Gem and Jewellery Research and

Training Institute

# Annual Report
# 2023

Gem and Jewellery Research and
Training Institute
"Ruwan Sewana"
No. 73/5/A,
Welivita
27.02.2024

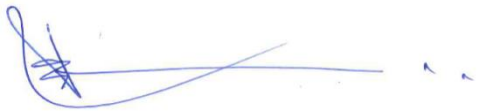
Hon. Minister
Ministry of Industries
P.O. Box 570,
73/1
Galle Road,
Colombo-03

Hon. Minister,
**Annual Report 2023**

In terms of sub section 14 (2) of the Finance Act No.38 of 1971, the following documents are submitted to you.

1. Administration Reports of the Gem and Jewellery Research and Training Institute for the year 2023
2. The performance report as at 31st December.

Yours faithfully,



A.M.Rathnayake
Chairman
Gem and Jewellery Research and Training Institute

## Vision

To be the Regional Centre of Excellence in Research and Training in the Gem and Jewellery Industry while facilitating the Growth and Development of the Industry in Sri Lanka

## Mission

To enhance the Competitive capability of Sri Lanka Gem & Jewellery Industry by providing high quality Research & Training services, conducting workshops, Seminars, and by publication of books and papers on related subjects leading to Exploration of Gem Deposits, Technological Innovation, Skill and Competency Development and Quality Improvement for the satisfaction of our Stakeholders

## Objectives

Explore gem resource potential areas of Sri Lanka and harvest these resources through sustainable methodologies, and contribute to the national economy by producing tradesmen with training in new technological methodologies.

## 2.1. Composition of the Board of Directors

The composition of the Board of Directors for the year 2023 was as follows.

| | | | |
|---|---|---|---|
| 01 | Mr. A.M. Rathnayake | Chairman<br>Gem and Jewelery Research and Training Institute | Chairman of the Board of Directors<br>From 27.06.2022 to date |
| 02 | Mr.K.N.P. Jayarathne | Director (Acting)<br>Department of National Planning<br>Ministry of Finance | Member of the Board of Directors<br>From 01.04.2022 to date |
| 03 | Mr. S.G.L.Fernando | - | Member of the Board of Directors<br>From 08.12.2022 to date |
| 04 | Mr. Ravirajasinghe Sanjeepan | Chairman<br>Geological Survey and Mines Bureau | Member of the Board of Directors<br>From 11.01.2023 to 15.11.2023 |
| 05 | Mr.Sanjay Perera | Chairman<br>Geological Survey and Mines Bureau | Member of the Board of Directors<br>From 15.12.2023 to date |
| 06 | Mr. Janaka Udayakumara | Director General<br>National Gems and Jewelery Authority | Member of the Board of Directors<br>From 28.12.2023 to date |
| 07 | Mr.S.A.W.K. Jayasekara | Director (Planning) Acting<br>Ministry of Industries | Observer of the Board of Directors<br>(Ministry's representative)<br>From 31.01.2022 to date |

# Senior Management

**Mr. A.M. Rathnayake**

Chairman

(2022.06.27 to date)

**Mr. B.G.R.W.Gamlath**

Director General (Actg).

MSC (Gem),B.Sc (SP) (Physics) FGA, MGA (SL),MBA(Reading)

**Mr. B.G.R.W.Gamlath**

Director (Training and Development)

MSC (Gem),B.Sc (SP) (Physics) FGA, MGA (SL),MBA(Reading)

**Mr. R.M.N.P.K. Jayasinghe**

Director (Research) Actg.

M.Phil(Gem.),M.Sc(GIS & RS),B.Sc. (Geology),MIGSL,MGSSL,MGASL

**Mr. S.L.J.Muhandiram**

Assistant Director (Finance)

MPAcc(USJP),B.com (SP)Accountancy 2nd lower Hons (USJP),CBA(ICASL),ADV.Cer (Procurment)(ICTAD

**Mrs. W.L. Prasangika**

Assistant Director (Admin& Human Resources) Actg.

B.des,Jew(Sp)(UOM)

## 3. Chairman's review of the opportunities and challenges of the year under review

### 3.1 Opportunities

- **Demand for research and training**

Established by an Act of Parliament for the development and regulation of training and research activities in the gem and jewellery industry, this institute is currently is engaged in providing the skills and knowledge required for the task of novel design, covering the process of value enhancement in the stages of production from gem mining to the creation of jewellery for the international market. The institute has already implemented nearly 21 training courses through 15 centers by conducting courses from certificate level to diploma level covering a wide range of fields. In almost three decades since the establishment of the institute, no other public or private sector training institutes have emerged that could challenge this institute, and it has been identified that there is no trend in the market that will lead to the establishment of training institutes that can set a challenge to this institute. Thus, it can be seen that the institute continues to possess the competence to spread knowledge for the Sri Lankan and international gem markets at a level that is competitive with other countries.

- Technical facilities

The Institute has a wide range of machinery and equipment as well as computer software capable of introducing new products related to the gem and jewellery industry in order to produce trained workers with high technical skills for the gem and jewellery industry, as well as for environmentally friendly gem exploration and research activities. Also, the institute has a human resource with extensive training and knowledge with the ability to operate these machines. The institute has gemological laboratories, gem cutting training units, computer-aided jewelry design training facilities as well as 3D printing technology, casting and electroplating technical facilities including with extensive facilities that can be used for training courses at the international standard level. Also, the institute has modern equipment such as X-Ray Florescence Spectrometer, Magnetic Separator, specific gravity scale, Laser Diffraction Particle size analyzer, Fourier-Transform Infrared Spectroscope, Raman Spectroscope, Ultraviolet-Visible Spectroscope, which are used for research related to the gem industry.

- Opportunities for expansion of functions of the Institute and development

The institution has the ability to carry out a number of development activities beyond the basic objectives established by the Act of Parliament. The institution has the capacity for carrying out many opportunities such as conducting high standard annual certificate awarding ceremonies,\ conducting research conferences of international standards and starting and maintaining an association of students of the institution.

❖ Implementation of joint cooperation programs for the development of the industry

In order to create a sustainable, environmentally friendly and ethical development of the gems and jewellery industry in the country, the institutions will implement its activities as much as possible in joint venture programs with external institutions. Under this, the Institute implements these programs in collaboration with the National Gems and Jewellery Authority, Geological Survey and Mines Bureau, National Science Foundation, Department of Museums, Universities such as Peradeniya, Sabaragamuwa and Uva Wellassa as well as FGA, Gem and Jewellery Institute of Thailand (GTI), and foreign governments and institutions such as the Government of Pakistan and the institution has the capacity for implementing joint programs with various external parties towards creating a further developed industry.

❖ **Promotional programs of the Institute**

Publicity and awareness activities relating to research and training activities of the institute are given high priority. For this purpose, opportunity has been utilized to promote the functions of the institute with the use of social media, which is widely used for advertising at present. But according to the form of this industry, according to the respective age groups, regional base, professional and educational levels of those engaged in the industry, they are also engaged in traditional awareness and publicity work. But given the nature of this industry, traditional awareness and promotional practices are also utilized further according to the particular age groups, regional basis, professional and educational levels of those who are engaged in the industry.

### 3.2. Challenges

❖ Inadequacy of technology, financial infrastructure and physical facilities.

There is a situation of delay in the ever-updating technical knowledge on machinery and the latest trends relating to the gem industry reaching the local players of the industry. Also, the staff of the institution have less opportunities for higher education to gain international level knowledge. The trend of using modern machines and training equipment for training courses as well as for research work is at a low level and the lack of infrastructure has hindered the achievement of the desired results in the development of the institution. Also, the absence of the institute's own permanent building facilities is also a deficiency in the development of the institute. The training units used for the training and research activities of the institute are at a level that require development conforming to international standards. Also, gemology laboratories require modern machines for gemology laboratory tests and adequate financial allocation should be obtained for this purpose.

❖ Slow development in human resource

Under the employee plan of the institute, the number of permanent employees is 136, but the institute currently has only 64 employees. At present, the organization does not have sufficient number of

employees to maintain the activities of the institution in an optimal and quality manner and there are vacancies in several key positions that affect the operation of the organization.
Also, there is a shortage of academic staff with higher education, which must be present in an educational institution, and graduate level people should be recruited for the academic staff. Although there is currently a higher demand for the research and training activities of the institute, the lack of human resources has hindered the institution's activities in an optimal manner. Therefore, there is a need to direct thestaff for local and international training opportunities and to urgently recruit personnel for vacancies.

- Legitimacy in carrying out the functions of the institute.

It has been identified that the powers and functions assigned to the institution as per the Act under which the institution has been established should be revised at present. Due to having to work within these limits in carrying out the functions of the institute, opportunities to perform certain activities have been lost. Accordingly, a system of regulating educational institutions with international standards should be prepared. Further, a standardized education level should be set for those entering the industry and the legal background related to this industry should be established and a regulatory system should be prepared for the same for achieving sustainable development of the industry and for the operation of this industry in accordance with an ethical system with the professionalism of those employed in the industry for an environment-friendly industry.

- Unfulfilled requirements.

There is a need to further engage experts with higher education in the gem and jewellery industry for training and research work. Also, a slowness is observed in the empowerment of the institute with the innovative technology required for introducing quality products for the industry as well as the market and for experimenting environmentally friendly mining methods and research, and it is at a level that needs to be developed in a sustainable and sustainable manner.

## 4. Report of the Board of Directors

### 4.1. Objectives

The Gem and Jewellery Research and Training Institute was established by Gazette Notification No. 882 dated 28th July 1995 in accordance with Section 25 (1) of the National Gem and Jewellery Authority Act No. 50 of 1993. The main objective of the Institute is regualtion, promotion and development of the Gem and Jewellery Industry through research and training facilities in the industry.

### 4.2. Powers of the institution

Conducting surveys on gem minerals and their deposits in Sri Lanka and carrying out scientific research on the following related matters.

4.2.1. To conduct surveys on gem minerals in Sri Lanka

a) Location of gems
b) Identification of gems
c) Methods of enhancing gem stones.
d) Any other related aspects and gemmological research.

4.2.2 To provide Technical and other advice including invention of machinery for the development of the Gem and Jewellery Industry in areas such as mining, gem cutting, jewellery making, devices for the treatment of gem stones and making of jewellery.

4.2.3 To provide training in -
(a) Gem cutting
(b) Production of Jewellery;
(c) Gemology including diamonds;
(d) Jewellery designing;
(e) Enhancement of gem stones;
(f) Any other related aspects of the gem and jewellery industry

4.2.4 To conduct Workshops, Seminars and to publish Papers, Books on related topics, work done etc.

4.2.5 To do such other things as are necessary to facilitate the proper discharge of the functions of the Institute.

# TRAINING DIVISION

# 5. Training Division

Vocational education makes a significant contribution to the development of the country's production sectors and building an economy of that nature. The future of the majority of people in this country should be developed through the vocational education system after the general and advanced level examinations. The future of the majority of people in this country should be developed through the vocational education system after the general and advanced levels. In the recent past, there has been an increase in tending towards the gems and jewellery industry in Sri Lanka, and as a result, many people have shown interest in getting professional training and education related to the gems and jewellery industry. The training division had the capacity to satisfactorily fulfil this demand and thus, it has been possible through the vocational education courses of the institute to produce professionals who can work for the development of the industry.

In this professional education process, the training programs in the gem and jewellery industry carried out by the training division led to the production of an expert workforce with skills that can compete with the international market. Accordingly, the main tasks aimed at developing the gems and jewellery industry by achieving the objectives of the institute have been briefly reported below.

## 5.1. Formulation and implementation of training courses.

The training division prepares and conducts training courses from certificate level to diploma level. In carrying out this task, the main activities of curriculum development, recruitment, training, conducting examinations and referral for on the job training were carried out through 15 centers.

