the research effort at the AGU, in a mutually beneficial approach.



# 2.4 MULTIDISCIPLINARY RESEARCH

Presently, the research involves the contribution of knowledge from different streams of education. For example, almost every Mechanical and Electrical research projects need the implementation of IOT to make it more useful for society. There are various examples of blends produced in research to make it more impactful.

As per the highlights of NEP 2020, CRIG promotes multidisciplinary research approach in AISECT Group of Universities. To enhance awareness in multidisciplinary research, discussion sessions and meetings with the researchers of AGU organized time to time. Different disciplines of Engineering, Science and Agriculture works together on a project to produce fruitful research. Some of the promising research of AGU has been acknowledged in prestigious platforms.



# 2.5 DEPARTMENTAL RESEARCH & INNOVATION CELL (DRIC)

CRIG formed a Departmental Research & Innovation Cell (DRIC) in each department of universities of AGU, with activities expected, their areas of responsibilities and reporting system. The activities included in DRIC suggested the recognition & financial benefits and appropriate weightage in appraisal report of researchers. Major roles of DRIC will include the following-

- To act as Nodal Center for Departmental & Inter Departmental Research and Innovation Activities
- To build and promote Research and Innovation environment
- Physical presence through display corner & documents
- To promote in planned manner policy of one faculty one paper per year, one department 2 projects (one internal and one external) per year and one department 2 Books/Book chapters per year
- To increase department's participation in PhD research
- To exploit potential of Centers of Excellence in Research
- Visibility and vibrancy through documentation and meetings
- To enhance yearly activities under MoU's
- Utilization of social media for Academic/Research



### **2.6 JOURNALS**

It was a dream come true for the Rabindranath Tagore University (RNTU) when in the year 2012 it launched ANUSANDHAN - the engineering, science and management, print journal, to promote research writing among budding professionals as well as practicing experts. In 2014, SHODHAYTAN - the multi discipline print journal on commerce, education and humanities was also launched by the University. Both these journals, ANUSANDHAN & SHODHAYTAN are available online also. These journals have provided platform to a very large section of scholars, scientists, researchers and industry experts to publish their original work/ idea/ articles on prestigious and guality journals. Rabindranath Tagore University, an NIRF ranked and NAAC accredited institution, strongly believes that quality research can build the New India of our dreams much faster. Presently, Core Research and Innovation Group (CRIG), is operating journals and published by AISECT Publication Pvt Ltd.



### 2.7 SHODH SHIKHAR

The Annual Research Festival, Shodh Shikhar is a celebration of curiosity and collaboration has started in 2021-22 with the theme of the festival "Atma Nirbhar Bharat". It invites youth to be part of a mega festival of young researchers of our nation and build research environment in the universities and reward those dedicatedly working youth, who are applying their research and innovation talent to support vision of the nation. This festival gives opportunity to club young researchers from advanced fields, those continuously contributing to research by witnessing the swing from conventional research to advanced level. For touching every aspect that is meaningful for growth of nation, the festival provides three categories to participate: Engineering & Technology, Science & Agriculture and Commerce, Humanities & Management.

We welcome academicians, scientists, partners, researchers and students to perceive a diverse festival, that showcase the outstanding research carried out by young researchers from the universities around the nation in various fields via paper presentation and project demonstration.

It is the first research festival, where language is no bar. If you have research in your own language, Shodh Shikhar is here with a great platform with all subthemes in which research is nation's top priority. This event will motivate researchers to do their best for nation and Shodh Shikhar shall promote their spirit every year, each time in a better framework.

We will be delighted to welcome contributors and attendees from around the world to join us in the Annual Inter University National Research Festival on in RNTU Campus every year.



# **3** CENTERS OF RESEARCH EXCELLENCE

# **3.1 NEW DIMENSIONS OF RESEARCH**

A large number of Centers of Research Excellence have been established at AGU, which contribute in a big way to make research and teaching more effective providing a bigger platform for faculty and students to explore and work with other research communities. A very methodical approach is taken by these centers, which includes five essential elements of excellence in research i.e Formation of Center, Staff Members, Working Pattern, Performance Record and Financial Support for all research work at these centers.

### **Formation of Centers**

Based on the need and expertise available, constituent universities of AGU have established a number of Centers of Research Excellence. Presently there are 39 such centers in all five universities of the AGU.

An effective formation of center needs to be done to get effective output for society. In terms of organizational structure, every center though independent for functional purpose reports to Dean Academic of the University on administrative hierarchy. All Centers are open to all faculty members and doctoral students irrespective of their discipline. A Center is led by the Center Coordinator, assisted by the research scholar, and significantly benefit's from the higher leadership of the university and resources available across all the departments. The doctoral students and visiting scholars can work in one or more centers with the help of Center Coordinators to drive the research output using the facilities available in different centers. Centers also have an Advisory Board which includes a distinguished set of faculty members and external experts. All of the faculty members of the advisory board are Professors in various premier educational institutions around the world. An interdisciplinary approach in research adopted by AGU is the key to success in research ventures which have been initiated so far.

### **Staff Members**

The support personnel are also equally important to run a center efficiently along with faculty members, visiting scholars, and doctoral students.

- A center administrator deals with daily operations, support's all physical entities and manage's interactions of the center with the other constituents of the department/university and external vendors.
- All research projects are coordinated by a research coordinator. His/her job is to identify research needs, coordinate research project activities, and generate and deliver reports. Additionally exploring new research opportunities, help in finding publication and books, assistance in all writing initiatives at the center, are few important jobs that are done by research coordinators.



#### **Working Pattern**

The purpose of the research center is to provide not only facilities but a platform for interaction between educators, scientists, students and industry experts as well as opportunities for bettering research, academic excellence, solving real world problems, and creating and disseminating knowledge.

The integration of knowledge from other disciplines aims to provide a much wider horizon so as to arrive on an accurate and efficient solution to the problem. To increase research efficiency, centers ensure that each faculty member has multiple doctoral students and that each doctoral student has multiple faculty members to form a bigger group for exchange. This creates an environment full of healthy ideas, which leads to an effective research process.

Certificate programs are also offered by the centers which are useful to disseminate the knowledge and import skill in addition to publishing good quality research.

#### **Performance Record**

Perhaps the simplest indicator of performance of any Center of Research Excellence is their contribution to research and application stems from its ability to generate a steady stream of research ideas, methodologies and new methods, strategies and solutions, at the same time document them efficiently. All the Centers of Research Excellence at AGU have an excellent record in all the above parameters.

#### **Financial support**

Financial wellbeing of a research center is vital for the success of any research center. Achievement of objectives and effective conduct of research to expand the knowledge base in a safe and secure environment depend on financial stability and security. Financial support is therefore quite critical for growth and success of a research center. Research centers at AGU typically receive financial support from one or more of following sources at AGU:-

- Self-funding through doing projects with government research centers and consulting projects. The center can be self-financing by raising funds through consulting projects to finance its operations and on-going projects. In fact, it will be a consulting firm, similar to the structure of a research center.
- Respective university provides funds for setting up facilities for research.
- The AGU provides funding for the centers through CRIG for specific research projects.



## **3.2 CATEGORIES OF RESEARCH CENTERS IN AGU**

There are a total of 39 Centers of research excellence in various constituent Universities of AGU. Rabindranath Tagore University, Bhopal has 18 centers Dr. C.V. Raman University Bilaspur has 13 centers Dr. C.V. Raman University, Vaishali has 3, AISECT University, Hazaribagh has 2 centers and Dr. C.V. Raman University Khandwa has 3 centers of research excellence. These Research Centers of Excellence are categorised in to following three categories:-

#### Technology Centers of Research Excellence:

Research Centers, operating in various fields of technology and engineering come under this category. They are normally a combination of different streams of engineering. Multidisciplinary researches being the core vision of technical centers, most of the projects of technical centers have been participation from other categories also, besides partnership of centers in the same category.

#### **Skill Centers of Research Excellence:**

To produce efficient skilled workers and skilled researchers, several skill centers are active in AGU. PMKVY, DDUGKY and about 7 skill centers are set up by various industry giants like DAIKIN, LUCAS, Microsoft, Frugal lab, Tata etc under this category. In addition to providing skill training some of the prestigious programs are also run by these skill centers. There are a number of Skill Academies also operating in various departments. Additionally, academic departments run their own skill courses as per the course syllabus and it helps to introduce industry relevant new skills in diploma and UG curriculum.

#### **Cultural Centers of Research Excellence:**

These centers not only promote Indian culture at international stage but also provide plat form to explore various dimensions of ancient Indian cultural heritage through in depth research work. Cultural centers have been set up under the chair of "Vanmali Srijan Peeth". These centers work on various aspects of the visual, performing and literary arts. Indian cultural subjects have been included in the curriculum of AGU universities also and students get benefitted with cultural exposure irrespective of their discipline. A Dramatics School is also running, which not only provides diploma and degree programmes but is engaged in research also as regard to various forms of theatrical work.



### **3.3 TECHNOLOGY CENTERS OF RESEARCH EXCELLENCE**

A number of Technology Research Centers at AGU were established in each university as per expertise available and needs of the society, with the support of Core Research & Innovation Group (CRIG). Those centers have been envisaged as multidisciplinary platforms with a mission to provide all infrastructural and financial support to faculty members and researchers of AGU. The objective is to achieve excellence in research, technology translation and then to products if necessary. The technical research centers make efforts to develop strong relationship with industries to enhance industry-academia research and escalate commercialization of IP developed.

Technology research centers focus on finding efficient solutions of the social issues with the use of technology and replace old technologies with modern technical concepts to improve wellbeing in surrounding areas of the universities. Interaction with local people, exchanging technology-based ideas with farmers and promotion of new technological models through various technical centers are the key role performed by technology research centers.

Collaboration with other research organizations and universities explores the ways to address research challenges. Technology centers in AGU also aim to convert challenges in to opportunities. AGU research

centers have collaborations and MoU with national and international organizations. Technology centers of AGU are working in research project related to following sectors:-

- Defence sectors, with prestigious defence organizations.
- Agriculture sectors, to boost farmers income.
- School education, to disseminate the innovative way of science learning.
- Municipal waste, to minimize the hazardous effects pollution in environment.
- Renewable energy, to assure best use of available energy in industries and household.
- IoT & Advanced computing, to meet the technological enhancement in computer education.

Technology Centers are continuously upgrading the knowledge by conducting seminars and workshops by experts of the fields, visits of students to industries, national and international conferences. All centers have their own advisory board, to interact and enhance their field of knowledge and scope of work and apply in their research projects.



- Center for Renewable Energy and Energy Park
- Center for Agriculture Research
- Advanced Material Research Lab
- Center for IoT & Advance Computing
- Center for Advanced Water & Environmental Research
- Dr. C.V. Raman Center for Science Communication

# 🕅 DR. C.V. RAMAN UNIVERSITY

- Center of Excellence for Advanced Environmental Research
- Raman Center for Science and Communication
- Center for Biotechnology Research
- Center for Renewable and Green Energy
- Center for Rural Technology
- Center for GIS and Remote Sensing

# DR. C.V. RAMAN UNIVERSITY

- Center for Agriculture Research
- Bhabha Center for Renewable Energy



Center for Agriculture Research

# DR. C.V. RAMAN UNIVERSITY

- Dr. C.V. Raman Center for Science Communication
- Center for Agriculture Research

## **3.4 SKILL CENTERS OF RESEARCH EXCELLENCE**

Demand of skilled workers in industries is increasing continuously, as India is going to become a global manufacturing hub. To fulfil the growing need of certified skilled force in India, skill centers in AGU have been set up as part of a national skill development mission. It is necessary to cut down the gap between demand and supply of skilled manpower which is quite huge at presence. CRIG has launched therefore skill development centers with the aim to make world class skill development centers in every premises of AGU. The skill development centers work with the government initiatives to empower the people in different streams of skills, so that they can effectively contribute in growth of the organization. The skill development centers of AGU are producing skilled manpower from surrounding rural areas and imparting skill training there by generating competence and the confidence to face the challenge of a manufacturing unit and find job opportunity.

The skill development centers of AGU upgrade skills to international

standards with the significant involvement of industries to develop a pool of quality skill workers of international standards. Skill development centers are developing future ready manpower for industries. There are PMKK and DDU as well as Skill Academics in AGU Universities. They look after need of skill work force as well as skill training to UG/PG students. In addition to this RNTU has Atal Incubation Center with spokes of this center in all other Universities of AGU. These centers have facilities for plug and play and training for skill.





## SKILL CENTERS OF RESEARCH EXCELLENCE



- Atal Incubation Center
- Center for Skill Development (Pradhan Mantri Kaushal Kendra)
- Future Skills Academy
- Resource Center for Adult and Continuing Education
- MSME Consultancy Center
- Center for Women Entrepreneurship
- Center for Social Entrepreneurship

# DR. C.V. RAMAN UNIVERSITY

- Center for Incubation and Startup
- Center for Skill Development and Industrial Consultancy
- Future Skills Academy

### **3.5 CULTURAL CENTERS OF RESEARCH EXCELLENCE**

India is well known for its ancient and rich culture, which is unique in the world. It is one of the oldest cultures in the world which has a rich and diverse heritage. Unlike most other homogeneous communities around the world, India is a conglomerate of many customs, tradition and cultural subsets; still there are common characteristics among all these cultures and traditions that construct the unity of the region.

