

VJTI MUMBAI

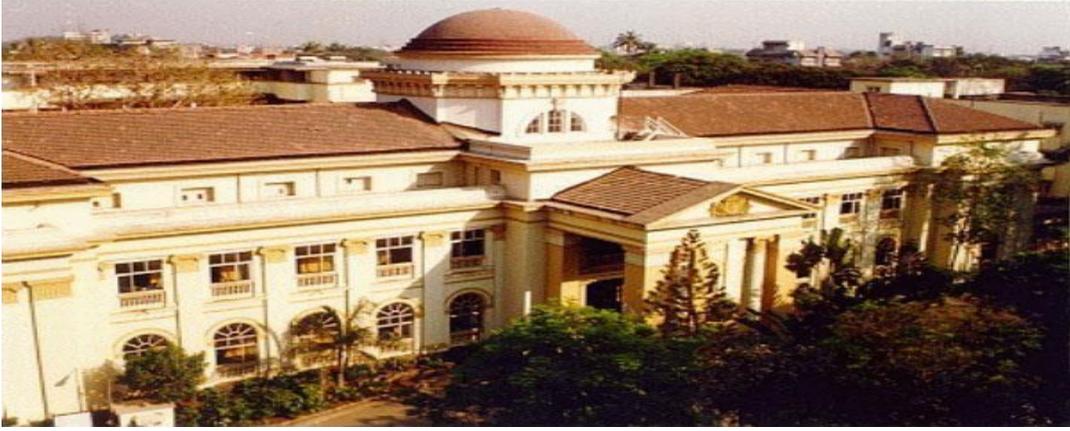
वीरमाता जिजाबाई तंत्रज्ञान संस्था

Veermata Jijabai Technological Institute

(Autonomous Institute of Govt. of Maharashtra)

H. R. Mahajani Road, Matunga (East), Mumbai - 400 019

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INFORMATION BROCHURE AND APPLICATION FORM

For

Admission to Doctor of Philosophy (Ph. D.) Program

AY 2023-24

The information described in this brochure is applicable to the Ph.D. Programs listed below:

Programme Code	Name of the Programme	Department
901	Civil Engineering	Civil Engineering
902	Mechanical Engineering	Mechanical Engineering
903	Electrical Engineering	Electrical Engineering
904	Production Engineering	Production Engineering
905	Textile Engineering	Textile Manufactures
906	Electronics Engineering	Electrical Engineering
907	Computer Engineering	Computer Engineering & Information Technology
909	Physics	Physics

1. Schedule of Admission (Important dates):

Sr. No.	Activity	Date	Day
1	Available of online application forms mode	24.08.2023	Thursday
2	Last date for submission of completed application forms	13.09.2023	Wednesday
3	Display of shortlisted candidates on website	18.09.2023	Monday
4#	Clarification/Objection on shortlisted candidates	20.09.2023	Wednesday
5	Display of corrected shortlisted candidates	22.09.2023	Friday
6	Offline Test conducts by respective department.	26.09.2023	Tuesday
7#	Interview conduct by respective department.	29.09.2023	Friday
8	Display of Final Merit List on website	05.10.2023	Thursday
9	Last day for confirmation of provisional admission by paying fees	10.10.2023	Tuesday

In case of any clarification or objection on shortlisted candidates, the candidates may communicate by sending an email to **phd_admission@vjti.ac.in** by 20th September 2023 before 4.30 pm

Interview shall be conducted by the concerned department at VJTI.

2. Application Processing Fee:

General Category:	Rs. 500/-
Reserved Category: SC, ST, VJ/DT- NT(A), NT(B), NT(C), NT(D), OBC, SBC, EBC , EWS & Differently abled person	Rs. 300/-

Application processing fee shall be paid online as per procedure given in Annexure –V

3. Submission of the application:

Candidates must first submit their application form with necessary application fees (along with all the relevant certificates/documents) online through <http://www.vjti.ac.in> (applications without online submission of application as well as certificates/documents will not be considered). Candidate should make sure that proper Institute/ Discipline codes are entered and all relevant details are duly filled in the respective fields. Access to the link for online submission of application opens on 24th August 2023 (Thursday). Last date for the online submission of application is 13th September 2023 (Wednesday) 5.00 pm.

