



IRMRA

Helping Rubber World in Building Better Future

Indian Rubber Manufacturers Research Association (IRMRA).

was established in 1958, under DPIIT-Ministry of Commerce and Industry, to provide scientific & technological support in terms of Testing, Training, Consultancy, Research & Product development services to the Rubber and Allied industries

www.learningberg.com

www.irmra.org



Certificate Course on

RUBBER MATERIALS SCIENCE & TECHNOLOGY

Session 2023 - 2024



Dr. R. Mukhopadhyay
President

It gives me immense pleasure to learn that online Certificate Course on Rubber Materials Science and Technology, was launched by IRMRA during the Covid period (year 2020) with purpose to provide a customized Programme of Rubber Science & Technology at affordable cost to industry people in their courtyard.

Since it is being organized via online mode there is overwhelming responses from people who are working in the industry and three batches of this online course are successfully completed and the participants have appreciated about the course.

Through this course, trained manpower with sufficient theoretical and practical knowledge and are ready to serve the Rubber industry. The 4th batch of the course is about to begin with the same mission and deliverables.

My best wishes and support to the course and hope that the industry would relish the course and got benefitted with it.



Dr. K. Rajkumar
Director

"The course is designed for students and working personnel to build and enhance their career in a Rubber Industry with expanding opportunities"

It really provides me great feeling to greet the interested participants to register in the 4th batch of this one-year certificate course on Rubber Materials Science & Technology.

The course is highly recommended for working professional / people of Rubber Industry who quest for formal long-term training program in Rubber Technology, without taking break from their job.

The course is also suitable for the Final Year Science and Engineering students who are interested to build their career in Rubber Industry. It is matter of great satisfaction and happiness this course has got getting pronounced response. in its previous three sessions i.e. 2020-21, 2021-22 & 2022-23

While this course is designed to provide training in online mode with access of 24*7 of course content and video lecture, the excellent R&D and Testing facilities available in its main campus at Thane, Maharashtra and in its regional centers at Sarpol, Kolkata, WB and Sricity. Andhra Pradesh, will also be available for the practical trainings to the participants.

Therefore, the course will be a complete package to Hone the skills by acquiring the knowledge, which it offers to participants. By moving with its missions to develop human resources to meet the assessed and potential requirements of the rubber and allied industries in India (as well as in abroad) in terms of technical competence through skill and knowledge development, IRMRA, with its faculty and experts of the industry who also deliver lectures in the course, is raring to go with the 3rd edition of the course.

I am sure that the course will fulfill the expectation of the working professionals as well as career aspirant students and assist them to achieve their desired goals in the industry.

I wish them as the best and suggest to fetch maximum from the course, the professionals and it will facilitate for them to get advancement in the career in Rubber industry.

Certificate Course in **RUBBER MATERIALS SCIENCE & TECHNOLOGY**



**Duration of Program:
1 Year (2 Semesters)**

**Selection Criteria:
Telephonic interview**

Rubber industry plays an important role in Indian economy, with almost 5,000 manufacturing units primarily producing tyres, tyre-tube & flaps, automotive rubber products, belts, hoses, footwear products, moulded goods, foam products, adhesives and latex based products. With rapidly rising mobility and supply chain logistics, there is increasing use of rubber products in industries, making rubber technology a lucrative career option. Therefore, job oriented courses is a pressing need of rubber industry, to fuel its need for skilled rubber technologists.

Except for the tyre sector and few large manufacturers of rubber products, major segment of the Indian Rubber industry lies in the unorganized and MSME sector and the work force in these sectors often have inadequate knowledge and training in rubber

technology. As a premiere Institute of research in the field of rubber IRMRA receives continuous requests from the rubber and allied industries and associated individuals for designing and subsequently conducting a suitable medium term course for working professionals/industry persons to provide the requisite knowledge and skills.

It will literally be an impossible task for the industries to regularly disengage their employees for extended periods of time, from their workplace to be properly trained and oriented. To address this issue, IRMRA has introduced an online certificate course meaningfully designed to cater the need of the industries balanced with theoretical as well as practical content and sessions in year 2023-2024 and now the admissions are open for 4th session (2023-2024).