Indian art includes visual, professional and literary skills with a wide variety of artistic flavour in each class. Thousands of artists have spent years in creating and

IVERSITY



enriching these art forms. Many families are engaged in various artistic and cultural activities that include various forms of creative expression. Cultural activities have a social orientation also. Culture and traditions are transmitted from generation to generation through cultural centers that aim to develop cultural environment via visual, performing and literary arts and AGU believes that without Indian Arts, Culture and Literature, education system is also not complete. Various Cultural Research Centers have been established at AGU to preserve the threads of India's art & cultural heritage. These centers are operational under the chair titled "Vanmali Srijan Peeth". An annual cultural festival "Vishwarang" organized by these centers every year at Rabindranath Tagore University, Bhopal in collaboration with 30 countries and it is the only festival of its kind which promotes Hindi, regional languages of India and Indian Culture, Arts, Dramatics and Painting amongst youth across the world. Vishwarang is one of the biggest cultural festivals of South Asia, which is continuously organized from last three years. Cultural centers at AGU therefore play a very important role to help preserving Indian culture, carry out research on various dimensions of Indian Culture, propagate various forms of culture amongst youth and impart skill as well.

विश्व रग

- Rabindranath TAGORE UNIVERSITY
  - Vanmali Srijanpeeth
  - Tagore International Center for Arts & Culture
  - Sub Center Lok Bhasha evam Sanskriti Kendra
  - Bhasha Shikshan Kendra
  - Sub Center Anuvad Kendra
  - Pravasi Bhartiya Sahitya Evam Sanskriti Shodh Kendra
  - Sanskrit, Prachya Bhasha Evam Bhartiya Gyan Parampara Kendra

# 🕅 DR. C.V. RAMAN UNIVERSITY

- Hindi Sahitya Kendra
- Vanmali Srijanpeeth
- Center for Performing Art and Raigarh Kathak
- Chhattisgarh Lok Kala and Sanskriti Kendra
- Rabindranath Tagore International Center of Excellence for Arts & Culture

# DR. C.V. RAMAN UNIVERSITY

Vanmali Srijanpeeth



Vanmali Srijanpeeth



Tagore International Center for Arts & Culture

# **3.6 SOME SIGNIFICANT ACTIVITIES IN TECHNOLOGY**

### **CHEMISTRY & MATERIALS**

#### **Completed Projects**

- 1. Synthesis and Characterization of Lanthanide based phosphors as spectral convertors in solar cells. Co PI- Dr. Sudeshna Ray, PI- Dr. Sameer Sapra, Prof., Chemistry, IIT Delhi. PI from Taiwan- Prof., Teng Ming Chen, applied Chemistry, NCTU, Taiwan. Project funded by DST Gol (Indo-Taiwan Project)
- 2. Investigations on ABO<sub>3</sub> and A<sub>2</sub>X<sub>3</sub> compound under extreme conditions of pressure and temperature External Investigator Dr. Sudeshna Ray. Project supported by Spanish Ministry testing chemicals received by AMRC.
- Development of Pyrophoric Metal Ceramic Composite material for smart flare as IR Counter measure Project is funded by ARMREB, DRDO, PI – Dr. Sudeshna Ray.

#### **Ongoing Projects**

- Indoor quality herbs/vegitable production through vertical/geoponic farming with the intervention of Nano Tech/Phosphor converted LED, PI- Dr. Sudeshna Ray, RNTU, Co PI-Dr. Tapan Adhikari, Indian Institute of Soil Science, Co PI- Dr. Ajay, Indian Institute of Soil Science.
- 2. Development of dust resistant nano material coating for solar panel, PI Dr. Prachi Dhote. (Project funded by CRIG).
  - 1. IPR No. 201921035656 "up conversion nanophosphor-based photo electrode".
  - 2. IPR No. 201821003809 "A novel blue color emitting phosphor composition and a process for the preparation there of ".

### AGRICULTURE

#### **Ongoing Projects:**

#### 1. Self Generating Research Projects

- Organic Farming to enhance quality and yield
- · Vermi-composting for agri waste management in innovative manner
- Hi-tech poly house with facilities for experiments and research
- Organic honey bee production and Mushroom cultivation
- Skill upgradation program for farmers from adopted villages
- Evaluation of various herbicides for weed control in mustard
- Evaluation of different nutrient management for growth and yield of mustard
- Evaluation of various varietal parameters in Moong bean
- Evaluation of different herbicides for weed control in Moong and Urd bean including nutrient management

### 2. Externally Funded Ongoing Projects

• DSIR funded Project "Assessment study of the commercialization of already developed technologies of the Public Funded Research Institutes established in Madhya Pradesh" Funded by Department of Scientific and Industrial Research (DSIR)









#### 3. Transfer of Technologies

- In five adopted villages namely Medua, Keeratnagar, GoklaKundi, Chandkhedi and Tilendi a • technology transfer was done under Unnat Bharat Abhiyan for adoption of improved process, fertilizers and weed control system developed by ARC.
- Farmers' Meeting in villages-"Kisan Sangosthi" at adopted villages to solve problems of the farmers shares the outcome of ARC and mutually exchanges the experience. ARC takes up projects based on need of the adopted villages.

### IoT & ADVANCE COMPUTING

#### **Completed Projects**

- 1. Design and development of some prototype smart systems including smart dustbin, Attendance system, Fire Detection System security system and temp and humidity monitors system for agriculture application PI - Dr. Preeti Maheshwari. Project was funded by CRIG.
- 2. Natural level training project for faculty. PI Dr. Preeti Maheshwari. Project was self generating nature.

#### **Ongoing Project**

1. Design and development of 6 prototype smart systems – Soap Dispenser, Mask Detector, Temp Controller, Water guality. Monitor and Smart bed. PI – Dr. Rakesh Mittan Project is funded by CRIG.

#### **Patents Generated**

1. IPR No. – 20172104069 Automated attendance system

### **ENERGY**

#### **Ongoing Projects**

- 1. MODROB Project for Refrigeration & Indoor Air Quality (RIAQ) Lab Funded By AICTE
- 2. Establishment of two RE labs for Suryamitra Solar PV Installation.
- 3. Design and development of an innovative multi solar dryer for rural application Funded by CRIG.
- 4. Design and development of fault resistant dual axis solar tracking system Funded by CRIG.
- 5. Design and development of a vertical turbine pump for rural application Funded by CRIG.

#### **Major IPR Generated**

- 1. IPRNo-201721034865 -
- 3. IPRNo-201721042401 -

- 6. IPRNo-201821035492 -
- Solar Dryer
- 2. IPR No-201721034866 Transformer Fault Detection System
  - Smart Solar panel cleaning device
- 4. IPR No-201721040691 Intelligent Solar Pole
- 5. IPR No-201721042400 Dual Axis Solar tracking system
  - A Novel Slider Crank Mechanism







# SCIENCE COMMUNICATION

### **Ongoing Project**

1. Mission Eco Next, Eco Route, Eco Leads to nurture young role models for resurgence of eco scientific tradition funded by DST (Gol) – National Council for Science and Technology (NCSTC)

### Publication

1. Electroniki Aapke Liye, a popular science magazine published every month since last 25 years.



### WATER AND ENVIRONMENTAL SCIENCE

#### **Completed Projects**

- 1. Design and development of pervious concrete blocks for rural application. PI- Dr. Shalini Yadav, Project funded by CRIG.
- 2. Assessment and water quality management with special reference to lifeline sources of Bhopal. PI- Dr. Sunil Sharma, Project funded by CRIG.

### **Ongoing Projects**

- Project KA-1 in collaboration with PM University, Romania for faculty & Student Mobility for research and education activities. Project is Funded by European Union. RNTU PI is Dr. Shalini Yadav.
- 2. Design and development of mobile sanitizer. PI- Dr. Dinesh Kumar Soni, Project funded by CRIG.





# 4 ABOUT ATAL INCUBATION CENTRE (AIC) RNTU

### **4.1 INTRODUCTION**

A random idea might lose its track if it is not nurtured regularly in the right way. For a large number of people venturing into the culture of entrepreneurship nowadays, it is very important to educate and support them for the proper growth of their ideas. At AIC-RNTU, we have taken the charge of providing essential services such as fund support, management, mentorship, co-working space, and state-of-the-art technical assistance to the budding business units. By playing the role of both startup incubator and accelerator, we aim at training and mentoring young people to fuel their inner drive to innovate. Our primary objective here is to create



a startup ecosystem and familiarize the visionary brains with the business aspects of an idea and provide them a platform with necessary resources – culture, opportunities, and amenities – to grow their startup units into business enterprises.

The services are offered by AIC RNTU

#### Co-Working Space

A comfortable and dedicated working space is said to have a visible impact on the performance of the workers. At AIC-RNTU, we give splashy office space to the startups for their exclusive use.

#### Access To Network & Events

It is imperative to build healthy relationships with the like-minded people in order to learn and refine your perspective. We provide opportunities for the startups to network with the top minds of their industry and get the knack of the real-time business operations from their experiences.

#### Mentorship

We provide a pool of experts who shall mentor the incubates and guide them with their experience. Our domain-specific and generic network of mentors would acknowledge the challenges faced by the incubates and give them advice in their fields of expertise.

#### Intellectual Property Rights

It is essential to protect your creation in the growing trend of piracy. We, thus, take care of providing you with the intellectual & property rights to safeguard your startup.

#### Trainings & Workshops

We conduct different workshops and events to educate the incubates wherein experts provide valuable insights on subjects concerning the development of a startup. We organize both domain-specific and general training sessions to enhance the knowledge of the incubates.

#### HR/Intern Support

As the business flourishes, so it demands more workforce. Thus, we provide the necessary Intern /HR support to fulfill the requirements of human resource.

#### Access To Labs

Our incubation center houses several labs which are important for the startup units. Some of them are FAB

lab, Rapid Prototyping lab, IoT lab, and shared resources lab.

#### Company Registration

We will provide assistance and guidance for the registration of the startups.

#### • Funding

For an idea to take wings and materialize, money is the crucial resource. We have several funding options available (seed funding, etc), and a pool of investors to our disposal which shall pave the way for the startups to blossom through all the stages of development.

#### Technical Assistance

At our incubation center, the incubates will have access to high-speed internet. We will also provide them with guidance for the domain registration and the hosting space.

#### Legal & Accounting Support

The sound legal and accounting advice plays an important role in the smooth running of the business. We would be providing the incubates with the necessary legal & accounting support for their seamless development.

# 4.2 HAND HOLDING SUPPORT FOR A SUCCESSFUL STARTUP

#### Ideate

The Ideate symbolizes the startups that are teeming with ideas but still have no concrete action plan. They have a strong idea but a limited understanding of building a startup. This program aims at helping the innovation driven startups in their cocoon stage to convert their invalidated business ideas into a feasible and profitable business proposition. Under this, the startups in their ideation stage with no MVP and customer segment but a proof of concept would be guided to form a team, build a sustainable business model and learn nuances of market and entrepreneurship.

#### Discover

The team is built, the customers are there, and the money is coming too but is it enough to rev up your success? The raw material of innovation has to be converted into real-world breakthrough success. And this is where this 'Discover Program' helps you. This program, in particular, is designed for the startups in their'caterpillar stage'to steer them in the right direction by making them aware of the process to turn the product insights into a great company. This diligently prepared incubation program would assist them in catalysing their growth and upscaling their limited customer base by adopting an outlier's approach towards the culture of entrepreneurship. In this, the startups will learn to leverage technology to drive their innovation to the real-world market, customer acquisition and revenue generation. The training sessions focused on business operations by seasoned professionals will facilitate them in engineering their startup success by following the right process.

#### Growth

This program targets the segments of startups with sound customer base and revenue in hand but not enough market visibility. With a team built successfully, this program will categorically help the startups to earn the market exposure on a wider scale & seek different channels to market their products. This will help in improving the success rate of their innovative products. The quality mentorship by the adept professionals of the industry would help them in acing different verticals of the market so that their venture lives up to its potential and does not fail in the long run. This is the stage where our support would take their back.

# 4.3 I4 LAB [INNOVATION INTEGRATION INCUBATION AND IMPLEMENTATION]

#### **Rapid Prototyping**

A rapid prototyping lab weighs much importance when it comes to product development. AIC-RNTU has the well-furnished rapid prototyping lab equipped with the latest technology to help the startups create a high-quality scale model of their product at lower costs. A shared Rapid Prototyping lab ensures speedy process and efficient management of the available resources.

#### Fabrication

Dedicated to the facility of digital fabrication, a well-furnished fab lab with all the modern equipment comes up with AIC-RNTU. It renders assistance to the product focused startups with a bunch of flexible technology, industrial-grade fabrication and computer-controlled tools to carry out their research with ease. The benefit of a fab lab lies in its ability to be tailored according to the specific needs of the startups.

#### Internet of Things (IoT)

A highly developed IoT lab dons our Incubation Centre for the startups driven toward advanced technical research and innovation. It is basically a large scale research platform for exploiting the potential of the Internet of Things to translate innovative ideas into material products. Our sophisticated lab is suitable for carrying out the deployment and testing of small wireless sensor devices and communicating objects.

#### "Learn while Innovating or Innovate while Learning"

A random idea might lose its track if it is not nurtured regularly in the right way. For a large number of people venturing into the culture of entrepreneurship nowadays, it is very important to educate and support them for the proper growth of their ideas. At AIC-RNTU, we have taken the charge of providing essential services such as fund support, management, mentorship, co-working space, and state-of-the-art technical assistance to the budding business units. And providing a platform to students, entrepreneurs,

professionals to fabricate the samples, build a prototype in our lab with their ideas. And assistance throughout the way by our team. By playing the role of both startup incubator and accelerator, we aim at training and mentoring young people to fuel their inner drive to innovate. Our primary objective here is to create a startup ecosystem and familiarize the visionary brains with the business aspects of an idea and provide them with a platform with necessary resources – culture, opportunities, and amenities – to grow their startup units into business enterprises.



# **4.4 RESOURCES IN AIC**

#### **3D Printer**

3d printer can print solid 3D models which are simple or complicated ranging from toys to bearings, machine parts, replacements of broken article, casing and variety of other things. 3D printer helps turn concepts and ideas into physical prototypes saving time, reducing costs and shortening product development life cycles.

#### **LASER** Machine

This machine are used for engraving and cutting on wooden material, acrylic and other soft materials.