The Training Division has planned training and educational programs in accordance with the standards and criteria of the Tertiary and Vocational Education Commission (TVEC). Under this, high quality training courses are implemented in the head office of the institute and other regional centers.

The institute primarily plans and implements training program under three main categories

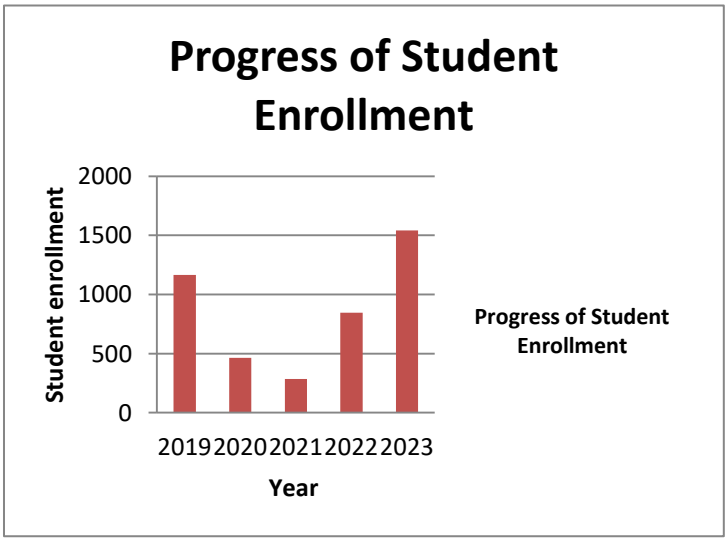
I. Fee-based courses
II. Free courses for low income earners
III. Courses under the Thirteen Year-Continuation Education Programme

This year, 150 full-time and part-time courses have been implemented through 15 training centers across the country, and the number of students trained is 1577. This is a growth of 57% in relation to the previous year. In addition to this, through the implementation of skill development programs and entrepreneurship development programs, it has been possible to train apprentices and introduce them to the industry in the year 2023 and the number of trainees who completed training courses in the year 2023 is 1092. The number of students who continue to be trained in the courses that run from 2023 to 2024 is 665.

### 5.1.1. Number of training courses implemented in 2023 and student enrollment

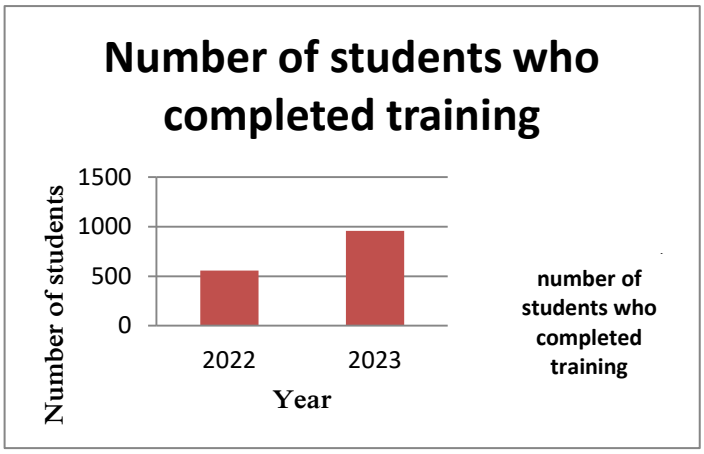
| Training course | | Number enrolled in 2022 | Number enrolled in 2023 |
|---|---|---|---|
| 01 | Basic Gemmology | 147 | 229 |
| 02 | Hybrid Gemmology | 148 | 240 |
| 03 | Gemmology | 22 | 22 |
| 04 | Gem Colourgrading & Marketing | 24 | 23 |
| 05 | Geuda Heat Treatment | 102 | 212 |
| 06 | Gemstone carving | 07 | - |
| 07 | Gem cutting and polishing NVQ 3 / NVQ 4 | 235 | 429 |
| 08 | 10 Day Gem Cutting Course | 8 | 18 |
| 09 | Valuation and marketing of gems | - | 36 |
| 10 | Jewelry designing | 69 | 80 |
| 11 | Computer Aided Jewellery Designing | 17 | 57 |
| 12 | Jewelry manufacturing NVQ 4 | 25 | 138 |
| 13 | Costume Jewellery Manufacturing | 15 | - |
| 14 | Jewellery Stone Setting | 30 | 38 |
| 15 | Casting and Electroplating | - | 10 |
| 16 | Diploma in Gemmology | 13 | 23 |
| 17 | Diploma in jewellery | - | 13 |
| 18 | Short-term courses | 07 | 09 |
| | **Grand total** | **869** | **1577** |

### 5.1.2. Numerical Progress of Student Enrollment for Past Five Years




| Year | Progress of Student Enrollment |
|---|---|
| **2019** | **1165** |
| **2020** | **465** |
| **2021** | **286** |
| **2022** | **869** |
| **2023** | **1577** |

### 5.1.3. Growth in number of students who completed training

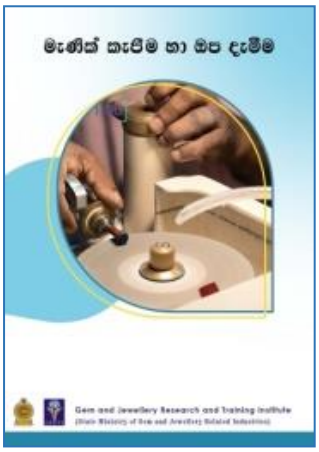



| | 2022 | 2023 |
|---|---|---|
| number of students who completed training | 558 | 1092 |

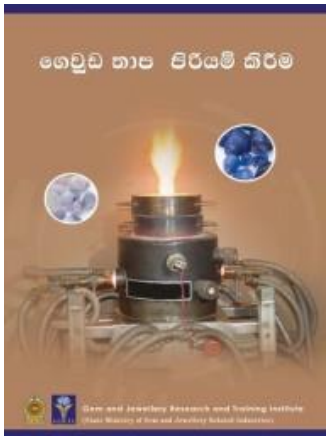
### 5.1.4. Growth in Revenue

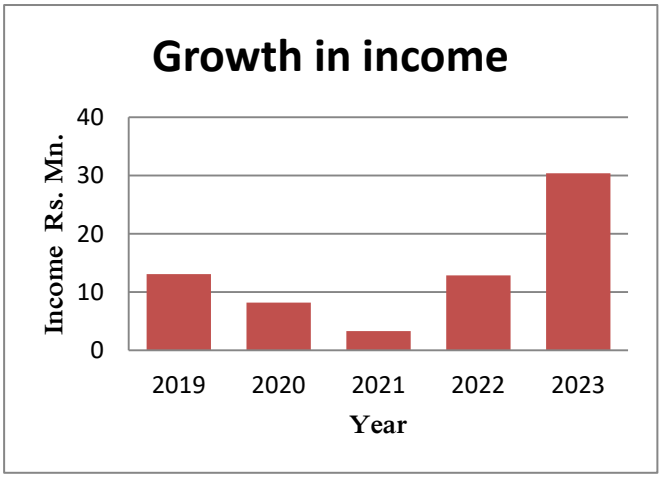
This year, through the implementation of training courses, the institute has been able to earn the highest income ever, which is 30.4 million rupees. In addition, this year, the training division has also acted to generate income through the sale of printed course support books.

Books for sale printed by the Division.
Gemology
Geuda heat treatment
Gem cutting and polishing
Jewelry manufacturing








| Year | Income Rs. Mn. |
|---|---|
| 2019 | 13.17 |
| 2020 | 12.82 |
| 2021 | 3.74 |
| 2022 | 16.3 |
| 2023 | 30.4 |

### 5.1.5. Implementation of special technical training programs related to gems and jewellery industry

- With the resource contribution of the Sri Lanka Export Development Board, two business development guidance workshops were organized at the Ratnapura Regional Training Center and it was expected thereby to produce small and medium scale entrepreneurs related to the gem and jewellery industry.

- In the year 2023, a one-day training workshop has been organized to provide proper technical theoretical and practical knowledge on determining the amount of gold and jewellery valuation for the officials of the Sri Lanka Cooperative Board and 30 officials from the said sector participated in this workshop.

## 5.2. Developing programs and courses related to current needs of the gems and jewellery industry

In the implementation of training programs for the gem and jewellery industry, the Division has planned and reviewed the training courses taking into account the ever updating trends both nationally and internationally. Accordingly, based on the identified current requirements, the division carried out the following training programs and developed the course syllabus during the 2023 academic year.

### 5.2.1. Developing the training course on Gem Mining Techniques.

The mining industry in Sri Lanka is still carried out through traditional knowledge and informal learning. For this reason, this course was designed to introduce professionals with scientific knowledge to the mining industry in this country. This course will be implemented from 2024 onwards.

### 5.2.2. Gem Valuation and Marketing Course

A special subject in the gem and jewellery industry is gem valuation and marketing. This course was started to create persons who can engage in the gem and jewellery industry with formal knowledge, centering on the international market. By completing the development of the this course and the curriculum, it was implemented in the year 2023.

### 5.2.3. Obtaining National Vocational Qualification (NVQ Level 4) accreditation for Jewellery Design Course

Taking into account the market conditions that our institution studied with the Tertiary and Vocational Education Commission, this subject was identified for the first time as an employment-based field and accordingly, action was taken to obtain National Vocational Qualification (NVQ Level 4) accreditation for the Jewellery Design Course.

### 5.2.4. **Obtaining National Vocational Qualification (NVQ Level 4) accreditation for course on Gemology**

The National Vocational Qualification Level had not been accredited to the field of Gemology, and our institution, in cooperation with the Tertiary and Vocational Education Commission and the National Apprenticeship and Training Authority, initiated and implemented the necessary activities to obtain the National Vocational Qualification NVQ 4 level accreditation for the field of Gemology. Currently, its final phase is being assessed under the National Apprenticeship and Training Authority. This course can also be implemented from the year 2025 with NVQ 4 qualification.

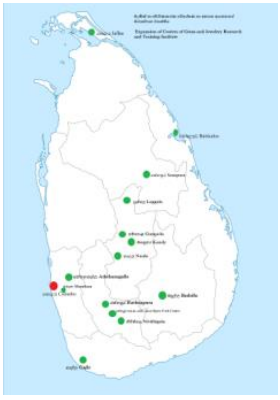
### 5.2.5. Making arrangements for awarding the Bachelor of Science degree in the subject of gem and jewellery industry

In order to introduce highly knowledgeable professionals to the product market related to the local and the international gem and jewelry industry, this year, the necessary preliminary actions were started to prepare a systematic program to produce graduates related to the gem and jewelry industry in association with the Uva Wellassa University. As identified here, it is has been planned to carry out the necessary activities in such a way that the diplomas and higher diploma qualification related to the industry can be obtained first and then the degree can be awarded. The institute has planned to achieve this goal in the year 2025 / 2026.

### 5.2.6. Facilitation of national vocational examination and awarding of national vocational qualifications

Under this programme, conducting vocational tests and issuing certificates of proficiency in the respective fields to the skilled artisans are carried out. This method is more suitable for the currently serving skilled artisans who have received informal training to get a recognized professional certificate and secure better local and foreign jobs. Therefore, in 2023, the training division started offering Recognition of Prior Learning Certificates (RPL) to provide proper vocational training to persons with informal training related to the gem and jewellery industry. There is a high demand for this initiative and this will improve the income generation of the institution.

