

**MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI**

1	Name of Syllabus	CERTIFICATE COURSE IN WEAVING OF MAN-MADE FIBER FABRICS (402153)																																																
2	Max. Nos of Students	25 STUDENTS																																																
3	Duration	6 MONTHS																																																
4	Type	PART TIME																																																
5	Nos Of Days / Week	6 DAYS																																																
6	Nos Of Hours /Days	4 HRS																																																
7	Space Required	1) WORKSHOP = 800 SQFEET 2) CLASS ROOM = 200 SQFEET TOTAL = 1000 SQFEET																																																
8	Entry Qualification	S.S.C.																																																
9	Objective of Syllabus/ introduction	<b>Introduction:</b> weaving technology offers the knowledge about weaving machineries and weaving processes (winding, warping and looming prior to weaving, followed by the basic principles of weaving, shuttle and shuttle less methods of weft insertion and multiphase weaving), inculcate standard weaving plant operations to improve working conditions and fabric quality. <b>Objectives:</b> 1. To give contemporary technological knowledge of weaving (shedding, picking, beating-up, warp let off and cloth take up motions and control and stop motions) 2. To teach the ways to control, lead and improve the actual working conditions, 3. To develop problem solving skills related to weaving operations. The ‘weaving technology’ subject gives a thorough understanding of the latest weaving practices. ‘Introduction to textiles and fabric structure’ subject gives knowledge of various textile fibers, yarn manufacturing methods, knitting techniques, nonwovens, chemical processing and goes into greater depth of fabric structure. The course is conducted through lectures, discussions, practicals on machines & equipments, industrial visits etc.																																																
10	Employment Opportunity	The technological knowledge and skills of textile weaving students are highly valued by textile manufacturing companies. The majority of weaving students take up posts in the textile manufacturing industry as process or plant managers, technologists. Recently employment have found in the areas of production management, design, textile testing and quality assurance, new product development, purchasing. At present there is a huge demand in textile industry.																																																
11	Teacher’s Qualification	Diploma/Degree in weaving or equivalent																																																
12	Training System	<table><tr><th colspan="4">Training System Per Week</th></tr><tr><th>THEORY</th><th>PRACTICAL</th><th colspan="2">TOTAL</th></tr><tr><td>6 hrs.</td><td>18 hrs.</td><td colspan="2">24 hrs.</td></tr></table>							Training System Per Week				THEORY	PRACTICAL	TOTAL		6 hrs.	18 hrs.	24 hrs.																															
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**CERTIFICATE COURSE IN WEAVING OF MAN-MADE FIBER FABRICS (402153)**

