

No. 43/2014

NOTIFICATION

Date: 24/4/2014

Subject : Syllabi along with other details for Certificate / Diploma / Advanced Diploma course in 'Surface Coating Technology' under the scheme of Career Oriented Programme at first degree level.

It is notified for general information of all concerned that the authorities of the University have accepted the syllabi of Certificate / Diploma / Advance Diploma course for the "Subject Surface Coating Technology" under the Scheme of Career Oriented Programme at first degree level as given in following Appendix-A, to be implemented from the Academic Session 2014-15.

It is further notified that the eligibility criteria and other details along with the Scheme of examination shall be as provided under Ordinance No.47 of 2005, Regulation No.38 of 2005.

Sd/-

(Dineshkumar Joshi)

Registrar

Sant Gadge Baba Amravati University

Appendix-A

Syllabus prescribed for Certificate Course in Surface Coating Technology

1. Theory

- Unit 1 : Solutions and Volumetric analysis
1.1 Definition and types. Molecular weight, Equivalent weight and their significance.
Types of solutions, expression of concentration of solids in liquids.
1.2 Volumetric Analysis – Requirements, standard solutions, primary standards, indicators, choice of indicators, calculations of volumetric analysis.
- Unit 2 : Nature of chemical bond
Types of bond, ionic bond, Born Haber cycle: covalent bond parameters. Lewis structure, polar character of covalent bond, covalent character of ionic bond, valence bond theory, resonance, geometry of covalent molecules; VSEPR theory, concept of hybridization involving s, p and d orbitals and shapes of some simple molecules, hydrogen bond.
- Unit 3 : Surface chemistry
Adsorption – physisorption and chemisorption; factors affecting adsorption of gases on solids; catalysis: homogenous and heterogeneous, activity and selectivity; enzyme catalysis; colloidal state: distinction between true solutions, colloids and suspensions; Lyophilic, Lyophobic, multimolecular and macromolecular. Colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation; emulsion – types of emulsions.
- Unit 4 : Polymers
Definition Classification - natural and synthetic, methods of polymerization (addition and condensation), copolymerization. Some important polymers; natural and synthetic like polythene, nylon, polyesters, bakelite, and rubber. Biodegradable and non biodegradable polymers.
- Unit 5 : Physical Properties & Their Significance
Physical properties such as density, specific gravity, surface tension, viscosity and refractive index of liquids. M.P., B.P., Boiling range.
Cleansing agents: Soaps and detergents, cleansing action.

2. Practical

List of Practicals: [Minimum 12 Experiments to be completed]

1. To prepare 0.1 N HCl and 0.1 N NaOH and their standardization.
2. To prepare 0.1 N KMnO₄ and its standardization.
3. To determine the amount of Ferrous sulphate in the given solution.
4. To determine the amount of Copper sulphate in the given solution.
5. To determine the amount of Glycerol in the given solution.
6. To determine the amount of Formaldehyde in the given solution.
8. To prepare a sample of Acetanilide from Aniline.
9. To prepare a sample of Methyl orange.
11. To prepare a sample of Benzoic acid from Benzaldehyde/ Toluene.
12. To prepare a sample of Phthalic acid from o-xylene.
13. To determine amount of Sodium carbonate/bicarbonate in their mixture of soln.
14. To determine the amount of Sodium carbonate/hydroxide in their mixture of solution
15. To estimate the amount of acetamide in the given solution.
16. To determine the amount of ester in the given solution.

3. Project / Field work report

Learning Resources

Books:

1. Peter Sykes Guide book to mechanism in Organic Chemistry. Orient Longman Ltd.
2. Bahl & Tuli Essentials of Physical Chemistry. S Chand & Co.
3. L H Gadgi & D B Kulkarni A Text Book of Chemistry. Narendra Prakashan, Pune
4. B S Bahl & Arun Bahl Text Book of organic Chemistry. S. Chand & Co.
5. V K Ahluwalia, Sudha Raghav. Comprehensive Experimental Chemistry. New Age International Publisher.

Marks Distribution

Theory100 marks.

Practical

Two practical (each 15 marks)..... 30 marks.

Vivo- voc 10 marks.

Record Book..... 10 marks.

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Total - 50 marks.

