

**M.D. UNIVERSITY**  
**ROHTAK**

**SYLLABUS**

**FOR**

**PRE-PH.D (TEXTILES CHEMISTRY)**

**MAHARSHI DAYANAND UNIVERSITY,  
ROHTAK SCHEME OF STUDIES AND  
EXAMINATION**

**TEXTILE CHEMISTRY  
Pre-Ph.D Scheme w.e.f 2012-13  
SEMESTER-FIRST**

	<b>Textile Chemistry</b>									
PhD- TC-101	Chemistry of Dyes	3	1	-	4	20	80	-	100	3
PhD- TC-103	Textile Chemicals & Analytical Methods	3	1	-	4	20	80	-	100	3
PhD- TC-105	Advances in Theory of Dyeing	3	1	-	4	20	80	-	100	3
PhD- TC-107	Modern Methods of Dyeing & Printing	3	1	-	4	20	80	-	100	3
PhD- TC-109	Advances in Textile Finishing & Allied Processes	3	1	-	4	20	80	-	100	3
<b>Total</b>		<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>	<b>20</b>	<b>80</b>	<b>-</b>	<b>100</b>	

- NOTE:** i) Only one paper will be chosen from the above courses  
ii) Class work consists of two assignments of 10 marks each.  
iii) Candidates will have to attempt five questions of each consisting of 16 marks  
iv) Q1 will be compulsory with objective type of questions

## **PhD-TC-101 Chemistry of Dyes**

L     T     P  
3     1     -

Class work     :     20  
Examination   :     80  
Total            :     100  
Exam duration:     3 hrs

NOTE: Examiner will set 9 questions in total, with two questions from each unit and one question covering all sections which will be Q.1.

This Q.1 is compulsory and of short answers type. Each question carries equal mark (16 marks). Students have to attempt 5 questions in total at least one question from each unit

### **Unit I**

Advances in chemistry of dye intermediates and unit organic processes applied for their application. Colour and chemical constitution, Stereoisomerism

### **Unit II**

Chemistry of various synthetic dyes for application on textile fibres, novel chromophores and reactive groups, newer application techniques, Developments in dye chemistry

### **Unit III**

Photochemistry of dyes, Solvent dyes, optical brightening agents and pigments. Azo ban, the forbidden amines, anomalies and testing.

### **Unit IV**

Natural dyes- concept and practice, classification, technology for production and application of natural dyes on textiles

### **Reading list**

#### Title

Industrial Dyes  
Colour Chemistry  
Unit Processes in Organic Synthesis  
Journal of the Society of Dyers & Colorists  
Colouration Technology

#### Author

Klaus Hunger  
R L M Allen  
P H Groggins

- International Journals

## **PhD-TC-103 Advances in Theory of Dyeing**

L     T     P  
3     1     -

Class work     :     20  
Examination   :     80  
Total            :     100  
Exam duration:     3 hrs

NOTE: Examiner will set 9 questions in total, with two questions from each unit and one question covering all sections which will be Q.1.

This Q.1 is compulsory and of short answers type. Each question carries equal mark (16 marks). Students have to attempt 5 questions in total at least one question from each unit

### **Unit I**

Thermodynamics of dyeing, concept of Free energy, Surface chemistry, Kinetics of dyeing

### **Unit II**

Classification of fibres and dyes, Intermolecular forces related to dyeing, dye-fibre bonds, adsorption at surfaces, mechanism of direct, reactive, acid, disperse and other dyes on specific fibres.

### **Unit III**

Influence of fibre structure on dyeing, effect of processes on fibre properties before dyeing and during dyeing, Solubility parameter, and cohesive energy density. Interaction between dyes and polymers

### **Unit IV**

Dye sorption, diffusion and rate of dyeing. Measurement of diffusion, dyeing with ionized dyes on substrates containing charged sites.

### **Reading list**

#### Title

Theory and Coloration of Textiles  
Theory of Coloration of Textiles

#### Author

C L Bird & W S Boston  
Alan Johnson

### **PhD-TC-105 Textile Chemicals & Analytical Methods**

L	T	P	Class work	:	20
3	1	-	Examination	:	80
			Total	:	100
			Exam duration:		3 hrs

NOTE: Examiner will set 9 questions in total, with two questions from each unit and one question covering all sections which will be Q.1.