<b>TH-I WEAVING TECHNOLOGY (40215311) Marks: 100, Hrs: 66</b>			
<b>Sr No</b>		<b>Marks</b>	<b>Hrs</b>
1	<b>Sequence of process involved in manufacturing cotton fabric</b> – flowchart. <b>Sequence of process involved in manufacturing synthetic fabric</b> – flowchart.	2	2
2	<b>Winding</b> – Objectives of winding, essential elements of winding machine like creel guide, slub catcher, tensioner. Study of modern winding machine with reference to above points. Role of knotter and splicer. Objectives of pirn winding and features of modern pirn winding machine. Production calculations.	8	6
3	<b>Warping</b> – Study of conventional and modern beam warping machines. Production calculations. <b>Sectional Warping Machine</b> – Features of modern sectional warping machine. Production calculations.	6	4
4	<b>Sizing</b> – Objectives of sizing of spun and filament yarn. Study of multi cylinder sizing machine. Types of creels, modern saw box and leasing operations. Control in sizing. Calculations.	8	6
5	<b>Looming</b> – Manual drawing and knotting. Analysis of types of looms. Weft insertion rates of various looms.	4	2
6	<b>Principles of weaving</b> – Primary motion – Definition of shedding. Positive and negative shedding. Study of shedding mechanism on shuttle and shuttle-less looms (tappet shedding)	4	4
7	<b>Primary Motions</b> - Definition of picking. Outline of over and under picking. Detailed study of (a) Airjet picking (b) Water jet picking (c) Project tile picking (d) Rapier picking (flexible & rigid picking) Quality of air and water required for Airjet and Waterjet picking. Devas and gabler rapier picking. Study of weft accumulator.	20	10
8	<b>Primary Motions</b> - Definition of Beating. Study of Crank driven sley and Cam driven sley.	4	2
9	<b>Secondary Motions</b> - Definition of Let-off. Study of Let-off on shuttle less looms.	4	3
10	<b>Secondary Motions</b> -Definition of Take-up motion. Study of seven wheel intermittent and continuous take-up motion. Study of take-up motion on shuttle-less looms.	4	3
11	<b>Stop motion on shuttle-less looms. Selvedge motions on shuttle-less looms. Driving mechanism on shuttle-less looms.</b>	4	6
12	<b>Study of Dobby</b> (a) Climax Dobby (b) Cam Dobby (c) Circular Dobby Comparison of above dobby mechanisms.	4	6
13	<b>Weft colour mixing on shuttle-less looms.</b>	6	2
14	Principle of Jacquard shedding, classification of Jacquards based on 1. Figuring capacity, 2. Types of sheds form, and 3. Pitch of Jacquards Study of (a) Double lift double cylinder Jacquard ( b) Electronic Jacquard	8	4
15	<b>Features of Automatic Looms</b> – Study of Warp stop motion, Pirn changing mechanism and Let off mechanism.	6	4
16	<b>Fabric Defect</b> - Causes and Remedies	4	1
17	<b>Introduction to fabric costing</b>	4	1

<b>TH-II - Introduction To Textiles &amp; Fabric Structure (40215312) Marks: 100, Hrs: 66</b>			
<b>Sr No</b>	<b>Sec-I Introduction to textiles Marks:30, Hrs: 20</b>	<b>Marks</b>	<b>Hrs</b>
1	<b>Introduction to textile fibres</b> Classification of textile fibers. Origin and important properties of natural fibers – cotton, wool, silk, linen, jute, Introduction to wet, dry and melt spinning of man-made fibres. Flow charts for the production of man-made fibers - viscose rayon, nylon, acrylic, polyester, polyurethane. Introduction to texturizing and its advantages. Important properties of man-made fibers – viscose rayon, nylon, acrylic, polyester, spandex.	8	5
2	<b>Introduction to yarn manufacture</b> Introduction to cotton spinning - ring spinning and open end spinning. Introduction to woolen and worsted spinning. Yarn twist – s and z twists, effect of twist on yarn properties. Yarn count, denier and tex with simple calculations. Blending of fibers – objectives and methods. Types of yarns and their characteristics as ply yarns, cabled yarns, doubled yarns.	6	5
3	<b>Knitting</b> Introduction, types of knits, comparison of woven & knit fabric, comparison of warp & weft knit fabrics. <b>Non-woven</b> Introduction, types of nonwovens, their uses.	6	5
4	<b>Chemical processing</b> Chemical processing flow charts for cotton, wool, silk, viscose rayon, nylon, acrylic, polyester Substrate. <b>Preparatory processes</b> - objectives and process description of singeing, desizing, scouring, bleaching, optical whitening of cotton, wool, silk, viscose rayon, nylon, acrylic, polyester substrate. Mercerization of cotton – objectives and method in brief. <b>Dyeing</b> –basic terminology, dyes for common textile fibers. Dyeing of cotton with direct, reactive, vat and sulphur dyes. Dyeing of wool, silk and nylon with acid, basic dyes. Dyeing of acrylic with basic dyes. Dyeing of pet with disperse dyes. <b>Printing</b> - introduction, styles & methods of printing. <b>Finishing</b> - introduction, classification of finishes, examples of common mechanical & chemical finishes.	10	5
	<b>Sec-II Fabric Structure Marks:70, Hrs: 46</b>		
5	<b>Elements of woven design</b> Introduction of fabric structure. Classification of woven fabrics. Methods of fabric representation. Use of graph paper. Repeat of the design. Drawing-in, denting, draft, lifting plan, design. System of drafting. Construction of drafts and lifting plans.	10	6