## 5.3. Expansion of gem and jewellery industry across the island



### 5.3.1. Training Centers in operation

By the year 2023, the number of training centers operating all over the island was11. Training courses related to the Gems and Jewellery Industry were conducted through these centers. Under the said program, the 11 regional training centers were each operated at the Colombo office, which was maintained as the headquarters, and the Rathnapura center, which was operated as the main regional center, and at the centers that were operated in Kandy, Galle, Naula, Jaffna, Batticaloa, Nivithigala, Attanagalle, Senapura, and at the Youth Service Council center in Ratnapura.

### 5.3.2. New centers started in 2023


Four new centers were started in the year 2023 to gradually increase the number of people engaged in the industry by expanding the training courses related to the gems and jewelry industry. The newly established centers are the center established in the Maradana Technical College premises, the centers established in Badulla, Gampola, and Laggala areas. Accordingly, training courses and other technical programs related to the gem and jewellery industry are currently being implemented through a total of 15 training centers.

## 5.4. Implementation of capacity building programs related to the gem and jewellery industry

Capacity building programs are implemented for the purpose of implementing training courses and such courses were implemented this year as well.

### 5.4.1. Introducing an information management system for the training division

The need for a management information system was identified for the operations related to the administration and management of the process from planning courses, recruiting students, from conducting exams, issuing certificates to employment through training. Therefore, In the year 2023, in collaboration with the Department of Technical Education and Training, the preliminary work was carried out to get the management information system used by that department to the institute. The objective of carrying out operations using this system is to carry out the functions of the training division more efficiently.

### 5.4.2. Other general activities related to the subject

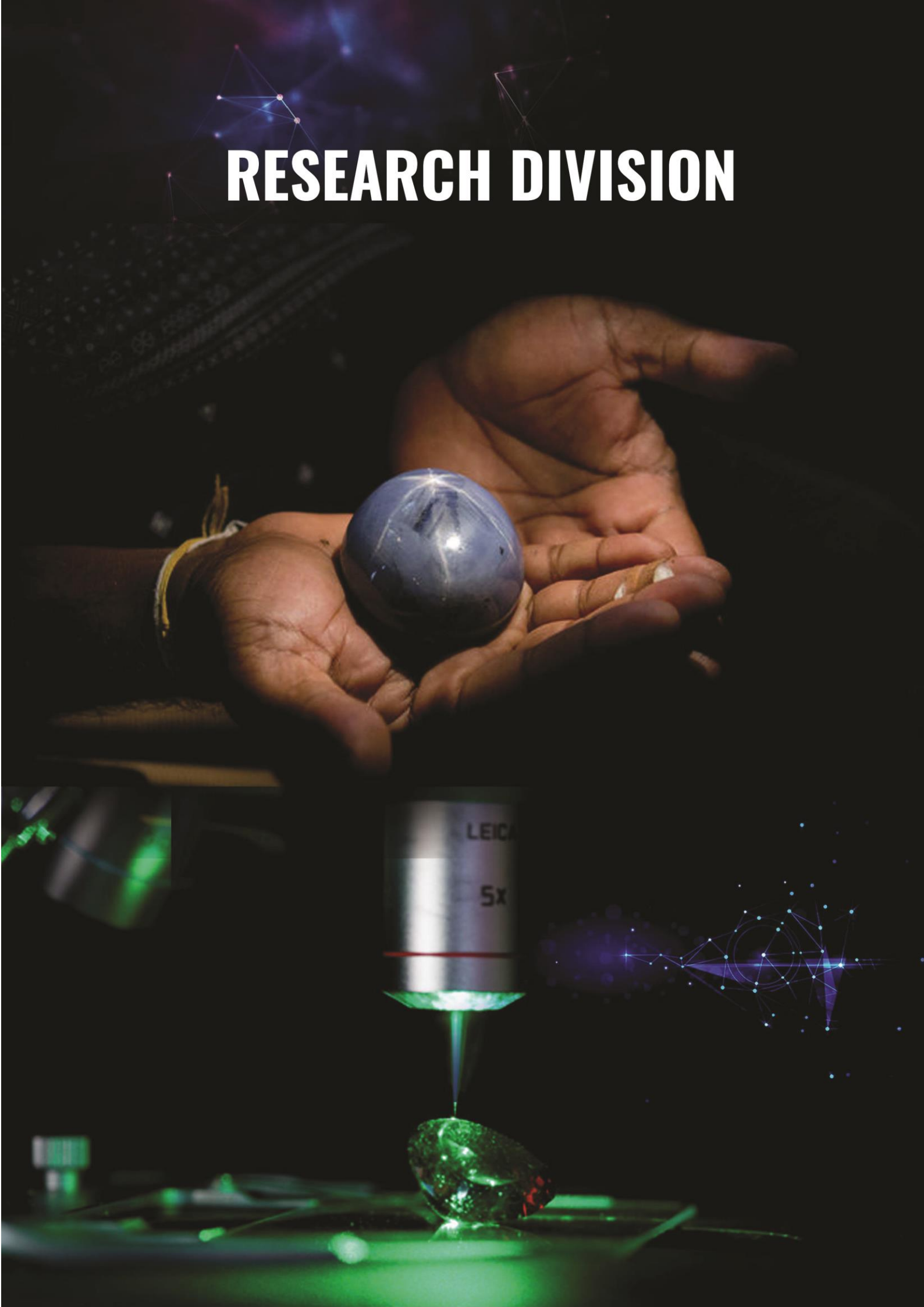
**Conducting a certificate awarding ceremony**

In order to maintain the high level of attraction of the students studying the training courses of the institute and the external community, the division made arrangements to hold a high-quality certificate awarding ceremony for diploma and national vocational qualification level 4 for the second time in 2023. Under this, 33 diploma students and 77 students with NVQ 4 qualification were issued certificates.

### 5.4.3. Workshops Conferences and Exhibitions

Jewels Exhibition is one of the internationally organized trade exhibitions related to the gems and jewellery industry. Arrangements were made to present an exhibition stall of the institute for the Jewels Exhibition organized in the year 2023. This will make it easier to reach the outside society with the information about the training courses conducted by the training division relating to the gem and jewellery industry. This year, the institute participated in a science exhibition organized by the Ministry of Education centering on the Sri Lanka Museum.

# RESEARCH DIVISION



# 6. Research Division

## 6.1 Project :- Exploration and Evaluation of Gem Deposits in Sri Lanka

This project is implemented at the divisional secretariat level to contribute Sri Lanka's gem deposits to the national economy and prepare a collection of 1:50,000 scale maps. In this task, a relevant gem potential map and a technical report is prepared at the level of each divisional secretariat.

### 6.1.1 Niyagama Divisional Secretariat Division

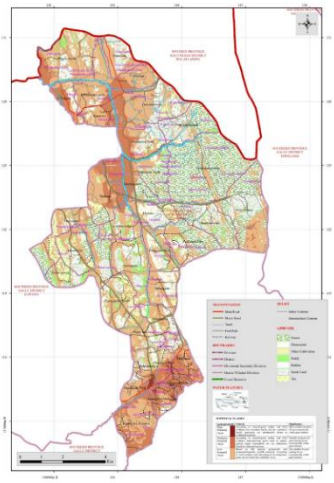


*Figure 01 – Gem Potential Map- Niyagama Divisional Secretariat Division.*

Niyagama Divisional Secretariat consisting of 11,110 hectares is located in Galle District. There are mainly primary deposits in this divisional secretariat. These deposits are located along geological structures and exist prominently in areas like Horangalla, Niagama South. Precious gems such as chrysoberyl and alexanderite are found in these deposits.

The thickness of the gem deposit (0.5-3 feet) and the depth of the deposit (10-20 feet) vary by location. Also, there are primary and low-flow gem deposits in the villages of Pitigala North, Godamuna, Marthupitiya, Uhanowita, but enough gem minerals were found to implement mining projects at an economically viable level. The gem potential map prepared for this divisional secretariat is shown in figure 1.

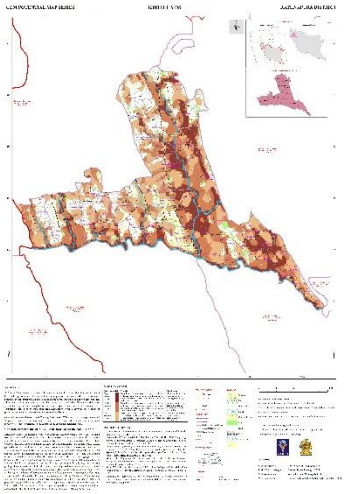


*Figure 02(a)*

### 6.1.2 Kiriella Divisional Secretariat Division

. Gem deposits in Kiriella area are mainly of metamorphic origin. Alluvial and residual deposits are also commonly found as sedimentary deposits. Alluvial sediment deposits are mainly found along the Kaluganga and Kuru Ganges. The areas of Kurugammodara, Dodampe, Pohorabava, Ellawala, Epitawala, Allagava, Yatipahuwa, Galathura, Dodampe, Mudukotuwa, Matuwagala, Purana Naduna Viharasthanya have been identified as high gem potential areas.

However, active gem mines are found throughout the division and gems are extracted through pit-head mines ranging from 10-50 feet deep as well as from shallow mines of 5-20 feet. The average depth of the gem vein layer usually varies between 6 - 20 feet and only one deposit layer has been found so far in field investigations. All gemstones except

topaz and chrysoberyl are found here. According to the studies carried out so far, Kiriella division is a high gem potential area and many areas have already been mined.

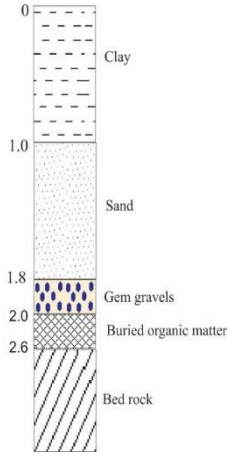



***Figure 02(b)***


***Figure 02(c)***

*Figure 02 (a)*- Gem potential map - *Kiriella Divisional Secretariat Division*

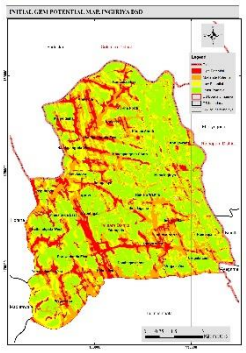


*Figure 02 (b) - Vertical cross-section of a gem deposit (depth in meters) located in Epitawala area.*

*Figure 02(c) - Spinel, sapphire and blue apatite found in Kiriella area as microscopic photographs.*

### 6.1.3 Ingiriya Divisional Secretariat Division

About 70% field exploration has been completed in this division. Figure 01 shows the preliminary gem potential map prepared for the area. Test samples were taken to verify the prepared gem potential map. Laboratory analysis of the samples is underway and is expected to be completed in the first quarter of 2024.

*Figure 03 - Basic Gem Potential Map- Ingiriya Divisional Secretariat Division*

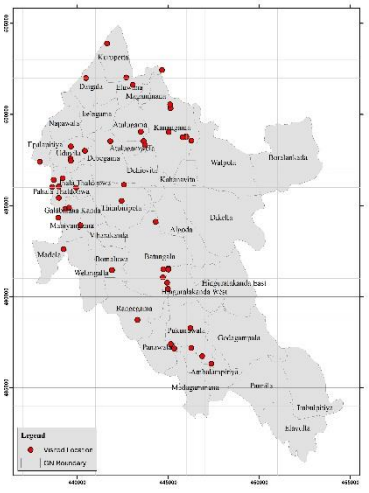
### 6.1.4 Dehiowita Divisional Secretariat

Gem deposit exploration work is currently going on in Dehiovita Divisional Secretariat Division of Kegalle District and it has been found that there are gem deposits in the vicinity of the Kelani River basin. Yogama, Apalapitiya, Talduwa, Uduwila, Madola, Dahanwaka, Panawala and Maniamgama have been identified as areas with high gem potential. The final gem potential map and technical report is scheduled to be released in 2024 based on future field exploration.

