



GEMOLOGIST CURRICULUM

DURATION: 6 Months

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Technical Training for Polio-affectees

The United Nations Industrial Development Organization (UNIDO) is the specialized agency of the United Nations mandated to promote industrial development and global industrial cooperation.

UNIDO's Education Programme strives to promote industry-relevant education and training for the sustainable industrial development of Pakistan.

The UNIDO Education Programme, in collaboration with the National Vocational & Technical Training Commission (NAVTTC) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), has developed ten curricula as part of its Polio-Plus Initiative.

Amongst its main objectives, the United Nations' Polio-Plus Initiative is intended to aid in the rehabilitation of working-age disabled individuals by means of technical training programs in employable skills. With such training, it is projected that these individuals may then positively contribute, both socially and economically, within their respective communities.

In December 2013, teachers of selected Technical Educational & Vocational Training Authority (TEVTA) centres from the priority districts underwent such technical training for the specified ten curricula.

NAVTTC delivered competency-based training to trainers of selected TEVTAs from several high-priority polio districts. The competency standards developed and validated during the curricula development process, now certified as National Standards, are to be used during the training of polio-affected individuals. The workshop was markedly interactive in nature, focusing on group work and presentations while highlighting the intended goal of applicability in such competency-based trainings.

One notable trainer recounted his own experiences working with thousands affected by Polio in Pakistan. Noting their often absence from rigorous economic participation, he referred to these individuals as Pakistan's 'untapped resources'. The trainer also placed special emphasis on the work of disabled working-age individuals in the carpet industry and urged the other trainers to

use this as an example during their own training to ensure the successful streamlining of polioaffectees into Pakistan's workforce.

In order to sensitize participants and raise awareness on the matter, participants shared individual experiences linked to polio-affectees and working-age individuals. Most of the high-priority TEVTAs are located in smaller districts of Pakistan where trainers aimed to raise awareness through word-of-mouth. Additionally, they spoke of success stories and considered using these experiences as sources of inspiration during their own trainings for polio-affectees. Trainers were quick to suggest several untapped avenues to maximize the potential of this training.

It is imperative to note that although polio-affectees may require special attention and training, it must be delivered without compromising their dignity and self-esteem.

The idea is to train polio-affectees and equip them with the ability to earn a respectable living. The TEVTAs of these high-priority districts will carry out these trainings through the coordination and support of NAVTTC.

The pattern of the training is such that it will aim to merge the training of Life Skills Curriculum into the training polio-affectees will receive. Earlier in 2012, the Education Programme at UNIDO along with GIZ and NAVTTC developed a Curriculum on Life Skills.

The Life Skills component of this training will impart knowledge on the use of 'soft skills'. This will result in employees who have:

Effective	A kna	ck for	Plain	"common	Α	good	work	Flexil	ole at	titude
communication	internal	and	sense"		eth	ic		and	are	self-
skills	external							drive	n	
	custome	r care								

Since polio-affectees are disconnected from the mainstream workforce, their inclusion through the use of Life Skills Curriculum will make their transition into Pakistan's mainstream workforce smoother. If trainings consist of five sessions per week, three will consist of technical training for polio-affectees while the other two will incorporate 'Life Skills' trainings, thereby making it more effective and successful.

UNIDO hopes that the creation of these curricula will serve the purpose for which they were made i.e. the rehabilitation of working-age disabled individuals through technical training programs in employable skills, so that they may contribute socially and economically in their respective communities.

Furthermore, it is hoped that this training will serve to educate and sensitize local communities, particularly illiterate people & workers, on measures for prevention against fatal diseases and the benefits of early intervention while also mobilizing support in local communities for the polio eradication drive.

1. Curriculum Specification for Gemologist

- Overall objective of course

o The overall objective of Curriculum of gemology is to give students all required knowledge about gemstones, their occurrences, their physical and chemical properties and the internationally employed scientific methods for the identification and grading of Gemstones. After completion of this Curriculum the certificate holder in Gemology can work anywhere in the world in the gem and jewellery sector or can start his or her own gem and jewellery business with confidence. Those who successfully complete this certificate program will be known as Gemologists.

- Competencies gained after completion of course

After completion of this Curriculum, the Certificate holder in Gemology can work anywhere
the world in the gem and jewellery sector or can start his or her own gem and jewellery
business with confidence. Those who successfully complete this certificate program will be
known as Gemologists.

- Job opportunities available immediately and in the future

- o A huge scope in the job market for the gem and jewellery sector
- $_{\odot}$ A certificate holder can take on the role of an entrepreneur in the Gem and Jewellery sector.
- o Every jewellery outlet requires a gemologist.