	<p>Methods of indicating drafts and lifting plans: by ruling lines, by design papers and by numbering.</p> <p>Relations between design, draft and lifting plan.</p> <p>Construction of drafts and lifting plan from given designs.</p> <p>Construction of drafts from given designs and lifting plans.</p> <p>Construction of designs from given drafts and lifting plans.</p>		
6	<p><b>Construction of elementary weaves</b></p> <p>Study of plain weaves.</p> <p>Classification of plain weave.</p> <p>Simple twill weaves and its construction.</p> <p>Sateen and satin weaves: regular sateen and satins, irregular sateen and satins.</p>	10	6
7	<p><b>Development of weaves from elementary bases</b></p> <p>Plain weave derivatives: warp rib weaves, weft rib weaves, hopsack, mat or basket weaves.</p> <p>Weaves constructed on twill bases: waved or zigzag twills, herringbone twills, curved twills, broken twills, transposed twills, elongated twills, combined twills.</p> <p>Weaves constructed on satin or sateen bases: simple developments, extension of sateen weaves.</p>	10	6
8	<p><b>Diamond and diaper designs</b></p> <p>Construction of diamond designs</p> <p>Construction of diaper designs.</p>	10	6
9	<p><b>Simple fancy weaves</b></p> <p>Principles of designing honey comb weaves.</p> <p>Types of honey-comb weave: ordinary and brighton honey comb weave.</p> <p>Huckaback weaves.</p> <p>Mock leno weaves. Simple spot designs.</p> <p>Crepe weaves&amp; their different methods.</p> <p>Fancy rib and cord weaves.</p> <p>Bedford cords: wadded Bedford cords. Bedford cords (arranged with alternate picks), twill-faced Bedford cords.</p> <p>Welts and piques: ordinary welt structures, weft wadded wefts, pique, pique weaves with wadded ends, waved piques.</p>	8	6
10	<p><b>Simple colour and weave effects</b></p> <p>Representation of colour and weave effects upon design paper</p> <p>Classification of colour and weave effects</p> <p>Methods of producing variety of effect in the same weave and coloring</p> <p>Different effects produced by simple weave and colour combination:- continuous line effects, hound's tooth patterns, bird's-eye and spot effects, hairlines, Step patterns, all-over effects.</p>	8	5
11	<p><b>Elements of jacquard shedding</b></p> <p>Ordinary harness ties,</p> <p>Harness drawing in, card cutting and card lacing.</p> <p>Harness &amp; design calculation</p> <p>Sett of the harness, number of harness cords to each hook, casting-out</p> <p>Jacquards, counts of design paper.</p> <p>Construction and development of jacquard designs. Construction of squared paper designs, process of drafting a sketch designs.</p> <p>Designing and card cutting systems.</p>	8	6
12	Crimp calculation, weight of warp and weight of weft, cover factor of fabric.	6	5

<b>PR-I Weaving Technology - I (40215321) Marks: 100, Hrs: 198</b>	
<b>Sr No</b>	<b>NAME OF PRACTICALS / ASSIGNMENTS</b>
1	Different types of weaving accessories.
2	Different types of yarns.
3	Identification of different types of fibers.
4	Different types of knots.
5	Study of double deck winding machine.
6	Study of twisting machine.
7	Study of cone winding.
8	Study of warping.
9	Study of sectional warping.
10	Study of slasher sizing.
11	Study of multi cylinder sizing.
12	Study of drawing-in.
13	Study of passage of warp on loom.
14	Study of tappet shedding.
15	Study of over pick mechanism.
16	Study of under pick mechanism.
17	Study of beat up.
18	Study of negative let off mechanism.
19	Study of semi positive let off.
20	Study of five wheel continuous take up motion.
21	Study of seven wheel intermittent take up motion.
22	Study of seven wheel continuous take up motion.
23	Study of loose reed mechanism.
24	Study of fast reed mechanism.
25	Study of weft fork motion.
26	Study of various fabric faults.
27	Dismantling and refitting of climax dobby.
28	Study lattice pegging of left hand dobby.
29	Study lattice pegging of right hand dobby.
30	Study of cross border dobby.
31	Constructing a design for cross border dobby and peg the 2 lattice and master barrel according to the design.
32	Study of 4 x 4 pick at will box motion.
33	Study of 2 x 1 drop box motion.
34	Preparation of pattern chain for 2 x 1 drop box.
35	Preparation of pattern chain for 4 x 4 pick at will box motion.

