

Bangladesh Institute of Nuclear Agriculture
Electronics Section
BAU Campus, Mymensingh-2202

Introduction

Electronics, Irradiation and Health physics related works are mandatory for any kind of nuclear activity. Bangladesh Institute of Nuclear Agriculture (BINA) has been mandated in research and development work in the field of agriculture by using peaceful application of nuclear techniques for the last four decades. By this time, the Institute has got/brought a huge number of sophisticated nuclear and analytical instruments from different sources; like IAEA, SIDA, USAID and GOB funds. The success of the Institute's research depends mainly on proper functioning of the equipments. Since 1975 i.e. from the beginning of the Institute, the manpower of the Electronics Section has been working on planning, installation, calibration, operation, repair & maintenance and trouble shooting of sophisticated nuclear instruments, such as; Gamma Irradiators, Neutron Gauges, N-15 analyzer, IRMS etc. and analytical instruments, such as; AAS, HPLC, GC, UV-VIS spectrophotometers, etc. They are also engaged on radiation safety measures activities; like radiation measuring, monitoring of personnel and environment, protection and waste management, etc. against radiation coming from different nuclear equipment and radio isotopes used as tracer in the field of nuclear agriculture at BINA. Besides these, they have also been doing the works related to small design, design modification of nuclear and analytical equipments as and when required. Also, they have been performing all sorts of ICT related works of BINA.

Activities of Electronics Section

Considering the peaceful use of nuclear energy in agriculture, following activities have been continuing/will be continued for the proper functioning of all sorts of equipment, research related to environment impact for nuclear activities at BINA

Nuclear Instrumentation/Activities

- Directly engaged on renewal of 'C-class' and 'E-class' Licenses of Irradiator and Nucleonic gauges used at BINA which is mandatory for the use of nuclear equipments and importing of the nuclear equipment from abroad.
- Pursuant to section 4(1) (a) & 5(1) of the Nuclear Safety and Radiation Control Act No. 21 of 1993 for getting the license (C-class) of Co-60 Irradiator and nucleonic gauges.
- Pursuant to rule 54.2 of the NSRC rules-97 (SRO No. 205-law/97) for getting and renewal of the certificate as Radiation Control Officer (RCO) of the Institute.
- As a Radiation Control Officer (RCO) of BINA, solely responsible for the peaceful use of nuclear energy at the Institute with engaged on the activities related to radiation safety measures against radiation comes from Cobalt-60 Gamma Irradiators, Nucleonic Gauges and different radio isotopes using as a tracer in the field of nuclear agriculture.
- Engaged on planning, installation, calibration, repairing and maintenance of isotopic as well as detection and measuring of radiation coming from different equipments and isotopes.
- Responsible for the safe and sound operation of Gamma Irradiators, Neutron moisture meters and other nuclear equipment as well as radio-isotopes.
- Routine radiation survey in and around the nuclear facilities of BINA.
- Ensure protection of man and environment, at present & future from radiation hazards.
- Engaged on small design and modification for the nuclear equipment when and as required.
- Estimate radiation dose and irradiation time of different samples to be irradiated.
- Ensure protection, security and safeguard of all sorts of nuclear equipments.

Analytical Instrumentation

- Devoted to Planning, installation, repair, maintenance and trouble shooting of all sorts of analytical equipment.
- Minor design, design modification and fabrication works of different equipments as and when required.
- Arrange training program related to analytical and laboratory equipment as and when required

ICT related activities

- Provide internet connection to Scientists/Officers/others in different divisions/Sections using both UTP Cable and Wi-Fi system.
- Configure, repair and maintenance work of all sorts of ICT related works.
- Fully engaged with ICT related activities, like website design, web administration, broad band internet, etc. through-out the year.

- Process all sorts of bill for domain (BTCL/T&T) and website hosting (BRAC bdmil) as well as internet/bandwidth bill.

