MAHARSHI DAYANAND SARASWATI UNIVERSITY

AJMER

पाठ्यक्रम

SYLLABUS

SCHEME OF EXAMINATION AND

COURSES OF STUDY

FACULTY OF SCIENCE

Post Graduate Diploma in

Textile Chemistry

Examination

(w.e.f. 2018-19)

महर्षिदयानन्दसरस्वतीविश्वविद्यालय, अजमेर

POST GRADUATE DIPLOMA IN TEXTILE CHEMISTRY

Eligibility for Admission - A graduate of science with chemistry, at least 50% marks, with relaxation in case of reserved candidates may be considered.

Duration of Course - Duration of course is spread over one academic year. There will be no supplementary examination. However, if a student fails, one more chance will be given in next three academic sessions to pass the examination. If a student passes in practical, his marks will be carried forward for next examination, and he is exempted to reappear in the practical in the following year(s).

Scheme of Examination

(i) There will be four theory papers and one practical paper. Each paper will be of 100 marks and 3 hours duration & practical is of 200 marks. Minimum pass marks in each paper is 40% with an aggregate of 50% marks in all the papers, for awarding the diploma.

(ii) The division will be awarded as follows:

I Division - Minimum 60% or above marks in aggregate

II Division - 50% marks or above but less than 60% marks in aggregate.

Papers	Max. Marks
I Chemistry of Fibers	100
II Technology of Bleaching and finishing	100
III Technology of dyeing and printing	100
IV Computer Application & Programming	100
Practical (12 hours duration in 2 days),	200(including 25 marks for seminar)

Note: Each theory paper is divided into three independent units Part-A Part-B and Part-C.

Part-A(30 marks) is compulsory and contains 10 questions (50 words each)& at least 3 questions from each unit, each question carries 3 marks.

Part-B(25 marks) is compulsory and contains 5 questions, at least 1 from each unit. Each question carries 5 marks (100 words each).

Part-C(45 marks) contains 6 questions, 2 from each unit. Candidate is required to attempt 3 questions, 1 from each unit. Each question carries 15 marks (400 words).

PAPER -I CHEMISTRY OF FIBRES

Max. Marks:100 **3Hours Duration**

UNIT-I

Chemical structure of fibers

(a) Chemical structure of cellulose like cotton,jute etc. Action of different chemicals on these fibers.

(b) Chemical structure of manmade fibers (Rayon, Polyamide, Polyester &Polyacrylonitrile) Synthesis of fiber forming polymers, brief idea about

Commercial production of fibers/yarns & sequence of operations.Effect of acids, alkalies, oxidizing agents, reducing agents, solvents, heat & light on various types of man-made fibers.Determination of hardness of water & methods for its removal.Determination of BOD& COD.

(c) Introduction and applications oxidizing and reducing agents like $K_2Cr_2O_7$, $KMnO_4$, $H_2O_2$and $Na_2S_2O_3$

UNIT-II

Testing of textiles & fibers

(a) Physical testing of textiles

(i) Fibers - Shape staple length, tensile strength, elongation, moisture regain, elemental analysis& burning test.

(ii) Yarns - counts, evenness, turn per inch & tensile length elongation.

(iii) Fabric - ends, picks, warp & weft, identification of stiffness, crease recovery, wear tear resistance air permeability, wrinkle test & thermal conductivity.

(iv) Applications of UV, NMR & IR spectroscopy in textile fibers.

(b) Chemical testing of textile, Determination of ash content % colorfastnesses of dyed, printed textile (light washing perspiration rubbing & bleaching). Analysis of blend composition namelycotton/ viscose, viscose/ acetate, viscose/ nylon, cotton/ polyester, nylon/acrylic viscose/ acrylic & other popular blend

(i) Determination of hardness of water and BOD, COD.

(ii) Methods for removal of hardness of water

UNIT-III

Analysis of different agents used in Textile industries

(a) Analysis of desizing, scouring & bleaching agents. Analysis of dyes, dyeing & printing gums, treatment of water to make it suitable for textile industry.

(b) Identification & evaluation of common finishing agents such as stiffening agents, softness surface active agents, crease proofing & water proofing chemicals.

(c) Pretreatment of hosiery, Denim & garments

(i) Washing & scouring of hosiery, Denim & garments

(ii) Special Treatment- stone washing, fading, biopolishing, drum washing & peach finishing

PAPER -II TECHNOLOGY OF BLEACHING & FINISHING

Max. Marks:100 **3Hours Duration**

UNIT-I

Sizing Desizing& Scouring Methods

(a) Singeing, sizing &desizing, various methods for desizing. Scouring cotton by kiers & continuous method.

(b) Efficiency of kier & boiling operation. Scoring of wool & silk. Types of kiers

UNIT-II

Bleaching of different yarns/fabric

(a) Bleaching of cotton & rayon with sodium hypochlorite, hydrogen peroxide & sodium chlorite. Bleaching of wool & silk.

(b) Scouring & bleaching synthetic yarn/fabric & their blends. Use of optical whitening agents in the scouring & bleaching of man made fibers/fabrics.

UNIT-III

Finishing

(a) General introduction about all types of finishes. Application of temporary & permanent finishes, starch, gums & softener such as Wash N wear finishing, water proofing, fire proofing, moth proofing etc. Finishing machines covering stretching devices, washing machine, drying machines damping, calendaring & curing machines etc.Mercerization of cotton & its blends.

(b) Finishing of man - made fibers/fabrics & their blends e.g. Heat setting antistatic soil release, flame retardant & durable press finishing. Study of finishing compounds & the methods used in laboratory.Commercial application of finishing compounds.