COURSE OVERVIEW

This course will show you how material selection, compounding and processing influence end product properties. It provides a sound introduction to rubber materials and their properties. It covers the fundamental aspects of rubber technology from material selection, compounding, vulcanisation, processing (conversion of raw materials into finished products), through to mechanical properties, environmental resistance, testing and specifications, evaluation of product failure and finally interactive case study exercises.

Rubber technology is the subject dealing with the transformation of rubbers or elastomers

into useful products, such as automobile tires. The materials include latex, natural rubber, synthetic rubber and other polymeric materials, such as thermoplastic elastomers.

This subject also deals with different types of rubbers, their properties, and descriptions of the formulation of rubber compounds. The methods involved in the processing of rubber are vulcanization, Mastication, and Calendaring. The duration of the course is four years and it is an important and valuable course that provides a lot of lab scopes for the candidates after its completion.

ELIGIBILITY

- ✓ Qualification of inert mediate or 10+2 along with minimum 1 year of experience working in rubber industry
- OR
- ✓ Diploma/Graduation in Engineering or Science

FEE STRUCTURE

- ✓ Fee for Indian Applicants : INR 14,500*
- ✓ Fee for Foreign Applicants : USD 500*
- ✓ * Inclusive of GST
- ✓ Fees paid are non-refundable

COURSE BENEFITS

- ✓ An online course in rubber technology to facilitate skills and knowledge development of the concerned manpower for the rubber industry
- ✓ To provide an opportunity for young minds to build their career in the strategic industry with a long term growth potential
- ✓ The industrial connection of IRMRA provides job assistance facilities for enrolled candidates.
- ✓ In addition to imparting practical concepts, technological advancement and knowledge, the programmes would provide the opportunity where the industry's leaders, experienced technologists and scientists would share their experience

COURSE STRUCTURE

SEMESTER 1

RMST 101	: Basic Rubber Science
Credit	: 4
Duration	: 24 Hrs
RMST 102	: Rubber Compounding and Ingredients
Credit	: 4
Duration	: 16 Hrs
RMST 103	: Rubber Processing Technology
Credit	: 4
Duration	: 18 Hrs
RMST 104	: Rubber Practical-1
Credit	: 4
Duration	: 12 Hrs

SEMESTER 2

RMST 201	: Rubber Product Manufacturing
Credit	: 4
Duration	: 24 Hrs
RMST 202	: Rubber Testing & Characterization
Credit	: 4
Duration	: 24 Hrs
RMST 203 A	: Latex & Adhesion Technology
Credit	: 4
Duration	: 18 Hrs
RMST 203 B	: Tyre Technology*
Credit	: 8
Duration	: 18 Hrs
RMST 204	: Rubber Practical - II
Credit	: 8
Duration	: 12 Hrs

CALENDAR OF EVENTS

SL. No	Activity	Date
01	Call for Application	21st September 2023
02	Last Date of Application Receipt	20th October 2023
03	Shortlisting of Candidates & Interview	25th October 2023
04	Commencement of Admission	28th October 2023
05	End of Admission Process	31th October 2023
06	Commencement of classes	6th November 2023
07	Semester I Examination	February 2024
08	Commencement of Semester II	February 2024
09	Semester II Examination	July 2024
10	Result Declaration	August 2024

If a particular day is declared as a holiday or happens to be holiday then the Corresponding event will come into effect on the next working day.



COURSE OUTLINE: THEORY

Teaching is providing through online lectures, classes, seminars and supervisions and you can expect between 4 and 5 hours of lectures and classes per week.

SEMESTER 1



RMST 101: Basic Rubber Science

Basic Polymer Terminologies, Polymerization Techniques, Different Type of Rubbers and Their Structure- Property Relationship, Chemistry Vulcanization.



RMST 102: Rubber Compounding & Ingredients

Study of Rubber Compounding Ingredients-Fillers. Accelerators, Plasticizers, Activators Processing Aids, Plasticizers, Process Additives, Special Purpose Additives Antidegradants etc. Formulation Development.

SEMESTER 1



SEMESTER 1



**RMST 103:
Rubber Processing Technology**

Rubber Mixing Mechanism & Machinery, Extruders, Calendars, Molding & Vulcanization Techniques & Machineries. Curing Processes

SEMESTER 2

**RMST 201:
Rubber Product Manufacturing**

Product Manufacturing Processes Performance Characteristics of Different Products Such as Tyre, Hose, Conveyor Belts, V- Belts, Rollers, Seals, O-Rings, Gaskets, Diaphragms, Rubber to Metal Bonded Products, Footwear Etc.