Google link to fill Ph.D application form: <https://forms.gle/Jrg2WVTzLhxFWce7A>

4. Eligibility for Admission

Educational Qualification:

Subject to the conditions stipulated in Directive No. CG-DL-E-07112022-240086 of dated: 7th November 2022 of UGC Regulations, 2022, the following persons are eligible to seek admission to the Ph.D. programme:

Candidate who have completed:

A 1-year /2-semester master's degree programme after a 4-years/8-semester bachelor's degree programme or a 2-year/4-semester master's degree programme after a 3 year bachelor's degree programme or qualification declared equivalent to the master's degree by the corresponding statutory regulatory body, with at least 55% marks in aggregate or its equivalent grade in a point scale wherever grading system is followed

Or equivalent qualification from a foreign educational institution accredited by an assessment and accreditation agency which is approved, recognized or authorized by an authority, established or incorporated under a law in its home country or any other statutory authority in that country to assess, accredit or assure quality and standards of the educational institution.

A relaxation of 5 % marks or its equivalent grade may be allowed for those belonging to SC/ST/OBC (non-creamy layer)/differently-abled, Economically Weaker Section (EWS) and other categories of candidates as per the decision of the Commission from time to time.

Provided that a candidate seeking admission after a 4-year/8-semester bachelor's degree programme should have a minimum of 75% marks in aggregate or its equivalent grade on a point scale wherever the grading system is followed. A relaxation of 5% marks or its equivalent grade may be allowed for those belonging to SC/ST/OBC (non-creamy layer)/Differently-abled, Economically Weaker Section (EWS) and other categories of candidates as per the decision of the Commission from time to time.

Note: Institute reserves the rights to admit candidates based on merit and performance during Interview & written test. Mere satisfaction of minimum qualification does not entitle admission to Ph.D. programs.

5. Procedure for Admission to Ph.D. programmes

- a) The admission shall be based on the criteria notified by the institution, keeping in view the guidelines/ norms in this regard issued by the UGC and other statutory/regulatory bodies concerned, and taking into account the reservation policy of the State Government/institute guidelines from time to time.
- b) Admission to the Ph.D. programme shall be made using the following methods:
 - i. Institute may admit students who qualify for fellowship/scholarship in UGC-NET/UGC-CSIR NET/GATE/CEED and similar National level tests based on an interview.
And/or
 - ii. Institute may admit students through an Entrance Test conducted at the level of the individual. The Entrance test syllabus shall consist of 50% of research methodology and 50% shall be subject specific.
 - iii. Students who have secured 50% marks in the entrance test are eligible to be called for the interview.
 - iv. A relaxation of 5% marks will be allowed in the entrance examination for the candidates belonging to SC/ST/OBC/ differently –abled category, Economically Weaker Section (EWS), and other categories of candidate as per the decision of the Commission from time to time.
 - v. Institute may decide the number of eligible students to be called for an interview based on the number of Ph.D. seats available.
 - vi. Provided that for the selection of candidates based on the entrance test conducted by the institute. A weightage of 70% for the entrance test and 30% for the performance in the interview/viva-voce shall be given.

6. Exemption from the Written Test

The following candidates shall be exempted from Written Test:

- i. Candidates qualified having valid scores in UGC-NET/UGC-CSIR NET ISLET/GATE /INSPIRE / PET(By Maharashtra Public Universities) and any other JRF holder of the apex bodies like CSIR/ UGC/ ICAR/ ICMR/ DBT/ DST/ ICSSR;
- ii. Ph.D. degree holder of University of Mumbai or any other recognized University who desires to pursue Ph.D. at VJTI.

Types of Ph.D. candidates

1. Full Time Non Sponsored/ Sponsored Research Scholar
Candidate is required to be available in the institute full time for a period of at least three years. There is possibility of Research / Teaching assistantship available to the candidate from institute funds or research projects. Candidates sponsored by their parent organizations cannot avail of Research / Teaching assistantship. Sponsored candidates have to produce a sponsorship letter in given format along with application form.
2. Part Time Sponsored Research Scholar / VJTI internal candidates
Candidate is required to complete at least two semesters of residential requirement at the institute. Sponsored candidates have to produce sponsorship letter in a given

format along with application form. Institute internal candidates have to apply as part time research scholars only. Internal candidates have to work under VJTI supervisor and/or external supervisor from IIT or other research organizations (optional with recommendation from DAC).

Course Duration of the Programme:

1. Ph.D Programme shall be for a minimum duration of three years, including course work, and a maximum duration of six years from the date of admission to the Ph.D programme.
2. A maximum of an additional two years can be given through a process of re-registration as per the statute/ordinance of the institute concerned; provided, however, that the total period for completion of a Ph.D programme. Should not exceed eight years from the date of admission in the Ph.D programme.