PAPER III: TECHNOLOGY OF DYEING AND PRINTING

Max. Marks: 100 **Duration : 3 Hours**

Unit I

Dyes

(a) Classification of dyes, various color theories. General idea about chemistry of dyes, Application of various dyes to cotton and viscose

(b) Dyeing of synthetic fibers. Dyeing of blends of synthetic fibers and cellulosic fibers.

Unit II

Methods of printing

(a) Various methods of printing, Block printing, Screen printing, Roller printing, Rotatory screen cope heat transfer printing, printing of cotton with various dyes by direct style.

(b) Dyeing of wool and silk.Modern techniques in dyeing and printing of natural and man - made fibers in pure and blended forms.

Unit III

Printing of different fibers

(a) Printing of synthetic fibers and blends, Discharge and resist style of printing on cellulosic fibers, synthetic fibers and blends.

(b) Methods of printing on different fabrics - Block Screen Hand, flatbed, rotary, transfer printing, stencil, roller.

(c) Style of printing.

(i) Direct style on cellulosic, wool & silkfibers

(ii) Discharge style

(iii) Resist style

(iv) Printing with natural and biodegradable dye.

(v) Foam, Flock, Foil, glitters printing

Books Recommended:

1. Hall, A.J. (8^{th} Edition) The Standard Hand Book of Textiles Buttor Worth. London.

2. Clark, W An Introduction to Textile [romtong-A practical for use in Laboratories College and School Arts manual Buttor Worth, London.]

3. Shinia. V.A.: Technology of Textile Processing Vol. I ,II,IXSevak Publication, Mumbai.

4. Chakravarty, R.R. Glimpses of Textile Technology, Caxton Press, Delhi.

5. Hall, A.J.: Textile Finishing, Elsevier.

6. Peters, R.H.: Textile Chemistry, Vol. II Elsevier Amsterdam Analytical methods for textile laboratory III WiliamsUnivofoDelewale U.S.A.

7/ R.S. Prayog technology textile printing

8. R.S. Prayog Bleaching Mercerizing and Dyeing of cotton material.

PAPER IV - COMPUTER APPLICATION & PROGRAMMING

Time: 3Hrs. **Max. Marks: 100**

Unit-I

Basics of Computer

Introduction to computer, Basic structure and functioning of computer with AFC as an illustrative example, classification of computers on the basis of application purpose and size, advantage and disadvantage of computers, application of computers, hardware and software, input-output devices, binary numbers and arithmetic memory, Secondary storage.

Unit II
Computer Networking

(a) Introduction-Server client & parts, server & network operating system, network cards, cabling& hubs, maintenance & connecting to internet. IF Statement and FOR Statement IF-ELSE Statement, GO TO Statement, decision making & looping, WHILE statement, DO Statement and jumps in loop.

(b) Features &concept of e-mail technology : - message, headers, address book, attachment, filtering & forwarding mail.

(c) Web Technology - languages and protocols, web page and website, scientific websites. Web resources - search engines, message boards, web page creation concept - planning navigation.

Unit III

Basics of Computer Applications

(a) Windows, MS Word, PowerPoint, Computer system with DOS - as an example introduction to UNIX and Windows, principles of programming, algorithms and flow charts. Microsoft Excel.

(b) Computer aided color matching.

Basic principles - (i) Basic color theory (ii) computation of tristimulus theory (iii) standardization of shades

Books Suggested:

1. Computer and their application to chemistry: R.Kumari: Springer 2008

2. Computer of Chemists, Pundir&Bansal, PragatiPrakashan

3. Computer and Common Sense, R. Hunt and J. Shelley, Prentice Hall

4. Computational Chemistry, A.C. Norris.

Practical- P.G. Diploma Textile

Time Duration: 12 hours (in 2 days) **Max. Marks:** 200

Seven experiments will be given in the examination (4 Major and 3 Minor)

(A) Major Experiment: (30 marks each)

1-. Testing and complete analysis of chemicals involved in wet process like purity of H_2SO_4, $NaNO_2$, $K_2Cr_2O_7$, CH_3COOH, hypo, caustic soda.

2. Preparation of fabrics for dyeing and printing- Desizing, scouring, mercerizing bleaching, optical whitening.

3. Dyeing of natural fiberslike cotton, wool and silk with different dyes.

4. Printing of cotton with different dyes and methods like Block printing/screen printing.

5. Finishing processing of various fabrics - soft finish, stiff finish, active content, solid content.

6. Determination of Purity of coconut oil.

7. Estimation of the chlorine in the sample of bleaching powder.

8. Determination of permanent, ^{13}C temporary and total hardness of water.

(b) Minor Experiment (10 marks each):

1. Analysis and identification of organic functional group in a given compound.

2. Identification of fiber- Microscopic, Burning, solubility and other tests (minimum three)

3. Identification of dyes.

4. Evaluation of Surfactants.

5. Damage evaluation of fabrics during processing.

6. Synthesis of Dyes like methyl orange, Azo Dyes (Congo Red) etc.

7. Rubbing fastness test.

Instructions for Practical Exam -

A board of three examiners will be constituted with two external and one internal. Out of two external one external examiner will be from textile and one from chemistry.

Marking Scheme-

Max. Marks : 200 **Time: 12 Hrs.**

(Spread over 02 days)

Major Experiments (Four in Number) of 30 marks each, total 120 marks. Minor Experiment (Three in Number) of 10 marks each, Total 30 marks.

Seminar - 25 marks

Record - 10 marks

Viva - 15 marks.