SEMESTER 2



**RMST 202:
Rubber Testing & Characterization**

Overview of Total Quality Management System, Quality Improvement, Productivity improvement. Circular Economy, Raw Material Testing of Rubber, Physical & Mechanical Testing of Rubber Material & Products, Chemical. Thermal & Dynamic Mechanical Testing, Overview of testing of Rubber Products; Failure investigation, Benchmarking, Troubleshooting & Recycling Technology



***RMST 203 A:
Latex & Adhesion Technology**

SEMESTER 2

Latex & Classification, Latex Particle Size And Distribution, Stability And Destabilization Of Latices, NR & SR Latices Compounding & Product Manufacturing Such As Dipped Products, Latex Foam Rubber, Latex Thread, Rubber Coated Fabric, Latex And Natural Rubber Adhesive, Butyl Rubber And Polyisobutylene, Nitrile Rubber Adhesive, Styrene Butadiene Rubber Adhesive, Neoprene Adhesives, Phenolics, Epoxies, Acrylics, Anaerobics, Cyanoacrylates Based Adhesives, PU & Silicone Based Adhesives And Applications

SEMESTER 2***RMST 203 B:
Tyre Technology**

Design and development of tyres of various kinds and type the current status of tyre industry in India and its future prospects, tyre sizing and marking on the tyres, Different types of tyres bias-belted tyre, tube and tubeless tyre, their basic functions and performance comparisons. Different components of a tyre, its geometry, basic functions.

Tyre processing & Manufacturing Techniques. Tyre wear, Rubber friction and sliding mechanism, Various factors affecting friction and sliding. Tyre stresses and deformation, Tyre noise, Mechanism of noise generation, Effect of tread pattern, Vehicle speed etc.

COURSE OUTLINE: PRACTICAL

Practical course via Video Demonstration

RMST104 Rubber Practical - I

- ▶ Molecular weight determination of Viscometry.
- ▶ Determination of volatile matter, dirt, ash content in Rubber from Natural sources.
- ▶ Rubber identification pyrolysis and spot test by specific reagents (ASTM solution) & FTIR analysis.
- ▶ Mixing behaviour of NR / carbon black filled NR / carbon black filled SBR / carbon black filled SBR & NR blend / carbon black filled EPDM / carbon black filled NBR on two roll mill & rheological studies (Mooney Viscometer, MDR and RPA)
- ▶ Testing & characterization of raw materials namely Zinc oxide / Stearic acid / Sulfur / Antioxidants / Accelerators / Processing oils
- ▶ Testing & characterization of carbon black by
 - Iodine Value
 - IAN
 - BET Surface area
 - Sieve residue
 - Heating Loss

RMST104 Rubber Practical - II

- ▶ TGA/DTG of different Rubber compounds and interpretation
- ▶ DSC analysis of polymers and interpretation
- ▶ Evaluation of tyre tread compound by using abrasion resistance index, heat build-up and DMA
- ▶ Testing of visco-elastic properties like compression and tensile tension property, creep & stress relaxation of rubber compound
- ▶ Tyre testing by endurance, rolling resistance, plunger energy, bead unseat etc.
- ▶ Extrusion characteristics of a filled rubber mix-NR & SR compound
- ▶ Calendaring of rubber compounds, Adhesives and Application

NOTE:

Every week 2 online classes will be conducted - each of 2 Hrs duration.

The laboratory visit of 2 days (Total 16 Hrs) in each semester will be conducted at **IRMRA Centres located at Thane (MH), Kolkata (WB), Sri City (AP).**

Continuous Assessment will be done based on performance in assignments given after each class. online class tests & final examination.



CAREER OPPORTUNITIES

Students from rubber technology background can find jobs in both private and public sectors. In

India the demand for trained personnel are soaring high in the recent times.

Effective Interview Techniques

Interviewing techniques include making a positive first impression and building on that impression. The confidence students develop during the career training will be projected during the interviews with employers. The Training and Placement Cell offers individualized sessions on interview training

Interview Opportunities

IRMRA will assist with employment contacts during the final portion of professional training. The majority of our students obtain positions almost immediately on completion of the course.