Office Equipment

- Engaged on assembling, hardware and software installation, up-gradation, repair and maintenance of personal computers, photocopiers, Fax machines, public address (PA) system and their related accessories.
- Planning, installation, repair and maintenance of all sorts of cooling/heating equipments.
- Planning, installation, supervision, repair & maintenance and troubleshooting of computerized digital PABX and its related accessories.

Administrative and others Activities

- Engage with day to day works of the Electronics, ICT and health physics related works as well as some administrative works of the Institute.
- As a president/member secretary/member of different committee time to time formed by the authority, we Prepare/ perform some other/development works as technical evaluation, price estimation, monitoring of development works, extra curricular activities etc. as per office orders.
- Prepare and submit all sorts of reports as asked by the Ministry of Agriculture (MoA), Prime Minister's Office (PMO), Bangladesh Agricultural Research Council (BARC), etc.
- Provide technical support for condemnation of equipment as and when required.
- Audio-visual support for conducting seminar, workshop, etc. throughout the year.
- Quality control for procuring all sorts of equipments by checking/testing as per supply order and invoice.
- Deliver lecture on different training programs on instrumentation and radiation safety at BINA, FRI and other NARS Institutes for scientists, officers and staffs.

Specific works

1. Planning, Installation supervision, Calibration, Repair & maintenance of all sorts of equipments and their related accessories
2. Supervision of installation, testing & calibration, design modification, repair and maintenance of all sorts of analytical equipments and their related accessories
3. Assembling, hardware & software installation, Up-gradation, repair and maintenance of PCs, Photocopiers, Fax m/c and their related accessories
4. Planning, Installation, Supervision, repair and maintenance of all sorts of cooling/heating equipments like Refrigerators, Ice chambers, Dehumidifiers, incubator including growth chambers.
5. Planning, installation, supervision, repair, maintenance and troubleshooting of computerized digital PABX and its related accessories
6. Provide technical specification, technical evaluation, market price evaluation of tender documents (National and International) of all sorts of equipments. Also provide technical supports for selecting and procuring equipments (Q.C.).
7. Provide technical support/comments for condemnation of equipment when and as required
8. As a President/Member secretary/Member of the committee (time to time, formed by the Director General/ Authority of BINA), we perform some other development works, following the office order.
9. As a Focal point/member secretary of ICT-committee, we engage with ICT related activities like, Website design- development and administration, Broad band internet etc. through-out the year.
10. We calculate radiation dose/ irradiation time of all experimental samples (Seed/Callus/Insects) as required by the respective division/scientists.
11. We are also engaged on the activities related to radiation safety measures against radiation comes from Cobalt-60 Irradiator, Neutron moisture meters and different radio isotopes using as a tracer in the field of nuclear agriculture.
12. Provide service to other Institutions like BFRI, BAU as a member of TEC when and as required.
13. Prepare answers of queries for Ministry of Agriculture, Prim Minister's office, Bangladesh Agricultural Research Council and other organizations related to ICTs, equipments when and as required.

Manpower (Scientists) status

Eligibility for the recruitment as Scientific Officer:

B.Sc. Engineering in Electrical and electronic/ M.Sc. in Applied Physics and Electronics/ M.Sc. in Physics from public or any reputed University.

Scientists:

1. **Dr. S. H. Bhuiya:** B.Sc. Engg. (E&E); MS Engg. (FPM); Ph.D. in Radiation Safety and Environment from Japan. Joined as SO in 1994, Promoted to SSO in 2001 and appointed as PSO in 2009.

2. **K. S. Arefin:** B. Sc. (Hons.), M.Sc. in Applied Physics and Electronics, Joined as SO in 2006, got current charge as SSO in 2009.

3. **Md. M. H. Sohag:** B. Sc. (Hons.), M.Sc. in Physics, joined as SO in 2012.

