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# Maharshi Dayanand University Rohtak

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## Ordinances, Syllabus and Courses of Reading for M.Tech. (Textile Technology) Examination

Session—1995-96

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## **ORDINANCE-MASTER OF TECHNOLOGY (M.TECH) EXAMINATION**

- 1.1. The duration of the course for the degree of Master of Technology (Textile) Examination for regular candidates shall be one and a half years. The maximum period in which such a candidate must qualify for the degree shall be three academic years, failing which he shall not be allowed to continue his studies for the course.
- 1.2. The duration of the course for the degree of Master of Technology (Textile) Examination in the case of part-time candidates shall be five semesters. The maximum period in which such a candidate must qualify for the degree shall be eight semesters, failing which he shall not be allowed to continue his studies for the course.
- 2.1. Each academic year shall be divided into 2 semesters each semester extending to about 17 weeks. The examination for first semester shall be held in November/December and for second semester in April/May each year on the dates to be fixed by the Vice-Chancellor. The supplementary examination for both semesters shall be held in July/August on the dates to be fixed by the Vice-Chancellor.
- 2.2. The last date for receipt of admission forms without and with late fee shall be fixed by the Vice-Chancellor and notified by the Controller of Examinations.
- 3.1. Persons holding the following qualification shall be eligible for admission to the course for the degree of Master of Technology :-
  - a) Those who qualify in the Graduate Aptitude Test in Engineering (GATE), or
  - b) For Self-financing Students :
    - (i) B.Tech Degree from Maharshi Dayanand University with atleast 50% marks in the aggregate :

OR

- (ii) Bachelor's Degree in any branch of Textiles from any Indian University included in the approved list of the Association of Indian Universities and also recognised by this University as equivalent to (i) above securing atleast 50% marks in the aggregate;

OR

- (iii) B.Tech. or other equivalent Degree from any Foreign University recognised by this University for purposes of admission to this course.
- 3.2. A whole-time teacher working in a college recognised by the University in the Faculty of Engineering, of a working textile engineer employed in a department/industry/laboratory within the territorial jurisdiction of the University may also join this course as a part-time student subject to fulfilment of any of the conditions laid down in Clause 3.1. above. Such part-time student shall be allowed to offer not less than 2 and not more than 3 papers in a regular semester examination.
4. The examination shall be open to a candidate who:-
- i) has attended regularly the prescribed course of studies for the relevant semester in a college recognised by the University for the degree of Master of Technology (Textile).
  - ii) has his name submitted to the Controller of Examinations by the Director of the College.
  - iii) Produces the following certificates signed by the Director :-
    - a) of good character and conduct;
    - b) of having carried out and acquitted himself to the satisfaction of the Director in class work, laboratory and sessional work covered during the semester and in the periodical tests held in the college from time to time;
    - c) of having attended not less than 85% of the total classes held in that semester in subjects offered by him for the examination provided that his attendance in each individual subject (Lectures, tutorials, seminars, practicals, etc.) is not less than 70%. The Director of the college may in bonafide case condone deficiency upto 15%.

**Note:** A candidate who fails to complete the requirement of attendance for first semester as in(c) above may be allowed to appear in first semester examination and be granted provisional admission to second semester provided he has attended atleast 60% of the total classes held during the first semester.

The result of such a candidate for first semester examination shall be declared only if his attendance for both the semesters taken together is not less than 85%. The Director of the College may, in bonafide case, condone deficiency upto 15%. If the candidate is unable to fulfil the requirement of attendance as above he would not be allowed to take the second semester examination and his result of first semester would also stand cancelled. Such a candidate may be allowed by the Director of the college to repeat the semester(s) in the following year. Attendance shall be counted upto 10 days before the date of commencement of the examination.

5. The fee to be paid by a candidate will be as under :

M.Tech. Rs. 160/- (each semester) for Regular Candidates  
Rs. 200/- for Private Candidates.

6.1 Every candidate shall be required to offer for examination :-

- a) Theory papers as provided in the Scheme of Examination prescribed by the Academic Council.
- b) A dissertation of which four neatly typed or printed copies properly bound shall be submitted to the Institution/University.

6.2 English shall be the medium of Examination.

7.1 Each theory paper shall be set and examined by an external and an internal examiners jointly in accordance with the procedure laid down by the University.