CAREER OPPORTUNITIES AREAS

- ✔ Adhesives & Paints
- ✔ Textile
- ✔ Cycle Tyre & Tube
- ✔ Cables & Wire
- ✔ Pharmaceuticals
- ✔ Latex
- ✔ Mining & Steel Industries
- ✔ Footware Industry
- ✔ Hoses
- ✔ Agriculture Products
- ✔ Automotive OEMs
- ✔ Defense & Aerospace

LEARNING MANAGEMENT SYSTEM



Threaded discussion contact hours are dedicated to student-to-student, student-to-faculty, and student-to-content interaction to demonstrate critical thinking and are always delivered online via the Learning Management System (LMS), **LearningBerg**. Threaded discussion contact hours take a minimum of one hour per week and are not homework assignments. Lecture and lab contact hour breakdowns located in the catalog course descriptions group the lecture and threaded discussion contact hours together as lecture contact hours.

In all courses, students receive a syllabus which outlines course content, objectives, course schedule, instructor information, grading scale, and homework assignments. Students are

expected to spend a minimum of two hours studying or completing assignments out of class for every contact hour.

Faculty members use a variety of instructional techniques best suited for their subject. Online video classes, learning affords students the opportunity to ask questions, have discussions with their peers, and interact in their learning environment.

Online courses are delivered asynchronously and may include, but are not limited to, recorded lectures, assigned reading, videos, demonstrations, simulations, quizzes, and exams. At the discretion of the instructor, synchronous activities may be part of classroom activities.



LEARNING MANAGEMENT SYSTEM



Dr. Rajkumar Kasilingam



Dr. R. K. Matthan



Mr Paul P Vannan



Mr. T. V. Sethumadhavan



Mrs. Suchismita Sahoo



Dr. Bharat P. Kagate



Dr. Debdipta Basu



Dr. Rupesh Rohan



Mr. Manohar Nawale



Mr. Sachin Barve



Mr. Gnana Sandeep



Ms. Suhasini Katke



Mr. Santosh Jagadale



ABOUT IRMRA

Indian Rubber Manufacturers Research Association (IRMRA), very soon to be known as Indian Rubber Materials Research Institute (IRMRI), was established in 1958, to provide scientific & technological support by way of Testing, Training, Consultancy, Research & Product development services to the Rubber and Allied industries. Now, IRMRA is an autonomous body under the administrative control of Government of India.

Mission

- Establish as a recognized Centre for Rubber Industry for Testing and Evaluation of Raw Materials, Products, Simulation and Modeling, Product Design Engineering and Development.
- Provide R & D, Technical, Quality Management Services, Audit and Support to Rubber Industries to upgrade their Products to compete globally.
- Support Automotive Tyre Manufacturers and Original Equipment Manufacturers with Advanced Testing Facilities for Evaluation, Performance and Certification.
- Enhance the Knowledge and Skills among the people engaged in the Rubber Industry.
- Provide Opportunities to Scientists, Technologists and Engineers to pursue Academic and Multidisciplinary Research

Research and Development

IRMRA is well known for its expertise in the fields of Testing and Investigations, Research and Products /Compound development, training & manpower development and consultancy services, and has diversified its activities in the emerging areas of material research & product development.

QUALITY CREDENTIALS

IRMRA has acquired following accreditations/recognitions and certifications from various national and international bodies of repute.

- **ISO/IEC 17025: 2017 Accreditation**
- **ISO 9001: 2015 Certification**
- **DSIR Recognition**
- **CEMILAC Recognition**
- **NBQP Registered**
- **BIS Recognition**

ROLE IN STANDARDIZATION

IRMRA is a very active member in the Standardization by way of presenting in the following committees.

- **ISO- TC 45**
- **PCD-13**
- **PCD-28**
- **PCD-29**
- **PGD - 40**
- **TED -7**
- **ME-17**
- **AISC**
- **CMVR-TSC**

EXPERTISE

IRMRA has established the state of art R&D facilities to support Rubber Industries, Public sectors such as Defense R&D establishments, Indian Navy, Air force, Bhabha Atomic Research Centre [BARC]. Indira Gandhi Centre for Atomic Research [IGCAR]. Nuclear Power Corporation Ltd [NPCL], Oil & Natural Gas Corporation [ONGC] etc. End users like Automotive Industry, Railways, etc. by rendering services in Process & product development, Research, Testing & Certifications, Training & Consultancy apart from carrying out fundamental & applied Research work along with premier academic & Research Institutes Like IITs, MIT, leading

Universities, Indian Council for Agricultural Research [ICAR] institutes, in the frontier areas such as development of nano fillers & composites, Bio materials for rubber application, value addition from waste, recycling, radiation resistance, life prediction, etc.