#### **CNC Router Machine**

This CNC Router machine can engrave the 3D & 2D design on wood,

plywood, MDF board and Acrylic also. Its working precision is very high.

#### **MINI 3D Printer**

This printer is Digital Light Processing (DLP) type. Its output is very precise than other type of 3D Printer. It can design very complex model quickly and easily.

#### **Mini CNC Machine**

As a small milling machine, that offers compact size and powerful functionality. Production of realistic parts and prototypes is made simple. For users looking for advanced milling capabilities without the need for expert operating skills, this is one of the easiest and most precise CNC mills in its class.

#### **Vinyl Cutter**

It is a type of computer-controlled machine. The computer controls the movement of a sharp blade over the surface of the material. This blade is used to cut out shapes and letters from sheets of thin self-adhesive plastic (vinyl). It is used to make signs, banners and advertisements. Advertisements seen on automobiles and vans are often made with vinyl cut letters.

#### **3D Scanner**

This 3D Scanner can scan real objects for 3D printing. The lightweight, ergonomic design makes it portable and easy to use for larger objects. It can produce portable as well as high-accuracy scans.















# **4.6 STARTUP ASSOCIATED**





# 5 RESEARCH RESOURCES

## 5.1 THE NATURE OF RESEARCH

The research process is involved everywhere and in our daily life. We do research for buying a new car, book etc, before selecting a job, school or college. It leads to give optimum result in our query. Ultimately research is a key parameter of life to produce and choose best one from lots of information, without it we can't take decision to move ahead. However, theoretical research may differ from experimental research and may more analytical in nature.

University research is aimed to perform more experimental research rather than theoretical research. Comparatively, experimental research is close to practicality and more reliable.

# **5.2 WHY RESEARCH IS NECESSARY?**

The key highlights of research are: -

- Investigating and understanding new data and information
- Constructing informed opinions based on research findings
- Involve in conversation with writers and scholars in your field
- Understand the way of using primary and secondary resources in related research

Research expands and integrates your experience and knowledge by providing a broader foundation for thinking and writing. This allows you to become an expert in a field that is not directly related to your daily life. When you do your research, you develop valuable and important skills that will help you in other areas of your life. You will learn to ask important questions, collect and interpret data, read critically, form knowledgeable views, and process and know conflicting evidence. By studying the major of your choice, you will become an expert in the field. Also, when you write down your findings, others will respect your knowledge and evaluate your judgement.

# **5.3 WHEN IS RESEARCH IMPLEMENTED?**

Not all writing requires research, it involves investigation of a field needed more detailed knowledge. Research is a combination of discipline and sophisticated skills. It is vital to explore the hidden subjects of a particular stream by generating knowledge about a subject and managing contradictory opinions. Asking questions to the research community is important in growth of research.

# **5.4 RESOURCES**

Research resources can be categorized as physical sources and digital sources. Physical sources include the experimental setups, which required to perform research. The key parameters to evaluate an experimental setup is the efficient and smooth working, time and power consumptions, and reliability. Their periodical preventive and predictive maintenance, calibration before experiments are the basic requirement during operation of an experimental setup. Digital resources include books, brochures, journals, magazines, newspapers etc as print media and other electronic sources, such as the internet and the World Wide Web. It also come from the interviews and surveys of someone else designs in the form of articles. By collecting data one can develop own articles. The research query leads to the selection of research resources accordingly. In AGU, researchers have access to digital research resources in terms of journals, e-books, magazines and e-libraries. Experimental setups are provided to researchers after evaluating their need. CRIG is an evaluating authority to provide such setups to promote research.

## **5.5 SOME PROMINENT RESEARCHERS OF AGU**

AGU have experienced researchers, those applied research methodologies efficiently in their academic career. They are familiar with the kinds of resources available within and outside campus. They engage in consultancy and guides research scholars in their field. They coordinate with research scholars to consult with subject experts, guide them to approach recommended readings and unaware research topics in subject. They can help research scholars by focusing on productive area of study rather than non-productive content. Such

advice helps research scholars to aim productive, authoritative, and updated information, saving your hours of valuable time. In addition to researchers, librarians are invaluable resources for your research.

CRIG organizes interviews, questionnaires, and surveys time to time, in one of the selected universities of AGU every year. These are the most useful tools to upgrade research environment in AGU campuses by involving researchers of universities.

# **5.6 EXPERIMENTAL RESEARCH RESOURCES**



Most of the research cannot complete without its experimental performance. To support decisions, it is required to perform several sets of experiments. It is time consuming and challenging task to accept favourable and non-favourable results. Experimental research helps to improve decisions based on data collection.

The success of experimental analysis is depending upon the coordination of universities and researchers knowledge. AGU provides facility to conduct research in scientifically acceptable conditions by using experimental methods and equipments. The research should create a prominent root and outcome.

There is list of research equipment available in AGU. Some equipments have gone through rigorous research experiments and have produced exceptional research for society.


# SOME PROMINENT RESEARCHERS OF AISECT GROP OF UNIVERSITIES (AGU)

Researchers of AISECT Group of Universities (AGU) contributes in research every year. Most of their contribution is based on their parent discipline, however RNTU researchers heading towards interdisciplinary solution of problems to produce path-breaking outcomes. AISECT Group of Universities (AGU) have an impressive H-Index of 60 (based on Scopus database), which is cumulative contribution of all researchers of AGU.

### **RABINDRANATH TAGORE UNIVERSITY, BHOPAL**



**Dr. Anil Kurchania** Agriculture Engineering Citation-15 H Index-2



**Dr. S Veenadhari** Computer Science-Engineering Citation-86 H Index-3



**Dr. Dinesh Kumar Soni** Mechanical Engineering Citation-87 H Index-4



**Dr. Sanjeev Gupta** Electronics & Communication Engineering Citation-22 H Index-2



**Dr. Pratima Gautam** Computer Science-Engineering Citation-23 H Index-3



**Dr. Rajendra Gupta** Computer Science-Enginnering Citation-24 H Index-2



**Dr. Shiv Shakti Shrivastava** Computer Science-Engineering Citation-38 H Index-1



**Dr. Shalini Yadav** Civil Engineering Citation-161 H Index-3



**Dr. Laxmi Singh** Electronics & Communication Engineering Citation-5 H Index-1



**Dr. Sangeeta Jauhari** Management Citation-15 H Index-2



**Dr. Sudeshna Ray** Chemistry Citation-225 H Index-9



**Dr. Prachi Tadge** Chemistry Citation-86 H Index-6

### **DR. C.V. RAMAN UNIVERSITY, BILASPUR**



**Dr. Shanti Rathore** Electronics & Communication Engineering Citation-7 H Index-2



**Dr. Durga Sharma** Electricals & Electronics Engineering Citation-5 H Index-1



**Dr. Rohit Miri** Computer Science-Engineering Citation-12 H Index-2



**Dr. Ragini Shukla** Computer Science Engineering Citation-3 H Index-1



**Dr. Neelam Sahu** Computer Science Engineering Citation-2 H Index-1



**Dr. Vineet Kumar Awasthi** Computer Science Engineering Citation-68 H Index-3



**Dr. R.P. Dubey** Mathematics Citations-33 H Index-2



**Dr. Shantanu Bhaumik** Mathematics Citation-2 H Index-1



**Dr. Manish Upadhyay** Chemistry Citation-1 H Index-1



**Dr. R. K. Singh** Zoology Citation-1 H Index-1



**Dr. Ashutosh Pandey** Physics Citation-79 H Index-6



**Dr. Ratnesh Tiwari** Physics Citation-241 H Index-10



**Dr. M. Z. Khan** Physics Citation-2 H Index-1



**Dr. A. K. Shrivastava** Physics Citation-30 H Index-2

AISECT UNIVERSITY, HAZARIBAGH



**Dr. Arvind Kumar** Agriculture Engineering Citations-21 H Index-2



**Prof. P. K. Naik** Sociology Citations-27 H Index-2

### DR. C.V. RAMAN UNIVERSITY, KHANDWA



**Dr. Bhavna Bajpai** Computer Science Engineering Citation-13 H Index-1



**Dr. Arun R Joshi** Agriculture Science Citations-73 H Index-3



**Dr. Swati Pathak** Chemistry Citations-10 H Index-1

#### **DR. C.V. RAMAN UNIVERSITY, BIHAR**



**Dr. Sitesh Kumar Sinha** Computer Science Engineering Citation-43 H Index-3



**Dr. Dharmendra Kumar Singh** Electronics & Communication Citation-25 H Index-1



**Dr. Vimal Kumar Sharma** Toxicology Citation-57 H Index-3



**Dr. Basant Kumar Singh** Mathematics Citation-20 H Index-1

## **MAJOR RESEARCH FACILITIES AT RABINDRANATH TAGORE UNIVERSITY**

### **CIVIL ENGINEERING**

- Los Angels Abrasion Testing Machine
- Marshall Stability Testing Machine
- Ductility Testing Machine
- Benkelman Beam Appratus
- Flexural testing machine
- Conctere mixers
- Compaction Factor Testing Appratus
- Compression Testing Machine

- Briquette Testing Machine
- Aggregate Crushing Test Apparatus
- Aggregate Impact testing Machine
- Rebound Hammer
- Casagrandes Appratus
- CBR Testing App (Electrically)
- Modified Proctor test (Heavy Compaction)
- Permeability test falling head



### **MECHANICAL ENGINEERING**

- Variable compression Ratio Engine
- CNC Machine
- Lathe machines
- Drilling Machines

- Milling Machine
- Refrigeration Units
- Compressors
- Softwares



- Solar Thermal Test setup
- Wind Research Test setup
- Solar PV Research System
- Spectrum Analyzer
- Digital storage oscilloscope
- Variable DC Power Supply
- Function GeneratorLux-Meter

### **ENERGY SCIENCE**

- Complete PCB Design & Fabrication Lab
- Lab view 2017
- MATLAB 2017
- Scilab 6.0.0
- Novarm Diptrace 3.1.0.1
- Keil Microvision 4.0

- Arduino 1.8.3
- AVR Studio 4.0
- Designsoft TINA Pro V.9
- Xilinx ISE 14.1

- Ansys 15.0
- CATIA (2018)
- Mentor Graphics Model Sim 10





### AGRICULTURE SCIENCE

- Automatic seed/grain counter
- Seed Moisture Meter (digital)
- Bather & Chillers 32 liter
- Sterilizer & Washes
- EC Meter
- Autoclave Vertical 22 liter double wall
- Grinder
- Automatic Filtration
- Calcimeter
- Screw Auger
- Post Hole Auger
- Counting boards
- Florescense Microscope 40x1000
- Grauated Measuring cylinder 1000 ml.
- High speed Refrigerator centrifuge 20000 RPM
- Plant Breeding kit
- Oil eneulson kit
- · Shaker and vortex
- Sterilizer and washer
- Vertical gel electrophoresis unit
- Heater
- Incubator
- Spriat lamp
- Colouycaruter
- Cutture tube
- Compound Micros cope

- Balance PGB630
- Automatic filtration
- Dessicutor 210mm.
- Burette stand
- Mechanical shaker
- Precision balance pgb 220
- Rotary evaporator
- Soil moisture meter
- Shaking machine 18x18
- Catheter
- Milk pippets
- Termereic paper strip dozen
- Wood file
- Dissecting microscope
- Seed Counter
- Weighing Balance TTB 30
- Refrectometer
- Innoculatiuon Loop
- Electrical Conductivity Meter
- Water Testing kit
- wind wane
- Single distillation Unit
- Tensiometer

36

- Hot plate stirrer
- Flame Photometer
- Seed Germinator- 308 liter capacity

DEPARTMENT OF AGRICULTURE SCIENCE

TAGORE UNIVERSITY

### CHEMISTRY

- Rectangular Muffle Furnace
- Oven Universal
- Magnetic Stirrer
- Heating Mantle
- Ultra Violet Cabinet
- Electronic Digital L.E.D./ I.C.D. Display top pan
- High Temperature Tubular Furnace

### • Spectrometer (Ocean Optics)

- Software. It is attached with High Temperature
- Rota Mantle
- PT 100 sensor hot plate
- Vertical Muffle Furnace
- Double distillation set up



#### **CENTRAL SOFTWARE RESEARCH LAB**

- Net Sim
- Sim-2
- Weka
- Gephi
- Python
- Sci Lab
- Cloud Sim
- Lab view XILINXIE3D
- Mentor Graphics
- SPSS

- Computer System (35) in research lab
- R, Language Open Source
- Python Open Source/Anaconda
- Java Open Source
- .Net
- My Sql Open Source
- Cloud Sim, Ns2
- MATLAB
- Weka, Quantminer, Rapidminer





# MAJOR RESEARCH FACILITIES AT DR C.V RAMAN UNIVERSITY (C.G.)

### **ENVIRONMENTAL SCIENCE**

- Digital Flam Photometer (Besto) Besto/BLT
- Atomic Absorption Spectrophotometer sys-WFX-320
- Flame Photometer SYS-128
- B.O.D. IncubatorBes
- Conductivity Meters
- UV-vis. Double Beam Spectrophotometer sys-2205
- UV-vis. Single Beam Spectrophotometer Sys-118
- Turbidity Meter Sys-135
- C.o.d. Digester Besto/7945
- Auto Karl Fischer Titrimeter Ti-381
- Photoelectric Calorimeter Sys-113
- Soil Testing Kit
- Water Analysis Kit Sys-371
- Kjeldal Apparatus Insif
- Sohxlet Apparatus Borosilicate
- Tlc Apparatus Besto/tlc-37/7550
- Analytical Balance Hst
- Colorimeter Sys-115

- Water Deionizer Waston-50
- Digital Balance Citizen/CY-220
- Vortex Shaker 15WIXJR
- pH Meter MK VI
- Incubator
- Hot air oven CIC
- Autoclave 8192B
- Electrophoresis DPS2003
- Laminar air Flow 4FPTC
- Plant Growth Chamber Th7004
- Digital weighing Balance K ROY
- HPL, CSYS-LC-138
- PCR Thermal cycle T-100(Miorel)
- Distillation Unit
- Microtome BMT-6
- Turbidity meter Sys -135
- Paper chromatography SBCG2





### **CENTRAL SOFTWARE RESEARCH LAB**

- MATLAB 11a
- Internet of Thing (IoT) Kit
- SCI Lab



- Weka
- Latex
- Python



# 6 RESEARCH PROJECTS

## **6.1NTRODUCTION**

AGU aims to develop cooperative projects with external universities and research funding organizations. The centers and DRIC (Departmental Research & Innovation Cell) members search for the opportunities to contemplating a project in cooperation with a private or government sponsor. CRIG helps to identify the actual sources of funding and cooperates with research centers and DRIC in project formulation as per the guidelines of the funding agency.