7.2 The sessional work in each paper shall be evaluated by the teacher concerned. It shall be based on the work done and the general performance of the student in the college during the semester. The award will be forwarded to the Controller of Examinations through the Director, immediately after the commencement of each semester examination.

- 8.1 The candidate shall prepare his dissertation under the supervision of the teacher concerned in the college. If, however, the Director is satisfied that facilities for preparing the dissertation exist elsewhere, he may allow the candidate to prepare his dissertation there and this period shall count towards the requirement for the M.Tech degree course, but the candidate shall spend, for completing his dissertation a minimum period of four weeks under the direct supervision of his teacher or the Head of the Department.
- 8.2 The dissertation shall present an orderly and critical exposition of the existing knowledge of the subject or shall embody result of original investigation and demonstrate the capacity of the candidate to do independent research work. While writing the dissertation candidate shall lay out clearly the work done by him independently and the sources from which he has obtained other information contained in his dissertation.
- 8.3 The dissertation shall be submitted by a regular candidate at any time during the third semester of the course provided that he has appeared in all theory papers included in the Scheme of Examination. The result of the dissertation shall be declared only after the candidate has passed in all the theory papers.

In case the candidate's dissertation is rejected or is unable to complete his dissertation within the period prescribed above, he may be allowed extension by the Director, upto two semesters. A further extension of one semester in addition to this may be allowed by the Vice-Chancellor, on the recommendation of the Director, in exceptional cases.

- 8.4. The dissertation shall be submitted by a part-time student at any time during the fifth semester provided that he has appeared in all the theory Papers included in the Scheme of Examination. The result of the dissertation shall be declared only after the candidate has passed in all the theory papers. In case the candidate's dissertation is rejected or he is unable to complete his dissertation within the period prescribed above he may be allowed extension by the Director, upto two semesters, A further extension of one semester in addition to this may be allowed by the Vice-Chancellor, on the recommendation of the Director in exceptional cases.
- 8.5. The dissertation shall be examined by a Board Consisting of external and internal examiners.
- 8.6. There shall be Viva-Voce test on the subject matter of the dissertation. The examiners may, if they consider it necessary, also require the candidate to undergo a written and/or a practical test.

8.7. If a candidate is not available for Viva-Voce test and/or other tests in connection with dissertation, the Board of Examiners may exempt him, if, in their opinion, the dissertation merits such an exemption.

9. The minimum number of marks required to pass the examination shall be :-

- a) 40% in each theory paper;
- b) 60% in the sessional part of each paper;

10.1 Subject to clause 1.1 or 1.2 a candidate who, having satisfied the requirement of attendance, does not appear in any Semester examination for sufficient cause or having appeared fails in any subject(s) may be allowed to re-appear in any subsequent examination, including supplementary examination, to pass the examination. Such a candidate may, however, be promoted to the next higher semester course.

10.2. A candidate who has passed M.Tech. Examination and has obtained less than 60% marks in Aggregate and is desirous to improve his division from II to I, may be allowed to re-appear in one or more theory paper(s) to improve his division, only once within the period specified in clause 1.1 or 1.2. Provided that such a candidate shall not be placed in the category of 'Pass with Honour'.

The result of the candidate shall be tabulated with the marks obtained by him in the paper(s) offered by the candidate for improvement together with the marks obtained by him previously in the paper not offered by him for improvement. In case the candidate does not improve the division from second to first, his result shall be declared as 'previous result stands.'

11. Successful candidates shall be classified as under :

- a) Candidates obtaining atleast 60% marks in each theory paper and atleast 75% marks in the aggregate. First Division with Hons.
- b) Candidates obtaining 60% or more marks in the aggregate. First Division
- c) Candidate obtaining less than 60% marks in the aggregate. Second Division

12. Four weeks after the termination of each semester examination or as soon as possible, the Controller of Examinations shall publish the result. Every successful candidate shall receive a certificate of having passed that semester examination. A candidate who has passed in all the papers and the dissertation shall be awarded the Master of Technology Degree in accordance with Clauses 9, 10 & 11 above.
13. A candidate who registers for Master of Technology Degree and who for some reasons cannot continue his studies after having passed all the papers specified in the Scheme of Studies and the relevant sessionals shall, on request, be eligible for the award of a Post-graduate Diploma in Textiles. There will be no classification in the award of the Diploma.
14. Notwithstanding the integrated nature of this course, which is spread over more than one academic year, the ordinance in force at the time a student joins the course shall hold good only for the examination held during or at the end of the academic year and nothing in this ordinance shall be deemed to debar the University from amending the ordinance and the amended Ordinance, if any, shall apply to all students, whether old or new.