Today, IRMRA has emerged as one of the leading centres in the Asian Countries having cumulatively rendered service to more than 3000 customers across the globe. The core expertise of IRMA is as under.



- ✓ Testing of Polymeric Materials and Products
- ✓ Research and Development on Rubber and Allied Products
- ✓ Reverse Engineering & Failure Investigation
- ✓ Academic / Sponsored Research
- ✓ Training & Skill development
- ✓ Industrial Consultancy
- ✓ Third Party Inspection
- ✓ Tyre testing Facilities (Centre of Excellence)
- ✓ Academic / Sponsored Research

IRMRA AND ITS RUBBER INDUSTRY CONNECT

IRMRA has built-up a multifaceted engagement with Indian and International tyre and non-tyre rubber products manufacturers, raw material producers and OEMs. IRMRA provides technical support, testing, training as well as consultancy to the industry. On the other side, the Governing Council of IRMRA consists of industrious and sharp brains of trend rubber industry that provide valuable inputs about trend and requirements of the industry. In addition, regular meetings between IRMRA and rubber industry take place at various platform which is a reflection of relationship of rubber industry with IRMRA. This strong network can be leveraged for the students of the proposed course by various means including good opportunity to get placed in rubber industry.



INFRASTRUCTURE AVAILABLE AT IRMRA

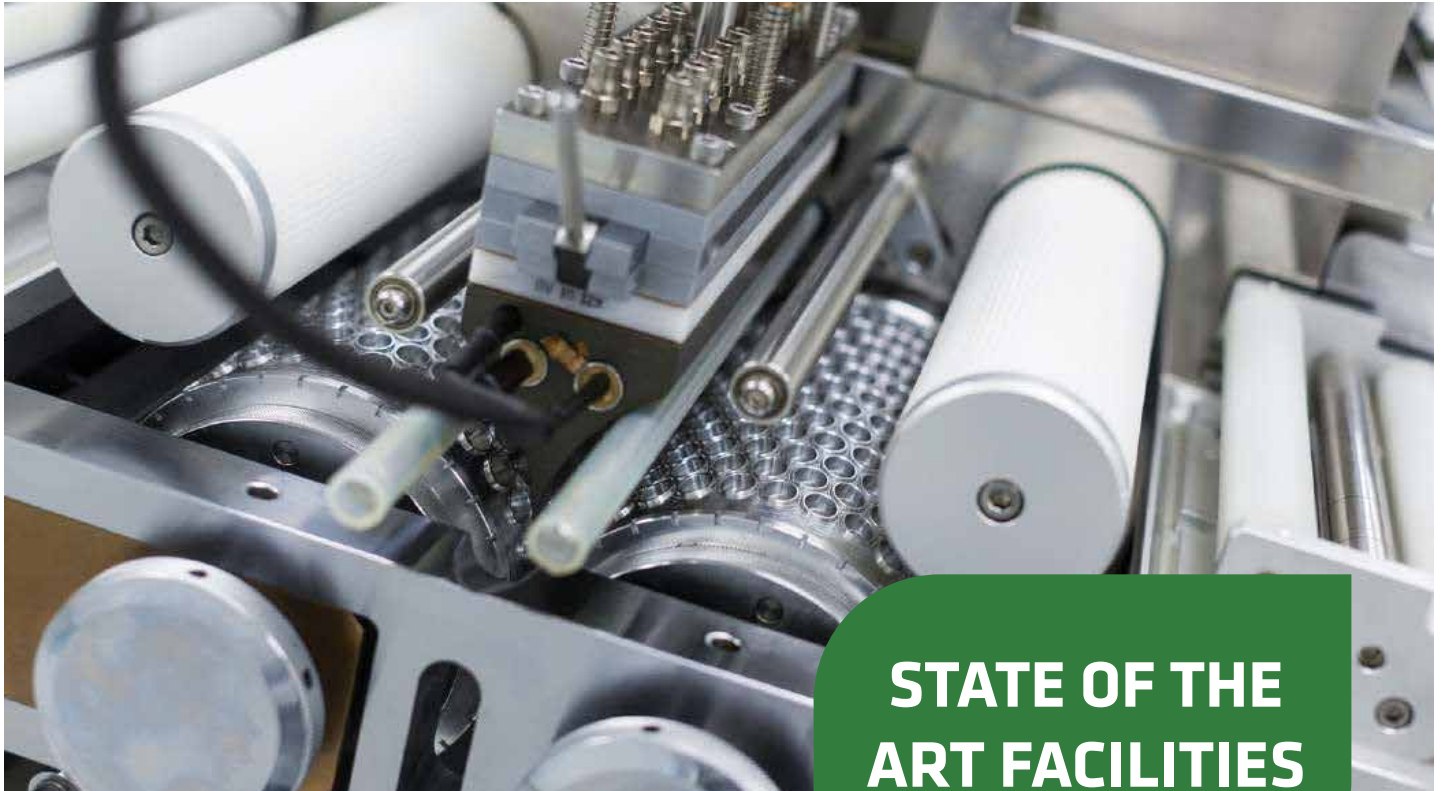
- ✓ Lecture rooms with Audio/Video facilities.
- ✓ Library facility along with reading hall, with access of books, journals & magazines particularly related to rubber.
- ✓ Meeting and presentation rooms.
- ✓ Facilities of rubber processing.
- ✓ Laboratory for experiments and testing, with full of sophisticated instruments for rubber and elements detection and characterization.
- ✓ Tyre Testing laboratory with recognition as Centre of Excellence.
- ✓ Parking Area and Institution's transport.
- ✓ IRMRA is located in heart of Thane district, part of Mumbai Metropolitan Region, and has great connectivity with nearby airport, railway station and road transport.

