1	Name of Syllabus	**C. C. IN Gems Identification & Diamond Grading (416202)**
2	Max.Nos of Student	25 Students
3	Duration	1 year
4	Type	Part Time
5	Nos Of Days / Week	6 Days
6	Nos Of Hours /Days	4 hrs.
7	Space Required	1) Workshop = 200 sq feet 2) Class Room = 200 sq feet TOTAL = 400 sq feet
8	Entry Qualification	S.S.C.
9	Objective Of Syllabus/ introduction	To provide trained man power to Gems & Jewellery industry, to make self-employable ability in youth.
10	Employment Opportunity	* Trading, consultancy in Gems, Diamonds field. * Can work us Gemologist selling & making in Gems & diamonds.
11	Teacher's Qualification	M.sc with Gemology/ Diploma in Gemology with 1 year exam. Form recognized institute.
12	Training System	**Training System Per Week**

Theory	Practical	Total
6 hrs	18 hrs	24 hrs

13 Exam. System

Sr. No.	Paper Code	Name of Subject	TH/PR	Hours	Max. Marks	Mini. Marks
1	**41620211**	Gem Identification& Properties	TH-I	3 hrs.	100	35
2	**41620212**	Study of Gems.	TH-II	3 hrs.	100	35
3	**41620213**	Diamond Identification and valuation	TH-III	3 hrs.	100	35
4	**41620221**	Gem Identification	PR-I	3 hrs.	100	50
5	**41620222**	Study of Gems.	PR-II	3 hrs.	100	50
6	**41620223**	Diamond Identification	PR-III	3 hrs.	100	50
		Total			**600**	**255**

Syllabus - Gems Identification & Diamond Grading

THEORY: I Gem Identification& Properties

I. **Crystallography**: Seven crystal systems, elements of symmetry for gemstones, typical forms & habits, surface features, twinning,& types of twinning, identification of gems in rough forms.

II. **Physical Properties of Gemstones**: Hardness, differential hardness, application of hardness, cleavage, parting, specific gravity, durability.**Optical Properties of Gemstones :** Single & double refraction, reflection, refraction, isotropism, anisotropism, critical angle of a gemstone, total internal reflection, optic character of gemstones, uniaxial, biaxial gems, optics axis, refractive index, birefregence, spectrums, etc.

III. **Optical Properties of Gemstones :** Single & double refraction, reflection, refraction, isotropism, anisotropism, critical angle of a gemstone, total internal reflection, optic character of gemstones, uniaxial, biaxial gems, optics axis, refractive index, birefregence, spectrums, etc

IV. **Identification of Synthetic Gemstones**: Identification of Ruby, Sapphire, Emeralds made by different methods. Also some semi-precious stones such as Turquise, Coral, Malachite, etc.

V) Imitations: Identification of various imitations used to imitate gemine gemstones

THEORY - II Study of Gems

I. **Optical Effects in Gemstones**: Luster, dispersion, cat's Asterim, metamerism, play of colours, iridescence (Labradorescence), Sheen, banding, aventurescence, Pleochroism.

II. **Study of Inclusion in Gemstones**: Study of internal features of precious & semi precious stones under 10 x magnifications. Identification of inclusions. Determine possible country of origin of precious stones by seeing inclusions. Study natural or synthetic nature of the gemstones with inclusions.

III. **Use of dichroscope, Poloriscope**: Determine the basic properties of gemstones to differentiate them from each other.

IV. **Synthesis of Gemstones :** To study how man made stones are grown in Labs by following processes such as Verneniel process, flux process, Hydrothermal process, Crystal Pulling process, skill process & bonding process. Typical features of the gemstones made by these processes.

V. **Organic Gems**: Identification of organic gemstones such as pearl, coral, Irory, Amber & their possible imitation.

B) Diamond Grading, Identification & Valuation:
(Total 380 Hrs. 9 Topics, 42 Hrs. each topic)

I) **Occurrences**: of rough diamonds in Indian & abroad, Crystal structure of diamonds, forms, habits, rough classification, surface marks, specialties of rouighs from different origins, etc.

II) **Clarity Grading**: Inclusion, blemishes, factors affecting clarity grades, International clarity grading, comparison with Indian grades.

III) **Cut Grading**: Identification of modern brilliant cut proportions, polish – symmetry factors, heart & arrow cut, cut defects, types of cuts, etc.

THEORY - III - Diamond Identification and valuation

I) **Carat Grading :** Size grading, weight estimation, use of guage & sieve sizes.

II) **Treatment :** Irradiation, heat treatment, cracks filling, IIPIIT techniques to improve clarity or colour and their identification.

III) **Properties** of diamonds & simulants.

IV) **Identification of diamonds** from latest simulant such as synthetic Moissanite, Cubic Zirconia, Zircon & Synthetic Diamonds.

V) **Marketing :** Market operations, D.T.C. sites, sites holdership, import-export customs, etc.

VI) Market survey in technical, methods.