Provided further that, female Ph.D scholars and person with Disabilities (having more than 40% disability) may be allowed an additional relaxation of two years; however, the total period for completion of a Ph.D programme in such cases should not exceed ten years from the date of admission in the Ph.D programme.

3. Female Ph.D. Scholars may be provided maternity leave/Child care leave for up to 240 days in the entire duration of the Ph.D programme.

No Objection Certificate:

All sponsored candidates must submit 'No Objection Certificate' from the employer in a format given in Annexure III along with application.

Sponsorship letter

All sponsored candidates must submit 'Sponsorship letter' from the employer in a format given in Annexure II along with application.

7. Reservations

The reservations will be as per reservation policy of Maharashtra State

8. Fees

Fees in Rs. for confirmation of Admission at VJTI for Ph. D. students	
(Sponsored)	(Non Sponsored)
1,17,051/-	92,051/-

If any change in fees for A.Y.2023-24 same will be communicated before the start of selection process.

Notes:-

- a) For confirmation of seat allotted, all candidates have to pay appropriate amount of fee as applicable.
- b) All reserve category students seeking admission to Ph.D. Programs, shall have to pay full fees at the time of admission/ registration.
- c) Candidate whose result of qualifying post graduate degree is awaited:
 - Must have submitted the thesis on the day of interview.
 - These candidates must submit the certificate as per Annexure IV and produce the copy of dissertation at the time of interview.
 - The admission shall be provisional and will be confirmed only if the result of qualifying examination is submitted on or before 10th October 2023.
- e) No change in category of admission (Full Time to Part Time or vice versa) will be allowed at the time of examination or admission.
- f) Information related to Ph. D. admission 2023-24 will be displayed only on VJTI website <http://www.vjti.ac.in> Applicants shall visit the Institute website for time to time.

Annexure –I

List of Documents to attached along with application form

Attested photocopies of following documents/certificates should be attached with the application form at the time of submission. If a candidate fails to submit applicable documents/certificates along with application form, he/she will not be shortlisted for Ph. D. admission 2023-24.

Sr. No.	Document Name
1	Graduation degree certificate
2	Final year marks list / grade sheet
3	Post graduate degree certificate
4	Post graduate Final year marks list / grade sheet
5	Work/ Research experience Certificates
6	<p>Nationality Certificate: In lieu of this “Certificate of Indian Nationality” following Certificates/Documents will also be acceptable-</p> <ol style="list-style-type: none"> 1. Indian Passport in the name of the Candidate, issued by appropriate authorities. 2. The School Leaving Certificate indicating the Nationality of the Candidate as ‘Indian’. 3. Birth Certificate of the Candidate indicating the Place of birth of the Candidate is within India.
7	<p>Caste certificate: Candidates belonging to categories SC, ST, VJ/DT-NT(A), NT(B), NT(C), NT(D), OBC, SBC will be required to submit a Caste Certificate</p>
8	<p>Caste Validity Certificate: Candidates belonging to SC, ST, VJ/DT-NT (A), NT (B), NT(C), NT(D), OBC, SBC category are required to submit Caste Validity Certificate.</p>
9	<p>Non-Creamy Layer Certificate A candidate belonging to ‘Creamy Layer’ amongst the categories SBC, V.J./D.T.-N.T.(A),N.T.(B), N.T.(C), N.T.(D) ,O.B.C. must note that the provision of reservation is NOT applicable to him/her. A candidate claiming benefit of reservation under the categories SBC, V.J./D.T.-N.T.(A), N.T.(B), N.T.(C), N.T.(D), O.B.C. will be required to produce “Non-Creamy Layer Certificate” in the name of the candidate as specified in the Government Resolution No. CBC/10/2008/CR-697/BCW-5, dated 27th February 2009 or its updated versions from time to time. The certificate must be valid up to 31 March 2024.</p>
10	<p>Differently abled Certificate (if applicable): The candidate claiming to be physically handicapped shall produce a certificate from the Director, All India Institute of Physically Handicapped, Mumbai or Dean/Civil Surgeon of the Government / CIVIL HOSPITALS normally located at the District Headquarters, regarding his or her physical disability, and ability to undergo all parts of syllabus for the normal course. Candidates suffering from Dyslexia, Dysgraphica & Dyscalculia are required to produce certificate issued by the ‘Learning Disability Clinic, Lokmanya Tilak Municipal General Hospital, Sion, Mumbai-22.</p>
11	Proof of Exemption for Written test
12	Annexure II
13	Annexure III
14	Annexure IV
15	Receipt of application processing Fee
16	Copy of first page of research papers published in journal / conferences
17	Statement of purpose from the candidate (one page justifying the research area)
18	Any other Certificates

Annexure -II

Format for Sponsorship Letter for Full time/Part Time sponsored candidate
(To be submitted at the time of application/ Interview.)