# **6.2 EXTERNALLY FUNDED PROJECTS**

The main objective of AGU is to develop externally funded projects, those should be accepted globally and ready to publish in the readily available framework. Intellectual property developed during the research projects is generally owned by the principal investigator of the project.

AGU tries to touch all fields, which requires improvement. Work in defence and social welfare, to upgrade science education and to save environment are fields, where AGU is involved presently, through collaboration with externally funded projects. The list of externally funded project is attached with their outstanding work.

S. No.	Title	Funding agency	Name of Research Center
1	Synthesis, Characterization of Lanthanide-based Phosphors as Spectral Converters in Solar Cells.	DST Indo-Taiwan Scheme	Centre of Excellence of Advanced Materials for Research
2	ABO <sub>3</sub> and $A_2X_3$ compounds under extreme conditions of pressure and temperature.	Funding agency - Spanish Ministry	Centre of Excellence of Advanced Materials for Research
3	Development of Pyrophoric Metal Ceramic Composite Materials for Smart Flare as IR Countermeasure.	Armament Research Board, DRDO	Centre of Excellence of Advanced Materials for Research
4	Assessment study of the Commercialization of already developed technologies of the Public Funded Research Institutes established in Madhya Pradesh.	Scientific and Industrial Research (DSIR)	Agriculture Research Center (ARC)
5	Mission Eco Next, Eco Routes Eco Leads to nurture Young Role Models for Resurgence of Eco Scientific Tradition"	National Council for Science & Technology Communication, (NCSTC), DST, GOI	Centre for Science Communication, RNTU

## **RNTU Bhopal-List of Externally Funded Projects**

6	Staff Mobility and Higher studies Program with Romania	Project funded from EU	Centre of Excellence for Advanced Water and Environmental Research
7	Preparation of Biodiversity Register of Obaidullaganj Block, District Raisen.	MP Biodiversity Board, Bhopal.	Department of Basic Science
8	Preparation of Biodiversity Register of Udaipura Block, District Raisen.	MP Biodiversity Board, Bhopal.	Department of Basic Science
9	Preparation of Biodiversity Register of Raisen Nagar palika.	Forest Department Raisen, District Raisen.	Department of Basic Science

## **CVRU Bilaspur - List of Externally Funded Projects**

S. No.	Title of Project	Name of the Funding Agency	Name of Research Centers
1.	Documentation of Traditional knowledge and ethnomedicine uses of medicinal plants from remote villages in Bilaspur District in Chhattisgarh, India	National Innovation Foundation (Nif) & DST	Center of Research Excellence for Arts & Culture



# **6.3 INTERNALLY FUNDED PROJECTS**

Core Research & Innovation Group (CRIG) provide funding for AGU researchers to produce good quality research within campus. CRIG Promotes inter university and multidisciplinary projects to introduce AGU in every possible sector and motivate researchers to collaborate with external research organizations. Internal grant is provided to the projects that have academically worthy and innovative content in the particular academic discipline.

Project agreements is clearly stated that the investigators retain full and free rights to determine what they will publish according to normal standards of professional ethics. The CRIG may permit delay of the project, but not more than 3 months, for the following reasons:

- · The projects involved more experimental work,
- The project is a part of a larger project and waiting for permission to disclose results
- The project involves the development of an invention which may be patentable.

CRIG permits external appointment as per project need and it shall be made in accordance with established university procedures. This responsibility cannot be shared with external funding organization. Until or unless, any appointment is recommended by external funding organization. The primary criteria for such appointment is academic merit and research background. All agreements are subject to approval by Chancellor of the university and CRIG Director, and agreements are normally activated between CRIG and researcher of AGU as principal investigator.

Intellectual property data created by the researcher is owned by the university and is licensable for the commercial development for public use or benefit.

### **Completed Projects**

CRIG funded 23 research projects, whereas 9 research projects have completed successfully. These research projects comprise experimental analysis and study of different subjects of social interest. As per the research policy of AGU, CRIG pays equal attention on research projects, having social and industrial importance.

### RNTU, BHOPAL

#### **Social Projects**

- Research Project on Parvati River Pollution Check
- Development of a smart Lab and smart class room
- Development of an Innovative Solar system for Rural Application
- Study on financial Literacy in Youth

#### — Industrial Projects

- Design & Development of Ecofriendly Pervious Concrete Blocks
- Master Slave Dual Axis Tracking System Proto type on one set of existing solar panel
- Development of a working model for vertical axis sail type wind mill for water pump in stand along mode
- IoT based smart devices

# COMPLETED PROJECTS

### **CVRU, BILASPUR**

#### —Social Projects-

 Estimation of Pesticide in Fruits & Vegetables in Chhattisgarh Area

### **Ongoing Projects**

CRIG distributed funds to another 13 projects, which selected according to the problem addressed from AGU universities. These projects are ongoing under the supervision of researchers and center heads. There are 6 social projects, based on the local issues and 7 projects are based on industrial problems. Following research projects are ongoing in AGU campuses.

### **RNTU, BHOPAL**

Design and Development of a Moveable Sanitization Machine

### Social Projects

### **CVRU, BILASPUR**

- Performance assessment of primary students undergoing brain development classes in Bilaspur district
- Study of Harmful Effect of Food Preservatives
- Preparation of Eco- Friendly and low cost fly Ash based Materials for various applications
- Sustainable Livelihood Village Model Plan under Atma Nirbhar Bharat at Village

# ONGOING PROJECTS

#### **RNTU, BHOPAL**

- Development of dust resistant Nano material coating for solar panel
- Development of IoT based Production- VTS, Soap Dispenser, Mask Detector, Temp Controller, Water Quality Monitor, Smart bed
- Development of Internal Management Control System

### CVRU, KHANDWA

A Study of Kalbelia Tribes to preserve their identity

### **CVRU, BILASPUR**

- Recognition of Cationic and Anionic Pollutants using Chemo sensor from the effluents of Sirgitti Industrial area in Bilaspur
- Formulation of Hebo –metallic –nano conjugate for skill in infection therapy: An emerald approach
- Nano synthesis and Characterization of some Phytochemicals used in Hypothyroid Treatment
- Investigation on cation exchange capacity of clay minerals for environmental pollutant

Industrial Projects



## **7.1 AGU PERSPECTIVE**

Quality research is always a top priority for AGU, such research work normally ends up with good patents, which contribute in a big way to nations vision. Patent oriented research always opens a new way for innovative ideas and many a times give way for commercialization and product of social use.

A large number of good quality patents are filed by AGU every year. Not only, centers are involved in innovative work and filling patents, departments are also filling patents to improve their academics. However, number of quality patents is an important parameter for most of the accreditation agencies.

Every patent filled by AGU is examined by CRIG first and many times funded and also provide support of patent attorney. Over 100 Patents have been acquired by the AGU.





## 7.2 CORE DISCIPLINE PATENTS

All patents based on the core subjects are categorised in "Core Discipline Patents". It involves the knowledge of core discipline to get the innovative solution of specific problem by using various subjects of discipline. Some of the core discipline key patents of AGU are listed below.

S.No.	Name of the Patent published/awarded	Patent Number	University
1.	A Transformer Fault detection device	201721034866	RNTU, Bhopal
2.	A Novel System and Method for Automatic Attendance Marking	201721040690	RNTU, Bhopal
3.	Intelligent Solar Street Pole	201721040691	RNTU, Bhopal
4.	A Crank Less I.C. Engine	201721038460	RNTU, Bhopal
5.	A Novel Slider Crank Mechanism	201821035492	RNTU, Bhopal
6.	Fake Data Detection System and Method	201921035659	RNTU, Bhopal
7.	Optimal Path selection Method	201921035660	RNTU, Bhopal
8.	Education Management System and Method	201921035661	RNTU, Bhopal
9.	Waste Water Treatment System	201921035662	RNTU, Bhopal
10.	Concrete composition and a method of Preparation	201921035663	RNTU, Bhopal
	Reparation thereof		

11.	Power Amplification System	201921035654	RNTU, Bhopal
12.	Up conservers ion Nanophosphor Based Photo electrode	201921035656	RNTU, Bhopal
	for Dye Sensitized Solar Cell and a Method of Making there		
	of		
13.	Harmonic detection and reduction system	201921035658	RNTU, Bhopal
14.	Bar Clamp	322260-001	RNTU, Bhopal
15.	Mouth Piece for Analysing Exhaled Breath	322254-001	RNTU, Bhopal
16.	Pneumatic Clutch Actuator	322262-001	RNTU, Bhopal
17.	Sheet Cutter	322255-001	RNTU, Bhopal
18.	Wood Cutting and Trimming Machine	322256-001	RNTU, Bhopal
19.	Frequency Converter	322258-001	RNTU, Bhopal
20.	Vacuum Cleaner	322253-001	RNTU, Bhopal
21.	Portable Charger	322257-001	RNTU, Bhopal
22.	Video Shot Transition Detection Method	201921049693	RNTU, Bhopal
23.	System and Method for constructive effort estimation	201921049688	RNTU, Bhopal
24.	Enhanced Biometric Based Digital Circulation of encrypted	202041040640	RNTU, Bhopal
	question Paper		6
25.	Artificial Intelligence Based Efficient Communication	202021044631	RNTU, Bhopal
	Platform Between Deaf & Blind and between Blind & Deaf		
26.	A Heat Recovery System for Use with an IC Engine	202121041817	RNTU, Bhopal
27.	Phase Sequence Detection Device	201921026120	CVRU, Bilaspur
28.	Voice And Remote-Controlled Home Automation System	-201921026118	CVRU, Bilaspur
29.	Automatic Temperature Based Fan Controlling System	201921026123	CVRU, Bilaspur
30.	Data Loss Prevention System and Method	201921026142	CVRU, Bilaspur
31.	Method for Removing Contaminants from Liquids Using	201921026144	CVRU, Bilaspur
	Bio- Separation Technique		
32.	Method for Estimating Heavy Metals Contamination in	201921026140	CVRU, Bilaspur
	Foodstuffs		<i>,</i> ,
33.	Method for Determination of Heavy Metals Contamination	201921026143	CVRU, Bilaspur
34.	Method and Systems for Two-Wheeler Security	201921008522	CVRU, Bilaspur
35.	Water Filter for Aquarium	319204-001	CVRU, Bilaspur
36.	Fluid Dispensing Bottle	319205-001	CVRU, Bilaspur
37.	Chain Cover for Vehicle	319206-001	CVRU, Bilaspur
38.	Light Fixture	319207-001	CVRU, Bilaspur
39.	Air Pump	319209-001	CVRU, Bilaspur
40.	Public Light Fixture	319210-001	CVRU, Bilaspur
41.	Spark Plug Connector	319211-001	CVRU, Bilaspur
42.	Laser For Drilling	319194-001	CVRU, Bilaspur
43.	Liquid Sorting Machine	319195-001	CVRU, Bilaspur
44.	Hand Cart for Agriculture	319196-001	CVRU, Bilaspur
45.	Adapter 8	319188-001	CVRU, Bilaspur
46.	Heat Exchanger	319189-001	CVRU, Bilaspur
47.	Retractable Paint Gun	319190-001	CVRU, Bilaspur
48.	Mouth Cleaning Apparatus	319191-001	CVRU, Bilaspur
49.	Drill Chuck	319192-001	CVRU, Bilaspur
50.	Jack For Lifting	319216-001	CVRU, Bilaspur
51.	Device For Cutting Paper	319220-001	CVRU, Bilaspur

52.	Vending Machine	319221-001	CVRU, Bilaspur
53.	Finger Wearable Forceps	319218-001	CVRU, Bilaspur
54.	Chimney For Kitchen	319219-001	CVRU, Bilaspur
55.	Manual Roll Press Machine	319233-001	CVRU, Bilaspur
56.	Hand Juicer	319223-001	CVRU, Bilaspur
57.	Punching Machine for Paper	319224-001	CVRU, Bilaspur
58.	Air Tool Balance	319232-001	CVRU, Bilaspur
59.	Electric Wires Connector	319225-001	CVRU, Bilaspur
60.	Mincer	319227-001	CVRU, Bilaspur
61.	Pump Unit	319228-001	CVRU, Bilaspur
62.	Dispensing Brush	319229-001	CVRU, Bilaspur
63.	Lubricant Container	319230-001	CVRU, Bilaspur
64.	Filter Housing for Water Purifier	319208-001	CVRU, Bilaspur
65.	Public Light Fixture	319210-001	CVRU, Bilaspur
66.	Liquid Sorting Machine	319195-001	CVRU, Bilaspur
67.	Adapter	319188-001	CVRU, Bilaspur
68.	Hand Juicer	319223-001	CVRU, Bilaspur
69.	IOT Based Smart Surveillance Security with Automatic	202021044245	CVRU, Vaishali
	Sanitization.		
/0.	Enhanced Biometric based digital circulation of Encrypted	202041040640	CVRU, Vaishali
	question Paper.	2	
71.	IPF- Voltage Converter Shoe: Intelligent Shoe Power Bank	202021052201	CVRU, Vaishali
	charged by Foot Steps.		
72.	MODI	202011035844,	CVRU, Vaishali
73.	Multi Power Source AC thela	202011037949	CVRU, Vaishali

# 7.3 MULTIDISCIPLINARY PATENTS

These patents involve the knowledge of different disciplines to solve the problems. Comparatively, these patents consume more time to develop fruitful work because of the challenges of different disciplines. Researchers have to analyse the problems from their subject point of view, to find possible inclusion of subjects for solutions. Some of the Multidisciplinary Patents of AGU are listed below.