This Q.1 is compulsory and of short answers type. Each question carries equal mark (16 marks). Students have to attempt 5 questions in total at least one question from each unit

#### **Unit I**

Colloidal and Surface chemistry as applied to textile chemicals, Preparation and properties of anionic, cationic and nonionic surface-active agents

#### **Unit II**

Chemistry of Thermoplastic and thermosetting resins, Mechanism of crease resistance

#### **Unit III**

Theory & Instrumentation techniques and application of absorption chromatography, Absorption spectroscopy, Mass spectroscopy

#### **Unit IV**

Evaluation of dyes and finishes, merits and demerits

#### **Reading list**

##### Title

Textile Auxiliaries and Finishing Chemicals  
Basic concepts of Analytical chemistry

##### Author

A A Vaidya, S S Trivedi  
S M Khopkar

## **PhD-TC-107 Modern Methods of Dyeing & Printing**

L     T     P  
3     1     -

Class work     :     20  
Examination   :     80  
Total            :     100  
Exam duration:     3 hrs

NOTE: Examiner will set 9 questions in total, with two questions from each unit and one question covering all sections which will be Q.1.

This Q.1 is compulsory and of short answers type. Each question carries equal mark (16 marks). Students have to attempt 5 questions in total at least one question from each unit

### **Unit I**

Advances in preparatory processes, time and energy saving techniques, Combine preparatory processes, Processing of textured man-made fibres

### **Unit II**

Rapid dyeing techniques, Foam dyeing and other advanced dyeing techniques. Dyeing using Supercritical carbon dioxide

### **Unit III**

Developments in transfer printing of natural as well as synthetic dyes, Digital printing – Inkjet printing and Xerography

### **Unit IV**

Concept of continuous processing, Developments in dyeing and printing machineries

### **Reading list**

#### Title

Engineering in Textile Coloration

Review of Progress in Coloration

International Dyer

#### Author

C. Duckworth

-International Journals

### **PhD-TC-109 Advances in Textile Finishing & Allied processes**

L	T	P	Class work	:	20
3	1	-	Examination	:	80
			Total	:	100
			Exam duration:		3 hrs

NOTE: Examiner will set 9 questions in total, with two questions from each unit and one question covering all sections which will be Q.1.

This Q.1 is compulsory and of short answers type. Each question carries equal mark (16 marks). Students have to attempt 5 questions in total at least one question from each unit

#### **Unit I**

Concepts of antcrease finish, Esterification and etherification, Developments in resins, problem of formaldehyde release. Polycarboxylic acids for wrinkle recovery finish, merits and demerits. DP rating

#### **Unit II**

Burning behaviour of polymers and ways to affect flame retardancy, Condensed phase and gas phase mechanisms of FR. Classification, application and developments in flame redardants. Test methods for fire resistance. Soil release finish-theory and practice, advances and evaluation

#### **Unit III**

Minimum application techniques, CAV, Foam finishing technology, Developments in finishing machineries

#### **Unit IV**

Air and water pollution, disposal of waste and effluents and related processes, Modern ETP, Analysis of waste water

#### **Reading list**

<u>Title</u>	<u>Author</u>
Chemical finishing of textiles	W D Schindler & P J Hauser (Woodhead Publishing Ltd.)
Handbook of Fibre Science and Technology: Chemical Processing of fibre and fabrics Vol II Part-B Technology of Finishing	Lewin & Sello (Marcel Dekker Publication) V A Shenai

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**SCHEME OF STUDIES AND EXAMINATION**

**TEXTILE CHEMISTRY**

**Pre-Ph.D Scheme w.e.f 2012-13**

**SEMESTER-SECOND**

Course No.	Course Title	Teaching Schedule				Marks of Class work	Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
	<b>Textile Chemistry</b>									
PhD-TC-102	Research Methodology	3	1	-	4	20	80	-	100	3
PhD-TC-104	SEMINAR	-	-	2	2	100	-	-	100	
<b>Total</b>		<b>3</b>	<b>1</b>	<b>2</b>	<b>6</b>	<b>120</b>	<b>80</b>	<b>-</b>	<b>200</b>	

- NOTE: i) Research Methodology paper is common for all streams**  
**ii) Class work consists of two assignments of 10 marks each.**  
**iii) Candidates will have to attempt five questions of each consisting of 16 marks**  
**iv) Q1 will be compulsory with objective type of questions**  
**v) Seminar topic will be chosen as pre-project work**

**PhD TC-102 Research Methodology**

L      T      P  
3      1      -

Class work      :      20  
Examination      :      80  
Total                :      100

Exam duration:      3 Hrs

**Course contents are same as in other streams**

**PhD TC-104 SEMINAR**

L      T      P  
-      -      2

Class work      :      100  
Examination      :      -  
Total                :      100  
Exam duration:      -

Each student will have to deliver a talk on the topics, in the weekly period allotted to the subject pertaining to his/her project work or any topic assigned by Head of the Department.

*The performance of the speaker would be judged in the class by Board of Examiners.*