Achievement of Electronics Section

Technology (s) developed

Electronics of BINA has developed the following technologies:

| Sl. No. | Name of technology developed | Present status/Suitability |
|---------|--|--|
| 1. | Design and Construction of Ground Water level indicator | The ground water level indicator has been using by Agricultural Engineering Division of BINA for geo-hydrologic studies for the last 10 years. |
| 2. | Development of Plant/Tissue Growth chamber | This was used for several years by the Plant Breeding Division of BINA for tissue cultural research. |
| 3. | Development of an energy independent neutron dose monitor | The monitor would be suitable for dosimetry in a specified time during the installation and commissioning of nuclear power plant. |
| 4. | Graphical Radiation monitoring system | This system is now used as a radiation survey meter at BINA for the area monitoring of radiation producing fields like Gamma Irradiator. |
| 5. | Customized data acquiring from data logger and weather stations | This technology is now used by Agriculture Engineering division, BINA |
| 6. | Redundant connectivity of Wi-Fi and LAN as two different network under same router | This system is now working at BINA campus to provide Internet connections. |
| 7. | Customized content management system for dynamic website | This technology is now used to maintain and update BINA website |

Publications:

About 20 papers have been published by the scientists of Electronics Section in the reputed National and International (impact factor) journals

Lists of existing nuclear, analytical and office equipment of BINA

Electronic Section/Central

| Sl. No. | Name of equipment | Qty. | Year of purchased/Installed | Present status | Remarks |
|---------|--|--------|-----------------------------|----------------|------------------------------------|
| 1. | Cobalt-60 Irradiator (8570 Ci on Nov, 1995) | 2 Nos. | 1996 | Working | - |
| 2. | Cobalt-60 Irradiator (10473 Ci on Nov, 2012) | 1 No. | 2013 | Working | - |
| 3. | IRMS | 1 No. | 2014 | Working | - |
| 3. | AAS | 1 No. | 2007 | working | - |
| 4. | HPLC | 1 No. | 2007 | working | - |
| 5. | Gas Chromatography | 1 No. | 2007 | working | Needs detector |
| 6. | Scintillation counter | 1 No. | 2015 | working | - |
| 7. | Gamma-Beta Counter | 1 No. | 1985 | Out of order | Needs rep. |
| 8. | Thermocycler | 3 Nos. | 2007 | Working | - |
| 9. | UV-VIS Spec. | 3 Nos. | 2004 & 2007 | Working | - |
| 10. | Survey meter (Gamma & Neutron) | 5 Nos. | 1996, 2007, 2012, 2015 | Working | - |
| 11. | ICT equipments: Router, Access points, Switches etc. | 1 set | 2013 | working | - |
| 12. | Digital PABX (128+8 lines) | 1 set | Central | working | Needs up-gradation with automation |

Different Divisions/ Sub-satations:

| Sl. No. | Name of equipment | Qty. | Division (s) | Present status | Remarks |
|---------|---|----------|---------------------------------|----------------|---------|
| 13. | Atomic Absorption Spectrophotometer (AAS) | 1 No. | SSD | working | - |
| 14. | Growth chamber | 5 Nos. | PBD, SSD, PPD, Agro. | working | - |
| 15. | Gas Chromotography | 1 No. | SSD | working | - |
| 16. | Seed counter | 15 Nos. | PBD, Biotechnology. | working | - |
| 17. | Digital balance | 20 Nos. | PBD,CPD,SSD,Ent. A.Engg., Agro. | working | - |
| 18. | Seed moist. meter | >10 Nos. | - | Working | - |
| 19. | Water bath | >5 Nos. | Bio, SSD, Ento., PPD | Working | - |
| 20. | Conductivity bridge | >5 Nos. | SSD, PBD, CPD, A.Engg., Agro. | Working | - |