- Trainee entry level

Matriculation / Gemstone traders

- Minimum qualification of trainer

- o M Sc. Geology/ Graduate with Science
- Diploma in Gemology

- Medium of Instruction i.e. language of instruction

o English / Urdu

- Sequence of the modules

o Module 1:- Gemstone Identification

o Module 2:- Diamond Grading and Pricing

o Module 3:- Colored stone Grading

o Module 4:- Natural, Treated and Synthetic Gemstone Identification

Module 5:- Marketing Gemstones

2. Overview of the program – Curriculum (for Gemology)

Module Title and Aim	Learning Units	Theory ¹ Days/hour s	Workplace ² Days/hours	Timeframe of modules
Gemstone Identification	Introduction to Gemology			
	Gemstone Classification	62 hours	246 hours	308 hours
Aim: To identify	Basic Crystallography			
gemstones correctly	The Instruments			
	Physical & Optical Properties			
	Inorganic Gem Material			
	Organic Gem Material			
Diamond Grading and Pricing	History , formation and Physical Properties of Diamond	33 hours	121 hours	154 hours
	Optical Properties of Diamond	33 flours	121 110013	134 110013
	Colour Grading: Diamond.			
Aim: To grade diamond	Clarity Grading.			
correctly	Proportion grading.			
	Finish Grading.			
	Carat weight.			
	Diamond Treatment, substitute and Synthetic			
	Pricing in general.			
Colour stone Grading	The concept of Grading			
	Colour	31 hours	123 hours	154 hours
Aim: To Grade colour stones according to the	Clarity			
International grading	Cut			
system.	Carat weight			
	Grading Enhanced Gemstones			

Natural, Treated and	Identification of synthetic and treated	31 hrs	123 hrs	154 hours
Synthetic Gemstone	gemstones			
Identification.				
	Classification of Gemstones			
Aim: to differentiate				
natural gemstones from	Inclusion			
Treated and Synthetic gemstones.	Treatment of Gemstones			
	Synthetic Gemstones and processes.			
Marketing Gemstones	Care of gemstones.	05 hrs	25 hrs	30 hours
	Packing of gemstones.			
Aim: To learn gemstone	Price determination.			
marketing.	Advertisement. Regular Market visits.			

(Gemology) Curriculum Content (Teaching and Learning Guide) 3.

Module: Title # 1. **Gemstone Identification**

Objective of the Module: <u>To understand all types of Gemstones and the process of identification.</u>

Duration:- 308 hours Theory:- 62 hours Practice:- 246 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
Introduction to Gemology	The learner will be able to interpret basic concepts of Gemology.	-Introduction to gemology, What is a gemstone? -Factors which influence the value of gemstonesWeights and measures -Uses of basic tools like the loupe and tweezer	2hrs	Tweezer 10x Loupe Balance	Class Room
		Ability to: -understand gemology and gemstones -use basic tools like 10x loupe and tweezer	8 hrs		
Gemstone	The learner will be able to	-Definition of	02 hrs	Tweezer	Class

Classification	classify gemstones (natural gemstone, synthetic gemstone, manmade gemstone and	Natural, Treated, Synthetic, and Imitation stones.		10x Loupe	Room
	assembled gemstone.)	-Visual observations (colour, transparency, cut, phenomena, Luster)	08 hrs		
		Ability to: -distinguish practically between kinds of gems; natural, treated, synthetic, artificial.			
Basic Crystallography	The learner will be able to identify different rough	-Basic Crystallography	04 hrs	Wooden crystals /	Class Room
	gemstones on the basis of crystal systems.	-Crystalline material, non Crystalline Material and Gemstones		glass crystals and rough gemstone crystals.	
		-The Crystal Systems	1.Ch.vo		
		Ability to: -Identify gems on the basis of crystal systems.	16hrs		
The	The learner will learn	The Polariscope and	12 hrs	Poloriscop	Class
Instruments	about different gemstone-	the testing		е	Room
	testing equipment and the	techniques;		Refractom	and Lab
	use of this equipment for			eter	Lau
	the purpose of gemstone	The Refractometer		Dichrosco	
	identification.	and its construction,		pe	
		care and use;		Spectrosc	
		Pleochroism;		ope Chelsea	
		the dichroscope &		Colour	
		its construction and		Filter	
		use;		UV Lamp Gemologic	
		Construction and function of the two types of		al Microscop e	
		spectroscope;		Specific	
		The Chelsea colour filter;		Gravity Balance	
		Use of UV lamp and behavior of different gems under UV light;			
		Magnification Techniques;			
		Internal and External Features of			

		gemstones ;			
		Definitions of density and SG. SG measurement and hydrostatic weighing;	48hrs		
		The use of high- density liquids in gem testing;			
		care and caution during use;			
		Colour and its causes in gem materials;			
		Ability to: Identify different gemstones with the help of gemological instruments.			
Physical & Optical properties	The learner will be able to learn about different properties of gemstones which will be helpful in their identification	-Durability of Gem Materials (Hardness, differential hardness, Moh's scale Toughness and stability)	06 hrs	Hardness pencils and rough gemstone crystals.	Class Room And Lab
		-Fracture, types of fracture, Cleavage, Parting and streak.			
		-The importance of light in gemology.			
		-The electromagnetic spectrum.			
		-The visible spectrum of colour.	24hrs		
		-Optical properties of crystalline and non-crystalline gem materials.			
		Ability to: Identify different gems with the help of these properties			