<b>PR - II - WEAVING TECHNOLOGY – II (40215322) Marks: 100, Hrs: 198</b>	
<b>Sr No</b>	<b>LIST OF THE ASSIGNMENT / PRACTICAL</b>
<b>1</b>	Study of double lift double cylinder jacquard.
<b>2</b>	Study of electronic jacquard.
<b>3</b>	Study of norwich tie.
<b>4</b>	Study of london cross tie.
<b>5</b>	Study of point tie.
<b>6</b>	Study of mixed tie.
<b>7</b>	Card cutting and card lacing.
	<b>Fabric Analysis</b>
<b>8</b>	Plain weave
<b>9</b>	Warp rib weave
<b>10</b>	Weft rib weave
<b>11</b>	Hopsack or basket or matt weave
<b>12</b>	Plain weave-stripes
<b>13</b>	Plain weave-checks
<b>14</b>	3/1 twill weave
<b>15</b>	Denim weave
<b>16</b>	Satin or sateen weave
<b>17</b>	Pointed twill
<b>18</b>	Large twill
<b>19</b>	Herringbone twill weave
<b>20</b>	Diamond weave
<b>21</b>	Honeycomb weave
<b>22</b>	Mock leno weave
<b>23</b>	Huck-a-back weave
	<b>Testing</b>
<b>24</b>	Measurement of fibre fineness by cut and weigh method
<b>25</b>	Measurement of yarn count
<b>26</b>	Measurement of single yarn strength and elongation
<b>27</b>	Determination of lea strength and csp
<b>28</b>	Measurement of gsm of fabric
<b>29</b>	Determination of crimp percentage of yarn from fabric
<b>30</b>	Measurement of yarn twist
<b>31</b>	Measurement of fabric cover factor

**Reference books:****TH – I Weaving Technology**

<b>Sr No</b>	<b>Book Name</b>	<b>Author</b>	<b>Publication</b>
1	SIZING- Materials, Methods, machineries	Prof. D. B. Ajgaonkar wadekar & Talukdar	Textile Trade Press – 1982
2	Yarn & Fabric conversion	Prof. P. R. Lord and Mohammed	Mecrow Publishers, UK - 1982
3	Hand Book of Weaving	Sabit Adnur	Technomic Publisher Co. – Lancaster, USA - 2001
4	Weaving Mechanism Vol – I	N. N. Bannerjee	West Bengal - 1982
5	Weaving Mechanism Vol – II	N. N. Bannerjee	West Bengal - 1982
6	Plain Weaving Motion	Prof. K. T. Aswarji	Mahajan Brothers, Ahmedabad - 1997
7	Weaving calculations	R. Sengupta	D. B. Taraporwala – 1971
8	Catalogue of woven fabric defects & visual inspection system	Textile Committee	Textile Committee, Mumbai, May -2002
9	Modern Preparation and Weaving Machinery	A. Ormerod	Butterworth Publisher - 1983
10	Innovations in Weaving Machinery	Dr. Teruo Ishida	Osaka Senken, Tokyo – 1994
11	Weaving- Machines, Mechanisms, Management	Dr. M. K. Talukdar, Prof. P.K. Shreeramulu, Prof. D.B. Ajgaonkar	Mahajan Publisher - 1998

