



WOVEN TEXTILE

Teacher Manual

Class - XI



CENTRAL BOARD OF SECONDARY EDUCATION

Shiksha Kendra, 2, Community Centre, Preet Vihar, Delhi-110 092 India



Woven Textiles

Textbook

CLASS

XI



CENTRAL BOARD OF SECONDARY EDUCATION

in collaboration with



NATIONAL INSTITUTE OF FASHION TECHNOLOGY

WOVEN TEXTILES

Woven Textiles , Text book & Practical Manual Class XI

First Edition: October 2013

CBSE, India

Copies: 1000

Price : ₹ 275/--

Paper used : 80 Gsm CBSE Water mark white Maplitho

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Published By : The Secretary, Central Board of Secondary Education,
Shiksha Kendra, 2, Community Centre, Preet Vihar,
Delhi-110092

Design, Layout : Multi Graphics, 8A/101, WEA Karol Bagh, New Delhi-110005
Phone: 011-25783846

Printed By : Kalyan Enterprises D-20, Sec. B3, Tronica city Gzb (U.P.)

भारत का संविधान

उद्देशिका

हम, भारत के लोग, भारत को एक सम्पूर्ण ¹[प्रभुत्व-संपन्न समाजवादी पंथनिरपेक्ष लोकतंत्रात्मक गणराज्य] बनाने के लिए, तथा उसके समस्त नागरिकों को:

सामाजिक, आर्थिक और राजनैतिक न्याय,

विचार, अभिव्यक्ति, विश्वास, धर्म

और उपासना की स्वतंत्रता,

प्रतिष्ठा और अवसर की समता

प्राप्त कराने के लिए

तथा उन सब में व्यक्ति की गरिमा

और ¹[राष्ट्र की एकता और अखंडता]

सुनिश्चित करने वाली बंधुता बढ़ाने के लिए

दृढ़संकल्प होकर अपनी इस संविधान सभा में आज तारीख 26 नवम्बर, 1949 ई० को एतद्वारा इस संविधान को अंगीकृत, अधिनियमित और आत्मार्पित करते हैं।

1. संविधान (बयालीसवां संशोधन) अधिनियम, 1976 की धारा 2 द्वारा (3.1.1977) से “प्रभुत्व-संपन्न लोकतंत्रात्मक गणराज्य” के स्थान पर प्रतिस्थापित।
2. संविधान (बयालीसवां संशोधन) अधिनियम, 1976 की धारा 2 द्वारा (3.1.1977) से “राष्ट्र की एकता” के स्थान पर प्रतिस्थापित।

भाग 4 क

मूल कर्तव्य

51 क. मूल कर्तव्य - भारत के प्रत्येक नागरिक का यह कर्तव्य होगा कि वह -

- (क) संविधान का पालन करे और उसके आदर्शों, संस्थाओं, राष्ट्रध्वज और राष्ट्रगान का आदर करे;
- (ख) स्वतंत्रता के लिए हमारे राष्ट्रीय आंदोलन को प्रेरित करने वाले उच्च आदर्शों को हृदय में संजोए रखे और उनका पालन करे;
- (ग) भारत की प्रभुता, एकता और अखंडता की रक्षा करे और उसे अक्षुण्ण रखे;
- (घ) देश की रक्षा करे और आह्वान किए जाने पर राष्ट्र की सेवा करे;
- (ङ) भारत के सभी लोगों में समरसता और समान भ्रातृत्व की भावना का निर्माण करे जो धर्म, भाषा और प्रदेश या वर्ग पर आधारित सभी भेदभाव से परे हों, ऐसी प्रथाओं का त्याग करे जो स्त्रियों के सम्मान के विरुद्ध हैं;
- (च) हमारी सामासिक संस्कृति की गौरवशाली परंपरा का महत्त्व समझे और उसका परीक्षण करे;
- (छ) प्राकृतिक पर्यावरण की जिसके अंतर्गत वन, झील, नदी, और वन्य जीव हैं, रक्षा करे और उसका संवर्धन करे तथा प्राणिमात्र के प्रति दयाभाव रखे;
- (ज) वैज्ञानिक दृष्टिकोण, मानववाद और ज्ञानार्जन तथा सुधार की भावना का विकास करे;
- (झ) सार्वजनिक संपत्ति को सुरक्षित रखे और हिंसा से दूर रहे;
- (ञ) व्यक्तिगत और सामूहिक गतिविधियों के सभी क्षेत्रों में उत्कर्ष की ओर बढ़ने का सतत प्रयास करे जिससे राष्ट्र निरंतर बढ़ते हुए प्रयत्न और उपलब्धि की नई उंचाइयों को छू ले;
- ¹(ट) यदि माता-पिता या संरक्षक हैं, छह वर्ष से चौदह वर्ष तक की आयु वाले अपने, यथास्थिति, बालक या प्रतिपाल्य के लिये शिक्षा के अवसर प्रदान करे।