S.No.	Name of the Patent published/awarded	Patent Number	University
1.	Solar Tree Based Structure	201721002193	RNTU, Bhopal
2.	A Multipurpose solar Dryer	201721034865	RNTU, Bhopal
3.	Dual Axis Fault Resistant Solar Tracking Device	201721042400	RNTU, Bhopal
4.	Smart Solar Panel Cleaning Device	201721042401	RNTU, Bhopal
5.	Method for Routing in Vehicle AD-HOC Network (VANET) with Mobility Awareness	201821047991	RNTU, Bhopal
6.	Computer Implemented Method for Semantic Indexing Based Text Classification using Deep Learning	201911042141	RNTU, Bhopal
7.	System of Personalized Physical and Mental Monitoring with Using IOT Sensors Network	201911041380	RNTU, Bhopal
8.	Automatic transformer Maintenance System	201921035655	RNTU, Bhopal
9.	Hybrid Power Generation System	201921035657	RNTU, Bhopal
10.	Method for preparing Stone Matrix Asphalt	201921049692	RNTU, Bhopal

11.	Fog Collecting System	201921049689	RNTU, Bhopal
12.	System and Methods for identifying Knuckles for Users	201921049690	RNTU, Bhopal
13.	Prediction Device for Roughness Surface	201921049691	RNTU, Bhopal
14.	An IOT Enabled Cloud Computing Based Remote Monitoring System of Hazardous, Flammable, and Explosive Leakage for Chemical Industries	202041015822 A	RNTU, Bhopal
15.	A System for Electric Terrain Vehicle Dynamics Analysis& Optimization	202111036381 A	RNTU, Bhopal
16.	An IoT & Cloud Computing Enabled 5G Sensor Network for Smart City Implements	202111041401	RNTU, Bhopal
17.	Locomotive Track Monitoring System	201921026121	CVRU, Bilaspur
18.	Green House Management System	201921026122	CVRU, Bilaspur
19.	Method for Estimating Micronutrients	201921026119	CVRU, Bilaspur
20.	System and Method for Controlling Multi-Media Displays	201921026138	CVRU, Bilaspur
21.	Computational System	201921026145	CVRU, Bilaspur
22.	Denoising System	201921026141	CVRU, Bilaspur
23.	Method for Synthesizing Graphene Nano-Platelets	201921026139	CVRU, Bilaspur
24.	Autonomous Motor Controlling System	201921026135	CVRU, Bilaspur
25.	Cancer Detection System and Method	201921026127	CVRU, Bilaspur
26.	Power Factor Correction System and Method	201921026130	CVRU, Bilaspur
27.	System And Method of analysing Vibration on Machines	201921026131	CVRU, Bilaspur
28.	Risk Assessment Method	201921026129	CVRU, Bilaspur
29.	Cognitive Radio System	201921026132	CVRU, Bilaspur
30.	Cordless Screw Driver	319203-001	CVRU, Bilaspur
31.	Filter Housing for Water Purifier	319208-001	CVRU, Bilaspur
32.	Hydraulic Pipe Cutter	319212-001	CVRU, Bilaspur
33.	Electric Transducer	319213-001	CVRU, Bilaspur
34.	Alternator	319214-001	CVRU, Bilaspur
35.	Robotic Arm	319197-001	CVRU, Bilaspur
36.	Gear Shifter Knob of a Vehicle	319198-001	CVRU, Bilaspur
37.	Fuel Burner for Testing	319222-001	CVRU, Bilaspur
38.	Grill for an Automobile	319217-001	CVRU, Bilaspur
39. 40	Suspension Assembly Connector for Signal Transmission	319220-001	CVRU, Bilaspur
41.	Crime Detection and Prevention System Using Personal and Public IoT Networks	2020102101	CVRU, Bilaspur
42.	Method For Water Pollutant Concentration Estimation in Water Reservoir Using Laplace Transform	2020102450	CVRU, Bilaspur
43.	Green Building Environment Management Module for Real Time Air Quality Monitoring	2020102451	CVRU, Bilaspur
44.	Disease Detection Using IoT and Machine Learning in Rice Corps	2020102100	CVRU, Bilaspur
45.	An Al Based System for Glucose Monitoring and DeterminingCompliance	2020142112	CVRU, Bilaspur

# 8 RESEARCH PAPER PUBLICATION

# 8.1 PARAMETERS OF AGU

AGU believes that the publication of any article can be defined in three critical phases of writing such as expressive, investigative and influential. Each of these types of writing phases requires special skill to make an informative publication. A quality publication constituent a literature review to explore opportunity in existing research and methodology to justify the gap in research, in an expressible way. The collection of data and result formulation should be in investigative in nature. Whereas, discussion should have influential element.

Δ		Դ
	=	
	Ξ	
	=	
F		J

# **8.2 RESEARCH PAPER WRITING SKILLS**

To express research in a technical way, publication writing skill is required. A good notifiable publication comprises following characteristics, those reflects in a publication from up to the end.

- 1. Clarity of subject
- 2. Purpose of Publication
- 3. Stick to an objective
- 4. Collection of solid information (facts and data) 9.
- 5. Be Neutral with results

- 6. Concise Writing
- 7. Maintain direction
- 8. Consistent style and format
- 9. Content should be archival
- 10. Citation of contributions



# 8.3 ANALYSIS

47

# 9 BOOK/BOOK CHAPTERS PULICATION

## 9.1 PARAMETERS OF AGU

AGU has standards of formatting guidelines to reflect thoughtful and professional way of book writing. Proper formatting helps to attract reader of same community. Some important keywords of a standard formatting are fonts, margins, indentation, line spacing, alignment, page number, scene brakes, italics, sentence separation, page separation and word count.



# 9.2 SHARING KNOWLEDGE WITH SOCIETY

Knowledge sharing is a major part of knowledge management process. Researchers and Professors are not only involved in research publication, but also share their knowledge among people, friends, families, communities and between organizations by writing books and book chapters. More than 100 books and book chapters are published by AGU faculty members in different publication houses.

Now a day, social media emerges as one of the advanced tools to share knowledge apart from traditional face to face interaction. It arises an opportunity to write E-books, E- contents, blogs etc.

E-library has pool of publication and books in AGU. AGU has e-library in each university, which can be accessed from anywhere.



# 9.3 ANALYSIS

# **10** CONSULTANCY AT AGU

## **10.1 INTRODUCTION**

AGU provides consultancy in large number of fields to various organizations in public as well as private sectors. Experts in various streams such as Agriculture Science, Engineering & Technology, Humanities & Languages, Physical & Life Science, Economy, Management, Paramedical & Nursing, Library Science, Science Communication and Yoga are available in AGU. Our experts have years of experience and do extensive research with the end organization and come up with most efficient solutions.

Today, industries face constant challenges regarding reassessment of business models, technology problems, structure of organization, staff members, marketing & management, and distribution channels. We work with our clients to develop practical and possible solutions, that incorporate technological, market and financial considerations. Our labs are adequately equipped to take up much consultancy assignments.

## **10.2 CONSULTANCY SERVICES**

Consultancy skills & expertise as per nature of problems,

- Inventive thinking.
- Thinking conceptually and practically.
- Problem-solving.
- Communicating clearly and sympathetically.

## **10.3 STREAM WISE AREAS OF CONSULTANCY**

### Humanities, Arts and Languages

#### Areas of consultancy

- Social work in Rural & Tribal area / Sociology
- Hindi Literature
- Indian Mythology & Feminism in English Literature, Soft skills & Personality development

## Agriculture, Farms, Crops and Food Processing Areas of consultancy

- Renewable Energy & Farm machinery
- Trainer- (Crop Insurance & Rural Finance) / Farmer Training / Inorganic & Organic farming Consultancy.
- Horticulture Science, Vegetable based kitchen garden/farming module, Greenhouse management, Organic farming
- Bee keeping, Insect Population dynamic and Storage grain management
- Social work in Rural & Tribal area / Sociology
- Hindi Literature
- Indian Mythology & Feminism in English Literature, Soft skills & Personality development

- Collaboration with all job levels.
- Organization and time management.
- Curiosity.
- Trustworthiness.







### Physical, Science, Life Science, Biotechnology & Maths

### Areas of consultancy

- Environmental Science / Parasitological / Potential of Medicinal Plants
- Advance Material Science/Nano Technology
- Environmental Science, Sustainability analysis & design
- Advance Material Science/Nano Technology
- Maths related topics





### Areas of consultancy

- Wastewater Treatment, Industrial & Solid
  Waste Management
- Water resources and Environment and Geology
- Transportation



#### Computer Science Engineering Areas of consultancy

- IOT
- Data Mining / Machine Learning
- Machine Learning, Data analytics, Python



## **Mechanical Engineering**

### Areas of consultancy

- Energy and Emissions with regards to internal Combustion Engines.
- Renewable energy & Material Management
- Production Engineering
- I.C. Engine, Refrigeration & Air conditioning
- Fabrication, CNC, CAD/CAM
- Solar Energy, Refrigeration & Air Conditioning
- Material Science



## **Electrical Engineering**

- Areas of consultancy
- Control System
- Integrated Circuits & VLSI
- Energy Communication Systems



### Electronics and Communication Engineering Areas of consultancy

- Wireless Communication, Sensor Networks
- Wireless communication, Digital Electronics
- Single Phase Electrical circuits (Electrician training)
- Digital Communication / Wireless
   Communication /Optical Communication





# Information Technology

## Areas of consultancy

- Data mining / Graphic Designing /2 D Animation
- Information Technology

### Paramedical, Nursing & Pharmacy Areas of consultancy

- Specialization in Mental health Nursing
- Nursing
- Yoga & Nutrition Expert / Ayurved
- Physiotherapy / Dry needling / Cupping





### Education

### Areas of consultancy

 Psychology / Psychometric Test Research on Educational Issues /subjects

## **Commerce & Management**

### Areas of consultancy

- Behavioural Trainer / Statistical Software
   Trainer/ Taxation
- Statistical Software Trainer/Taxation/Stock Market
- Personality development/Communication Skills
- Career Counsellor





# **EXPERTISE FOR CONSULTANCY OF SOME SPECIALIZED FIELDS**

S. No.	Fields	Consultancy Services	Name of Experts
1.	Agriculture	<ul> <li>Customization and design of form machinery and equipment using solar energy</li> <li>Seed to harvesting consultancy for better productivity and enhancement of income</li> <li>Green house expansion to management with cost effectiveness and efficiency</li> <li>Project based consultancy for horticulture and vegetable farming from small to mega project</li> <li>Consultancy for effective organic and inorganic farming for profit.</li> <li>Training projects for group of farmers and managers on all aspects of agriculture</li> <li>Finance related consultancy on crop insurance, and other activities.</li> <li>Training of farmers</li> <li>Bee keeping Mushroom cultivation and Herbal garden consultancy on turnkey mode</li> </ul>	Dr. Anil Kumar Kurchania Dr. Ashok Kumar Verma Dr. Shubham Kumar Kulshreshtha Mr. Swapnil Kumar Pandey Dr. Arun R Joshi Dr. Santosh Kumar Dr. Arvind Kumar
2.	Humanities, Arts and Languages	<ul> <li>Survey based projects in rural and urban areas</li> <li>Translation work on a turnkey basis</li> <li>Publication of books journals and magazine on from inception to marketing</li> <li>Campaign design and management</li> <li>Design and execution of social work project in rural and urban area</li> <li>Training project on soft skill, personality groom and other aspects of competitive sphere</li> </ul>	Prof. P. K. Naik Dr. Usha Vaidya Dr. Mousmi Parihar Dr. Ruchi Mishra Tiwari Dr. Aanchal Shrivastava, Dr. Manisha Dewedi Dr. Ved Prakash Mishra Dr. Manish Ranjan
3.	Commerce	<ul> <li>Case based and regular Consultancy on taxation and book keeping</li> <li>Preparation of professional Project Reports</li> <li>Training on tally, taxation and other aspects of accounting</li> <li>Project based consultancy in commerce</li> </ul>	Dr. Indu Santosh Dr. Priyank Mishra Dr. Basanti Merlin Mathew Mr. Mohammad Sagir