Inorganic Gem Material	The learner will learn in detail about all the materials which are of an inorganic nature and are considered gemstones.	Actinolite, Apatite ,Beryl, Chrysoberyl. chrysocolla, Chalcedony, corundum, Diamond, Danburite, Diopside, Enstatite, fluorite, garnets, glass, Goldstone, hematite, idocrase, iolite, jadeite, labradorite, lapis lazuli, malachite, metajade, nephrite, obsidian, opal, Quartz, Rhodochrosite, scapolite, serpentine, slocumgalss,sodalite, sphene,spinel,spodu mene,tektite,topaz,t ourmaline, Turquoise, variscite, zoisite, zircon. Ability to: Identify different inorganic gemstones	24 hrs	Diamond Corundum Beryl Spinal Garnet Chrysober yl Jadeite Tourmalin e Peridot Zoisite Zircon Opal Spodume ne Quartz Turquoise Lapis Topaz	Class Room And Lab
Organic Gem Material	The learner will learn in detail about all the materials which are of an organic nature and are considered gemstones.	Origin, occurrence, recovery; methods of identification and common simulations of: Amber, copal, coral, ivory, jet, tortoiseshell. Pearls: natural pearls, cultured pearls Ability to: Identify different inorganic gemstones	12 hrs 46hrs	Pearls Amber Copal Coral Ivory Shell	Class Room And Lab

Module # 1 (Gemstone Identification)

Duration:- 308 hours Theory:- 62 hours Practice:- 246 hours

Learning Units	Theory Days/h ours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
Introduction to Gemology	02hrs	08hrs	Basics names and different terminology used in gemology.	MCQ's / Questions and Answers	
Gemstone Classification	02 hrs	08hrs	Origin of gemstones in mineralogy.	Questions and Answers	
Basic Crystallography	04 hrs	16 hrs	Basic crystal structure of seven crystal systems.	Practical observation / Theory.	
The Instruments	12 hrs	48 hrs	Use of Gemological instruments.	Practical work	
Physical & Optical properties	06 hrs	24 hrs	Visual Identification with indicators from physical appearance and Gemstones' optical properties.	Practically observe and check gem properties.	
Inorganic Gem Material	24 hrs	96 hrs	Inorganic varieties and groups of gemstones.	Short question answers.	
Organic Gem Material	12 hrs	46 hrs	Identification of all organic gems.	Practical / MCQ's.	

Module: Title # 2. **Diamond Grading and Pricing.**

Objective of the Module: .To understand the 4 C's of Diamond and how to grade a Diamond.

Duration:- 154 hours Theory:- 33 hours Practice:- 121 hours

Learning Unit	Learning Outcomes	Learning Elements	Duratio n	Materials Required	Learnin g Place
History, formation and Physical Properties of Diamond	The learner will learn about the physical properties of Diamond.	History and formation of diamond ,Mining techniques, Construction and use of binocular microscope, Demonstration of a l0x triplet loupe Creating dark-field illumination for a loupe, The four C's that determine diamond value – Introduction Physical properties of diamond, Crystallography of	05 hrs	Microscope 10x loupe	Class Room

Ability to: understand the use of binocular microscope and lOx triplet loupe Identify Diamond in its rough form.4C's of Diamond Optical Properties of Diamond The learner will learn about the Optical properties of Diamond Optical Properties of Diamond. Ability to: Understand the Optical properties of Diamond, Ability to: Understand the Optical properties of Diamond, 16hrs			alamonas			
Understand the use of binocular microscope and lOx triplet loupe Identify Diamond in its rough form.4C's of Diamond Optical Properties of Diamond Diamond The learner will learn about the Optical properties of Diamond. Optical Properties of Diamond. Ability to: Understand the Optical properties Understand the Optical properties 16hrs Ichrs				1		
Use of binocular microscope and lOx triplet loupe Identify Diamond in its rough form.4C's of Diamond Optical Properties of Diamond The learner will learn about the Optical properties of Diamond Diamond The learner will learn about the Optical properties of diamond, How light travels through a diamond. Ability to: Understand the Optical properties Understand the Optical properties			Ability to:			
Identify Diamond in its rough form.4C's of Diamond 16hrs			use of binocular microscope and			
Optical Properties of Diamond Diamond The learner will learn about the Optical properties of Diamond. The learner will learn about the Optical properties of Diamond. Optical properties of diamond, How light travels through a diamond. Ability to: Understand the Optical properties 16hrs			Identify Diamond in its rough			
Properties of Diamond about the Optical properties of Diamond. about the Optical properties of Diamond. of diamond, , How light travels through a diamond. Ability to: Understand the Optical properties			Diamond			
Understand the Optical properties	Properties of	about the Optical	of diamond, , How light travels through a	05 hrs	Microscope	
Understand the Optical properties			Ability to:			
or Blamona,			Optical properties	16hrs		
			or Diamona,			
Colour Grading: The learner will be able to -Colour-grading 04 hrs Lab				04 hrs		Lab
Diamond. grade diamond by its nomenclature Diamond colour	Diamond.	_	nomenciature		Diamond colour	
-Colour-grading chart or set, procedure ultraviolet unit						
-Fluorescence			-Fluorescence			
Ability to: 17hrs			Ability to:	17hrs		
grade a diamond by its colour. Use ultraviolet unit for diamond colour grading.			by its colour. Use ultraviolet unit for diamond colour			
Clarity Grading. The learner will learn about the clarity grade of Diamonds. Defining the GIA clarity grades, Factors influencing the clarity grade, Clarity grading procedures, Why, when and what to plot, Plotting symbols Clarity Chart or Representative samples of diamonds and Loupes.	Clarity Grading.	about the clarity grade of	Defining the GIA clarity grades, Factors influencing the clarity grade, Clarity grading procedures, Why, when and what to plot, Plotting	04 hrs	Representative samples of diamonds and	Lab
Ability to:			Ability to:	17 hrs		
Carry out diamond clarity grading and plotting			clarity grading and	27 1113		
Proportion The learner will be able to Tolkowsky's ideal 03 hrs Transparent Lab	Proportion	The learner will be able to	Tolkowsky's ideal	03 hrs	Transparent	Lab