1. संविधान (छयासीवां संशोधन) अधिनियम, 2002 की धारा 4 द्वारा (12.12.2002) से अंतः स्थापित।

THE CONSTITUTION OF INDIA

PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a ¹**[SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC]** and to secure to all its citizens :

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the² [unity and integrity of the Nation];

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949, do **HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.**

1. Subs, by the Constitution (Forty-Second Amendment) Act. 1976, sec. 2, for "Sovereign Democratic Republic" (w.e.f. 3.1.1977)
2. Subs, by the Constitution (Forty-Second Amendment) Act. 1976, sec. 2, for "unity of the Nation" (w.e.f. 3.1.1977)

THE CONSTITUTION OF INDIA

Chapter IV A

FUNDAMENTAL DUTIES

ARTICLE 51A

Fundamental Duties - It shall be the duty of every citizen of India-

- (a) to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;
- (b) to cherish and follow the noble ideals which inspired our national struggle for freedom;
- (c) to uphold and protect the sovereignty, unity and integrity of India;
- (d) to defend the country and render national service when called upon to do so;
- (e) to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women;
- (f) to value and preserve the rich heritage of our composite culture;
- (g) to protect and improve the natural environment including forests, lakes, rivers, wild life and to have compassion for living creatures;
- (h) to develop the scientific temper, humanism and the spirit of inquiry and reform;
- (i) to safeguard public property and to abjure violence;
- (j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement;
- ¹(k) who is a parent or guardian to provide opportunities for education to his/her child or, as the case may be, ward between age of six and fourteen years.

1. Ins. by the constitution (Eighty - Sixth Amendment) Act, 2002 S.4 (w.e.f. 12.12.2002)



Woven Textiles

Preamble:

Textile refers to any material made through weaving, knitting, crocheting, braiding, and other non-woven textiles. Development of textile involves complete cycle right from the development of fibre to fabric ranging from 100% natural fibres to 100 % synthetic materials. Then it also involves a complete vision of development of new design aspects for novelty in fabric surface, textile products and various other textile materials. It includes designing of fabric used in clothing, house hold textiles, decorative textiles and others. It involves design intervention along with the development of the final product within the technical specification and right commercial value.

In order to understand and create varieties of fabric using various innovative weaves “Woven Textiles” course is introduced as an elementary course. The course will provide an overview of Textiles which are produced in the Textile Industry. The overall objective of this course is to understand the basics textiles, related terminologies and the overall work pattern of textile industry

CBSE

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Foreward

The Indian Textiles Industry has an over whelming presence in the economic life of the country and is one of the leading textile industries in the world. India earns about 27% of its total foreign exchange through textile exports. Further, the textile industry of India also contributes nearly 14% of the total industrial production of the country. It also contributes around 3% to the GDP of the country. India textile industry is also the second largest provider of employment in the country in terms of after agriculture.

As per the 12th Five year plan, the integrated skill development scheme aims to train over 2,675,000 people within the next 5 years. This scheme would cover all sub sectors of the textile sector such as textiles and Apparel, handicraft, handlooms, jute and sericulture.

In order to match the increasing requirement of skilled personnel, CBSE has initiated to introduce “Textile Design” as a vocational course for Class XI and XII. The course aims to introduce students to Elements of Design, Fabric science, Woven textiles, Dyeing & Printing procedures and introduction to our traditional textiles. This will help students to join the industry after Class XII or they can pursue higher education in this field.

