

MAHARSHI DAYANAND SARASWATI UNIVERSITY, AJMER



पाठ्यक्रम
SYLLABUS

SCHEME OF EXAMINATION AND COURSES OF STUDY

FACULTY OF SCIENCE

**Post Graduate Diploma in
Textile Chemistry
(w.e.f. 2015-16)**

महर्षि दयानन्द सरस्वती विश्वविद्यालय, अजमेर

NOTICE

1. Change in Statutes/Ordinances/Rules/Regulations Syllabus and Books may, from time to time, be made by amendment or remaking, and a candidate shall, except in so far as the University determines otherwise comply with any change that applies to years he has not completed at the time of change. **The decision taken by the Academic Council shall be final.**

सूचना

1. समय-समय पर संशोधन या पुनः निर्माण कर परिनियमों/ अध्यादेशों/नियमों / विनियमों / पाठ्यक्रमों व पुस्तकों में परिवर्तन किया जा सकता है, तथा किसी भी परिवर्तन को छात्र को मानना होगा बशर्ते कि विश्वविद्यालय ने अन्यथा प्रकार से उनको छूट न दी हो और छात्र ने उस परिवर्तन के पूर्व वर्ष पाठ्यक्रम को पूरा न किया हो। विद्या परिषद द्वारा लिये गये निर्णय अन्तिम होंगे।

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

3 Hours 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

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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) Methods for removal of hardness of water, and some oxidizing and reducing agents like $K_2Cr_2O_7$, $KMnO_4$ etc.

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) General principles involved in analytical techniques used for study of textile fibers such as UV, NMR & IR spectroscopy.
- (b) Chemical testing of textile, Determination of ash content %, colourfastnesses of dyed, printed textile (light washing perspiration rubbing & bleaching). Analysis of blend composition namely cotton / viscose, viscose / acetate, viscose / nylon, cotton / polyester, nylon / acrylic viscose / acrylic & other popular blend
- (c) Determination of hardness of water and BOD, COD.

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) Speciality Treatment- stone washing, fading, biopolishing, drum washing & peach finishing

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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.

PART C-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, General idea about chemistry of dyes, Application of various dyes to cotton and viscose basic color theory.
- (b) Dyeing of synthetic fibers. Dyeing of blends of synthetic fibers and cellulosic fibers, dyeing from organic solvents.

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 wild, Modern techniques in dyeing and printing of natural and man-made fibers in pure blended forms.
- (c) Computer aided color matching.
Basic principles-(i) Basic color theory (ii) computation of tristimulus theory (iii) standardization of shades

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 & silk .
 - (ii) Discharge style
 - (iii) Resist style
 - (iv) Printing with natural eco-friendly dye.
 - (v) Foam, Flock , Foil, glitters printing

Books Recommended:

1. Hall, A.J. (8th Edition) The Standard Hand Book of Textiles Butter Worth. London.
2. Clark, W An Introduction to Textile [romtong-A practical for use in Laboratories College and School Arts manual Butter Worth, London.]
3. Shinia. V.A.: Technology of Textile Processing Vol. IX Sevak 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, Voll and Vol II Elsevier Amsterdam Analytical methods for textile laboratory III WilliamsUnivofDeleware, U.S.A.
7. R.S. Prayog technology textile printing,
8. R.S. Prayog Bleaching Marcerisng and Dyeing of cotton material.

PAPER IV – COMPUTER APPLICATION & PROGRAMMING

Time: 3 Hrs.

Max. Marks: 100

Unit I

Basics of Computer

Introduction to computer, Basic structure and functioning of computer with AFC as an illustrative example, evolution of computers, 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 I/O device. 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 language, operating system with DOS – as an example introduction to UNIX and Windows. Data processing, principles of programming, algorithms and flow charts. Microsoft Excel, Use of Computer in Textile Industry.

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.

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Practical-P.G. Diploma Textile.

Time Duration: 12 hrs (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. Analysis and identification of binary organic mixture.
3. Preparation of fabrics for dyeing and printing- Desizing, scouring, mercerizing bleaching, optical whitening.
4. Dyeing of fabrics with different dyes – Natural and Synthetic.
5. Finishing processing of various fabrics – soft finish, stiff finish, active content, solid content.
6. Purity of coconut oil.
7. Estimation of the chlorine in the sample of bleaching powder.

(B) Minor Experiment (10 marks each):

1. Printing of fabrics with different dyes – Printing of cotton, polyester fabric, staining test.
2. Identification of fibers – Microscopic, Burning, solubility.
3. Identification of dyes.
4. Evaluation of Surfactants.
5. Damage evaluation fabrics during processing.
6. Preparation of Dyes
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.