grading.	learn about different types of cuts and the parameters for ideal cuts.	proportions Girdle thickness estimation Culet size estimation, Methods of estimating table percentage, Crown angle estimation, Pavilion depth percentage estimation Proportion grading Ability to: -Examine all 58 facets -Observe the line across the star facets -Tabulate percentage estimation -Examine girdle and culet - Calculate: depth percentage Girdle thickness estimation Culet size estimation Ability to: Tabulate percentage	11hrs	measuring tape or vernier caliper	
		estimation, Pavilion depth percentage estimation, Overall proportion grade			
Finish Grading.	The learner will be able to check the final grade of diamonds, i.e., Polish and overall appearance.	Fancy cut diamonds and fancy coloured diamonds. Finish grading of diamonds.	03 hrs	Loupes.	Lab
		Ability to: Judge the ideal polish grade.	11 hrs		
Carat weight.	The learner will learn the value of diamonds according to their weight.	Carat weight and weight estimation, Diamond weight- estimation formulae	03 hrs	Carat weight scale.	Class Room And Lab
		Ability to:			
		-Calculate a diamond's weight	11hrs		

		-Complete Grading and Pricing of diamond.			
Diamond Treatment, recognising substitutes	The learner will learn how to distinguish a natural diamond from substitutes, and study the treatment of enhancement of a diamond.	-Treatment of diamond -Types of diamond -Separating real diamond from its substitutes. Ability to:	03 hrs	S. G. Balance, Diamond Tester, Microscope, Loupes and UV lamp	Lab
		distinguish diamond from its substitutes	11hrs		
Pricing in general.	The learner will be able to learn different techniques; methods applicable to the International Diamond market will be disclosed.	-Pricing structure of diamond -Appraising Factors affecting price of diamonds -How to use the Rapaport (Diamond Report)	03 hrs	Loupes Tweezer	Lab
		Ability to: Evaluate the price of diamond.	11hrs		

Module 2 (Diamond grading and pricing)

Duration:- 154 hours Theory:- 33 hours

Practice:- 121 hours

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
History , Formation and Physical Properties of Diamond	05 hrs	16 hrs	Visual Identification through evaluation of physical appearance and structure.	Question and answers and MCQ's.	
Optical Properties of Diamond	04 hrs	17 hrs	Identification of diamonds using knowledge of optical properties.	Practical and visual observation.	
Colour Grading: Diamond.	05 hrs	16 hrs	Colour grading diamonds according to international standards.	Practical observation.	
Clarity Grading.	04 hrs	17 hrs	Clarity grading diamonds according to	Practical observation.	

			international standards.		
Proportion grading	03 hrs	11 hrs	Properly cutting and maintaining symmetrical proportions of a diamond.	Practical.	
Finish Grading	03 hrs	11 hrs	Over all 'beauty' and polish of a diamond.	Practical observation	
Carat weight	03 hrs	11 hrs	Final 4C's of Diamond grading.	Practical.	
Diamond Treatment, recognising substitutes and synthetic diamonds	03 hrs	11 hrs	Distinguishing natural diamonds from substitutes and synthetic ones.		
Pricing in general	03 hrs	11 hrs	Appraisal of diamond.	MCQ's	

Module: Title # 3. **Colour Stone Grading.**

<u>Objective of the Module:.</u>
To determine the colour, clarity, and cut for a range of coloured stones.
Learn the grading system for coloured stones