4.	Management	<ul> <li>Project management right from concept to conclusion</li> <li>Training of human resources in all spheres at various codes from worker to senior manager</li> <li>Statistical Analysis and consultancy</li> <li>Report writing and DPR presentation</li> </ul>	Dr. Neha Mathur Dr. Sangeeta Jauhari Dr. Neha Mathur Dr. Vivek Bajpai Dr. Abhishek Pathak
5.	Civil	Testing of building material	Dr. Shalini Yadav
	Engineering	• Conduct and Generation of survey report	Dr. Sunil Kumar Sharma
	Lingineering	Architectural design of all kind of civil	Mr. Kapil Soni
		construction	Dr. M.K.Tiwari
		Civil project design for inception to	Dr. Vimlesh Vivuti Ranjan
		execution	
б.	Physical and	Analysis of causes which affects	Dr. Pragya Shrivastava
	Life Science	temperature rising	Dr. Sudeshna Ray
		Projects writing of power of recycling	Ms. Jyoti Rawat
		• Study projects on invasive and	Dr. Prachi Tadge
		endangered species	Dr. Sweta Sao, Dr. R.K. Singh
		<ul> <li>Design of projects based on</li> </ul>	Dr. Amit Sharma
		environmental science and sustainability	Dr. Brijesh Singh,
		• All types of advanced testing of material	Dr. Rajeev Kumar Sharma
		<ul> <li>Developing advanced material based</li> </ul>	Dr. Sushil Kumar Jamariar
		solution for various problem in emerging	
		fields of nano material and other material	
		<ul> <li>Project management right from</li> </ul>	
		specification design to commission	
		Development of solar material	
7.	Computer	Research projects based on IOT and their	Dr. Rakesh Kumar
	Science	model developments	Mr. Mukesh Kumar
	Engineering &	Consultancy and project writing and of	Dr. S. Veenadhari
	Information	Principal Component Analysis, Rule	Dr. Preeti Manesnwary
	Technology	learning, Clustering and Amnity	Dr. AmritaVerma
		Grouping of Data Mining	Dr. Bhayna Bainai
		Machine Learning research projects     based on repetition of past data	
		<ul> <li>Provides Consultancy on Graphic</li> </ul>	Dr. Rajendra Gupta
		Designing and 2D Animation Projects	Dr. Varsha Jotwani
		besigning and 20 Animation rojects	Dr.Ragini Shukla
			Dr. Neelam Sahu
			Dr. Arvind Kumar Tiwari
0	Floctropics and	• Consultance and project writing or	Dr. Saniagy Kumar Cunta
õ.	Electronics and	Consultancy and project writing on     wireless DAN	יוט. Sanjeev Kumar Gupta Mr. Ashish Chouhan
	Communication	and wireless WAN	Mr. Litendra Ahir
	Engineering	Consultancy for different applications of	Ankit Pandit
		<ul> <li>consultancy for unreferit applications of sensor networks such as lot industrial</li> </ul>	Dr. Saurabh Mitra
		Automation Video Surveillance etc	Dr.Shanti Bathore
		Hands on Practices on Single Phase	Dr. Dharmendra Kumar Singh
		Flectrical Circuits	

		<ul> <li>Consultancy and project writing on applications of communications in Digital, Wireless and Optical.</li> </ul>	
9.	Mechanical Engineering	<ul> <li>Consultancy and project writing on Energy and Emission control technologies of Internal combustion Engines</li> <li>Consultancy for Material and inventory management for industries.</li> <li>Consultancy and project writing for industrial application of production engineering by using advanced machines such as CNC, Milling, Drilling, Lathe Machines etc.</li> <li>Training on Refrigeration &amp; Air Conditioning</li> <li>Hands on training of solar systems in solar equipped labs</li> </ul>	Dr. Dinesh Kumar Soni Mr. Lalit Narayan Mr. Vijay Bhan Dinkar Mr. Rahul Kumar Singh Mr. Vinay Yadav Dr. T Ravikiran Mr. Tejkaran Narolia Dr. Dinesh Kumar Soni Dr. Harsh Pandey
10.	Electrical Engineering	<ul> <li>Consultancy and project writing on Control System</li> <li>Training on Integrated Circuits &amp; VLSI</li> <li>Consultancy and project writing on Communication Systems</li> </ul>	Dr. Prateek Nigam Dr. Shashikant Soni Dr. Kishore Thakre



## **10.4 CONSULTANCY CAPABILITIES**



## **10.5 CONSULTANCY GENERATED**



# 11 COLLABORATIONS & MOU'S

# 11.1 MEANSTO AGU

The purpose of the MoU is to develop strategic relationship with other universities, or research organizations and Industries with specified objectives. AGU emphasizes on active MoU and collaborative projects to maintain strong relationship with other organizations. It has more than 140 MoU and Collaborations with national and international organizations. There are a large number of projects being done under these MoU's which have resulted in product, patents and documents/reports.



Research relationship with organizations under the MoU explores the possible research collaborations with collaborative research module in which researchers from both sides join hands to come out with project ideas. Additionally, there are some problem specific research MoU and collaborations to solve a research issue by mutual collaborations.

# 11.2 ACTIVE INTERNATIONAL COLLABORATIONS & MOU'S



# 11.3 ACTIVITIES AS PER INTERNATIONAL COLLABORATIONS AND MOU'S

There are 14 active international collaborations and MoU's, and some significant activities under collaborations are as follows:-

S.No.	Organization	Collaborative	Area of Collaboration	Activities
1.	ICEWARM (Australia)	RNTU, Bhopal	<ul> <li>Water Resource Management</li> <li>Faculty Exchange</li> <li>Research Participation</li> </ul>	<ul> <li>Jointly organized ICWEES-16</li> <li>Two faculty exchange programs</li> </ul>
2.	RPI, New York (USA)	RNTU, Bhopal	<ul> <li>Collaborative Research</li> <li>Exchange Faculty/Student</li> </ul>	<ul> <li>Jointly organized ICETST-14</li> <li>Faculty Visit</li> </ul>
3.	MOI University (Kenya)	RNTU, Bhopal	Research Oriented Activities	A research project
4.	Tribhuvan University (Nepal)	RNTU, Bhopal	<ul> <li>Student Research oriented activities</li> </ul>	VC, TU visited     AISECT University
5.	NCTU (Taiwan)	RNTU, Bhopal	<ul> <li>Joint Research Projects</li> </ul>	<ul> <li>One Indo Taiwan Research Project Ongoing on Phosphors for Solar Cells</li> </ul>
6.	Polylecnica de Valencia University (Spain)	RNTU, Bhopal	<ul> <li>Joint Research Work</li> </ul>	<ul> <li>Joint Research on ABO<sub>3</sub> &amp; A<sub>2</sub>X<sub>3</sub> Compounds</li> </ul>
7.	A & M Texas University (USA)	RNTU, Bhopal	<ul> <li>Climate Change and Water Management</li> </ul>	<ul> <li>Jointly organized ICWEES-16</li> <li>Research Oriented faculty visit</li> </ul>
8.	Florida State University	RNTU, Bhopal	Research in IOT	Research Oriented     faculty visit
9.	MOI University	RNTU, Bhopal	<ul> <li>Research in Environment &amp; Energy</li> </ul>	Research Oriented     faculty visit
10.	UK, Netherlands, China, France, Czech Republic, Canada,	RNTU, Bhopal	IAWEES Activities	Research Oriented faculty visit under the IAWEES Collaboration
11.	Usmanu Danfodiyo University, Sokoto, North Western Nigeria	CVRU, Bilaspur	Academic & Research	<ul> <li>Research Oriented faculty visit and project</li> </ul>
12.	Skyline University College, United Arab Emirates	CVRU, Bilaspur	Academic & Research	<ul> <li>Research Oriented faculty visit and project</li> </ul>
13.	RANA University, Afghanistan	CVRU, Bilaspur	Academic & Research	<ul> <li>Research Oriented faculty visit and project</li> </ul>
14.	Faculty of Civil Engineering, Brno University of Technology, Czech Republic	CVRU, Bilaspur	• Environment and Water	<ul> <li>Project on Water Purification is running</li> </ul>

# 11.4 ACTIVE NATIONAL COLLABORATIONS & MOU'S

Over 100 National Collaborations and MoU's are registered with AGU. These can be categorised in Research Organizations, Industries, Government Universities and Private Universities. The numbers of National Collaborations and MoU's are analysed in following manner.



# 12 EVENTS 12.1 AGU DIMENSIONS

AGU believes in strong bonding of researchers and academicians within associate university of AGU and with other organizations. The research events such as workshops, seminar, conferences congress and competitions as research festivals are organizing time to time in each university of AGU. Research events give opportunity to explore the hidden areas of a subject, also provides opportunity to review past performance and future aspects regarding specific issue.

# **12.2 LEARNING THROUGHOUT THE YEAR**

The objective of the AGU research events, is to arises awareness on a particular subject, by conducting a healthy debate in the form of discussion and it should be the part of all research events. The subject specific researchers and academicians from national and international level are always participating to share their knowledge with the new researchers. Universities review departmental research activities by follow a research calendar of university and set targets accordingly. Universities are conducting research events through offline and online mode as per the need of the event.

# **12.3 TYPES OF RESEARCH EVENTS AND THEIR ANALYSIS**

Research events can be categorised in following manner to define their importance for research culture in the universities.

## Workshops and Seminar

Every year a large number of workshops and seminars are organising for students and faculty members as a form of Faculty Development Programs (FDP). Mainly, FDPs are organized for 3 to 5 days according to the nature of subject. Total 278 Workshops and Seminars has been organized by AGU in last 5 years.

## International and National Conferences

International and National conferences are organized in AGU regularly, to provide a "Platform for Interactions" with the subject related experts from all over the globe. Total 24 International and National Conferences has been organized by AGU in last 5 years.

## Expert Lectures, Webinars and Administrative Training Programs

AGU also organizes small programs for students, faculty members and administrative staff. Most of the time, these programs are focused on a topic of any subject. Such programs give opportunity to students and faculty members for interacting more deeply and openly with the experts. AGU organizes administrative training programs to strengthen the administrative capabilities of the staff members. Total 209 Expert Lectures, Webinars and Administrative Training Programs has been organized by AGU in last 5 years.





60











# **13** AISECT PUBLICATION- INHOUSE PUBLICATION

# **13.1 INTRODUCTION OF AGU PUBLICATION**

AISECT Group has AISECT Publication Private Limited, which publishes books, novel, short story, and nonfiction books. Most of the books of AGU writers is published by AISECT Publication Private Limited. The content for AISECT Publication is developed by AISECT Content Development Group which aims to meet continuously evolving need of high quality content for a better training of the aspirants in the Skill ecosystem. AISECT Content Development Group is backed by pool of highly qualified trainers, consultants and SMEs with rich industry and practical experience. Combination of these professionals offer world class content as a part of uniquely designed courses of our own academy programs as well as NSQF aligned job roles.by which participants are able to gain comprehensive understanding about the job role they get trained.