(To be filled in by sponsoring organization on their letter head only)

Date:

SPONSORSHIP LETTER

Shri. /Smt. /Msis a Full Time employee of our organization since (Date) and working as (Designation in the organization) from lastyears.

If selected, I / we hereby sponsor him/her to join the Ph.D. degree programme in Department of VJTI as

(a) Full Time Sponsored candidate for the period of Three years at VJTI

OR

(b) Part Time Sponsored candidate for the first year of Ph. D. programme to complete mandatory course work. Thereafter he/she will be allowed to report to the research supervisor for at least two working days in a month.

I / We shall relieve him/her of all responsibilities in our organization for a minimum period mentioned above to enable him/her to pursue the Ph.D. programme.

(Note: Tick Mark whichever is applicable from above a or b)

Signature of Sponsoring Authority

Name:

Place:

Designation:

Date:

Organization:



Annexure -III

Format for NOC for Full time/Part Time sponsored candidate
(To be submitted along with application form.)

(To be filled in by sponsoring organization on their letter head only)

Date:

No Objection Certificate

Shri. /Smt. /Ms is a full time employee of our organization since (Date) and working as (Designation in the organization) from lastyears.

If selected, I / we have no objection to him/her to join the Ph.D. degree programme in Department of V J T I, Matunga, Mumbai – 400019 and will issue sponsorship letter as per Annexure II at the time of interview as a

(a) Full Time Sponsored candidate for the period of Three years at VJTI Mumbai

OR

(b) Part Time Sponsored candidate for the first year of Ph. D. programme to complete mandatory course work. Thereafter he/she will be allowed to report to the research supervisor for at least two working days in a month.

(Note: Tick Mark whichever is applicable from above a or b)

Signature of Sponsoring Authority

Name:

Place:

Designation:

Date:

Organization:

Seal of
Organization

Annexure –IV

Format of Certificate

For candidate who have appeared in the qualifying degree examination i.e. M.E./M.Tech/MSc/MCA/B.E/B.Tech/UG in relevant filed or Equivalent Examination and whose dissertation is submitted.(To be filled along with application form)

(To be filled in by respective organization on their letter head only)

Date:

Certificate

Shri. /Smt. /Ms. is a M.Tech/M.E/MSc/MCA/B.E/B.Tech/UG in relevant filed student of(Name of Programme) in our Institute for Academic Year and submitted his/her M.Tech/M.E/MSc/MCA/ B.E/B.Tech/UG in relevant dissertation on (Date) for evaluation.

Signature of
Head of Department/Principal/Director/ Authority

Name:

Place:

Designation:

Date:

Organization:

Seal of
Organization

Annexure –V

Steps to be followed for making online payment (Application Processing Fee) through STATE BANK COLLECT

- Log On to <https://www.onlinesbi.com>
- Home Page STATE BANK COLLECT
- Click on State Bank Collect
- Select Type of Category as ‘Educational Institutions’
- Select the Name of the institution as ‘Veer mata Jijabai Technological Institute’
- Select the appropriate ‘Payment category’ as indicated below:
- Application Processing Fee
- On next screen Enter the details (like Name, Birth date, ID No. Should be ‘0’; Select your branch, Year ‘First Year’ mentioned in Remark as “PhD Application Fees” etc.) asked for
- Select options, wherever necessary carefully
- Proceed as instructed and Click on ‘Submit’
- On next screen verify details and click on ‘Confirm’
- You will be taken to payment gateway
- Select appropriate payment mode
- Check the charges/commission applicable for selected ‘Mode of Payment’
Follow instructions to Print Challan and pay at any SBI branch in Cash
OR
Pay ‘online’ using Internet Banking / Credit / Debit card
- Print receipt online.
- Copy of receipt (and not challan) should be enclosed with Application Form.

Make sure that the payments are made a day or two prior to Last date of submission of application. Institute is not responsible if the site is down for technical reasons and the last minute payments are not possible.