රූපය 04(a)

රූපය 04(b)

රූපය 04(c)




රූපය 04(d)

*Figure 04 (a)- Sampling of alluvial sediments along Seethawaka River*
*Figure 04 (b)- Sampling of primary deposits in Maniamgama area*
*Figure 04 (c)- Taking borehole samples from the river flood plain near Timbiriyapola area.*
*Figure 04 (d)- Locations of field survey in Dehiowita Divisional Secretariat*

### 6.1.5 Ayagama Divisional Secretariat

Preliminary field survey work was completed in Ayagama Divisional Secretariat. Based on the preliminary gem potential map prepared accordingly, field work was carried out to obtain soil samples. At present, the studies of the samples, the final report and the preparation of gem potential maps are being carried out. Alluvial deposits in Kalu Ganga, Gala Turu Oya, Heen Ganga, Pasgan Ela, and Primary Remnant Gem Deposit were identified in Pallekada area.

*Figure 05 - Field work*

### 6.1.6 Palamadulla Divisional Secretariat

In this Divisional Secretariat, soil sampling activities were completed and based on the data, the gem potential map and the final report are being updated.

*Figure 06 - Field work*

## 6.2 Promotion of value addition to gems

### 6.2.1 Introducing a new method for heat treatment of young Geuda with the aid of electric stove

One of the main problems in the field is obtaining blue colour by heat treatment of young Geguda. As a solution to this, a new method was discovered with the help of the electric stove of the Gem and Jewellery Research and Training Institute.

In carrying out this task, Young Geuda samples were taken and separated into four parts, and they were heat treated for 12 hours at a temperature of 1700oC with the usual method, with oxygen gas, with nitrogen gas and with a continuous supply of nitrogen gas.

UV-Vis absorption spectrum, infrared absorption spectrum and gemological microscope photographs were carried out before and after the heat treatment of all these samples to verify the Colour grading.

The changes in colours are shown in Tables 1.1 to 1.4 below. According to the tables, it is seen that the colour of young Geuda has been relatively developed by supplying nitrogen for a period of 12 hours at a temperature of 1700oC.

**Table 1.1: Heat treatment of TG Samples with normal condition in 1700 °C for 12 hours soaking.**

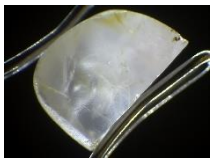
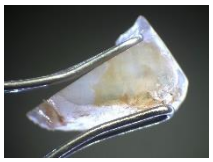
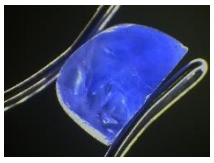
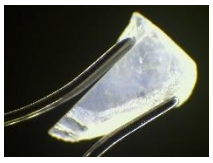
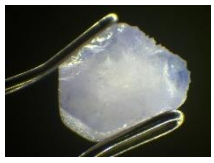
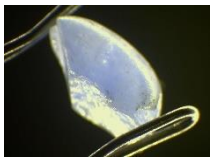
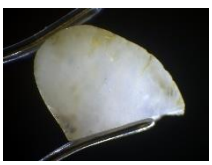
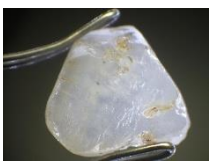
| Samples Name | TG 41/1 | TG 43/1 | TG 45/1 | TG 50/1 |
|---|---|---|---|---|
| Before Heat Treatment |  |  |  |  |
| After Heat Treatment |  |  |  |  |

*Figure 07- Specimen-01*

**Table 1.2: Heat treatment of TG Samples with filled $O_2$ in 1700 °C for 12 hours soaking.**

| Samples Name | TG 41/2 | TG 43/2 | TG 45/2 | TG 50/2 |
|---|---|---|---|---|
| Before Heat Treatment |  |  |  |  |

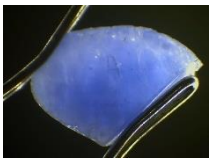
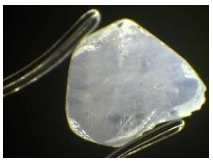
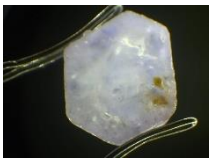
| | | | | |
|---|---|---|---|---|
| After Heat Treatment |  |  |  |  |

*Figure 07- Specimen-02*

**Table 1.3: Heat treatment of TG Samples with filled $N_2$ in 1700 °C for 12 hours soaking.**

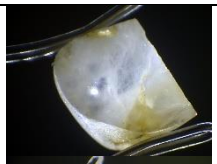
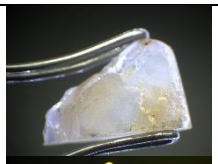
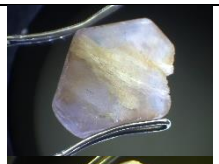
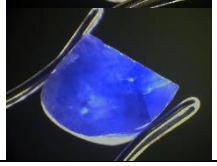
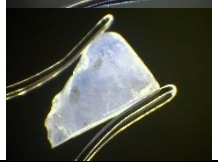
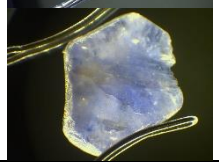
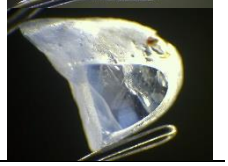
| Samples Name | TG 41/3 | TG 43/3 | TG 45/3 | TG 50/3 |
|---|---|---|---|---|
| Before Heat Treatment |  |  |  |  |
| After Heat Treatment |  |  |  |  |

*Figure 07- Specimen-03*

**Table 1.4: Heat treatment of TG Samples with flowing $N_2$ in 1700 °C for 12 hours soaking.**

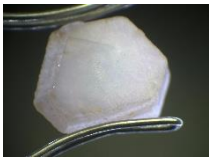
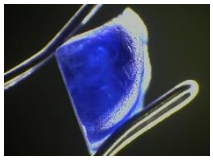
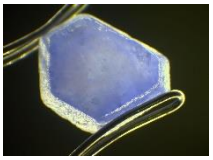
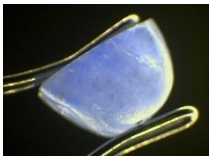
| Samples Name | TG 41/4 | TG 43/4 | TG 45/4 | TG 50/4 |
|---|---|---|---|---|
| Before Heat Treatment |  |  |  |  |
| After Heat Treatment |  |  |  |  |

*Figure 07- Specimen-04*

In the test, at high temperatures, nitrogen gas is converted into atoms, which create a pressure of 0.3bar more than the normal pressure in the electric furnace. Thus, it can be said that the Inter Valance Charge Transfer (IVCT) process of Ti2+ and Fe2+ ions takes place positively. Further studies in this regard are being conducted together with researchers from the Gemological Institute, China University of Geoscience.

### 6.2.2 Detailed Investigation of Radioactive African Rose Blue Sapphire

Irradiation has been used to improve the colour of rubies and sapphires for a long time. But recently, the LMHC (Laboratory Manual Harmonization Committee) discussed the correct identification of rubies and sapphires treated in this way (LMHC Press release, March 14, 2023). The main reason for this was due to the removal of the blue from African rubies and

pink sapphires by a very few people by using gamma equipment used for treating cancer patients in hospitals and they were directed to the international gem market. But no study has been done on this treatment. And it has not been able to be detected in international gemological laboratories.

Therefore, it is very important to study this scientifically. In order to study this, Madagascar blue/red samples were taken and processed by the gamma equipment available at the Horticultural Crop Research and Development Institute (HORDI). An analysis of the rays emitted by all these samples before and after gamma radiation was conducted with the National Atomic Energy Authority.

The findings of this research are that according to Figure 01, the blue colour of most Madagascar reds has decreased. Also, no significant difference was observed in UV-Visible and FTIR analysis after treatment.

| Sample No. | Appearance before Irradiation | Color of the samples before Irradiated | Appearance after Irradiation | Color of the samples after Irradiated |
|---|---|---|---|---|
| AS 01 |  | Pink color |  | Hot Pink color |
| AS 02 |  | Violet color |  | Peach color |
| AS 04 |  | Purplish Blue |  | Peach mixed Blue |
| AS 05 |  | Violet color |  | Pink color |
| AS 06 |  | Blue |  | Peach mixed Blue |
| AS 07 |  | Pink color |  | Hot Pink color |
| AS 08 |  | Purplish Pink color |  | Pink color |

Figure 08- Sapphire specimen analysis

The main factor through which the difference of this can be identified is that a subtle change in the emission of X-ray rays has been observed after gamma irradiation, and it is being studied further to find out whether it can be used to identify such stones.

### 6.2.3 Discovering the method of enhancing Spinel by removing the Geuda in them.

Various types of spinel are found in Sri Lanka and most of them are less in the quality of gem. But the use of treatment methods in this regard is minimum. Meanwhile, Spinel are found which are dark and less in colour and the interior of which appears to be Geuda

Sapphire. These are known as Geuda Spinel. It is important to find a treatment method for these Spinel.

Therefore, selected Geuda spinel were polished on two parallel sides and before and after heat treatment, photographs of inclusions were taken with the help of a gemological microscope. And the UV-Visible and Infrared absorption spectra of these samples were studied before and after heat treatment.

According to Figure 02, it appears that the maximum temperature of 900oC for an hour of heat treatment has also melted Geuda that exists in a low percentage. Also, there is a difference before and after heat treatment with the Raman absorption spectrum between 600 and 800 Cm-1. This can be used to identify heat treated Spinel.

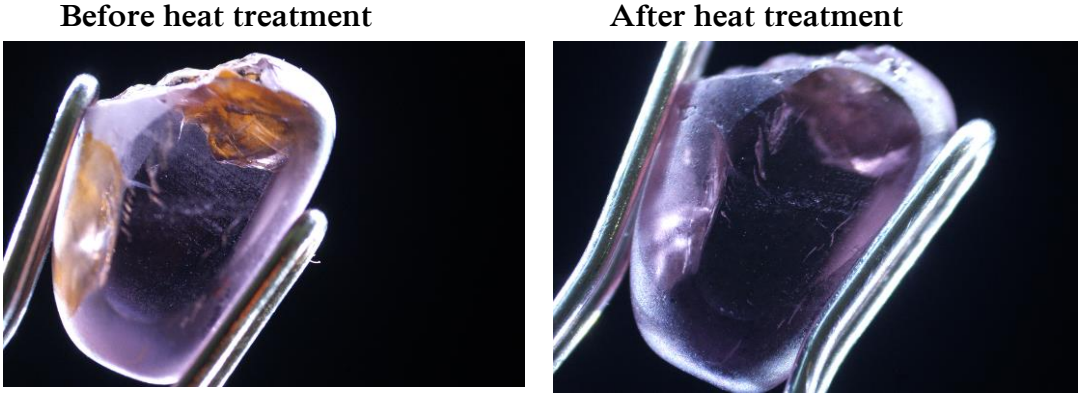



*Figure 09- Specimen analysis*

### 6.2.4 Study on enhancement of colour and clarity of Thick Silky Geuda using Lakmini Air stove.

According to the results obtained in the last year under this study, the best colour and clarity could be obtained by heat treatment under mild oxidizing condition. But here, there were still deficiencies such as colour enhancement (with gaps) with areas concentrated as colour bands, so research work was carried out under different oxidizing conditions during this year as well. But as it was not possible to surpass the results obtained under mild oxidizing conditions so far or overcome the weaknesses that existed, this study was extended for the next year as well.

### 6.2.5 Study on increasing the clarity of dark coloured stones.

Dark coloured spinel samples were subjected to chemical analysis and heat treatment experiments were carried out under different temperature and atmosphere conditions. There was no significant growth in clarity and this study was extended for the next year.