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Project / Field work report.....50 marks.

Theory100 marks.

Practical.....50 marks

Project / Field work report.....50 marks.

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Total - 200 marks.

Syllabus prescribed for Diploma Course in Surface Coating Technology

1. Theory

Unit 1 : Corrosion & Corrosion Resistant Paints

1.1 Introduction to Corrosion and passivity. Various aspects of corrosion. Factors affecting rate of corrosion.

1.2 Protection of ferrous and non-ferrous metals. Corrosion resistant paints – for locomotives, railway bridges, their formulations and properties .

- Unit 2 : Electroplating**
2.1 Electrochemistry.
2.2 Pretreatment and Processes such as : Nickel, Copper, Chromium, Zinc Plating, Silver, Gold plating and process like Anodization. Plating on non-metals – Plastics etc.
3.3 Testing of following properties : Corrosion resistance, Resistance to Salt spray, abrasion resistance, thickness.
- Unit 3 : Surface Preparation**
3.1 For industrial surfaces. Need for surface preparation, Methods of surface preparation – Mechanical and chemical. Hand cleaning, Power cleaning, Abrasive blasting, Shot blasting. Metal conditioning, Degreasing, Derusting / Descaling, Phosphating and chromatising.
3.2 Preparation of surfaces like Copper, brass, Aluminium and Plastic.
- Unit-4 : Oils, Natural Resins & Varnishes**
4.1 Classification of oils : Drying oils, semi drying oils, Non drying oils : Linseed, Tung oil, DCO, Safflower oil, Soyabin, Ricebran oil, Coconut oil. Uses of oils in paints and varnishes. Drying mechanism.
4.2 Uses of following natural resins: Rosin, Shellac, Bone glue. Preparation of varnishes from oils and Natural Resins – Their properties and uses – Ester Gum, Calcium hardened Rosin, Maleic hardened Rosins, Oleo-resinous varnishes, Penta ester based on linseed oil and above natural and modified resins.
- Unit 5 : Environmental chemistry**
Environmental pollution- air, water and soil pollution, chemical reactions in atmosphere, smog, major atmospheric pollutants, acid rain, ozone and its reactions, effects of depletion of ozone layer, green house effect and global warming. Pollution due to industrial wastes, green chemistry as an alternative tool for reducing pollution, strategy for control of environmental pollution.

2. Practical

List of Practicallss: [Minimum 12 experiments to be completed]

1. To determine the acid value of samples of oils.
2. To determine the iodine value of samples of oils.
3. To prepare a sample of D.C.O. from castor oil.
4. To prepare and test sample of varnish from Calcium rosinat.
5. To prepare and test sample of varnish from Ester gum.
6. To prepare and test sample of Oleo-resinous varnish.
7. To prepare and test Bituminous lacquer.
8. To prepare and test N.C. lacquer.
9. To test various properties of Alkyd resins.
10. To determine the free formaldehyde content of Amino resins.
11. To test the hydroxyl value of Phenolic resin.
12. To carry out the testing of Phenolic and Maleic resins for M. P., compatibility with solvents, oils and alkyd resins.
13. To compare the properties of varnish and alkyd resins.
14. To test the various properties of Amino resins.
15. To check acid and alkali resistance of alkyd resin.

3. Project / Field work report

Learning Resources

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Books:

1. R. Sinha Outlines of Polymer Technology. Prentice-Hall of India.
2. C C A Solvents, Oils, Resins & Driers. Champman & Hall.
3. C C A Convertible Coatings, Part III Champman & Hall.
4. H F Paynce Organic Coatings, Vol. I John Wiley & Sons.
5. W M Morgan Outline of Paint Technology, Raw Materials. S K Jain for CBS Publisher & Distributor.
6. V C Malshe & Minal Sikchi Basic Paint Technology, Part I –II.

Marks Distribution

Theory 100 marks.

Practical

Two practical (each 15 marks)..... 30 marks.

Vivo- voc 10 marks.

Record Book..... 10 marks.

Total - 50 marks.

Project / Field work report.....50 marks.

Theory 100 marks.

Practical.....50 marks

Project / Field work report.....50 marks.

Total - 200 marks.