Annexure-VI

Syllabus for Ph.D. Entrance Examination

CIVIL & STRUCTURAL ENGINEERING

Sr. No	Areas of research for Ph.D. in Civil Engineering	Syllabus for entrance Test
1.	Construction Management	Construction Management, Construction Engineering, Construction techniques, Construction Materials, Construction Technology, Contract management, Geospatial technology, Building drawings, Transportation Engineering.
2.	Environmental Engineering & Water Resource Engineering	Environmental engineering, Solid waste hazard mgmt, Industrial waste hazard mgmt, Environmental Impact Assessment, Advance Hydraulic , Water resource management, Air and Noise Pollution, Environmental Sustainability.
		Irrigation Engg, Water resource management, Advanced Hydrology , Ground Water Hydrology, Open channel flow, Dam and Hydraulics Structure, Geospatial technology
3.	Structural Engineering	Structural dynamics, Finite element method, FRP Composites, Plastic analysis, Plate and shell design, Geotechnical engineering, Soil Dynamics, Geotechnical Earthquake Engineering, Earthquake engineering, Concrete technology, Pre-stressed Concrete, Advanced structural analysis, Advanced foundation engineering and Low cost housing, Bridge Engineering, Non-linear Analysis ,Vibration Analysis, Steel Structure

NOTE:

- 1) Separate entrance test will be conducted for Ph.D. programs in Civil Engg with specialization areas in Structural Engineering, Construction Management, Environmental Engineering and Water resource Engineering
- 2) Candidate must appear for the entrance test of his or her M.Tech specialization / other specialization, He or She will be admitted only in the Ph.D. program of that specialization in which the candidates will pass the entrance test and not in any other specializations.

COMPUTER ENGINEERING & INFORMATION TECHNOLOGY

Sr. No.	Syllabus for entrance Test	
1.	Engineering Mathematics	Discrete Mathematics, Linear Algebra, Calculus, Probability and Statistics.
2.	Computer System	Digital Logic, Computer Organization and Architecture, Operating System.
3.	Theoretical Computer Science and Mathematics	Theory of Computation, Compiler Design and Construction.
4.	Communication	Computer Network
5.	C-Programming, Data Structure, Algorithms, Databases	

ELECTRICAL ENGINEERING

Sr. No.	Syllabus for entrance Test	
1.	Topics from basic mathematics:	Maxima/ minima, polynomials and their roots, sequences, series, and convergence, probability, permutations, combinations, prime numbers, Chinese remainder theorem, multivariable calculus, 2D/3D coordinate geometry, complex numbers.
2.	Linear algebra:	Rank of a matrix, solutions to $Ax=b$, vector space, basis, eigenvalues, eigenvectors, determinant, characteristic polynomial.
3.	Mathematical modelling:	Linear ordinary differential equations, difference equations..
4.	Topics from Electrical Engineering:	<p>(i) Electrical and electronic circuits, basic network theory, network theorems, KCL/KVL, dynamics of RLC circuits, Signals and Systems, Electric and Magnetic Fields.</p> <p>(ii) Basic Concepts of Feedback Control Systems (Transfer Function and State Space Analysis, Step Response, Transient and Steady State analysis).</p> <p>(iii) Principle of operation and speed control of Electric machines: dc, induction, synchronous machines.</p> <p>(iv) Power electronics: Principle of operation of line commutated ac to dc converters, ac to dc converters, dc to dc converters, dc to ac inverters. Various pulse width modulation techniques like SPWM, Space vector pulse width modulation technique etc.</p> <p>(v) Power generation, transmission, and distribution. Models and performance of transmission lines and cables. Series and shunt compensation. Power System Analysis and Computation (Power-flow, admittance matrices, per-unit representation). Voltage and Frequency control, Power factor correction, Fault Analysis and Protection, Power System stability.</p>