### 6.3 Project :- Identifying the effect of a third gas (H2, N2, Ar, CO2) to improve the colour of gemstones and establishment of treatment conditions for Geuda using electric furnace.

In addition to oxygen and LPG gases in Lakmini furnace, third gases have been used for a long time to obtain its oxidizing condition. But our research has shown that this may have a negative effect on improving the colour. The main reason for this is the rapid cooling of the Geuda by this third gas affects the enhancement of the colours. Therefore, in the first phase of this research, a plan to modernize the currently used Lakmini Furnace has been made and the modernization wok it is being carried out in collaboration with the Ceylon Refineries Institute.

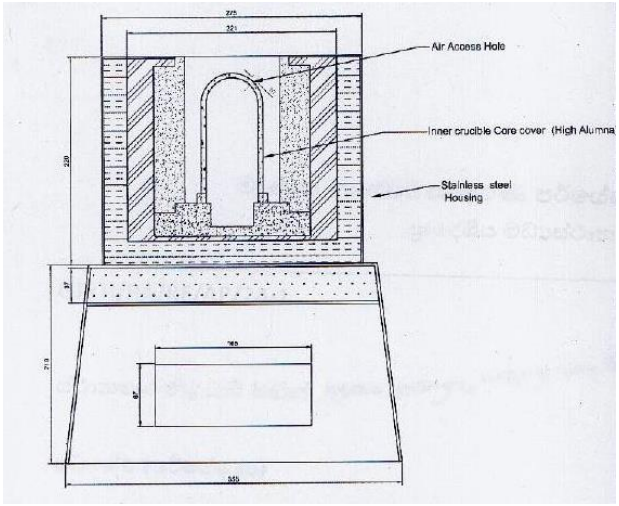



*Figure 10 - Proposed plan for modernization of Lakmini furnace*

### 6.4 Project :- Identifying a suitable oil for filling the cracks in gems of Sri Lanka

Under this project, the study on filling of cracks of Sapphire was carried out. It was studied that glycerine can be used to fill the cracks that are open on the outside of cut and polished flowers.

*Figure 11 - Conducting research to identify a suitable oil for filling cracks*

### 6.5 Project :- Making a colourful gold alloy using nanotechnology

Under this project, the preliminary study on the production of coloured gold particles by nanotechnology was carried out and red coloured gold particles were produced.

*Figure 12 – Carrying out experiments to produce a coloured gold alloy*

### 6.6 Project :- Preparation of a Catalog of Sri Lankan Traditional Jewellery Designs

Among the many works of art found in Sri Lankan history, Sri Lankan traditional jewellery holds a special position. The preparation of a detailed catalog with the aim of preserving the unique traditional designs found in these jewelleries and identifying new designs related to them and popularizing them in the national and international markets, has been included in the 2023-2024 annual action plan of the institute and is currently in implementation.

It was identified that the traditional jewellery designs inherited by Sri Lanka since the historical period are mainly preserved in the national museums as suitable sources for this task. Accordingly, necessary arrangements have also been made to enter into a memorandum of understanding with our institution and the Department of National Museums for obtaining the approval of the Department National Museums for copying and photographing of those traditional jewelry designs, as well as for making this project a success by sharing their knowledge, skills, experience, technology, human and physical resources. Also, copying of jewelry designs associated with the Colombo National Museum is currently being carried out.

*Figure 13 - Some designs of jewellery copied from the National Museum, Colombo*

### 6.7 Project :- Installation of Laboratory Quality Management System.

Accreditation of laboratory of the institute has been initiated under ISO 17025:2017 Laboratory Accreditation. Under the same, relevant activities are being carried out under

the guidance of Industrial Technology Institute. The entire process of laboratory quality management will be completed in 2024.

## 6.8 Project :- Publication of books.

### 6.8.1 Compilation of the book entitled "Sri Lankan Gem Mining Industry for Sustainable Era".

The book titled "Sri Lankan Gem Mining Industry for Sustainable Era" is the English translation of the book compiled in Sinhala by the name of "Sri Lankan Gem Mining Industry for Sustainable Era". It was planned to be printed in the last quarter of 2022, but due to lack of financial resources, printing has been carried out in 2023.


*Figure14 – the book, "Sri Lankan Gem Mining Industry for Sustainable Era"*

### 6.8.2 Printing of a Booklet on the Services of the Institute

A booklet containing details of the laboratory and research services provided by the institute has been sent to a printing company for printing.

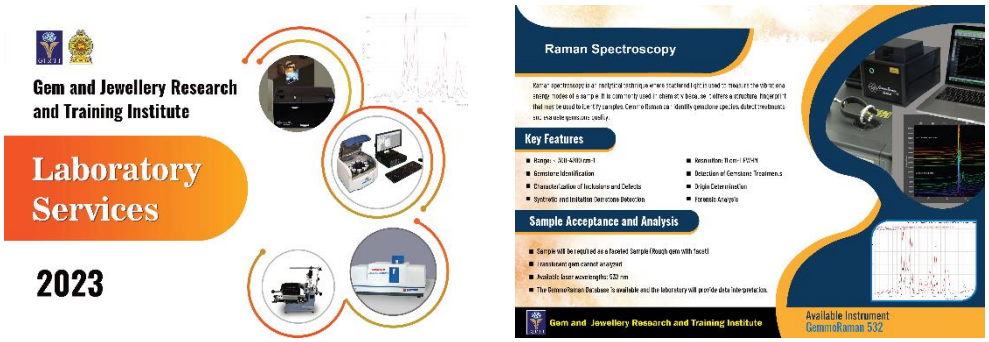



*Figure 15 - "Laboratory Services Manual" booklet*

## 6.9 Project :- Conducting a Research Conference.

First Annual Research Conference of the Institute 2023.10. 25 was held at the Bandaranaike Memorial International Conference Hall. The theme was 'Towards a Sustainable Gems and Jewellery Industry'. In the conference, 19 research abstracts were presented under 5 sub-topics and the review panel consisted of 24 experts in the field of gems and jewellery. The

presentation made by G.G.I.U. Senaratne of Uva Wellassa University was the best research summary and Mr. M.H.M. Shamri of the same university presented the best poster. The aim of the conference was to promote sustainability in the industry by creating awareness about research findings.


*Figure 16 - Research conference events and the research paper*

## 6.10 Project :- Workshops

### 6.10.1 On gem analysis using high tech equipment

A Workshop on High-Tec Instrumental Analysis for Gemology was held on 09.09.2023 and 10.09.2020 with the participation of about 20 gem-related industrialists at the hi-tech laboratory of the institute. Through project, the institute has earned a sum of Rs.240,000.00 in the year 2023.

*Figure 17 - Hi-tech equipment workshop*

### 6.10.2 Workshop to impart new knowledge on Gueda heat treatment

With the participation of about 300 businessmen, a workshop for imparting new knowledge of Geuda heat treatment was conducted on 21 and 22.12.2023 at Badulla Library Auditorium. The scene of the workshop in operation is shown in Figure 03.

*Figure 18 - Geuda heat treatment workshop*

## 6.11 Project :- Presentation of publications

***SCI Journal Publications:***

I. WICKRAMARATHNA ILCS, JALIYA RGC, ILLANGASINGHE KMSCK. Discovering Colour Alteration Conditions and Inclusion Changes of Sri Lankan Black/Brown (Penithora/Maangu) Tourmaline. IJESKA. August 2023;5(2):208-2016.

II. RAMESH TG, JALIYA RGC, ILLANGASINGHE IKMSCK, KURUPPU KADDN. Identification of the Effect of Localization on the Colour Alteration of "Geuda" Gemstones Through the Heat Treatment Using ED-XRF, FTIR, and UV-Vis Spectroscopic Analysis. IJESKA. December 2024;5(3):324-332.

III. UDAWATTE, C.P. , ABEYWEERA, S. , PERERA, L.R.K. , ILLANGASINGHE, S. , WEERASOORIYA, C. , SUTTHIRAT, C. , JAYASINGHE, N. , DHARMARATNE, T. and DIYABALANAGE, S. 2023. Optimized conditions for cobalt diffusion in Sri Lankan colourless topaz and colouration mechanism elucidation through spectro-chemical investigation. Journal of Metals, Materials and Minerals. 33, 1 (Mar. 2023), 73–81. DOI:https://doi.org/10.55713/jmmm.v33i1.1596.

***Citation:***

IV. The Journal of Gemmology, 2023, Volume 38, No. 7, acknowledges our research publication on Optimized Conditions for Cobalt Diffusion in Sri Lankan Colourless Topaz and Colouration Mechanism Elucidation through Spectrochemical Investigation as a literature of interest.

LITERATURE OF INTEREST

**Enhancement of Paraíba tourmaline.** *J.G.G.L. Gem Information*, **49**, 2023, 11–14 (in Japanese with English abstract).

**Gemstone testing during the jewelry manufacturing process. Lead-glass filled ruby.** D. Romanelli and S. Coppola, *Rivista Italiana de Gemmologia/Italian Gemological Review*, No. 16, 2023, 25–31.

**Identification method of glue-filled aquamarine.** N. Cao, T. Chen., J. Zheng, X. Chen, Y. Zhuang and Z. Wang, *Journal of Gems & Gemmology*, **25**(1), 2023, 45–51, https://tinyurl.com/bdepj8y5 (in Chinese with English abstract).*

**Mechanism of Be-thermodiffusion in rutile inclusions of fancy sapphires.** M. Rossi, R. Bisoffi, R. Rizzi, N. Corriero, F. Sepaino and A. Vergara, *Crystal Growth & Design*, **22**(11), 2022, 6493–6503, https://doi.org/10.1021/acs.cgd.2c00700.*

**Optimized conditions for cobalt diffusion in Sri Lankan colorless topaz and coloration mechanism elucidation through spectro-chemical investigation.** C.P. Udawatte, S. Abeyweera, L.R.K. Perera, S. Illangasinghe, C. Weerasooriya, C. Sutthirat, N. Jayasinghe, T. Dharmaratne *et al.*, *Journal of Metals, Materials and Minerals*, **33**(1), 2023, 73–81, https://doi.org/10.55713/jmmm.v33i1.1596.*

**Les saphirs chauffés à haute temperature et leurs inclusions identifiables en gemmologie classique [Sapphires heated at high temperatures and their identifiable inclusions in classical gemology].** M. Bouvier, *Revue de Gemmologie A.F.G.*, No. 220, 2023, 22–23 (in French).

**The spectroscopy study of different filling materials in tourmaline.** J. Sui, *Superhard Material Engineering*, **34**(5), 2022, 59–65, https://tinyurl.com/ycmne9p4 (in Chinese with English abstract).