Syllabus prescribed for Advanced Diploma Course in Surface Coating Technology

I. Theory

Unit 1 : Surface Coating Industry

- 1.1 Introduction to Paints. Raw materials used in paints and their functions. Types of paints. Requirements of a good paint. Failure of paint film and its prevention.
- 1.2 Printing inks – their raw materials. Formulations of paints and printing inks. Difference between these two surface coatings.

Unit 2 : Paint Additives

Surface active agents – classification and their role in paints. Wetting and Dispersing agents. Anti-settling agents, Anti-skinning agents. Matting agents. Emulsifiers, Stabilizers, U.V. Stabilizers. Preservatives. Mildew inhibitors, Viscosity modifiers. Universal tinters.

Unit 3 : Paint Formulation

- 3.1 Formulating principles of paints. Formulations of Primers for wood, metals, cement. Formulations of enamels – interior, exterior. Paints for plasters and masonry.- Architectural paints. Roof coatings.
- 3.2 Requirement of important properties of paint – how to achieve them. Costing, P:B ratio, NVM, Coverage, PVC, CPVC and its effect on paint film properties.

Unit 4 : Cosmetics & Polishes

- 4.1 Composition, Preparation, Properties and uses of : Talcum Powder, Nail Polishes, Lipsticks, Hair dyes, Cold creams, Vanishing Creams.
- 4.2 Toxicity and skin allergies and other troubles. Provisions of Food & Drug Act.
- 4.3 Composition, Preparation and uses of: Shoe Polishes, Wax polishes, Metal polishes, Liquid polishes.

Unit 5 : Powder Coating, Offset & Screen Inks

- 5.1 Principle of powder application. Pretreatment for powder application. Application by electrostatic spraying. Air fluidized bed application, Electrostatic Cloud Method of application.
- 5.2 Preparation, Properties and uses. Requirements of inks. Types of Lithography, Lithographic printing methods.
- 5.3 Producing screen designs. Screen printing method. Advantages and limitations of screen printing.

2. Practical:

List of Experiments: [Minimum 12 experiments to be completed]

1. Surface preparation of M.S./Aluminium/Plastic panels.
2. Paint application by conventional spraying process.
3. Application of paint by electrostatic spray gun, and evaluation of film.
4. To separate binary mixture of liquids by distillation.
5. To determine the rate constant of hydrolysis of methyl acetate.
6. To determine the surface tension of given organic liquids by drop method.
7. To determine relative viscosity of organic liquids using Ostwald's viscometer.
8. To prepare nitro-benzene from benzene.
9. To check the pH of various solutions by pH meter/pH paper.
10. Separation of binary mixture by column chromatography/ paper chromatography.
11. To determine hardness in sample of hard water.
12. To determine the chloride content in the given sample of water.
13. To test the sample of lubricating oil.
14. To determine flash point/ fire point of petrol/ diesel/ solvents.
15. To determine metal content in the given sample of driers.
16. To test the physical properties of printing inks such as colour, length, flow, tack, fineness of grind etc.

3. Project / Field work report :

Learning Resources

Books :

1. Dr. Dieter Stoye Paints Coatings & Solvents. Velt Publishers Inc.
2. Gordon Pettis Automotive Paints & Coatings. Velt Publishers Inc.
3. O C C A Surface Coatings, Vol. II Paints & Their applications. Macarthur Press HSW.
4. J. Boxall & Ja A Von Fraunhofer Paint Formulation-Principles & Practice Industrial Press, Inc.
5. Swaraj Paul Surface Coatings Hon Wiley & Sons
6. W. M. Morgan Outline of Paint Technology Vol. II Charles Griffin House
7. F A Apps Ink Technology for Printers & Students Volume III Chemical Publishing
8. E A Apps Printing Ink Technology Leonard Hill Ltd.
9. V R Gowarikar & N V Vishwanathan Polymer Science New Age International.

Marks Distribution :

Theory	100 marks.
Paractical	
Two practical (each 15 marks).....	30 marks.
Vivo- voc	10 marks.
Record Book.....	10 marks.
.....	
Total -	50 marks.

Project / Field work report.....50 marks.

Theory	100 marks.
Paractical.....	50 marks
Project / Field work report.....	50 marks.
.....	
Total -	200 marks.