ELECTRONICS ENGINEERING

Sr. No.	Syllabus for entrance Test	
1.	Topics from basic mathematics:	Maxima/ minima, polynomials and their roots, sequences, series, and convergence, probability, permutations, combinations, prime numbers, Chinese remainder theorem, multivariable calculus, 2D/3D coordinate geometry, complex numbers.
2.	Linear algebra:	Rank of a matrix, solutions to $Ax=b$, vector space, basis, eigenvalues, eigenvectors, determinant, characteristic polynomial
3.	Mathematical modelling:	Linear ordinary differential equations, difference equations.
4.	<p>Topics from Electronics Engineering:</p> <p>(i) Basic Electrical and Electronic Circuits and Network Theory</p> <p>(ii) Crystal structure, electrons in solids, energy band theory, p-n junction diode, charge carriers in semiconductors, Drift-diffusion theory, MOS capacitors, field-effect transistors, bipolar junction transistors, LEDs and solar cells</p> <p>(iii) Basic Analog and Digital Circuits</p> <p>(iii) Linear and Non-linear Circuits (discrete and integrated)</p> <p>(iv) Signals and Systems: Continuous-time and discrete-time signals and systems, LTI systems and representations, Sampling and reconstruction, Transform domain analysis (Fourier, Laplace, and Z-transforms), Basics of filter design</p> <p>(v) Signal Processing: Representation of signals on orthogonal basis, Discrete systems: attributes, Z-Transform Analysis of LSI systems, Frequency analysis, Inverse Systems. Discrete Fourier Transform (DFT) Fast Fourier Transform algorithm Implementation of Discrete Time Systems: Design of FIR Digital filters, Design of IIR Digital filters</p>	

MECHANICAL ENGINEERING

Sr. No.	Syllabus for entrance Test	
1.	ENGINEERING MATHEMATIS	Linear Algebra, Calculus, Differential equations. Complex variables, Probability and Statistics, Numerical Methods.
2.	APPLIED MECHANICS AND DESIGN	Engineering Mechanics, Mechanics of Materials, Theory of Machines, Vibrations, Machine Design
3.	FLUID MECHANICS AND THERMAL SCIENCES	Fluid Mechanics, Heat-Transfer, Thermodynamics, Applications: Power Engineering, I.C. Engines, . Refrigeration and air-conditioning, Turbomachinery
4.	MATERIALS, MANUFACTURING AND INDUSTRIAL ENGINEERING	Engineering Materials, Casting, Forming and Joining Processes, Machining and Machine Tool Operations, Metrology and Inspection, Computer Integrated Manufacturing, Production Planning and Control, Inventory Control, Operations Research

PRODUCTION ENGINEERING

Sr. No.	Syllabus for entrance Test	
1.	Metal Casting:	Casting processes – types and applications; patterns – types and materials; allowances; moulds and cores – materials, making, and testing; casting techniques of cast iron, steels and nonferrous metals and alloys; solidification; design of casting, gating and risering; casting inspection, defects and remedies.
2.	Metal Forming:	Stress-strain relations in elastic and plastic deformation; concept of flow stress, deformation mechanisms; hot and cold working – forging, rolling, extrusion, wire and tube drawing; sheet metal working processes such as blanking, piercing, bending, deep drawing, coining and embossing; analysis of rolling, forging, extrusion and wire /rod drawing; metal working defects.
3.	Metal Joining Processes:	Welding processes – manual metal arc, MIG, TIG, plasma arc, submerged arc, electro-slag, thermit, resistance, forge, friction, and explosive welding; other joining processes – soldering, brazing, braze welding;
		inspection of welded joints, defects and remedies; introduction to advanced welding processes – ultrasonic, electron beam, laser beam; thermal cutting. Merchant's analysis; selection of machining parameters; tool materials, tool wear and tool life, economics of machining, thermal aspects of machining, cutting fluids, machinability; principles and applications of nontraditional machining processes – USM, AJM, WJM, EDM and Wire cut EDM, LBM, EBM, PAM, CHM, ECM.
4.	Tool Engineering:	Jigs and fixtures – principles, applications, and design; press tools – configuration, design of die and punch; principles of forging die design.