**Study on the common effect of heat treatment, dyeing or irradiation treatment on UV-Vis diffuse reflectance spectra of pearls.** J. Yan, S. Fang, X. Yan, J. Sheng, J. Xu, C. Xu and J. Zhang, *Spectroscopy and Spectral Analysis*, **42**(12), 2022, 3697–3702, http://www.gpxygpfx.com/EN/Y2022/V42/I12/3697 (in Chinese with English abstract).*

**Update of andesine diffusion.** *J.G.G.L. Gem Information*, **49**, 2023, 7 (in Japanese with English abstract).

COMPILATIONS

**G&G Micro-World.** Aquamarine from Xinjiang, China • Clinochlore and muscovite in quartz from Colorado, USA • Iridescent 'insect wing' in diamond • Patchy yellow trigon on diamond • 'Rainbow mountain' in diamond • Musical note symbol in diamond • Snail-shaped pyrope-diopside inclusion in diamond • Metal sulfide(?) in garnet • Graphite in pink sapphire • Night sky scene in yellow sapphire • 'Eye' on a Tridacninae pearl • Thread-like inclusions of serpentine in brown peridot • Metallic platelets in Paraíba tourmaline • Triplite inclusions in Chinese quartz • Geocronite in fluorite. *Gems & Gemology*, **59**(2), 2023, 222–231, https://tinyurl.com/yr9nphm.*

**Gem News International.** Suite of Colombian emerald-and-matrix cabochons • Calcite in a pearl from *Pinctada maculata* • Unusual metallic core in a natural *P. radiata* pearl • Saltwater clamshell beads in freshwater cultured pearls • Quartz with 'rabbit hair' inclusions • Heat-treated rubies from Greenland • Treatment for creating phantom structure in opal • Spring 2023 auction highlights • 2023 Sinkankas Symposium • Sustainability panels at JCK Las Vegas. *Gems & Gemology*, **59**(2), 2023, 242–258, https://tinyurl.com/yy2p3rh2.*

**Lab Notes.** Star aquamarine • Faceted brucite • Natural diamond with CVD-like fluorescence pattern • Yellow zoning in pink diamonds • Glass imitation of cat's-eye chrysoberyl • 34.59 ct CVD synthetic diamond • CVD synthetic diamonds with invisible markings • Two pearls of Indian cultural significance • 19+ mm South Sea bead-cultured pearl • Linear structures in non-bead cultured pearls • Plastic imitations of emerald • Pink zektzerite. *Gems & Gemology*, **59**(2), 2023, 210–222, https://tinyurl.com/mrxr4cd9.*

*Figure 19 – Journal*

## 6.12 Project :- Patents

A patent was applied for a method to enhance the blue colour of corundum using nano materials.

**Title of Invention** - An economic bulk diffusion technique to enhance the blue colour in corundum using environmentally friendly synthesized Nano material.
**Inventors** – 1) Rathnayaka Mudiyanselage Naleen Pushpa Kumara Jayasinghe
2) Mohammed Nayeen Mohammed Rifkhan
**Application Number** - 22945

## 6.13 Project :- Provision of technical services

### 6.13.1 Exploration of gem deposits on private lands

Gem deposit exploration was carried out on private land in Kumbal Anga in Kurunegala, Uluvitike in Galle and Deraniyagala areas. Through this project, the institution has earned a sum of Rs. 239,000.00 in the year 2023.

*Figure 20 - Exploration*

### 6.13.2 Heat Treatment Services

Using the Lakmini stove, 18 services have been provided and earned an income of Rs. 216,000 this year under the provision of fee-based Geuda heating services for external parties.

### 6.13.3 High-tech Laboratory Services

Under the provision of laboratory analysis services, the institute has earned an amount of Rs.494,000.00 in the year 2023 through 64 ED-XRF analysis samples and 09 Raman analysis samples.

## 6.14 Project :- Commercialization of new research findings.

The following new research findings found through the research of our institution were referred to the commercialization of new research findings organized by the Ministry of Industry, and a few selected new products were presented in detail in the program held on 12.12.2023 at Water's Edge Hotel premises.

| No | Invention | Principal Inventor | Co- Inventors |
|---|---|---|---|
| 01 | Enhancing the Market Appeal of Colourless Topaz: A Cobalt Diffusion Approach | Mr. Sandun Illangasinghe | Mr. Chamal Jaliya<br>Mr. M. Nirushan |
| 02 | An economic bulk diffusion technique to enhance the blue colour in corundum using environmentally friendly synthesized nano material | Mr. R.M.N.P.K. Jayasinghe | Mr. M.N.M. Rifkhan |
| 03 | Precision Gemstone Valuation: An Advanced Computer-Aided Machine Learning System | Mr. R.M.N.P.K. Jayasinghe | Mr.S.Sutharshan<br>Mrs. I. Samaradasa<br>Mr. H.Ranaweera |
| 04 | Use of sustainable reinforcement material for the Sri Lankan gem mines | Mrs. S. Wijewardana | Mr. R.M.N.P.K. Jayasinghe<br>Mrs. M.K.C. Jayamali<br>Mr. W.G.C.N. Wawegedara |
| 05 | Mineral Embedded pain relieving coating for fabric | Mrs. M.A.N.C. Manthrirathna | Mr. R.M.N.P.K. Jayasinghe |
| 06 | Mitigating Mercury Risks: Introducing Eco-Friendly Gold Extraction Alternatives for Sri Lanka's Small Scale Jewelry Sector | Mrs. M.A.N.C. Manthrirathna | Mr. R.M.N.P.K. Jayasinghe<br>Mr. R.S. Diyabalanage<br>Mr. Damith De Silva<br>Mr. M.N.M. Rifkhan |
| 07 | Production of nanosilica from rice husks for use as a power for polishing gems | Mrs. M.A.N.C. Manthrirathna | Mr. R.M.N.P.K. Jayasinghe<br>Mr. M.H.M. Shamri<br>Mr. B. Kowarthanan |
| 08 | Using new techniques to produce crackle quartz | Mr. U.K.I. Dayarathne | Mr. B.G.R.W. Gamlath<br>Ms. H.W.M.M. Chandrasena<br>Ms. T.D. Anton |
| 09 | Extraction of economically valuable minerals available in the gem bearing layer | Mrs. S. Wijewardana | Mr. B.G.R.W. Gamlath<br>Mr. R.M.N.P.K. Jayasinghe |
| 10 | Exploration and Assessment of Gem Deposits in Sri Lanka – Gem Potential maps | Mr. R.M.N.P.K. Jayasinghe | Mr. B.G.R.W. Gamlath<br>Mrs. S. Wijewardana<br>Mrs. M.K.C. Jayamali<br>Mr. W.G.C.N. Wawegedara<br>Mrs. W.R. Lakshanthi |
| 11 | Quality enhancement of inferior quality corundum variety called "kirikottara" via thermal treatment | Mr. W.G.C.N. Wawegedara | Mr. M.N.M. Rifkhan<br>Mr. Prashan Francis |
| 12 | Enhancing Thick Silky Geuda through Lakmini Gas Furnace Heat Treatment | Mr. W.G.C.N. Wawegedara | Mr. S. Diyabalanage<br>Mr. S.W. Nawaratne |
| 13 | Development of GIS based model for gem potential mapping | Mrs. M.K.C. Jayamali | Mr. R.M.N.P.K. Jayasinghe<br>Mr. W.M.M.P.E. |

| | | | |
|---|---|---|---|
| | | | Bandara<br>Mr. Jagath Gunathilake<br>Mrs. W.R. Lakshanthi |
| 14 | Enhancing quality and competitiveness: Optimizing heat treatment for silky geuda in the Sri Lankan Gem industry | Mr. Sandun Illangasinghe | Mr. C.P. Udawatta<br>Mr. Sunil Abeyweera<br>Mr. L.R.K. Perera<br>Mr. R.M.N.P.K. Jayasinghe<br>Mr. S. Diyabalanage |
| 15 | A no<br><br>val heat treatment method for young geuda sapphires in Sri Lankan Gem industry | Mr. Sandun Illangasinghe | Mr. R.M.N.P.K. Jayasinghe |
| 16 | Differentiate the beauty factor of the standard cut varieties of the gemstones | Ms. K.G.S.S.W. Bandara | Mr. U.K.I. Dayarathne<br>Mrs. K.M.R.S. Konara<br>Mr. U.Rawsan |

Those who are engaged in the industry and investors who participated in the program on that day were briefed about these innovations, where discussions were held about bringing these innovations to the industry as industrial level inventions. Accordingly, at the invitation of the Jewellery Manufacturers Association, a program was held to acquaint those who are engaged in the industry with the Mitigating Mercury Risks: Introducing Eco-Friendly Gold Extraction Alternatives for Sri Lanka's Small Scale Jewelry Sector. Also, currently, with the expert advice of the National Innovation Agency, we are working on establishing an intellectual property policy and a business coordination unit of the institute for the commercialization of innovations.

# Administration and Human Resource Division

# 7.0 Administration and Human Resource Division

**Staff details as on 31.12.2023**

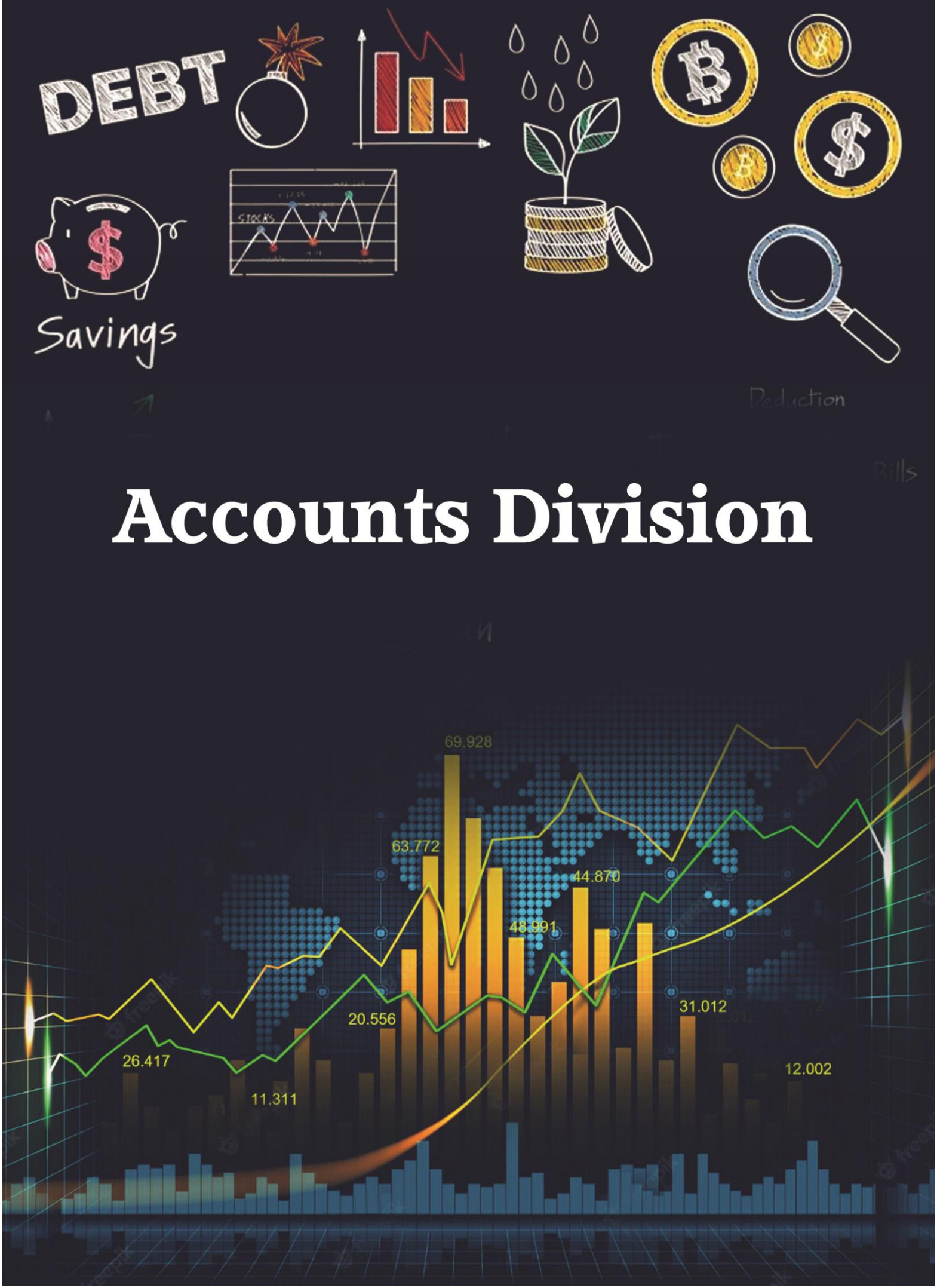
| Position/Grade | | Approved number | Existing Number | Number of vacancies |
|---|---|---|---|---|
| Director General | HM 2-1 | 1 | 0 | 1 |
| Director (Training and Development) | HM 1-1 | 1 | 1 | 0 |
| Director (Research) | HM 1-1 | 1 | 0 | 1 |
| Senior Research Officer (Exploration | AR-2 | 1 | 1 | 0 |
| Senior Research Officer (Colour Enhancement) | AR-2 | 1 | 0 | 1 |
| Senior Research Officer (Innovation) | AR-2 | 1 | 0 | 1 |
| Assistant Director (Administration and Human Resources) | MM 1-1 | 1 | 0 | 1 |
| Assistant Director (Finance) | MM 1-1 | 1 | 1 | 0 |
| Assistant Director (Program and Curriculum Development) | MM 1-1 | 1 | 1 | 0 |
| Assistant Director (Gemology) | MM 1-1 | 1 | 0 | 1 |
| Assistant Director (Jewellery) | MM 1-1 | 1 | 1 | 0 |
| Research Officer | AR-1 | 15 | 5 | 10 |
| Lecturer | AR-1 | 4 | 0 | 4 |
| Program Officer (Coordination and Development) | JM-1-1 | 1 | 1 | 0 |
| Program Officer (Examination and Statistics) | JM-1-1 | 1 | 1 | 0 |
| Internal Auditor | JM-1-1 | 1 | 1 | 0 |
| Senior Training Officer | JM-1-1 | 6 | 0 | 6 |
| Cartographer | MA-2-2 | 2 | 0 | 2 |
| GIS Assistant | MA-2-2 | 1 | 1 | 0 |
| System assistant | MA-2-2 | 1 | 1 | 0 |
| Research Assistant | MA-2-2 | 11 | 0 | 11 |
| Technical Assistant | MA-2-2 | 10 | 1 | 9 |
| Training Officer | MA-2-2 | 23 | 14 | 9 |
| Audit Assistant | MA-1-2 | 1 | 1 | 0 |
| Management Assistant | MA-1-2 | 22 | 15 | 7 |
| Drilling Rig Operator | PL-3 | 2 | 0 | 2 |
| Driver | PL-3 | 6 | 6 | 0 |
| Drilling Rig Operator Assistant | PL-2 | 2 | 0 | 2 |
| Field and Laboratory Assistant | PL-1 | 16 | 12 | 4 |
| | | 136 | 64 | 72 |