**SCHHEME OF STUDIES FOR THE THREE SEMESTERS  
 MASTER OF TECHNOLOGY (M.TECH(TT) DEGREE COURSE  
 M.TECH (FIRST SEMESTER)**

Index No.	Title of Papers	Hours per Week
TT 501N	Developments in Fibre Production	4
EN 503	Structure and Properties of Fibres	4
MA 505N	Advance Mathematics & Computer Programming	4
<b>Any one Group of the Electives</b>		
<b>Group-A</b>		
TT 507	Theory and design of Spinning Machinery	4
TT 509	Modern Technology of Fabric Production	4
<b>Group B</b>		
TC 507	Chemistry of Dyes	4
TC 509	Advances in Theory of Dyeing	4
		----- 20 -----

**SECOND SEMESTER**

MA 502N	Operations Research & Design of Experiments	4
EN 504	Instrumentation and Automatic Controls	4
TT 506N	Developments in Texturing	4

**Any one group of the Electives**

**Group-A**

TT 508N	Theory and Design of Weaving Machinery	4
TT 510N	Structural Engg. of Fibre Assemblies	4
TT 512N	Unconventional Spinning Systems	4

**Group-B**

TC 508N	Textile Chemicals & Analytical Methods	4
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TC	510N	Modern Methods of Dyeing & Printing	4
TC	512N	Advances in Textile Finishing & Allied Processes	4
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			24
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**THIRD SEMESTER**

TT/TC601		Dissertation	34
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**SCHEME OF EXAMINATION FOR THE THREE SEMESTERS**  
**MASTER OF TECHNOLOGY (M.TECH) (TT) COURSE**  
**M.TECH FIRST SEMESTER**

Index No.	Title of Paper	No. of Papers	Time (Hrs)	Marks of paper	Marks of C/work	Total Marks
TT 501N	Developments in Fibre Production	1	3	100	50	150
EN 503	Structure & Properties of Fibres	1	3	100	50	150
MA 505N	Advance Mathematics & Computer Programming	1	3	100	50	150
<b>Any one group of the electives :</b>						
<b>Group-A</b>						
TT 507	Theory and Design of Spinning Machinery	1	3	100	50	150
TT 509	Modern Technology of Fabric Production	1	3	100	50	150
<b>Group B</b>						
TC 507	Chemistry of Dyes	1	3	100	50	150
TC 509	Advance in Theory of Dyeing	1	3	100	50	150
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**SECOND SEMESTER**

MA 502N	Operations Research & Design of Experiments	1	3	100	50	150
EN 504	Instrumentation & Automatic Controls	1	3	100	50	150
TT 506N	Developments in Texturing	1	3	100	50	150

**Any one group of the Elective:****Group-A**

TT	508N	Theory & Design of Weaving Machinery	1	3	100	50	150
TT	510N	Structural Engg. of Fibre Assemblies	1	3	100	50	150
TT	512N	Unconventional Spinning Systems	1	3	100	50	150

**Group-B**

TC	508N	Textile Chemicals & Analytical Methods	1	3	100	50	150
TC	510N	Modern methods of Dyeing & Printing	1	3	100	50	150
TC	512N	Advance in Textile Finishing & Allied Processes	1	3	100	50	150
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							900
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**M.TECH. THIRD SEMESTER**

TT/TC	Dissertation (common)	Viva-voce	500
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G. Total			2150
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Note:- Each question paper should contain 7 questions out of which 5 questions will be attempted by the candidate.

**SYLLABUS FOR MASTER OF TECHNOLOGY (M.TECH)  
(TEXTILE TECHNOLOGY/TEXTILE CHEMISTRY)**

**FIRST SEMESTER**

**TT 501N Developments in Fibre Production 4(150)**

Fibre modification and evaluation of their properties. Advances in fibre extrusion processes and discussion on structure and properties of the product. Developments in post extrusion operations.

New fibres based on performance and functional applicability. Recent advances in spin-finishes and their applications.

**EN 503 Structure and Properties of Fibres (common) 4(150)**

Study of fibre structure by X-rays, IR Spectroscopy, optical and electron microscopy. Determination of degree of crystallinity, orientation, crystal size and Morphology.

Structure of fibres, morphology and order in fibre structure. Theories of fine structures of fibres.