5.	Metrology and Inspection:	Limits, fits, and tolerances, interchangeability, selective assembly; linear and angular measurements by mechanical and optical methods, comparators; design of limit gauges; interferometry; measurement of straightness, flatness, roundness, squareness and symmetry; surface finish measurement; inspection of screw threads and gears; alignment testing of machine tools.
6.	Powder Metallurgy:	Production of metal powders, compaction and sintering.
7.	Polymers and Composites:	Introduction to polymers and composites; plastic processing – injection, compression and blow molding, extrusion, calendaring and thermoforming; molding of composites.
8.	Manufacturing Analysis:	Sources of errors in manufacturing; process capability; tolerance analysis in manufacturing and assembly; process planning; parameter selection and comparison of production alternatives; time and cost analysis; manufacturing technologies – strategies and selection.
9.	Computer Integrated Manufacturing :	Basic concepts of CAD, CAM, CAPP, cellular manufacturing, NC, CNC, DNC, Robotics, FMS, and CIM.
10.	Product Design and Development:	Principles of good product design, tolerance design; quality and cost considerations; product life cycle; standardization, simplification, diversification, value engineering and analysis, concurrent engineering.
11.	Engineering Economy and Costing:	Elementary cost accounting and methods of depreciation; break-even analysis, techniques for evaluation of capital investments, financial statements.
12.	Work System Design:	Taylor's scientific management, Gilbreth's contributions; productivity – concepts and measurements; method study, micro-motion study, principles of motion economy; work measurement – stop watch time study, work sampling, standard data, PMTS; ergonomics; job evaluation, merit rating, incentive schemes, and wage administration; business process reengineering.
13.	Facility Design:	Facility location factors and evaluation of alternate locations; types of plant layout and their evaluation; computer aided layout design techniques; assembly line balancing; materials handling systems.
14.	Production Planning and Inventory Control:	Forecasting techniques – causal and time series models, moving average, exponential smoothing, trend and seasonality; aggregate production planning; master production scheduling; MRP and MRP-II; order control and flow control; routing, scheduling and priority dispatching; push and pull production systems, concept of JIT manufacturing system; logistics, distribution, and supply chain management; Inventory – functions, costs, Classifications, deterministic and probabilistic inventory models, quantity discount; perpetual and periodic inventory control systems.
15.	Operation Research:	Linear programming – problem formulation, simplex method, duality and sensitivity analysis; transportation and assignment models; network flow models, constrained optimization and Lagrange multipliers
16.	Machining and Machine Tool Operations:	Basic machine tools; machining processes-turning, drilling, boring, milling, shaping, planing, gear cutting, thread production, broaching, grinding, lapping, honing, super finishing; mechanics of machining – geometry of cutting tools, chip formation, cutting forces and power requirements, simple queuing models; dynamic programming; simulation – manufacturing applications; PERT and CPM, time-cost trade-off, resource leveling.
17.	Quality Management:	Quality – concept and costs, quality circles, quality assurance; statistical quality control, acceptance sampling, zero defects, six sigma; total quality management; ISO 9000; design of experiments – Taguchi method.

18.	Reliability and Maintenance:	Reliability, availability and maintainability; distribution of failure and repair times; determination of MTBF and MTTR, reliability models; system reliability determination; preventive maintenance and replacement, total productive maintenance – concept and applications.
19.	Intellectual Property System:	Definition of intellectual property, importance of IPR; TRIPS and its implications, patent, copyright, industrial design and trademark.
20.	Organizational Behavior & Industrial Management:	HRD, HRM, Organization, Management, Administration.
21.	Project Management:	Risk management, Disaster management, Technology Management, Innovation, Entrepreneurship & Business Transformation, MIS & Enterprise Resource Planning, Operations strategy, Supply Chain Management, Infrastructure Management.

TEXTILE ENGINEERING

Sr. No.	Syllabus for entrance Test	
1.	Fiber Science & High Performance Fiber:	Polymer, processes involved in conversion of polymer to fiber, structure development in fiber, properties of fiber, structure property correlation. Modern techniques in man-made fiber production. Raw materials, Production process & Application of high performance fibers
2.	Yarn & Fabric Formation:	Preparatory processes. Different methods of yarn/fabric formation. Technological advances in yarn/fabric manufacturing, structure and structure- property relationship. Knitting techniques, classification, application etc.
3.	Chemical Processing & Eco textile Production:	Preparatory processes e.g. singeing, desizing, scouring, bleaching, mercerizing, heat setting of textiles. Dyeing, printing and finishing of textiles. Development of eco-textile products coated & laminated materials; surface modification techniques for textile materials.
4.	Technical Textile & Nonwovens:	All areas of technical textiles, product development & processes, Textile composites, Nonwovens, classification of nonwovens, evaluation and applications.
5.	Testing:	Sampling procedures. Fundamentals of testing of textile materials in various forms, testing methods for evaluation of various properties of Textiles.
6.	Apparel Manufacturing & Merchandising:	Patterning, drafting and marker planning, sewing, quality control aspects, visual merchandising, retail and supply chain management.