VII) **Valuation of diamonds** as per Indian & foreign markets.

VIII) **Preparation of project report with cast analysis.**

IX) Role of Banking sector to start any industry. there schemes.

PRACTICAL - I Gem Identification

VI. **Crystallography**: Seven crystal systems, elements of symmetry for gemstones, typical forms & habits, surface features, twinning,& types of twinning, identification of gems in rough forms.

VII. **Physical Properties of Gemstones**: Hardness, differential hardness, application of hardness, cleavage, parting, specific gravity, durability.**Optical Properties of Gemstones :** Single & double refraction, reflection, refraction, isotropism, anisotropism, critical angle of a gemstone, total internal reflection, optic character of gemstones, uniaxial, biaxial gems, optics axis, refractive index, birefregence, spectrums, etc.

VIII. **Optical Properties of Gemstones :** Single & double refraction, reflection, refraction, isotropism, anisotropism, critical angle of a gemstone, total internal reflection, optic character of gemstones, uniaxial, biaxial gems, optics axis, refractive index, birefregence, spectrums, etc

IX. **Identification of Synthetic Gemstones**: Identification of Ruby, Sapphire, Emeralds made by different methods. Also some semi-precious stones such as Turquise, Coral, Malachite, etc.

V) **Imitations**: Identification of various imitations used to imitate gemine gemstones

PRACTICAL II Study of Gems

X. **Optical Effects in Gemstones**: Luster, dispersion, cat's Asterim, metamerism, play of colours, iridescence (Labradorescence), Sheen, banding, aventurescence, Pleochroism.

XI. **Study of Inclusion in Gemstones**: Study of internal features of precious & semi precious stones under 10 x magnifications. Identification of inclusions. Determine possible country of origin of precious stones by seeing inclusions. Study natural or synthetic nature of the gemstones with inclusions.

XII. **Use of dichroscope, Poloriscope**: Determine the basic properties of gemstones to differentiate them from each other.

XIII. **Synthesis of Gemstones :** To study how man made stones are grown in Labs by following processes such as Verneniel process, flux process, Hydrothermal process, Crystal Pulling process, skill process & bonding process. Typical features of the gemstones made by these processes.

XIV. **Organic Gems**: Identification of organic gemstones such as pearl, coral, Irory, Amber & their possible imitation.

B) Diamond Grading, Identification & Valuation:
(Total 380 Hrs. 9 Topics, 42 Hrs. each topic)

IV) **Occurrences**: of rough diamonds in Indian & abroad, Crystal structure of diamonds, forms, habits, rough classification, surface marks, specialties of rouighs from different origins, etc.

V) **Clarity Grading**: Inclusion, blemishes, factors affecting clarity grades, International clarity grading, comparison with Indian grades.

VI) **Cut Grading**: Identification of modern brilliant cut proportions, polish – symmetry factors, heart & arrow cut, cut defects, types of cuts, etc.

PRACTICAL III Diamond Identification

I) **Carat Grading :** Size grading, weight estimation, use of guage & sieve sizes.

II) **Treatment :** Irradiation, heat treatment, cracks filling, IIPIIT techniques to improve clarity or colour and their identification.

III) **Properties** of diamonds & simulants.

IV) **Identification of diamonds** from latest simulant such as synthetic Moissanite, Cubic Zirconia, Zircon & Synthetic Diamonds.

V) **Marketing**: Market operations, D.T.C. sites, sites holdership, import-export customs, etc.

VI) Market survey in technical, methods.

VII) **Valuation of diamonds** as per Indian & foreign markets.

VIII) **Preparation of project report with cast analysis.**

IX) Role of Banking sector to start any industry. there schemes.

List of Gemstones Covered : Ruby, Sapphires, Emerald, Aqumarine, other beryls, garnets group, Spinel, Fluorite, Zircon, Apatite, Tourmaline, Calcite, Quartz Group, Feldspars Group, Iolite, Tanzanite, Scapolite, Period, Opal, Opal, Diopside, Enstalite, Haematite, Turquise, Malachite, Lapiz-Luzuli, Jade Zoisite, Chrysoberyl, Topaz, Coral, Pearls, Ivory, Amber, Kyanite, etc.

Tools Equipments & Accessories

10 X lens	25	
Grading Pads	25	Small size
Twizzers	25	With locking system
Sieve size	2 sets	
Scoops	5	
Diamonds & Colour stones	--	
Polaris cope	--	
Dichroscopes	10	
U. V. Lamps	2	
Microscopes	2	Gemological

Other Requirements:

Grading Tables 15 to be shared between two students

White Board & markers 1 set

Slide Projectors 1

8) **Reference Books :**

Gem – Testing by Anderson
Gemstones of the World by Walter Schumann
Diamonds by Eric Bruton.
A. B. C. of Diamond Grading by Gems by Webster.
Gemstones Enhancement by Kirt Nassau by P. Read
Periodic Journal published by recognized institutions.

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