The mechanical properties of fibres. Theories of elasticity. Thermodynamics analysis of deformation. Rubber elasticity of long chain molecules and molecular network. Application to fibres. Theories of viscose-elasticity.

Stress relaxation, creep, stress-strain relations, Temperature of visco-elasticity as applied to natural fibres. The Boltzman supervision principle and Nutting's Power Law, their application to fibres.

Sorption isotherms, heat of sorption, swelling and theories of moisture sorption.

Di-electric properties. Effects of frequency and temperature on dielectric constant and static electricity.

Frictional properties - Theory of friction and lubrication and its application to fibres. Measurement of friction. Thermal and optical behaviour of fibres.

**MA 505N Advanced Mathematics and Computer programming 4(150)**

Partial Differential Equations : Partial differential equations. First order linear equations. Four standard forms of non-linear equations. Linear equations with constant coefficients. Equations of strings, heat-flow and electrical transmission lines.

Integral, Transform : Fourier transforms and their operational properties, Fourier integral theorems, inversion theorems, laplace transforms and their operational properties, Inversion theorem. Heviside's Unit step function, Dirac delta function, error function and their Laplace transforms.

Applications of transforms to solution of one dimensional wave and diffusion equation.

Computer Programming : Basic concepts of FORTRAN, Arithmetical expressions, Do Statement and transfer of control statement. Subscripted variables. Simple input and output statements with simple, FORMAT specifications-I.E.F.X,H. Sub-programs and subroutines. Simple programs in FORTRAN Language including Gauss-Seidel Method, Newton-Raphson Method, Simpson's Method.

#### GROUP-A

#### TT 507 Theory and Design of Spinning Machinery 4(150)

Design principles of Modern openers and blenders. Feed Regulation. Theories of carding. Design aspects of high production cards.

Effects of lap preparation on carding efficiency. Drafting force. Theories of drafting. Mechanism of hook removal during drafting. Autolevelling. Developments in high speed fly frames. Twist flow in ring Spinning, Spinning Tension. Developments in design of ring travelers. Spindles and high speed ring frame. Automated Spinning.

#### TT 509 Modern Technology of Fabric Production 4(150)

Modern trend in the production of woven-fabrics and evaluation of the performance of method of production.

Classification of non-woven fabrics. A survey of non-woven field-its uses and future growth. Principles of web formation. Fibre properties and their influence on properties of non-woven fabrics. Web geometry-fibre orientation, curl-factor and web density, effect on properties of non-woven fabrics.

Classification of binders and methods of binder application. Binder properties and effect of binder-fibre adhesion on properties of non-woven fabrics.

Needle bonded non-wovens; processing variables and their effects on properties.

Stitch bonded fabrics, their manufacture and properties. Spun bonded and split film fabrics.

Modern developments in the manufacture and properties of Industrial and knitted fabrics. Geometry of knitted structures.

**TC 507 Chemistry of Dyes****4(150)**

Advances in chemistry of dye intermediates and unit organic process applied for their production. Colour and chemical construction. Stereoisomerism. Chemistry of newer dyes for natural and man-made fibres. Photochemistry of dyes. Solvent dyes, optical brightening agents and pigments.

**TC 509 Advances in Theory of Dyeing****4(150)**

Thermodynamics and kinetics of dyeing. Mechanism of direct reactive, acid disperse and other dyes on specified fibres. Dyepolymer interactions and methods of investigation. Role of fibre structure and other characteristics in dyeing.

**SECOND SEMESTER****MA 502N Operations Research & Design of Experiments****4(150)**

Introduction to operations research, Linear programming, Graphical and Simplest methods, transportation and assignment models, CPM and PERT techniques.

Main features of Binomial, Poisson and Normal distributions and their properties. Their application in Engineering and Industrial problems. Elementary sampling Theory, Test of significance ( $\chi^2$ , t and F). Correlation and Regression Analysis (Only multiple and partial). Analysis of variance. Detailed study of Design of experimental control charts (X,R,c,p).

**EN 504 Instrumentation and Automatic Control****4(150)**

Automatic control : Introduction to control systems, concept of feed back. System representation-Schematics and block diagrams dynamic equations of physical systems. Transfer functions, system response to impulse, set-up, ramp and sinusoidal inputs.

Steady state errors and error constant, absolute and relative stability, Routh and nyquist criteria, Bode analysis, Basic Control actions and industrial automatic control. Control system design and compensation techniques in the splane.