PHYSICS

Sr. No.	Syllabus for entrance Test	
1.	Classical Mechanics:	Newton's laws. Dynamical systems, Phase space dynamics, stability analysis. Central force motions. Two body Collisions - scattering in laboratory and Centre of mass frames. Rigid body dynamics-moment of inertia tensor. Non-inertial frames and pseudo forces. Variational principle. Generalized coordinates. Lagrangian and Hamiltonian formalism and equations of motion. Conservation laws and cyclic coordinates. Periodic motion: small oscillations, normal modes. Special theory of relativity- Lorentz transformations, relativistic kinematics and mass-energy equivalence. Dynamical systems, Phase space dynamics, stability analysis. Poisson brackets and canonical transformations. Symmetry, invariance and Noether's theorem. Hamilton-Jacobi theory.
2.	Quantum Mechanics:	Wave-particle duality. Schrödinger equation (time-dependent and time-independent). Eigenvalue problems (particle in a box, harmonic oscillator, etc.). Tunneling through a barrier. Wave-function in coordinate and momentum representations. Commutators and Heisenberg uncertainty principle. Dirac notation for state vectors. Motion in a central potential: orbital angular momentum, angular momentum algebra, spin, addition of angular momenta; Hydrogen atom. Stern-Gerlach experiment. Time independent perturbation theory and applications. Variational method. Time dependent perturbation theory and Fermi's golden rule, selection rules. Identical particles, Pauli Exclusion Principle, spin-statistics connection. Spin-orbit coupling, fine structure. WKB approximation. Elementary theory of scattering: phase shifts, partial waves, Born approximation. Relativistic quantum mechanics: Klein-Gordon and Dirac equations. Semi-classical theory of radiation.
3.	Atomic & Molecular Physics:	Quantum states of an electron in an atom. Electron spin. Spectrum of helium and alkali atom. Relativistic corrections for energy levels of hydrogen atom, hyperfine structure and isotopic shift, width of spectrum lines, LS & JJ couplings. Zeeman, Paschen-Bach & Stark effects. Electron spin resonance. Nuclear magnetic resonance, chemical shift. Frank-Condon principle. Born-Oppenheimer approximation. Electronic, rotational, vibrational and Raman spectra of diatomic molecules, selection rules. Lasers: spontaneous and stimulated emission, Einstein A& B coefficients. Optical

4.	Solid State Physics:	Bravais lattices. Reciprocal lattice. Diffraction and the structure factor. Bonding of solids. Elastic properties, phonons, lattice specific heat. Free electron theory and electronic specific heat. Response and relaxation phenomena. Drude model of electrical and thermal conductivity. Hall effect and thermoelectric power. Electron motion in a periodic potential, band theory of solids: metals, insulators and semiconductors. Superconductivity: type-I and type-II superconductors. Josephson junctions. Superfluidity. Defects and dislocations. Ordered phases of matter: translational and orientational order, kinds of liquid crystalline order. Quasi crystals.
5.	Nuclear and Particle Physics	Basic nuclear properties: size, shape and charge distribution, spin and parity. Binding energy, semiempirical mass formula, liquid drop model. Nature of the nuclear force, form of nucleon-nucleon potential, charge-independence and charge-symmetry of nuclear forces. Deuteron problem. Evidence of shell structure, single-particle shell model, its validity and limitations. Rotational spectra. Elementary ideas of alpha, beta and gamma decays and their selection rules. Fission and fusion. Nuclear reactions, reaction mechanism, compound nuclei and direct reactions. Classification of fundamental forces. Elementary particles and their quantum numbers (charge, spin, parity, isospin, strangeness, etc.). Gellmann-Nishijima formula. Quark model, baryons and mesons. C, P, and T invariance. Application of symmetry arguments to particle reactions. Parity non-conservation in weak interaction. Relativistic kinematics.
6.	Thermodynamic and Statistical Physics	Laws of thermodynamics and their consequences. Thermodynamic potentials, Maxwell relations, chemical potential, phase equilibria. Phase space, micro- and macro-states. Micro-canonical, canonical and grand-canonical ensembles and partition functions. Free energy and its connection with thermodynamic quantities. Classical and quantum statistics. Ideal Bose and Fermi gases. Principle of detailed balance. Blackbody radiation and Planck's distribution law.
7.	Mathematical Methods of Physics.	Dimensional analysis, Vector algebra and vector calculus, Linear algebra, matrices, Cayley Hamilton theorem, eigenvalue problems, Linear differential equations, Special functions (Hermite, Bessel, Laguerre and Legendre), Fourier series, Fourier and Laplace transforms; Elements of complex analysis: Laurent series-poles, residues and evaluation of integrals, Elementary ideas about tensors; Introductory group theory, SU(2), O(3); Elements of computational techniques: roots of functions, interpolation, extrapolation, integration by trapezoid and Simpson's rule, solution of first order differential equations using Runge-Kutta method; Finite difference methods, Elementary probability theory, random variables, binomial, Poisson and normal distributions.