**TH-II Sec-I Introduction to Textiles**

<b>Sr No</b>	<b>Book Name</b>	<b>Author</b>	<b>Publication</b>
1	Textiles Fibre to Fabric	Bernard P. Corbman	McGRAW-Hill
2	Textile Fibres	H. V. S. Murthy	The Textile Association (I), Mumbai – 1987
3	Textile Fibres	V. A. Shenai	Sevak Publisher, Mumbai - 1977
4	Technology of Textile Fibres	V.A. Shenai	Sevak Publisher, Mumbai - 1977
5	Textile Science	J.T. Marsh	131 Publishers - 1979
6	Textile Science	E. P. G. Gohl, L.D. Vilensky	Guilford Publications
7	A Text book of Fibre science and Technology	Mr. S.P. Mishra	New Age Publishers - 2000
8	Yarn Preparation Vol. I and Vol. II	R. Sen Gupta	Popular Prakashan – 1970
9	Knitting Technology	David Spenser	Peogamon Press - 1983
10	Knitting Technology	D.B. Ajgaonkar	Universal Publisher Corp. - 1998
11	Knitting fundamentals, machines, structures & Developments	N. Anbumani	New Age Publisher - 2007
13	Technology of Scouring and Bleaching	V. A. Shenai	Sevak Publisher, Mumbai - 2003
14	Textile Preparation and Dyeing	Asim Kumar Roy Choudhury	Oxford – IBTT, 2006
15	Motivate series – Textiles	A. Wyne	Macmillan Education Ltd.

## TH-II Sec-II Fabric Structure

Sr No	Book Name	Author	Publication
1	Watson's Textile Design and Colour Elementary weaves and figured fabrics (seventh edition)	Z. J. Grosicki	Newnes Butterworth – 1975
2	Woven Cloth Constructions	Robinson A.T. C. Marks R.	The Textile Institute – 1973
3	Fabric Structure & Design	N. Gokarneshan	New Age Institue – 2004
4	Watson's Advanced Textile Design compound woven structure (fourth edition)	Z. J. Grosicki	Newnes Butterworth – 1977

### List of Required Machineries & Equipment

SR. No.	ESSENTIAL Machineries/Equipment
1	Shuttle, pirn, temple, reed, drop pins, heald wires, top reversing roller, tappet, picker, buffer, spindle, lingo, prong, hammer, leaver, dobby, lattice, pegs, tensioner, picking tappet
2	Various types of yarn samples
3	Various types of fibre samples
4	Board containing illustrations of knots
5	Two for one twister machine
6	Cone winding machine
7	Beam warping machine
8	Sectional warping machine
9	Slasher sizing machine
10	Multi cylinder sizing machine
11	Upright drawing-in frame
12	Tappet loom
13	Over pick loom
14	Under pick loom
15	Dobby loom
16	Loom with loose reed mechanism
17	Loom with fast reed mechanism
18	Loom with weft fork motion
19	Various fabric samples with various faults
20	Climax dobby
21	Lattice, peg, hammer
22	Cross border dobby
23	Lattice, peg, hammer
24	Loom with 4 x 4 pick at will box motion.



25	Loom with 2 x 1 will box motion
26	2 x 1 drop box cards
27	4 x 4 drop box cards
28	Double lift double cylinder jacquard
29	Electronic jacquard
30	Card board Cards, Piano Card Cutter
31	Pick Glass
32	Plain weave - Fabric sample
33	Warp rib weave - Fabric sample
34	Weft rib weave - Fabric sample
35	Hopsack or basket or matt weave - Fabric sample
36	Plain weave-stripes - Fabric sample
37	Plain weave-checks - Fabric sample
38	3/1 twill weave - Fabric sample
39	Denim weave - Fabric sample
40	Satin or sateen weave - Fabric sample
41	Pointed twill - Fabric sample
42	Large twill - Fabric sample
43	Herringbone twill weave - Fabric sample
44	Diamond weave - Fabric sample
45	Honeycomb weave - Fabric sample
46	Mock leno weave - Fabric sample
47	Huck-a-back weave - Fabric sample
48	Beesley's Count balance.
49	Single yarn strength tester
50	Lea strength tester, wrap reel
51	G.S.M Cutter
52	Crimp Tester
53	Twist Metter
54	Pick Glass
55	Beesley count balance
56	Digital Balance

<b>Sr No</b>	<b>DESIRABLE machineries (Students may be taken to Industries having these machineries)</b>
1	Air-Jet Loom
2	Water-Jet Loom
3	Rappier Loom
4	Projectile Loom
5	Sectional warping machine
6	Beam Warping machine

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