Department & Divisions

- ✓ Centre of Excellence for Tyre Research, Testing & Certification.
- ✓ Non-Tyre Material Testing Division
- ✓ Processing & Product Development
- ✓ Industrial Consultancy (ICON) & Projects
- ✓ Customer Service Cell & Marketing
- ✓ Training & Skill Development
- ✓ Quality Management System
- ✓ Third Party Inspection Services
- ✓ Rubber material & product testing
- ✓ Training & manpower development
- ✓ Third party inspection
- ✓ Consultancy services

Area of Expertise

- ✓ Material / Formulation Development
- ✓ Failure/ Defect investigation
- ✓ Product & process development of rubber products
- ✓ Failure Analysis
- ✓ Reverse Engineering
- ✓ Indigenization & import substitution of rubber products
- ✓ Specification development & Formula reconstruction
- ✓ Storage & service life prediction of rubber products
- ✓ Development of Thermoplastic Elastomers [TPEs]
- ✓ Sustainability development by developing bio-based ingredients for rubber products.
- ✓ Third party inspections / quality audits for rubber industry



STATE OF THE ART FACILITIES

- ✓ Rubber Processing Instruments
- ✓ Low Temperature Testing
- ✓ Product Testing Facilities
- ✓ Tyre Testing Instruments
- ✓ Tyre Research Facilities & Test
- ✓ Physical Testing Instruments
- ✓ Tools and Fabrication Instruments
- ✓ Latex Processing Instruments
- ✓ Molding Facilities



CONTACT US

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Mr Paul P Vannan

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Website: www.irmra.org

IRMRA LOCATIONS



Indian Rubber Manufacturers Research Association East Centre, South Asian Rubber Park, Dhulagarh, West Bengal

Nearest Railway Station:

Howrah Railway Station - 21.2 Km

Nearest Airport:

Netaji Subhash Chandra Bose International Airport - 35.8 Km

Google map URL:

<https://goo.gl/maps/QRyCPukFyLeF1jUv9>

Indian Rubber Manufacturers Research Association South Centre, Sri City, Andhra Pradesh

Nearest Railway Station:

Chennai Central Station - 75.4 Km

Nearest Airport:

Chennai International Airport - 83 Km

Google map URL:

<https://goo.gl/maps/fB2rQKhFXsZ5oZvc9>

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