The Faculty of the National Institute of Fashion Technology has developed the curriculum and the learning Material. I place on record the Board's thankful acknowledgement of the services rendered by Shri P. K. Gera, Director General, NIFT, Sr. Prof Banhi Jha, Dean- Academics, Project In-charge and Ms. Savita Sheoran Rana, Chairperson, Textile Design Department, Project Anchor - Textile Design. The course is developed and prepared by faculty members from Textile Design Department across NIFT centers. CBSE also acknowledges the contribution by Prof. Anupam Jain, Hyderabad, Ms. Kislay Choudhary, Assistant Prof. Bhopal; Ms. Shubhangi Yadav, Associate Prof, Gandhinagar, Mohammad Javed, Associate Prof., Mumbai; Shri. Arnab Sen, Assistant Prof, Bhopal, Mr. Debojyoti Ganguly, Assistant Prof., Bhopal and Shri. Shivalingam.

I would like to appreciate Dr. Biswajit Saha, Associate Professor and Programme Officer, Vocational Education Cell, CBSE and Ms. Swati Gupta, Assistant Professor and Assistant Programme Officer, Vocational Education Cell, CBSE and other members of Vocational Education Cell, CBSE is also deeply appreciated.

Comments and suggestions for further improving the curriculum are always welcome

Vineet Joshi
Chairman

Woven Textiles

Class XI

Theory and Practical Based

Preamble

- ❖ To Introduce weaving and weaving terminologies
- ❖ To familiarize students to Weaving Technology, looms category and the preparatory processes
- ❖ To gain an overview of the various woven structures
- ❖ To introduce scope of Woven design industry.

Unit I – Introduction of Woven Textiles

Objective:

- ❖ To introduce students to the woven textiles industry.
- ❖ The unit deals with all the important definitions of woven textiles and various associated terminologies.
- ❖ To sensitize students towards fabric classification and different fibre types.
- ❖ Introduction of looms and its parts.

Course Content:

1. Introduction to Textiles –
 - a. Introduction to textiles and various terminologies.
 - b. The classification of textiles in terms of Woven and Non-Woven on the basis of fibre / yarn types.
2. Introduction to Weaving –
 - a. Understand weaving, its history in terms of traditional weaving and the impact of Industrial Revolution.
 - b. Weaving terminologies
 - i. Ends /Warp
 - ii. Picks / Weft
 - iii. Selvedge
 - iv. Fabric Construction - Ends / Inch and Picks /Inch
 - v. Reed Count and warping calculations

3. Looms –

- a. What is a loom.
- b. Its classifications on the basis of shuttle and shuttle less looms, power loom, handloom, tappet, jacquard and dobby.

Learning Outcome:

At the end of the unit the student shall be able

- ❖ To differentiate types of woven fabrics
- ❖ To understand weaving technology
- ❖ To classify and identify various looms

Teaching Methodology:

- ❖ Illustrated lectures with power point presentations.
- ❖ The teacher shall plan a visit to a weaving unit of a composite textile mill.
- ❖ The teacher would be expected to create a library of fabrics to explain.

Assignment:

- ❖ **Preparation of Fabric Watch Book** – 10 sourced fabric swatches (8"x8") of woven, knitted and fused fabrics. The swatches should be made of different fibre and yarns.
- ❖ **Group Assignment**– Presentation by a group of 5-6 students. The group shall make a presentation on one type of Loom.

Evaluation Criteria:

- ❖ Selection of swatches , identification, classification and presentation as a swatch book.
- ❖ Presentation – verbal presentation, visual presentation, understanding of the topic, group management.
- ❖ Quality of work submitted.
- ❖ Viva- voice for swatch book and presentation.

Unit II – Weaving Technology

Objective:

- ❖ The unit will introduce the students to various loom mechanisms.
- ❖ Looms classifications and loom parts.
- ❖ To introduce yarn preparatory - an important prerequisite for weaving.

**Course Content:**

1. Weaving Mechanism –
 - a. Complete loom details – its parts, motions and other terminologies associated with weaving
2. Loom Preparatory –
 - a. Processes involved in preparation of loom for weaving – winding, warping, weft preparatory and denting
3. Introduction to Weave Design
 - a. Usage of Point Paper / Graph Paper / Design Paper
 - b. Methodology of Interlacement of Warp and Weft
 - c. Construction of Fabric
 - d. Design, draft and peg plan preparation
 - e. Different types of draft plan

Learning Outcome:

At the end of the unit the students shall know,

- ❖ Complete details about Looms and its parts.
- ❖ The preparatory procedures for weaving
- ❖ The process involved in preparing design, draft and peg plan

Teaching Methodology:

- ❖ Illustrated lectures with Power Point presentations
- ❖ Visit to a composite textile mill – Preparatory Unit

Assignment:

- ❖ Setting up of loom – the student will individually set up a loom- three meters of warp, for eight inch wide swatches.