### 7.2 Employee Participation in External Training Programs - 2023 (Local Training Programs)

| # | Training Centres | Name of training program | Participants |
|---|---|---|---|
| 01 | Skill Development Fund Ltd. (SDFL) | Marketing Strategy Development Workshop. | For senior and technical staff |
| 02 | Skill Development Fund Ltd. (SDFL) | Workshops on Duties and Responsibilities of Leave Clerks | Mrs. Kalpani Perera |
| 03 | Skill Development Fund Ltd. (SDFL) | Two day workshop on occupational health and safety for a better work life environment | For technical staff |
| 04 | Skill Development Fund Ltd. (SDFL) | Excel spreadsheet training workshop | For Management Assistant Staff of the Institute |
| 05 | Skill Development Fund Ltd. (SDFL) | One day workshop to improve attitude and professional knowledge for office assistants of the institute | For office support staff of the institute |
| 06 | Skill Development Fund Ltd. (SDFL) | Two day training workshop on Discipline and Office Etiquette | For the driver's staff of the institute |

### 7.3 Problems faced by the organization due to lack of human resources

1. Under the approved staff plan of the institute, the total number of permanent employees is 136 but currently only 64 staff members are working. The total number of vacancies is 72. Although 84 executive posts and technical posts have been approved, only 28 of them are employed and the remaining technical posts are vacant.
2. However, due to the fact that the industry has undergone a great transformation in technical, educational and international terms, it is essential to have an academic staff with advanced educational knowledge. This academic staff has to carry out many tasks such as developing advanced technology application training courses and educational programs and coordination with other educational institutions, and in the research division, the technical staff required to carry out various research and development activities such as exploration of gem deposits, innovation, introduction of modern technology and conducting industry related surveys is at a minimum level.
3. The capacity of the institution to achieve its desired objectives has also decreased due to the failure to recruit for vacant positions owing to various problematic situations. But since it is possible to fulfill the desired objectives of the institution through filling these vacancies, actions are being taken to obtain the necessary approvals to recruit the necessary staff for those vacancies.




# Accounts Division

# 8.0 Financial Division

**8.1 Audited financial information for the last 05 years.**

(Rs..000)

| | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|
| **Operating Revenue** | | | | | |
| Treasury Grants recurrent | 85,000.00 | 77,973.00 | 77,060.00 | 86,996.00 | 89,119.00 |
| Other contributions | 35,622.80 | 29,536.91 | 22,528.16 | 19,430.60 | 27,749.08 |
| Course fees | 12,212.03 | 12,409.64 | 3,542.50 | 15,529.05 | 30,820.87 |
| Income From Services | 308.0 | 72.5 | 12.00 | 246.00 | 216.00 |
| Income From Geological Services | | | | | |
| **Total Operating Revenue** | **133,142.83** | **119,992.05** | **103,142.66** | **122,201.65** | **147,904.95** |
| Other Revenue | 1,690.02 | 1,042.83 | 837.49 | 1,742.04 | 3,840.62 |
| Interest income | 553.42 | 457.21 | 293.71 | 466.03 | 632.09 |
| Other receipts | 60.48 | 4680.0 | 1564.0 | | |
| **Total Revenue** | **135,446.75** | **126,172.10** | **105,837.39** | **124,409.73** | **152,377.66** |
| **Less: Expenses** | | | | | |
| (a)Personnel and Administration expenditure | 98,994.18 | 91,624.36 | 84,691.33 | 99,431.65 | 106,582.99 |
| (b)Depreciation and General expenditure | 41,564.02 | 28,208.10 | 33,251.66 | 30,297.86 | 39,997.83 |
| **Total expenses** | **140,558.20** | **119,832.46** | **117,943.00** | **129,729.51** | **146,580.82** |
| **Surplus (Deficit)** | **(5,111.45)** | **6,339.64** | **(12,105.1)** | **(5,319.78)** | **5,796.84** |

**8.2**

**Gem and Jewellery Research and Training Institute**

**Income and Expenditure Statement for the year ending 31st December 2023**

| Description | 2023 | | 2022 | |
|---|---|---|---|---|
| | Rs. 000 | Rs. 000 | Rs. 000 | Rs. 000 |
| **Operating Income** | | | | |
| Recurrent grants – Treasury | | 89,119.00 | | 86,996.00 |
| **Other Income** | | | | |
| Course fees | | 30,820.87 | | 15,529.05 |
| Geuda heat treatment service charges | | 216.0 | | 246.0 |
| Interest income | | 632.09 | | 466.03 |
| Sundry income | | 3840.62 | | 1,742.04 |
| 13-year continuous education programme | | | | |
| **Operating Income total** | | **124,628.58** | | **104,979.13** |
| **Less – operating expenses** | | | | |
| Personnel emoluments | | 56,341.84 | | 57,278.25 |
| Travelling expenses | | 127.19 | | 72.60 |
| Supplies and consumable items | | 4751.28 | | 5,016.90 |
| Maintenance expenses | | 5641.31 | | 4,568.33 |
| Contractual services | | 32452.49 | | 28,282.47 |
| Training programme expenses | | 4745.96 | | 3,413.72 |
| Other operating expenses | | 2482.42 | | 774.80 |
| **Total operating expenses** | | **106,542.49** | | **99,407.07** |
| **Surplus / (Deficit) From Operating Activities** | | **18,086.09** | | **5,572.06** |
| Less: Financial Cost | | (40.50) | | (24.57) |
| **Grants- Capital Expenditure Portion** | 15,201.14 | | 16,876.10 | |
| **Other Receipts** | | | | |
| | 15,201.14 | | 16,876.10 | |
| Less: Depreciation and Amortization Expenses | (27,449.88) | (12,248.74) | (27,743.37) | (10,867.27) |
| **Other Capital Investment Grants** | | | | |
| | (12,547.94) | | (2,554.50) | |
| Less: Capital Investment Expenditure | (12,547.94) | | (2,554.50) | |
| Improvements of Capital Assets | | | | |
| NET Expenditure on Other Capital Investment | | 5,796.84 | | (5,319.78) |
| **Non-Operating Revenue** | | | | |
| **Add: Gain on Sales of Assets** | | | | |
| **Net Surplus (Deficit) Before Extra-Ordinary Items** | | 5,796.84 | | (5,319.78) |
| Extra Ordinary Items | | | | |
| **Net Surplus / (deficit) for the period** | | 5,796.84 | | (5,319.78) |
| **Add:** | | | | |
| Net Surplus / (Deficit) from previous years | (47,558.85) | | (39,308.94) | |
| Less: Prior year Adj. | | (1,979.82) | | (2,930.13) |
| **Net Surplus / (Deficit) C/F** | | **(43,741.82)** | | **(47,558.85)** |

8.3

**Gem and Jewellery Research and Training Institute**
**Balance Sheet as at 31.12.2023**

| Description | 2023 | | 2022 | |
|---|---|---|---|---|
| | Rs. 000 | Rs. 000 | Rs. 000 | Rs. 000 |
| **Non-Current Assets** | | | | |
| Property, Plant & Equipment | 99,630.0 | | 101,259 | |
| Gratuity Fund | 3,407.0 | 103,037.0 | 955 | 102,214 |
| Fixed deposit account | | 4846 | | 4304 |
| **Current Assets** | | | | |
| Stock & Consumables | 7355 | | 4798 | |
| Books for Sale | | | | |
| Loan and Advances | 5538 | | 3362 | |
| Deposits | 1334 | | 630 | |
| Trade & Other receivables | 8718 | | 7483 | |
| Poverty elimination project | | | 1559 | |
| Prepayments | 169 | | 202 | |
| Cash and bank | 20,044 | 43,158 | 9114 | 27,148 |
| **Total Assets** | | 151,041 | | 133,666 |
| **Liabilities** | | | | |
| **Current liabilities** | | | | |
| Payables | 5712 | | 604 | |
| Accrued expenses | 3386 | 9099 | 4336 | 4,940 |
| **Non-current liabilities** | | | | |
| Minimata project | 780 | | 179 | |
| Provisions for Gratuity | 14941 | | 13350 | |
| National Science foundation | | 15721 | | 13,529 |
| **Total liabilities** | | 24820 | | 18,469 |
| **Net total assets** | | **126,221** | | **115,197** |
| **Net Assets/Equity** | | | | |
| Contributed Capital | 50,000 | | 50,000 | |
| Reserves – Gem | 44,646 | | 43,772 | |
| Other contributions | 850 | | 850 | |
| Staff Circulating Fund (Loan) | 2,109 | | 1,857 | |
| Differed Income –Capital Grants | 72,358 | | 66,276 | |
| Accumulated Fund | (43,742) | | (47,558) | |
| **Total Net Assets/Equity** | | **126,221** | | **115,197** |

.....
Assistant Director (Finance)

21-05-2024
Date:

.....
Chairman

Date : 21-05-2024

.....
Member of the Board of Directors

Date: 21-05-2024

**8.4**

**Gem and Jewellery Research and Training Institute**
**Cash Flow Statement for the year ending 31st December 2023** **(Rs.000)**

| Description | 2023 | 2022 |
|---|---|---|
| **Cash Flows From Operating Activities** | | |
| Surplus/(Deficit) from Operating Activities | 5,796.84 | (5,319.78) |
| **Non Cash Movements** | | |
| Depreciation | 27,449.88 | 27,743.37 |
| Interest | (632.09) | (466.03) |
| Differed Capital income adjustments | (27,749.08) | (19,430.61) |
| Increase/decrease in other Non-current Liabilities | 4,158.93 | (2,126.89) |
| Income from sale of property, machinery and equipment | | (13.66) |
| Lease rent | 473.48 | 473.48 |
| Provision for gratuity | 1,692.39 | 2,939.77 |
| Capital assets adjustments | | (8.82) |
| Gratuity payments | (102.15) | (3,761.43) |
| Increase in other current assets | (7,074.80) | (1,331.63) |
| **Net Cash Flow from Operating Activities (A)** | **4,013.4** | **(1,302.23)** |
| **Cash Flow from Investment Activities** | | |
| Purchase of Property Plant and Equipment | (6,225.52) | (89.65) |
| Increase in Gratuity Fund | (2,451.62) | 1,316.79 |
| Interest income | 883.29 | 602.45 |
| Increase in fixed deposits | (542.37) | (324.42) |
| Profit on property plant and equipment | | 13.66 |
| Distress loan payments | | (2,743.05) |
| distress loan receipts | | 1,238.72 |
| **Net Cash Flow from Investment Activities (B)** | **(8,336.22)** | **14.51** |
| **Cash Flow from Financing Activities** | | |
| Capital grants | 14,651.0 | 2,000.0 |
| Minamata project | 601.25 | (391.82) |
| National Science Foundation fund | | |
| **Net Cash Flow from Financing Activities (c)** | **15,252.25** | **1,608.18** |
| Net Increase /(Decrease) in Cash and Cash Equivalents (a)+(b)+(c) | 10,929.43 | 320.46 |
| cash/cash balance at the beginning of year | 9,113.68 | 8,793.22 |
| **Cash/cash balance at the end of year** | **20,043.11** | **9,113.68** |

Chairman,
Gem and Jewellery Research and Training Institute

Auditor General's Report of the Gem and Jewellery Research and Training Institute in accordance with Section 12 of the National Audit Act No. 19 of 2018 on Financial Statements and Other Legal and Regulatory Requirements for the year ending as at 31st December 2023.

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## 1. Financial Statements

### 1.1 Qualified Opinion

Financial Statements of Gem and Jewellery Research and Training Institute for the financial year, ending on 31st December 2023 including Statement of Comprehensive Income ending for the same year, Statement of Changes in Equity and Statement of Cash Flow, notes relevant to Financial Statements with the information of Accounting Policies, of Gem and Jewellery Research and Training Institute for the financial year, ending on 31st December 2023 were audited under my guidance in accordance with the provisions of the National Audit Act No. 19 of 2018, which should be read with the provisions of Article 154 (1) of the Constitution of the Democratic Socialist Republic of Sri Lanka, and the provisions of Finance Act No. 38 of 1971. My Report shall be tabled in Parliament in due course as per the provisions of Article 154 (6) of the Constitution.

In my opinion, except for the effects of the matters described under the basis for Qualified Opinion of this report, the financial statements of the Institute reflect a true and fair view of the financial position as at 31 December 2023 and its financial performance and cash flows for the year ending on that date in accordance with Sri Lanka Public Sector Accounting Standards.

## 1.2 Basis for Qualified Opinion

a) As per paragraph 92 of Sri Lanka Public Sector Accounting Standards No. 07, the net value of property, plant and equipment, which was fully depreciated but still in use at a cost of Rs.60, 794,015.00 was not disclosed in the financial statements.

b) Rs 10,564,786 provided and Rs 5,534,456 incurred during the year under review for the project of setting up 03 training centers jointly operated with the Gem and Jewellery Authority had not been identified as income and expenditure respectively, and Rs 5,030,330 was shown in the financial statements as trade and other payables. The number of gemstones valued at Rs 2,301,575 included in property, plant and equipment had not been recalculated for over four years.

c) In 2020, 2021 and 2022, deposits worth Rs. 341,685 directly deposited in the bank had not been recognized and not included in the accounts.

d) Out of the deposit of Rs.600,000 given on the lease of the Badulla Training Center building, Rs.150,000 was not included in the accounts as relevant rent expense for the year under review.

e) According to audit calculations, though software and software development assets worth Rs.3, 908,650.00 should be fully depreciated by the end of the year under review, the accumulated depreciation in the financial statements was Rs. 3,554,560.00 Therefore, depreciation for the year had been under-accounted for by Rs.364,090.00

f) f) Provision of Rs.148,680.00 for the year under review for the service contract of the electricity generator installed in Ratnapura office premises was not provided.

I conducted the audit as per the Sri Lanka Auditing Standards (SLAS). My responsibility under the Auditing Standards has been further described in this report under the caption of the auditor's responsibility of auditing financial statements. I am confident that the audit evidences that I have obtained are sufficient and appropriate to provide a basis for my opinion.

### 1.3 Other Information of the Institute Included in the Annual Report 2023

Other information means information included in the 2023 annual report of the institution obtained by me prior to this audit report but not included in the financial statements and my audit report. Management is responsible for this other information.

Other information is not covered in my opinion regarding financial statements and I do not express any kind of assurance or opinion on that.

Regarding my audit of the financial statements, my responsibility is to read the other information identified above when available and, in doing so, consider whether the other information is materially inconsistent with the financial statements or with my knowledge obtained in the audit or otherwise.

If I conclude that other information is quantitatively misstated based on other information I have obtained and procedures I have completed prior to the date of this audit report, I shall report that fact. I have nothing to report in this regard.

### 1.4 Responsibility of the Management and the Administration on Financial Statements

Preparation of these financial statements according to Sri Lanka Public Sector Accounting Standards and fairly submission, and determination of the internal controls required to be able to prepare financial statements without material misstatement due to fraud or errors is the responsibility of the management.

It is the responsibility of management to determine the continuous existence of the organization in the preparation of financial statements. If management decides to liquidate or cease the operation of the organization when there is no other option, it is the responsibility of the management to keep accounts based on the continuity of the organization and to disclose the facts relevant to the continued existence of the organization.

Responsibility of the inspection of the financial reporting process of the institute will be borne by the administration.

Books and records of all its Income, Expenditure, Assets and Liabilities should be properly maintained so as to be able to prepare the annual and periodic Financial Statements of the Institution in terms of Sub-Section 16 (1) of the National Audit Act No. 19 of 2018.

### 1.5 Auditor's responsibility for auditing financial statements

My purpose as a whole is to provide a fair confirmation on financial statements that there are no material misstatements caused by fraud and errors and to issue the Auditor's Report, which includes my opinion. Fair certification is a high level of certification, but auditing in accordance with Sri Lanka Auditing Standards does not always guarantee that it will detect a material misstatement. Frauds and errors can result in material misstatements due to an individual or collective influence, and its adequacy depends on the impact on the economic decisions made by users based on these financial statements.

As a part of the audit in accordance with Sri Lanka Auditing Standards, I conducted the audit with professional judgment and professional skepticism. Further,

- Appropriate audit procedures were designed and implemented from time to time to identify and assess the risk of material misstatement in financial statements due to fraud or error in providing a basis for my stated opinion. The effects of fraud are higher than the effects of material misstatement, as fraud may involve collusion, forgery, intentional omissions, or the override of internal control.
- An understanding of the internal control of the organization gained in order to plan appropriate audit procedures, but it did not intend to express an opinion on the effectiveness of the internal control of the institute,
- The appropriateness of used accounting policies, reasonability of accounting estimates and disclosures made by management were evaluated.
- The relevance of using the basis of the institution's continuous existence for accounting was determined based on the audit evidence obtained as to whether there was a material uncertainty about the continuity of the institute due to events or conditions. If I conclude that there is sufficient uncertainty, attention should be paid to the disclosures that were made in the financial statements in my audit

report, and if that disclosure is not sufficient, my opinion should be modified. However, continuous existence may end based on future events or conditions.

- Appropriate and reasonable inclusion of transactions and events, based on the structure and content of financial statements, and the overall presentation of the financial statements, were valued.

I make aware of the administration regarding the important audit findings identified during my audit, internal controlling weaknesses, and other matters.

**2. Report on other legal and supervisory requirements**

2.1 Special provisions regarding the following requirements are included in the National Audit Act No.19 of 2018.

2,1,1 Except for the effect of the matters described in the Basis for Qualified Opinion section of my report, as per the requirements of section 12(a) of the National Audit Act No. 19 of 2018, all relevant information and explanations for the audit have been obtained by me and, according to my opinion, the auditee-entity had maintained financial reports rationally.

2.1.2 As per the requirements of section 6 (I) (d)(III) of the National Audit Act No. 19 of 2018, financial statements presented for audit are consistent with the previous year.

2.1.3 As per the requirements of section 6 (I) (d)(IV) of the National Audit Act No. 19 of 2018, recommendations made by the Auditor-General in the previous year had been included in the submitted financial statements.

2,2 Restricting to the action taken, received evidence and obtained quantitative facts, none of the following statements came to my notice.

2.2.1 In accordance with the requirements of Section 12 (d) of the National Audit Act No. 19 of 2018, any member of the Board of Directors of that Institution shall have a direct or indirect involvement in any contract relating to that Institution in a manner other than the normal business condition.

2.2.2 As per the requirements of Section 12 (f) of the National Audit Act No. 19 of 2018, the auditee entity has not acted in accordance with the applicable written law or the general or special instructions issued by the institution's board of directors.

2.2.3 In accordance with the requirements of Section 12 (g) of the National Audit Act No. 19 of 2018, the auditee entity has not performed according to its powers, functions, and duties.

2.2.4 In accordance with the requirements of Section 12 (h) of the National Audit Act No. 19 of 2018, the resources of the auditee entity had not been procured and utilized economically, efficiently and effectively within the time frames in compliance with the applicable laws.

## 2.3. Other Matters

a) In the overpaid salary balance, there was an amount of Rs 466,762.00 which should have been collected from 04 officers in instalments but it had not been collected for seven (7) years.

b) The gratuity payable in case of future employees leaving should be invested in a highly benefitted source to achieve its objective. However, Rs.3, 304,898.00 have been deposited in a savings account without fulfilling its primary purpose.

c) The "Sri Lanka Gem Deposit Exploration and Evaluation Project" was initiated to explore gem potential areas and prepare a database containing the information and direct landowners for gem mining. Though the reports had been issued carrying out surveys at a cost of Rs.300,589,687.00 from 2009 to 2023, the study's results were not achieved due to the inability of a formal agreement with the Gem and Jewellery Research and Training Institute.

d) The approved cadre of the institution was 136 and the actual staff on 31.12.2023 was 64. 72 posts were vacant and it was 52% per cent of the approved cadre. It was observed that there are 04 lecturer positions, 06 senior training officers and 09 training officer positions in those vacancies and the human resource problem has affected to implementation of this as a research and training institute.

e) The accounting software system "TALLY", purchased for Rs 346,035 in 2017/2018 for the accounting purposes of the institution, had not been used for six years to prepare financial statements.

f) The land acquired for the construction of the Rathnapura district office of the Gem and Jewellery Research and Training Institute in 2016 for Rs. 14,204,402 on a 30-year lease basis remained underutilized for more than 06 years due to non-implementation of related tasks until this year.

g) Out of the 31 activities in the approved action plan, the allocation for 14 activities was Rs. 20.675 million, and the actual cost was Rs.9,084.00 So the financial performance for 14 activities was 44%.

Sgd: Illegibly
W.P.C. Wickramrathna
Auditor General