Different Divisions/ Sub-stations:

| Sl. No. | Name of equipment | Qty. | Division (s) | Present status | Remarks |
|---------|--------------------|------|---|----------------|---------|
| 21. | Incubator | >10 | PBD,SSD,PPD, Agro., Horticulture Div. | working | - |
| 22. | Orbital shaker | >7 | PBD, SSD, PPD, Horticulture Div. | working | - |
| 23. | Autoclave | >7 | PBD, SSD, PPD, Horticulture Div. | working | - |
| 24. | Oven | >15 | PBD,SSD,PPD, CPD, Agro., Agri, Horticulture | working | - |
| 25. | Distillation plant | >13 | PBD,SSD,CPD, Agro., Agri, Horticulture Div. | working | - |
| 26. | Microtome | | | working | - |
| 27. | Centrifuge | 5 | PBD,SSD,CPD, Horticulture Div. | working | - |
| 28. | Bio-doc sys. | >5 | Bio-tech, SSD | working | - |

| | | | | | |
|-----|-----------|----|----------|---------|---------------------|
| 29. | Ice maker | >3 | Bio-tech | working | One needs repairing |
|-----|-----------|----|----------|---------|---------------------|

Different Divisions/ Sub stations:

| Sl. No. | Name of equipment | Qty. | Division (s) | Present status | Remarks |
|---------|----------------------|------|-------------------|----------------|----------------|
| 30. | PCR | 1 | PBD/Biotech | working | - |
| 31. | Salinity bridge | >3 | Biotech, PPD, CPD | working | - |
| 32. | Electrophoresis | - | - | - | - |
| 33. | Deep freeze | >30 | Different div. | working | - |
| 34. | N-distillation app. | >10 | Different div. | working | - |
| 35. | Digester | 3 | Different div. | working | - |
| 36. | N-15 analyzer | 1 | SSD | N/W | To be repaired |
| 37. | Furnace | 2 | SSD | working | - |
| 38. | Neutron Moist. meter | >11 | SSD, A.Engg., | working | - |

Different Divisions/sub-stations:

| Sl. No. | Name of equipment | Qty. | Division (s) | Present status | Remarks |
|---------|-------------------------|------|----------------------------|----------------|---------|
| 39. | Flame photometer | - | - | working | - |
| 40. | Life lizer/Freeze dryer | >2 | SSD | working | - |
| 41. | Seed dryer | >10 | Different Div. & SS | working | - |
| 42. | Hammer mill | 2 | SSD | working | - |
| 43. | Peat crusher | 1 | SSD | working | - |
| 44. | Rhizobium mixer | 2 | SSD | working | - |
| 45. | Lux meter | >2 | ED | working | - |
| 46. | Microscope | >10 | PBD, Bio-tech, ED,SS | working | - |
| 47. | Leap area meter | >3 | CPD, AD, Horticulture Div. | working | - |

Different Divisions/sub-stations:

| Sl. No. | Name of equipment | Qty. | Division (s) | Present status | Remarks |
|---------|-----------------------|------|--------------|----------------|---------|
| 48. | Photosynthetic system | 1 | AD | working | - |

| | | | | | |
|-----|-------------------|----|-------------------|---------|---|
| 49. | Chlorophyll meter | 1 | AD | working | - |
| 50. | Data logger | >2 | - | - | - |
| 51. | Root meas. Sys. | - | - | - | - |
| 52. | Electrophoresis | - | - | - | - |
| 53. | Ultra pure water | >3 | Biotec. | working | - |
| 54. | Weather sta. | >2 | Magura & Dinajpur | working | - |
| 55. | Ultrasonic Bath | >3 | - | - | - |

Different Divisions/sub-stations:

| Sl. No. | Name of equipment | Qty. | Division (s) | Present status | Remarks |
|---------|----------------------------------|------|-----------------------------------|----------------|-------------------|
| 56. | Computer/Laptop with UPS/Printer | >80 | All Div./Section/ sub-stations | working | R & M, frequently |
| 57. | Photocopier | >45 | All Div./Section/SS | working | R & M, frequently |
| 58. | Multi. projector | >15 | TCP, SRSD, Electronics | working | - |