Evaluation Criteria

- ❖ Daily assessment on presentation of work
- ❖ Level of improvement if required
- ❖ Punctuality, regularity and sincerity
- ❖ Quality of loom setup

Unit III – Fabric Structure

Objective:

- ❖ To introduce fabric structures and design development.
- ❖ To develop plain, twill and sateen weave structure using point paper.

Course Content:

1. Introduction to Plain Weave
 - ❖ Characteristics of Plain Weave
 - ❖ Ornamentation of Plain Weave
 - ❖ Derivatives of Plain Weave
2. Introduction to Twill Weave
 - ❖ Characteristics of Twill Weave
 - ❖ Derivatives of Twill Weave
3. Introduction to Satin Weave
 - ❖ Characteristics of Sateen
 - ❖ Irregular Satin / Sateen

Learning Outcome:

At the end of the unit the students shall know,

- ❖ The three basic fabric structures
- ❖ How to draw the structures on design paper
- ❖ How to prepare design, draft and peg plan

Teaching Methodology:

- ❖ Illustrated lectures with Power Point Presentations
- ❖ The teacher would be expected to create a library of fabrics to explain and conduct the class.
- ❖ The swatches should be collected in terms of the different designs – stripes, checks, textures and other related designs which can be developed using these three weave structures.

Assignment:

- ❖ Weaving practical – to weave 3 swatches of 8”x8” of plain, twill and sateen weave.
- ❖ Preparation of document of the woven swatches.



Evaluation Criterion:

1. Quality of weaving
2. Quality of documentation
3. Regularity and sincerity

Unit IV – An Overview of the Weaving Industry

Objective:

- ❖ To introduce the students to the commercial aspect of the woven textiles.
- ❖ This unit will introduce the students to woven structures and usage of computer for making the designs.

Course Content:

1. An overview of the Textile Industry
 - i. Segments of Indian Textile Industry
 - ii. Basic structure of Textile Industry
 - iii. Handloom and Power loom Textile Industry
2. Identification of the fabrics with Commercial Names
 - i. Commercial names of the fabric
 - ii. Various Fabrics and its end uses
 - iii. Selection of fabric as per end use based on its quality
 - ❖ Clothing / Apparel
 - ❖ Home Fashion
 - ❖ Accessories
3. Computerization in Textile Design
 - i. Woven Structures and development of woven design on Computer

Learning Outcome:

At the end of the unit, the students shall be able

- ❖ To identify Fabric types and product categories.
- ❖ To identify fabric as per end use
- ❖ To develop design on computer

Teaching Methodology:

- ❖ Illustrated lectures with Power Point Presentations

Assignment:

- ❖ **Preparation of Fabric swatch book** – 10 fabrics swatches (8”x8”) of plain, twill and sateen. The swatches should be of different types in terms of design patterns
- ❖ **Suggestive** – 1-2 swatches could be “NEW DESIGN” as identified by the students

Evaluation Criteria:

- ❖ Selection of swatches
- ❖ Identification and classification of Fabrics
- ❖ Presentation as a swatch book

Reference Material:

- ❖ Principles of Weaving - R. Marks, A. T. C. Robinson
- ❖ The Four-Shaft Table Loom - Anne Field, Dryad Press Ltd. London 1987
- ❖ Watson's Textile Design and Colour-I - Z. Grosiki, Universal Publishing, Bombay
- ❖ The Ashford Book of Weaving - Anne Field, B. T. Batsford, London, 1992
- ❖ Warp & Weft - A Dictionary of Textile Terms - Dorothy K. Burnham, Charles Seribner's Son, New York, 1981
- ❖ Textile Terms and Definitions- The Textile Institution, Manchester U.K. The Textile Institution, Manchester U. K. 1993
- ❖ International Textile Design - Mary Schoeser, John Wiley & Sons, Inc. 1995
- ❖ The New Textiles- Trends & Traditions - Chloe Colchester, Thames & Hudson 1997

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