## Some of the AISECT Publications are presented here.

# **13.2 ELECTRONIKI APKE LIYE** ONLY SCIENCE MAGAZINE IN HINDI BEING PUBLISHED FOR




# 13.3 CRIG BULLETIN A showcase of AGU research

Rebertersch Togre University Core Research Gro	letin		
Adulting things closeline which were leaded     CRG - Most Innovative Initiative to promote Research     Research plays a key role in the academic pursuit of higher     environment in a university is the barrometer of its academic to	All yesterday arch r education. As a matter of fact, research realth. Research is a long drawn affair and	Core Research Group	Core Research Group
demands heavy capital expenditure with guite uncertain R universities, which normally have very little support from the	etums on Investments (Rol). For private government, research becomes a double	Making things obsolete which were latest till yesterday	Making things obsolete which were latest till yesterday
edged weapon; no immediate returns from research on one r research, clubbed with their calculated focus on the degree a	side and students general apathy towards alone, on the other side. Yet there are few	From the Director's Desk	From the Director's Desk
universities like Rabindranath Tagore University (RNTU) who a the risk of inner investment. Core Research Once (CRO) is a	revery keen on research and ready to take	ine decises on quarry or research is now at very right pitch. There is a lot of our our to give final shape to New Education Policy and make it a game changer to usher is an	over the world and a total lockdown is eminent. We hope that with lock down and
Rs. 1 Crore, CRG has been established in the University as an i	ndependent group with an annual budget of	era of world quality higher education in India. The dream of establishing world class universities in India is taking shape with identification of 10 universities for special	initiatives taken by the government, India will be able to face the challenge without much problem. During 2019, on research and innovation front, RNTU faculty has
from its own resources. There are 3 ongoing international project	p is nanoling 6 research Projects funded cts too and many more activities and events	funding. RNTU is the only University which has established 7 Research Centers of Excellence with lot of funding. An independent research group CRG set up at RNTU.	done an excellent job. It published record number of research papers and bagged prestigious IPRs with some good projects for technology transfer and start up
activities.	provides the gimpses or research related	shows the vision and foresight of this University. In 2018 this vision has been pushed with lot of vigors which has resulted in many significant miles stones which you can	initiatives which have been incubated in Atal Incubation Center of the University. Another good news is that RNTU has been ranked within first 200 in All India ranking
The Group Composition	and an Ob 7711	see in this bulletin. - Prof. Vijay Kant Verma	by NIRF – The only private university of MP to get the honour. - Prof. Vijay Kant Verma
Director - Prof. Vijay Kant Verma Found	Selor Kin Lu		Research Events = 2019
Member - Prof. SK Shrivestev VC, AISE	CT University Jharkhand	Research Events - 2018	<ul> <li>Session on importance of Internship = 9 Jan 2020</li> </ul>
Member - Prof. RP Dubey VC, CVRU C Member - Prof. AS Zhadgaonkar Found	er VC, CVRU, CG	RNTU, organised an International Conference on Water Energy Environment and Society at Turisia in association with IRA Turisia and A & M Texas	<ul> <li>Une day workshop on IPK in association with emotion strategies for Hagianeth risks and IPRs to avoid legal challenges" – Feb 2020 and Research Component</li> </ul>
Member - Maj. Gen Ajay Chaturvedi VSI	Bnar M,AVSM	University USA Dr. Shalini Yaday and Dr. SK Sharma of RNTU present research paper in	<ul> <li>National Research Conference on MP, India Community 15-16 Ed. 2019</li> <li>National Conference (Recent Advance in Mechanical, Manufacturing and</li> </ul>
Member - Prof. Murali Mantrala Member - Prof. Anurag Settha		Research Event organised by Imperial College London at Istambul.  Research Event organised by Imperial Science organised by RNTU in collaboration	Industrial Engineering and Technology) NGRAMMET-2019 – 29-30 March 2019
Member - Prof. Sandhya Chaturvedi Member - Prof. CK Ghosh		with NAL_ARCT, RRCAT and AMPRI.	<ul> <li>International Seminar on Intervention of ICT in teaching Learning and Research 7-9 March 2019</li> </ul>
Navratn Centers of Excellence		collaboration with AGIS Bangaluru. ⇒ AScience Workshop on Work to learn'	<ul> <li>Two days Workshop on Innovation &amp; IPR: A Way to Sustainable Future 28-30 April 2019</li> </ul>
Taking deviation from normal protocol, nine Centers of Rese though come under respective Departments, cut across all th	stroh Excellence have been set up which te other departments in the University and	Technology Transfer Camp by RNTU for Mushroom Cultivation with research based improvements.	Workshop on Vibration Containment by GMBHEL-13 May 2019 One day session on New & Novel Material - 15 May 2019
enjay certain autonomy also in research operations. visit www.a Center for Renewable Energy (CRE)	alsectuniversity.ac.informore Director - Dr. Anii Kurchania	<ul> <li>Technology and Innovation as Game Changer' – World Education summit at New Deht occesarised by RNTU</li> </ul>	Case Writing Workshop – 12-13 Nov 2019     Workshop on Research as a tool of Social Transformation and Institutional
Advanced Material Research Lab (AMRL)     Center for Space & Earth Science (CESS)	Fead - Dr. Sudeshna Ray Fead - Dr. Survansha Choudhary	Start up Stand up National competition organised jointly by RNTU and CII	excellence- 8 Dec 2018 Visitwa Rang 2019 - Aurique International Festival of Literature Culture and Arts
Agriculture Research Complex (ARC)     Tacore International Center for Arts & Culture (ICAC)	Head Dr. Pragya Shrivastava Head Mr. Vinay Upadhavay		was organised at Bhopal which continued for 10 days (Nov-Dec) with over 50 countries participating, 500 researchers, writers, artists of world repute
Center for IoT and Advanced Computing (CIOTAC)     Center for Incubation for Entrepreneur & Startups (CIES)	Head - Dr. Preeti Maheshwary CEO - Mr. Nitin Vata		participated in this mega event facing 10k audiances.
	TOOR INVERSEN (S		
et and incretion Group CRSSG Built Antenie Topic University	etin	ASSECT GROUP OF UNIVERSITIES     Research, Innovation & Consultance	
et and interestion Group CORE JOG BUILD August have a language Core Research and	ti <u>ster w</u> urner <del>(</del> ) <b>Otton</b> Ion Group Warda	ASSECT GROUP OF UNIVERSITIES     Research, Innovation & Consultancy	
And Intervation Group Conception of the Intervational State of the Intervational State of the Intervational Intervationa Intervational Intervationa Interva	Harrison for the second	ASECT GROUP OF UNIVERSITIES	
	Provide systems & Define Martines	KY ARKAS	
a de lacoration d'autor de la constantinación de la constantinaci	Comparison of the second		
	Anterior (Construction of Construction) Construction Con	EXAMPLE A CONSISTENT      EXAMPLE A CON	
	Anterest (Construction)		
<section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header>	Variantee 6 Define Martine	Exerct CROUP OF UNIVERSITIES     Sesarch, Innovation & Consultancy      Wranted      Kranses     Atana     Besarch Funding     Besarch     Besarch Funding     Besarch     Besarch Funding     Besarch Fu	
<section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header>	<section-header><section-header><section-header></section-header></section-header></section-header>	Under Standard Register Anderson Standard Regist	VIEW CONTRACTOR OF
<section-header><section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header></section-header>	Contract of the second se	<section-header></section-header>	RIE REAL REAL REAL REAL REAL REAL REAL REA
<section-header><section-header><section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header></section-header></section-header>	<section-header><section-header><section-header><text><text><text></text></text></text></section-header></section-header></section-header>	<section-header></section-header>	RIE REAL REAL REAL REAL REAL REAL REAL REA
	Autors	• CENERCE CECUEP OF UNIVERSITES         • CENERCE Introvation & Consultancy         • CENERCE         • CENERCE <t< td=""><td>Research skill</td></t<>	Research skill
<section-header><section-header></section-header></section-header>	Control      Control     Contro     Contro     Control     Control     Control     Control     Co	• CONSIGNATION OF CONSUMPTION OF CO	Research, Innovation and Skill Research, Innovation Burger
<section-header><text><section-header><section-header><text><text><text></text></text></text></section-header></section-header></text></section-header>	<section-header><section-header><section-header><section-header><text><text></text></text></section-header></section-header></section-header></section-header>	<section-header></section-header>	Research, Innovation Brevelopment
<text><section-header></section-header></text>	<section-header></section-header>	• Creation and Consultance         • Creationce         • Creation and C	evelopment evelopment evelopment
<section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header>	Control      Control     Contro     Contro     Control     Control     Control     Control     Co	• Control       • Control	Research, Innovation and Skill pevelopment
<text><text><section-header><text><text><text><text><text></text></text></text></text></text></section-header></text></text>	<section-header><section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header></section-header>	<image/>	Riter Research, Innovation Bevelopment
<section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header>	<section-header><section-header><section-header></section-header></section-header></section-header>		evelopment
<section-header><section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header></section-header>		<image/>	Research, Innovation and Skill Development
<text><text><section-header><text><text><text><text><text></text></text></text></text></text></section-header></text></text>	<section-header><section-header><section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header></section-header></section-header>	<section-header></section-header>	Riter Research, Innovation Breisent
<text><section-header></section-header></text>		<image/>	Research, Innovation Bevelopment
		<image/>	Riber Riber

# **13.4 KATHA MADHYA PRADESH** 100 years journey of Hindi story writers of undivided Madhya Pradesh

ख्रणड - 1 ख्रण्ड - 1 विवसन विवसन	खुण्ड - 2 समकालीन कहानी अ से घ	खण्ड - 2 तमकालीन कहानी अ रो घ	रहाण्ड - 3 समकालीन कसनी न से म	खण्ड - 3 समकालीन कहानी न से म	खुण्ड - 4 समकालीन कहानी र से झ	खण्ड-4 समकातीन कहने र से झ	खुण्ड-२ युवा कहानी अ से म	युवा कहानी अ से म	खुरण्ड - 0 युवा कहानी र से स	खुवा कहानी र से स
कथा मध्यप्रदेश अभियात्म प्राथय के अवामने पर अंदेत प्राय कथा मध्यप्रदेश अभियात्म प्राथयभे के अवामने पर अंदेत प्राय	कशा मध्यप्रदेश	कथा मध्यप्रदेश	कशा मध्यप्रदेश औगारेल भग्रायेष के कामकले पर कोटन पूटन कामकेश	कथा मध्यप्रदेश अधिमानेत मध्यमे के क्याकरे पर केंदित युवद करणकेर	कशा मध्यप्रदेश अर्वभावित मध्यप्रदेश	कश्या मध्यप्रदेश अपैभावित भाष्यप्रेय के कवाकाले पर केन्द्रित कृदद कवाकोश	कशा मध्यप्रदेश अविभागित मध्यप्रेथ के कथाकारों पर केंदित बृहद कथाकोश	कशा मध्यप्रदेश अभिगडित मध्यप्रेश के कथाकरों पर केन्द्रित बृहद कथाकोश	कथा मध्यप्रदेश अभिर्णतम मध्यप्रदेश	कथा मध्यप्रदेश
प्रधान संपादक प्रधान संपादक		All	T AU	AU	AU		AL		AU	AU





# **13.6 HAPPY HARDA**

CVRU model to show the strength of local to global

# HORIZON

Research magazine of students, by students & for students

## **SAMARTH BHARAT**

Dedication towards National Missions

# **AVIRAL**

Showcasing Society connect with university through National Service Schemes (NSS)





# 14 AWARDS





# ANNEXURE-1

# **CONSULTANCY POLICY**

#### 1. Background

Rabindranath Tagore University has strong focus on meaningful research activities which should benefit society. It also believes that expertise gained by the university should not only be used in improving teaching - learning and research system within the university but also should be used to benefit larger part of the society. In order to motivate university staff to share their knowledge and expertise for betterment of Society, University shall permit consultancy and project/work in industry, corporate sectors and other organisations by the university staff. The staff may use material resources of the University for such Consultancy Work. The university shall share the monitoring benefits occurring out of such work/association/assignments with the concerned staff.

#### 2. Consultation Activities

Following activities will fall under the consultancy-

- 2.1 For development of a product/part of product or services for any individual industry or organisation external to the university shall fall under consultancy where one or more university staff works for such development for a pre agreed cost and period.
- 2.2 For modification, augmentation or alteration of any product or process or services where one or more university staff extend their active participation for such job.
- 2.3 Any kind of professional advice given by one or more staff of the university to external organisation/firm/individual for a predecided cost and time.
- 2.4 Any research work undertaken by one or more staff of the university for any external individual or organisation to develop product or process or services.
- 2.5 Conduct of any special courses, chairing/participation in organised activities, delivery expert advice/discourse for a fee to any outside organisation/individual.
- 2.6 Any royalty of fees received for any Intellectual Property by a staff and any fees received from outside.

#### 3. Consultancy Process

Research & Development Department (RDD) in the university will be the nodal agency for any consultancy activity in the university RDD. It will be the custodian of all documents for consultancy. Any staff, department or faculty may initiate the ground work and explore such possibilities. After the basic ground work it should be reported to RDD who will put it on their record. RDD will do the initial survey/preliminary inquiry and put up the matter to the VC who may form a team for further discussion with the client or he may himself discuss it with the client.

After the negotiation and on arrival on agreement an Agreement Form will be initiated as per the format given at Appendix A by the RDD. The format gives just the guidelines. It may be changed at the description of the Vice Chancellor. It will be signed by the client and Registrar on behalf of the university. The payment received for consultancy will be deposited by the client/RDD in university bank account as per terms of the agreement.

In case of faculty and/or university staff going for chairing an expert session, expert discourse on behalf of the university agreement form will not be raised. Money received from such consultancy event will be deposited in the university Account Section.

#### 4. Contingency and Incidental Expenses

Any contingency expenses incurred in respect of consultancy project will be met from the funds received from the same consultancy project. The fund left after deducting such expenses will be considered as net gain from the consultancy work.

#### 5. Sharing Policy

The net gain as worked out (Money Received from the client minus all incidental charges incurred for the consultation work) will be divided in ratio of 60:40 i.e. 60% of the gain will be paid to the faculty/staff who worked for the project and 40% will be retained by the university. University will plough back the share received by it in developing facilities to improve consultancy infrastructure.

#### 6. Appraisal Report

Consultancy work done by the staff will be entered in the Appraisal Report of the staff and will be given extra weightage in arriving Performance Index.

#### 7. Closing Report

After completion of the consultancy work a detailed report will be submitted by concerning staff in writing to RDD in which he should mention complete details of work, resources of university used resources from outside, results and feedback of the second party for whom the task was undertaken.

## Agreement for Consultancy An agreement is drawn between Rabindranath Tagore University, Village Mendua, Dist. Raisen (First Party) and ..... (Second Party) Where in it is agreed that Rabindranath Tagore University shall provide Consultancy Services to the second party as per following terms **Description of consultancy Services** Time From: ..... То: ..... Coordinators and consultancy providers (From First Party) (From Second Party) Cost of Consultancy to be Paid by Second Party Payment will be made as per following terms (Signature of 2<sup>nd</sup> Party) (Signature of 1<sup>st</sup> Party) Registrar Rabindranath Tagore University For official use by RDD, Rabindranath Tagore University

# **ANNEXURE-2**

# **PUBLICATION POLICY**

### 1. Introduction

National Education Policy 2020 (NEP-2020) aims to overhaul the country's education system with a clear emphasis on three language formula for teaching – learning, focusing on regional and mother tongue. RNTU from its inception encourages its faculty for writing text books in regional languages so that quality publications are available in our own languages. Translation of classical text books from English to regional languages is also encouraged to enrich the collection. In order to accelerate the efforts in back drop of NEP-2020, the parent body of RNTU, AISECT has established a publication division within house facility for editing, designing and printing of books. Many regulating bodies in higher education are also now coming up with various promotional schemes for publication in regional languages. RNTU provides tangible and intangible benefits to the writers for writing books as per its Research & Innovation Incentive Policy. This document lays down the process of getting a book published in any languages either by regulating bodies of the Higher Education Section or by AISECT Publication.

## 2. Objectives of the Policy

- 2.1 To motivate faculty members to write books in any languages in order to enrich collection of quality books by Indian authors.
- 2.2 To lay down the procedure for publication of books either by regulating bodies or by AISECT publication.
- 2.3 To facilitate faculty members earning credits and getting rewards in terms of cash and certificates.

## 3. Scope of the Policy

- 3.1 This policy shall be effective from 01 Jan 2021. All the publications initiated on or after 01 Jan 2021 will be governed by this policy.
- 3.2 The scheme shall cover all the staff members on the roll list of respective university of AGU.
- 3.3 A Nodal Committee has been set up who shall screen the proposals through a screening committee and forward to expert committee.

## 4. Process for Publication by AICTE or other Regulating Bodies

- 4.1 The writer will have to apply using the format placed at annexure I.
- 4.2 The writer will be required to follow the norms specified by respective regulating bodies.
- 4.3 The proposal will be examined by an in house expert committee to find suitability of the proposal.
- 4.4 If proposed is found suitable it will be sent by the Nodal Committee to concerned Regulating Body.
- 4.5 If the proposal is not eligible or not accepted by the regulating body, Nodal Committee may accept it for publishing in house after required modification/changes recommended by experts. IN such case the writer shall follow process as laid down at para 5.3 to 5.7
- 4.6 Monetary Incentives for books published by Regulating Bodies will be paid to the writer online as per the norms of the Regulating Bodies.

4.7 For books published by Regulating Bodies, the writer may get rewards as per the norms of respective regulating body. In addition, AGU will also provide incentives as per the Research Incentive Policy.