Duration:- 154 hours Theory:- 31 hours Practice:- 123 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learnin g Place
The Concept of Grading	The learner will learn the basics of coloured stones.	-Introduction to coloured stone grading and appraisal (pricing) -Essential tools -Conditions for colour grading -Colour grading -Clarity grading -Cut and cut grading -Carat weight	06 hrs	Daylight lamp, Loupes and colour charts or Gemwizard (software) for Colour description	Class Room
		Ability to: Uderstand the practical aspects of gemstone grading -Use devices and tools for grading -Perform	22 hrs		

		miscellaneous gemstone grading (of colour and clarity) -Understand gemstone grading by varieties of corundum			
Colour	The learner will be able to identify colour within proper colour parameters.	-Description of colour (Hue, tone, saturation). -Method of using International Standard Colour Chart. Ability to: -Judge the Colour of gemstones using	06 hrs	Daylight lamp, Loupes and colour charts or colour wheel.	Class Room And lab
		International Standard Colour Chart	22hrs		
Clarity	The learner will learn to check the clarity and transparency of coloured gemstones.	-Clarity of gemstones, -Inclusions (impurities) -Clarity grades according to GIA standard. Ability to: -assign a clarity	05 hrs 23 hrs	Necked eye, Loupes and Microscope,	Class Room And lab
Cut	The learner will learn different types of cuts and their proportions.	grade. -Types of cuts -International standards of cuts -Use of the vernier caliper. Ability to: Identify different cuts.	05 hrs 23 hrs	Note Book. vernier caliper.	Class Room And Lab
Carat weight	The learner will learn the value of coloured gemstones according to their weight.	-Carat weight -Carat weight balance -Procedure of operating carat	06 hrs	Carat weight balance and tweezers	Lab

		balance scale. Ability to: -Calculate gemstone weight.	22hrs		
Gemstone enhancement	The learner will be able to learn different techniques of gemstone treatment/enhancement and how to detect its use.	-Painting; Foiling/Coating; Dyeing; Impregnation and Filling; oiling; waxing; resin and polymer fillers; Laser treatment; Heat treatment; surface diffusion; Irradiation Ability to: Identify a treated gemstone.	03 hrs	Loupes and Microscope	Lab

Assessment Template

Module 3 (Coloured-stone grading)
Duration:- 154 hours
Theory:- 31 hours Practice:- 123 hours

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
The concept of Grading	06 hrs	22 hrs	Basics of coloured gemstones.	MCQ's Question and answers.	
Colour	06 hrs	22 hrs	Properties of colour in gemstones.	Observation MCQ's	
Clarity	05 hrs	23 hrs	Study gemstones internally.	Practical observation	
Cut	05 hrs	23 hrs	Proper cutting and grading of coloured gemstones.	Practical observation.	
Carat weight	06 hrs	22 hrs	Value of coloured gems with increasing size.	Practical observation	
Gemstone Enhancement	03 hrs	11 hrs	Increasing the aesthetic appeal and clarity of gemstones.	Theory Question and answers.	

Module: Title # 4. Natural, Treated and Synthetic Gem Identification.

Objective of the Module:

students will learn about how to identify natural, simulated, synthetic and treated gemstones.

Duration:- <u>154 hours</u> Theory:- <u>31 hours</u> Practice:- <u>123 hours</u>

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials	Learning Place
Identifying	The learner will be	-Beryl Identification	07 hrs	Required Note Book	Class
Natural , Treated and Synthetic	able to differentiate different types of Natural stones from	-Beryl (Aqua, Emerald etc.)		Microscope	Room And Lab
Gems	their synthetic counterparts and	-Characteristics of		UV lamp	
	also detect if they have undergone any treatment.	Natural and synthetic inclusions of Beryl		Polariscope	
	For example: Natural Beryl (Aqua,	-Treatment of Emerald and it detection.			
	Emerald etc)/Synthetic Beryl (Aqua, Emerald etc) and detection of treatment.	-Natural corundum / Synthetic corundum detection of treatment.			
	Natural corundum/		28 hrs		
	Synthetic corundum and detection of	Ability to: -Distinguish natural			
	treatment.	gemstones from their treated, synthetic and imitative forms			
		-Recognise treatment of gemstones			
Classification of Gemstone	The learner the basics of origins of gemstones.	-Gem material and classification	06 hrs	Note Book Microscope UV lamp	Class Room
	gemotories	-What is a gemstone?		Polariscope	
		-Gem classification by structure.			
		-Gem classification by origin.			
		Ability to:			
		-Distinguish synthetic from natural and treated from untreated.	22 hrs		
Inclusion	The learner will be	-What is an inclusion?	07 hrs	Note Book Loupe	Class Room
	able to learn the different inclusions	-Classification of		Microscope	And
	which will help to	inclusions			Lab
	separate natural from synthetic	-Describing inclusions			

	gemstones.	Ability to:			
		-Observe inclusions to determine origin.	28 hrs		
Treatment of Gemstone	The learner will learn different techniques to enhance the colour and clarity of gemstones, to hide flaws and make gems more valuable.	-Types of Treatments and detection of treatment -Painting, Foiling/Coating, Dyeing, Impregnation and Filling using oil, waxing, resin and polymer fillers, Laser treatment ,Heat treatment , surface diffusion, Irradiation	07 hrs	Note Book Microscope Loupe	Class Room and Lab
		Ability to: Detect different kinds of treatment	28 hrs		
Synthetic Gemstones and processes for their production.	The learner will learn different techniques used to manufacture synthetic gemstones.	-Overview of production -Methods: 1.Flame fusion method 2.Hydrothermal process 3.Flux process	04 hrs 17 hrs	Note Book Microscope	Class Room And Lab
		Ability to: Identify synthetic gemstones by observing its inclusions.			