Instrumentation : Principles of measurement, Sensor transducers for the measurement of force, acceleration, velocity, displacement pressure, temperature, strain, light-intensity and electrical parameters applications of transducers in industrial processes and quality control.

**TT 506N Developments in Texturing****4(150)**

Development in F.T. Texturing Edge crimping, Stuffer-box crimping, Air-bulking. Discussions on the effects of thermal and mechanical variables on properties of yarns, Method of assessing and evaluation of Textured Yarns. Hi-bulk yarns. Chemical texturing and texturing of staple yarns.

**GROUP-A****TT 508N Theory and Design of Weaving Machinery****4(150)**

Theory, measurement and control of yarn tension in unwinding from spinning packages during winding, from cones during rewinding and from pirns during weaving. Study of warp tension variation during weaving, its significance and measurement by mechanical and electronic devices.

Development in design and operation of modern winding, warping, sizing machines. Comparative study of different preparatory machines on the basis of their economy and performance. Theory and design principles of latest automatic controls in sizing.

Kinematics of slay, heald motion and shuttle motion on conventional looms. Design problems of conventional weavings.

Principles underlying unorthodox weaving machinery design. Kinematics of weft population in unconventional weaving machines.

**TT 510N Structural Engg. of Fibre Assemblies****4(150)**

Elements of yarn geometry. Geometry of helix and its application to yarn structure. Geometry of folded yarns.

Translation of fibre properties into yarn behaviour. Theories of yarn irregularity and blend irregularity. Theories of mechanics of yarn structures under tension, compression, bending and shearing.

Fibre migration characteristics of spun and continuous filament yarns. Concept of similar yarns. Effect of properties of constituent fibres and blend composition on the behaviour of composite yarns.

Theories of cloth setting. Geometry of woven fabrics based on the assumption of flexible rigid threads. Application of fabric geometry in fabric weaving and processing.

Later modifications to Peirce's fabric geometry. Use of weavability graphs. Effect of yarn properties and their configuration in fabric on fabric properties such

as extensibility, stiffness and drape. Distribution of stress in fabrics under elongation, bending, buckling and shearing. Effect of fabric relaxation on its properties.

**TT 512N Unconventional Spinning Systems 4(150)**

Causes leading to advent of unconventional spinning systems. Principles and Engineering Design of rotor, air-jet and friction spinning. Structure & Properties of these unconventional yarns. Effect of raw material and machine variables on yarn characteristics. Plying of these yarns.

Other unconventional spinning systems, viz. Self twist, Twistless, Integrated, Disc, Parafil, etc. their working principles, properties and end use of yarns spun on these system.

**GROUP B**

**TC 508N Textile Chemicals & Analytical Methods 4(150)**

Colloidal & Surface Chemistry as applied to textile chemicals, preparation and properties of anionic, cationic and nonionic surface active agents. Chemistry of Thermosetting and thermoplastic resins, Mechanism of crease resistance.

Theory & Instrumentation techniques and application of absorption chromatography-paper, thin layer and gas chromatography. Absorption spectroscopy, Mass spectroscopy. Evaluation of dyes and finishes.

**TC 510N Modern Methods of Dyeing & Printing 4(150)**

Combined preparatory processes. Processing of textured man-made fibres. Rapid dyeing techniques, Foam dyeing and other advanced dyeing techniques. Developments in transfer printing of natural as well as synthetic fibres. Developments in dyeing and printing machineries.

**TC 512N Advances in Textile Finishing & Allied Processes 4(150)**

Developments in textile finishing such as resin finishing, soil release, flame proofing, antistatic, etc. Foam Finishing Technology. Developments in finishing machineries.

Air and water pollution, disposal of waste and effluents and related processes.

**THIRD SEMESTER**

**TT/TC601 Dissertation (common) 34(500)**

Each student individually will carry out a project of an experiment, and/or theoretical nature in one of the main branches of textile technology/textile chemistry and present his findings in a systematic manner in the Project Report duly approved and signed by his Supervisor/Guide (to be nominated by the



Director, TITS). Each candidate would submit 3 typed copies of the Project Report to Director, TITS atleast 15 days before the commencement of second semester examination. One copy of the project Report will be returned to the candidate after viva-voce examination. The original Report and carbon copy will be retained by the concerned Department/Institution and the Supervisor respectively.