#### 5. Process for Publication by AISECT

- 5.1 The writer will have to apply using the format placed at annexure l.
- 5.2 The writer will be required to submit a synopsis in minimum 1000 words with abstract, chaptalization plan, specialty, applicability and novelty in the proposal.
- 5.3 The writer will be required to give an undertaking certificate that the book is free from any plagiarism and no part has been taken from any other published material. If a breach of trust is found later, the whole liability will be that of the writer.
- 5.4 The writer has to follow AGU template for format, font size, styling and layout of the book.
- 5.5 The figure and tables should be clean and free from errors or ambiguity. If they are taken from other sources, the same must be indicated and acknowledged.
- 5.6 The application will be examined by an Expert Committee. The same committee will examine final manuscript also. Only with a positive recommendation of Expert Committee after approval of the VC the manuscript will go for print. Normally a book of quality found suitable as text book/Reference book for some programs being run in any AGU University will only be accepted for printing at AGU cost. In such case copy right for the book will be held by AGU. The writer will be paid incentive as per'Incentives for Research Policy'

#### 6. Publication by other external Publishers

- 6.1 The University encourages its staff for publishing books on their own initiatives also.
- 6.2 Writer who publishes his/her book directly from other reputed publishers will also be eligible for provided the University name appears in the credit. The exact amount of monetary incentive will be decided by the Evaluation Committee constituted by the VC for incentives Expert Committee and Evaluation Committee will see the credential of the publisher, quality of the book and utility in the ongoing programmes of the University.

#### 7. Incentive to the Writer

- 7.1 The writers will be entitled for all the benefits provided by publishers as per their policies.
- 7.2 In addition to 7.1 the writer will be also provided monetary incentives as per the Policy for Research Incentives of the AGU, for text/reference books published by the University Regulating Bodies.
- 7.3 For books published by publishers other than Regulating Bodies also Evaluation Committee may provide monetary incentives to the Book Writer based on merit of the case on case-to-case basis.

# **ANNEXURE-3**

# **RESEARCH POLICY**

- 1. AISECT Group of Universities (AGU) has a vision to provide research driven environment and facilities to the students and faculty in the university. This document draws policy guide lines in regard to research activities in the university. This policy has been approved by the first GB meeting.
- Research in Conventional Departmental Programs Doctoral Research, Research in PG courses and 2. Research in UG programs will come directly under the preview of respective HoD's. However doctoral research will be coordinated through Research Coordinators. VC will appoint two Research Coordinators i.e. one for doctoral research in Technical Courses and one for doctoral research in Non Tech courses including commerce, management, education, agriculture, science, arts, law and languages. A Research & Development Dept (RDD) will be set up under the VC which will be manned by the Research Coordinators and two Record Keepers Cum Operators. R & DD will look after scheduling, conducting, administrative & financial activities/process of Doctoral Research under direct control of VC as per the procedure laid down in Ph D brochure of the university made as per the framework of UGC norms and Regulatory bodies guidelines. The actual research functions for doctoral research will however be under the respective HoD's who will ensure quality of research and quality of thesis. Research work, dissertation, project report in PG & UG research will be totally under the respective HoD's. The documentation, paper work, schedule preparation monitoring and organizing Ph D related events will be under Research Coordinators. R & DD will be the custodian of all documents related to PhD research including thesis. For PG and UG research HoD will be custodian of all documents including Dissertation/Project Reports.
- 3. Research orientation in UG & PG Courses. Students will be encouraged for meaningful research, preferably in university focus areas as laid down in para 6 during their program duration. There will be minor and/or major projects in all UG/PG professional courses as decided by the BoS/syllabus. Literature survey and study of current status of the field will be carried out by the students for zeroing on to the objective and methodology of their project for which they will be encouraged to refer to journals, study materials visit to industries, fields, library etc. Projects should have adequate component of research knowledge building, application, societal needs, experiments etc. In case for those courses where project is not part of the curriculum the students in the course will be divided in groups with maximum 5 to 6 members in each group and take up at least one research project on social problem, case study, survey etc and submit report/do a presentation in front of class/faculty panel. BoS and/or syllabus will be final authority as regard to research in PG/UG courses and VC may waive off need for formal research work where not laid down in the syllabus.
- 4. Formation of Core Research & Innovation Group (CRIG) for Research Projects. A Core Research & Innovation Group (CRIG) will be formed directly under chairmanship of the Chancellor to look after all Research Projects other than UG/PG and Doctoral research. The CRIG may be formed any time after 5 years when university would have completed setting up of all basic facilities for quality research. Till the formation of CRIG, VC will look after the function of CRIG.

The CRIG will have following functions:-

- (a) Promoting Research Projects in AGU
- (b) Monitoring ongoing Research Projects
- (c) Work as nodal agency for project research initiation to completion
- (d) Plan and develop research facilities & environment
- (e) Develop archive to build up research related information

- (f) Research Publication including journals Quality & Quantity of publication
- (g) Build up research network, liaison system, resource building, framework development
- 5. Research in Research Projects (other than UG/PG/Doctoral research). HoD's Dean and VC will encourage faculty to take up research projects in the departments as per following guide lines.
  - 5.1 Survey & Exploration. Each department will do extensive surveys to identify areas of research pertaining to their departmental subject and subjects of multidisciplinary nature.
  - 5.2 Brain Storing, Studies & Projects Ideas. Research Project Ideas will be discussed on departmental/university level platform to come out with Project Format. A team of PI/CoPI's at departmental/multidepartment/multi organizations level will be made for Project Report formulation with methodology and budget estimates worked out clearly.
  - 5.3 Research Project Initiation. A Core Research & Innovation Group (CRIG) will be formed after completion of five years for AGU University. All the Research Project other than Doctoral/PG & UG will be under direct control of CRIG. Till CRIG in formed these research projects will be under the control of VC. Till formation of CRIG, VC AU will directly control all the research work in the university.
  - 5.4 Funding of Research Projects. The PI & Co PI's will explore the possibilities of getting the funds from various funding agencies. The university may also fund some projects or part of the projects. After formation of CRIG funding policy will be laid down by the authorities. Till then all the research funds will be monitored and controlled by the VC.
  - 5.5 Monitoring of Research Projects. Till the formation of CRIG, the VC will supervise all the projects from initiation to completion. After CRIG is formed all the projects except UG/PG and Doctoral Research will be the responsibility of CRIG.
- 6. Special Fields for Research. Though research will be encouraged in all departments in any field, following fields have been identified for establishing world class facilities to develop resources, lab & manpower, to make them Research Centers of Excellence-
- 6.1 Renewable Energy & Green Technology. The university will have special focus to conduct meaningful research in the field of renewable energy to gain new knowledge, develop cost effective and efficient energy solutions, establish energy labs and energy park to encourage UG/PG Doctoral student and scholars/faculty to take up energy research as well as provide skill to students (regular & vocational) and take up research projects. A dedicated lab will have wide range of equipment, tools, test bench, material, working models and systems for solar, wind, Hydel and bio energy.
- 6.2 Material Science & Chemistry. A state of art Advanced Material Science Lab will be established with the test and experimental set ups for synthesis, characterization, testing, fabricating and development of materials nano materials, to facilitate research in pure science as well as application.
- 6.3 Earth & Space Science Center- This center will develop in to a modern observatory cum lab for monitoring, recording and analyzing atmosphere and earth data. Besides the research to enhance and expand knowledge base the facilities should provide platform to take up research work for application in the areas of climate change, seismic activities, weather phenomenon and scientific predication.
- 6.4 Agriculture Science. Advanced Research labs will be developed in Agriculture Science with the aim of taking up research in agriculture for serious application to improve productivity in agriculture in terms of quality as well as quantity. Research Projects for crop improvements and irrigation system will be taken up by these labs.

- 6.5 Water, Environment & Disaster Management. A multi-disciplinary team for this special area of research will be formed. Facilities in labs of various departments will be used and upgraded to take up research projects in the areas of water resources management, environmental studies and disaster management.
- 7. Research Motivation/Philosophy. Research can be taken up in any field in the university University has identified some research areas as discussed in para 6 above. The effort will be made by respective heads departments, deans, Research Coordinators guides and VC to encourage maximum research in PG/UG and doctoral research in identified fields in which university plans to achieve excellence. VC and CRIG (when formed) will ensure that Research Projects are initiated in identified fields of Research for funding from external funding agencies. University will also allocate some budget exclusively for Research Projects annually under the control of CRIG. Following will be ensured.
  - 7.1 Guides in UG/PG/doctoral program should encourage students to take up projects in areas identified at para 6.
  - 7.2 CRIG/VC will encourage. Research Projects in identified areas at para 6 for external funding.
  - 7.3 Multidisciplinary approach will be encouraged for research wherever possible.
  - 7.4 Lab to land, application, industry linkage and societal aspects be given due emphasis in research process and outcome.
  - 7.5 Whenever possible patent be applied for as one of the outcomes of Research Projects.
- 8. Research Targets. Following targets are set up for initial 5 years for the Rabindranath Tagore University in respect of Research Activities-
  - 8.1 Establish good Material Science. Advanced Research lab, Earth Science and Space lab, and Renewable labs so as to take some projects as early as possible.
  - 8.2 Put in effort to formulate at least one or two projects for external funding and one or two internally funded project
  - 8.3 Aim for one department one project by 2018.
  - 8.4 Constitute Core Research & Innovation Group after 5 years to tackle Research Projects other than doctoral/UG/PG independently. This group may have experts drawn from outside.
  - 8.5 Encourage faculty to write research papers and publish in journals of repute. At least 5 papers be written in each department annually.
  - 8.6 Encourage faculty to write book chapters.
  - 8.7 At least one international conference/seminar be organized in every two years. Large number of national/regional/state/university level events be organized. One major and two minor events (workshop, seminar, conference, guest lecture etc.) could be organized at faculty/departmental level.
  - 8.8 Faculty and students be encourage to take part in research events outside (conference/seminar/workshopetc)
  - 8.9 University should enter in research collaboration with organizations/universities/labs abroad and in India. A target of 5 to 10 MoUs each abroad and in India could be set for first 5 years.

- 8.10 In-house journals be published and effort be made for continuous up gradation of quality.
- 8.11 Students be encouraged through Project exhibition once or twice in a year.
- 8.12 Establish good print and e library for research.
- 8.13 Establish good software facilities for research.
- 9. Funds Allocation for Research. Funds for development of research facilities in the university will be allocated under following categories:-
  - 9.1 Annual & Supplementary Funding for Departmental Labs. Depending on research requirements of Doctoral Research, PG and UG research projects labs in all departments will be upgraded/re equipped with modified eqpt or new equipment and software for which requirement will be proposed by the HoD's/Deans in consultation with Research Coordinators, Guides and dealing faculty. This will be in addition to normal requirement by dept to conduct routine academic program as per syllabus.
  - 9.2 Annually & Supplementary Funds for Research Projects. A Core Research & Innovation Group (CRIG) will be formed to promote, regulate and supervise Research Projects other than doctoral UG/PG research. For Research Projects funding may come from either external funding agency or internally from the university. After completion of five years the internal budget for Research Projects may be around one crore or more depending on funds availability and merit of the cases.
  - 9.3 Research Funding for PG/UG & Doctoral Research. This will be catered for in university annual budget as per projective from departments/faculty and approved by VC.
- 10. Research Purchase Policy. For purchases for research work in UG/PG & Doctoral Research the normal purchase policy will be followed which includes following steps. Initiation of demand by the researcher, scrutiny and recommendation of Guide/faculty then by HoD and Dean, Obtaining minimum 3 quotations. With adequate technical justification single quotation may be accepted technical approval by VC, budgetary allocation by Registrar followed by Purchase Order supply, installation, training and payment clearance. Items purchased will be brought on change in Central Stock Register and issued to the respective department- Consumables for research may be purchases from university registered vendor or after three quotations from supplies or by Local Purchase Committee. Consumables will be brought on change of Stock Register of the Dept. In case of Research Projects will be approval by the CRIG. A separate account will be created for Research Projects.
- 11. Review & Stock Taking of Research Effort. Research activities will be reviewed as per the following format:-
  - 11.1 Research Projects. CRIG main and subgroups will be formed after 5 years who review Research Projects. It will be done quarterly at sub grade level and six monthly at CRIG main group level. An annual/6 monthly meeting of CRIG will be organized and minutes will be circulated. Till CRIG is formed, review will be done by the VC with concerned dept/faculty.
  - 11.2 Doctoral Research. VC will review the progress of PhD program every quarter. The status will be presented in 6 monthly CRIG meeting when formed
  - 11.3 PG & UG Research. It will be reviewed quarterly at Dean/HoD level and every six month at VC's level.

- 11.4 Research Events. A Calendar will be drawn at departmental, faculty and university level and every six month progress will be reviewed at respective levels.
- 12. Motivational Measures for Research. Research is a focus area of AGU. Effort will be made at all the levels to encourage and motivate students and faculty to do meaningful research. Following will be heads under which motivational allocation will be made by VC by himself or through a specialist committee as approved by the Chancellor for funds. Announcement will be made every year in the month of April about the upper limit on motivational/awards through an office order. It may be under following heads.
  - 12.1 Participation in conference/seminar/abroad or in India.
  - 12.2 Presentation of paper in a conference abroad/India.
  - 12.3 Publishing a paper in journal in India/Abroad.
  - 12.4 Writing a book
  - 12.5 Taking up a Research Project
  - 12.6 Fortaking a patent

Based on the experience a formal research incentive policy will be drawn after 5 years.









RNTU Bhopal (MP)



**CVRU Bilaspur (CG)** 



**DESIGNED & DEVELOPED BY:** 



- Academics per Excellence
- Goal oriented Research, Innovation and Excellence
- Ultimate in Collaboration, Consultancy and Entrepreneurship Development

Village Mendua, Post Bhojpur, Bhopal Chiklod Road, Near Bangrasiya Square, Dist. Raisen-464993 (M.P.) www.rntu.ac.in, crig\_agu@aisect.org 0755-2700431, 0755-2700400