Module 4: (Natural, Treated and Synthetic Gem Identification)

Duration: - 154 hours Theory:- 31 hours Practice:- 123 hours

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
Natural, Treated and Synthetic Gem Identification.	07 hrs	28 hrs	Detection of fake gemstones, separation of treated and synthetic gemstones.	Visual observation (practical demonstrations).	
Classification of Gemstone	06 hrs	22 hrs	Origin of gemstones in mineralogy.	Questions and Answers	
Inclusion	07 hrs	28 hrs	Internal study of gems.	Observation MCQ's	
Treatment of Gemstone	07 hrs	28 hrs	Different ways to enhance gemstones.	Question and answers MCQ's	
Synthetic Gemstone and processes.	04 hrs	17 hrs	Artificial methods of Gem formation in the Lab.	Theory MCQ's Questions and answers.	

Module: Title # 4. Marketing gemstones.

<u>Objective of the Module:</u>
In this module students will learn to market gemstones.

Theory:- **05 hours** Practice:- **25 hours** Duration: - 30 hours

Learning Unit	Learning Outcomes	Learning Elements	Durati	Materials Required	Learning Place
Care of	The learner will learn about	Detailed	01 hrs	Detergent, oil	
Gemstones	different techniques used for cleaning and ensuring the safety of gemstones	instruction regarding cleaning of mineral specimens/ gemstones during jewellery repair		and ultrasonic machine	Lab
		Ability to: -clean and care for gemstones	05 hrs		
Packing Gemstones.	The learner will learn how to pack different gemstones.	-Methods adopted during Packing of rough gemstones and cut gemstones.	01 hrs 05 hrs	Packing material and labeling machines.	Lab

			1	T	1
		-Use of different kinds of packing material			
		Ability to:			
		Pack gemstones.			
Price determination	The learner will learn to assign a price to gemstones.	Pricing on the basis of 4C's and different expenses involved in	01 hrs	Note Book	Class Room
		packing	05 hrs		
		Ability to:			
		Assign an appropriate price to gemstones.			
Advertisement	The learner will learn to market different gemstones.	Different means of marketing, for example: electronic,	01 hrs	Note Book	Class Room
		print etc Ability to:	05 hrs		
		Market gemstones.			
Regular Market visits.	The learner will learn to collect information from the local gemstone market.	-Visiting local markets and attending local gem bazaar exhibitions to guide the students in updating marketing information.	01 hrs		Gemston e Market.
		Ability to: -Buy gemstones at reasonable prices.	05 hrs		

Module 5 (Marketing Gemstones)

Duration:- 30 hours Theory:- 05 hours Practice:- 25 hours

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
Care of gemstones	01 hrs	05 hrs	Techniques for proper care	Observation	
Packing of gemstones	01 hrs	05 hrs	Packing techniques	Observation	
Price determination	01 hrs	05 hrs	Pricing techniques	Observation	
Advertisement	01 hrs	05 hrs	Different techniques for advertisement	MCQ's	
Regular Market visits.	1 hrs	5 hrs	Visiting the market	Observation	

- Assessment context
- Critical aspect
- Assessment condition
- Resources required for assessment

2. List of Tools, Machinery & Equipment

Name of Trade	Gemology
Duration	Six Months

Sr. No.	Name of Item/ Equipment / Tools	Qty.
1.	Tweezers	1
2.	10 X Loupes	1
3.	Poloriscope	1
4.	Refractometer	1
5.	Hardness Pencil	1
6.	Specific Gravity Balance	1
7.	Spectroscope	1
8.	Dichroscope	1
9.	Chelsea Colour Filter	1
10.	UV Lamp	1
11.	Gemological Microscope	1
12.	Ultrasonic Machine for cleaning gemstones.	1
13.	Labeling Machine	1
14.	Diamond Tester (Thermal conductivity test)	·
	List of Stones	

2. Aquamarine 10 3. Amber 10 4. Andalusite 10 5. Apatite 10 6. Chalcedony 5 7. Cathaystone 5 8. Chrysoberyl. Cats-eye 5 10 Chrysoberyl. Cats-eye 5 10 Chrysoberyl. Cyn.) 10 11 Chrysocolla 10 12 Coral. Imitation (Gilson) 10 13 Coral. Black & Gold 10 14 Syn. Ruby (FF) 10 15 Syn. Ruby (Flux) 10 16 Sapphire (Natural) 10 17 Syn. Blue Sapphire 10 18 Syn. CS Sapphire 10 19 Syn. O Sapphire 10 20 Sapphire – Surface Diffused 10 21 Corundum Doublet 5 22 Danburite 5 23 Diamond & Simulants 5 24 GGG 5 25 Strontium titanate <td< th=""><th>1.</th><th>Actinolite</th><th>10</th></td<>	1.	Actinolite	10
4. Andalusite 10 5. Apatite 10 6. Chalcedony 5 7. Cathaystone 5 8. Chrysoberyl 10 9. Chrysoberyl (Syn.) 10 11 Chrysocolla 10 12 Coral. Imitation (Gilson) 10 13 Coral. Black & Gold 10 14 Syn. Ruby (FF) 10 15 Syn. Ruby (Flux) 10 16 Sapphire (Natural) 10 17 Syn. Blue Sapphire 10 18 Syn. CC Sapphire 10 19 Syn. O Sapphire 10 20 Sapphire - Surface Diffused 10 21 Corundum Doublet 5 22 Danburite 5 23 Diamond & Simulants 5 24 GGG 5 25 Strontium titanate 5 26 Syn. CZ/Rutile 5	2.	Aquamarine	10
5. Apatite 10 6. Chalcedony 5 7. Cathaystone 5 8. Chrysoberyl 10 9. Chrysoberyl (Syn.) 10 11 Chrysoberyl (Syn.) 10 11 Chrysoberyl (Syn.) 10 11 Chrysoberyl (Syn.) 10 12 Coral. Imitation (Gilson) 10 13 Coral. Black & Gold 10 14 Syn. Ruby (FF) 10 15 Syn. Ruby (Flux) 10 16 Sapphire (Natural) 10 17 Syn. Blue Sapphire 10 18 Syn. CS Sapphire 10 19 Syn. O Sapphire 10 20 Sapphire - Surface Diffused 10 21 Corundum Doublet 5 22 Danburite 5 23 Diamond & Simulants 5 24 GGG 5 25 Strontium titanate 5 26 Syn. CZ/Rutile 5	3.	Amber	10
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7. Cathaystone 5 8. Chrysoberyl 10 9. Chrysoberyl. Cats-eye 5 10 Chrysoberyl (Syn.) 10 11 Chrysocolla 10 12 Coral. Imitation (Gilson) 10 13 Coral. Black & Gold 10 14 Syn. Ruby (FF) 10 15 Syn. Ruby (Flux) 10 16 Sapphire (Natural) 10 17 Syn. Blue Sapphire 10 18 Syn. CC Sapphire 10 19 Syn. O Sapphire 10 20 Sapphire - Surface Diffused 10 21 Corundum Doublet 5 22 Danburite 5 23 Diamond & Simulants 5 24 GGG 5 25 Strontium titanate 5 26 Syn. CZ/Rutile 5	5.	Apatite	10
8. Chrysoberyl 10 9. Chrysoberyl (Syn.) 10 10 Chrysocolla 10 11 Chrysocolla 10 12 Coral. Imitation (Gilson) 10 13 Coral. Black & Gold 10 14 Syn. Ruby (FF) 10 15 Syn. Ruby (Flux) 10 16 Sapphire (Natural) 10 17 Syn. Blue Sapphire 10 18 Syn. CC Sapphire 10 19 Syn. O Sapphire 10 20 Sapphire – Surface Diffused 10 21 Corundum Doublet 5 22 Danburite 5 23 Diamond & Simulants 5 24 GGG 5 25 Strontium titanate 5 26 Syn. CZ/Rutile 5	6.	Chalcedony	5
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10 Chrysoberyl (Syn.) 10 11 Chrysocolla 10 12 Coral. Imitation (Gilson) 10 13 Coral. Black & Gold 10 14 Syn. Ruby (FF) 10 15 Syn. Ruby (Flux) 10 16 Sapphire (Natural) 10 17 Syn. Blue Sapphire 10 18 Syn. CC Sapphire 10 19 Syn. O Sapphire 10 20 Sapphire - Surface Diffused 10 21 Corundum Doublet 5 22 Danburite 5 23 Diamond & Simulants 5 24 GGG 5 25 Strontium titanate 5 26 Syn. CZ/Rutile 5	8.	Chrysoberyl	10
11 Chrysocolla 10 12 Coral. Imitation (Gilson) 10 13 Coral. Black & Gold 10 14 Syn. Ruby (FF) 10 15 Syn. Ruby (Flux) 10 16 Sapphire (Natural) 10 17 Syn. Blue Sapphire 10 18 Syn. CC Sapphire 10 19 Syn. O Sapphire 10 20 Sapphire - Surface Diffused 10 21 Corundum Doublet 5 22 Danburite 5 23 Diamond & Simulants 5 24 GGG 5 25 Strontium titanate 5 26 Syn. CZ/Rutile 5	9.	Chrysoberyl. Cats-eye	5
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13 Coral. Black & Gold 10 14 Syn. Ruby (FF) 10 15 Syn. Ruby (Flux) 10 16 Sapphire (Natural) 10 17 Syn. Blue Sapphire 10 18 Syn. CC Sapphire 10 19 Syn. O Sapphire 10 20 Sapphire - Surface Diffused 10 21 Corundum Doublet 5 22 Danburite 5 23 Diamond & Simulants 5 24 GGG 5 25 Strontium titanate 5 26 Syn. CZ/Rutile 5	11	Chrysocolla	10
14 Syn. Ruby (FF) 10 15 Syn. Ruby (Flux) 10 16 Sapphire (Natural) 10 17 Syn. Blue Sapphire 10 18 Syn. CC Sapphire 10 19 Syn. O Sapphire 10 20 Sapphire – Surface Diffused 10 21 Corundum Doublet 5 22 Danburite 5 23 Diamond & Simulants 5 24 GGG 5 25 Strontium titanate 5 26 Syn. CZ/Rutile 5	12	Coral. Imitation (Gilson)	10
15 Syn. Ruby (Flux) 10 16 Sapphire (Natural) 10 17 Syn. Blue Sapphire 10 18 Syn. CC Sapphire 10 19 Syn. O Sapphire 10 20 Sapphire - Surface Diffused 10 21 Corundum Doublet 5 22 Danburite 5 23 Diamond & Simulants 5 24 GGG 5 25 Strontium titanate 5 26 Syn. CZ/Rutile 5	13	Coral. Black & Gold	10
16 Sapphire (Natural) 10 17 Syn. Blue Sapphire 10 18 Syn. CC Sapphire 10 19 Syn. O Sapphire 10 20 Sapphire – Surface Diffused 10 21 Corundum Doublet 5 22 Danburite 5 23 Diamond & Simulants 5 24 GGG 5 25 Strontium titanate 5 26 Syn. CZ/Rutile 5	14	Syn. Ruby (FF)	10
17 Syn. Blue Sapphire 10 18 Syn. CC Sapphire 10 19 Syn. O Sapphire 10 20 Sapphire – Surface Diffused 10 21 Corundum Doublet 5 22 Danburite 5 23 Diamond & Simulants 5 24 GGG 5 25 Strontium titanate 5 26 Syn. CZ/Rutile 5	15	Syn. Ruby (Flux)	10
18 Syn. CC Sapphire 10 19 Syn. O Sapphire 10 20 Sapphire – Surface Diffused 10 21 Corundum Doublet 5 22 Danburite 5 23 Diamond & Simulants 5 24 GGG 5 25 Strontium titanate 5 26 Syn. CZ/Rutile 5	16	Sapphire (Natural)	10
19 Syn. O Sapphire 10 20 Sapphire - Surface Diffused 10 21 Corundum Doublet 5 22 Danburite 5 23 Diamond & Simulants 5 24 GGG 5 25 Strontium titanate 5 26 Syn. CZ/Rutile 5	17	Syn. Blue Sapphire	10
20 Sapphire – Surface Diffused 10 21 Corundum Doublet 5 22 Danburite 5 23 Diamond & Simulants 5 24 GGG 5 25 Strontium titanate 5 26 Syn. CZ/Rutile 5	18	Syn. CC Sapphire	10
21 Corundum Doublet 5 22 Danburite 5 23 Diamond & Simulants 5 24 GGG 5 25 Strontium titanate 5 26 Syn. CZ/Rutile 5	19	Syn. O Sapphire	10
22 Danburite 5 23 Diamond & Simulants 5 24 GGG 5 25 Strontium titanate 5 26 Syn. CZ/Rutile 5	20	Sapphire – Surface Diffused	10
23 Diamond & Simulants 5 24 GGG 5 25 Strontium titanate 5 26 Syn. CZ/Rutile 5	21	Corundum Doublet	5
24 GGG 5 25 Strontium titanate 5 26 Syn. CZ/Rutile 5	22	Danburite	5
25 Strontium titanate 5 26 Syn. CZ/Rutile 5	23	Diamond & Simulants	5
26 Syn. CZ/Rutile 5	24	GGG	5
	25	Strontium titanate	5
	26	Syn. CZ/Rutile	5
27 Syn. Moissanite 5	27	Syn. Moissanite	5
28 YAG 5	28	YAG	5
29 Diopside 10	29	Diopside	10
30 Emerald (syn.) 10	30	Emerald (syn.)	10

31	Enstatite	5
32	Garnet	10
33	Pyrope / Almandine	10
34	Pyrope / Spessartine	10
35	Spessartine / Almandine	10
36	Garnet Doublet	5
37	Idocrase	10
38	Iolite	10
39	Ivory	10
40	Jadeite	10
41	Jet	10
42	Labradorite	10
43	Lapis Lazuli. Imitation (Gilson)	10
44	Quartz (Microcrystalline, Tiger's eye)	10
45	Quartz (Syn.)	10
46	Rhodochrosite	10
47	Scapolite	10
48	Serpentine	10
49	Shell	10
50	Slocum Stone	5
51	Sodalite	10
52	Spinel (Syn.)	10
53	Sugilite	10
54	Tektite	10
55	Zoisite	10
56	Nephrite	10
57	Obsidian	10
58	Oligoclase Feldspar (Sunstone)	10
59	Opal Doublet	5
60	Opal Triplet	5

61	Opal Syn.	10
62	Pearl (Cultured)	5
63	Pearl (Natural)	5
64	Natural Emerald	10
65	Natural Ruby	10

3. List of Consumable Supplies

Name of Trade	Gemology
Duration	Six Months

Sr. No.	Name of Consumable Supplies
1.	R.I liquids
2.	Oil and Detergent
3.	Packing material.