

Departmental Admission Test (DAT) –2025

Department of Polymer Science and Rubber Technology (PS&RT)

Cochin University of science and Technology (CUSAT), Cochin

About the DAT 2025

Date for DAT: June 24, 2025

It is a three hour long test covering the following subjects: Basic Chemistry (section I), Mechanical Engineering (section II), Chemical Engineering (section III) and Polymer Science/Polymer Engineering/Polymer Technology (section IV). 100 Multiple choice or one word/fill in the blank question will be in the question paper. 25 question will be set from each section. All the candidate have to attend the question from each sections and there is no negative marking.

Syllabus for the DAT Exam for M.Tech in Polymer Technology

Section I Chemistry

Reaction Mechanisms- Nucleophilic and electrophilic substitution reactions, elimination reactions, reactive intermediates, molecular rearrangements. Organic Synthesis: Synthesis, reactions, mechanisms and selectivity, carbon-carbon bond formation through coupling reactions. Structure and Group theory: Hydrogen and hydrogen-like atoms: atomic orbitals; radial distribution function. Spectroscopy and microscopy: Principles of different spectroscopies and microscopies and X ray. Thermodynamics of mixing. Chemical potential. Fugacity, activity and activity coefficients. Fractional distillation. Azeotropes and eutectics. Statistical thermodynamics. Kinetics of polymerization. Kinetics of photochemical and photo physical processes. Freundlich and Brunauer– Emmett–Teller (BET) isotherms. Organometallics, crystal systems and lattices, organometallic reactions, Ziegler Natta polymerization. Chromatography, stereochemistry.

Reference

1. Organic Chemistry by Morrison and Boyd
2. March's Advanced Organic Chemistry by Michael B. Smith and Jerry March
3. Physical Chemistry by Peter Atkins and Julio de Paula
4. Physical Chemistry: A Molecular Approach by McQuarrie and Simon
5. Concise Inorganic Chemistry by J.D. Lee
6. Cotton and Wilkinson's Advanced Inorganic Chemistry.

(section II) Mechanical Engineering

Basics of thermodynamics: thermodynamics laws, work energy principle & entropy. Heat and mass transfer: conduction, convection, radiation, heat exchangers, LMTD. Internal combustion (IC) engines: basic air cycles for IC engine, knocking. Refrigeration: types of refrigerants, properties, vapour compression and vapour absorption refrigeration system.



Reference

1. Rajput, R. K. (2004). A textbook of refrigeration and air-conditioning (Reprint 2013 ed.). S.K. Kataria & Sons.
2. Prasad, M. (2021). Refrigeration and airconditioning (3rd ed.). New Age International Pvt Ltd.
3. Nag, P. K. (2017). Engineering thermodynamics (6th ed.). McGraw Hill Education (India) Pvt. Ltd.
4. Ganesan, V. (2017). Internal combustion engines (4th ed.). McGraw Hill Education (India) Pvt. Ltd.
5. Prasad, M. (2021). Refrigeration and airconditioning (3rd ed.). New Age International Pvt Ltd.

Section III Chemical Engineering

Fluid Mechanics – Basics, properties of fluids, Fluids in motion, basic equations, Transportation and metering of fluids, flow past immersed bodies, fluidization, sedimentation. Chemical Process Principles – Fundamental concepts of stoichiometry, basic gas laws, bypass, recycle, purge. Chemical process industries – sugar and starch, oils and fats, soaps and detergents, fertilisers, petroleum and petrochemicals. Heat and mass transfer – modes of heat transfer. Fourier's law, overall heat transfer coefficient, evaporators, distillation, diffusion, drying, absorption, filtration. Thermodynamics and Reaction engineering – laws of thermodynamics, Maxwell relations, Joule Thomson expansion, phase equilibria, chemical kinetics.

Reference

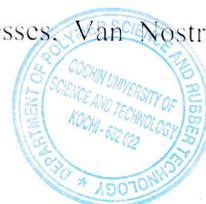
1. Warren L. McCabe, Julian C. Smith, Peter Harriott, Unit operations of Chemical Engineering, 7th Edn., Mc Graw Hill Higher education (2005).
2. P.E. Irving Granet, Fluid Mechanics for Engineering Technology, 3rd Edn., Prentice Hall (1989).
3. O.A.Hougen, K.M. Watson, R.A. Ragatz, Chemical Process Principles, Part –I Material and Energy balances, Second Edition, CBS Publishers (2004).
4. Shreve R. Norris, The Chemical Process Industries, McGraw-hill Book Company, Inc. New York (1945).
5. K.V.Narayanan, A Textbook of Chemical Engineering Thermodynamics, PHI Learning Private Ltd (2011).

Section IV Polymer Science / Polymer Technology / Polymer Engineering

Polymers, polymerization, polymerization techniques, characterization of polymers – molecular weight determination, structure and properties of polymers, thermal transitions, NR latex, latex compounding, processing and product manufacture, rubbers and plastics materials, manufacture, compounding and processing, fibre basics, spinning, types of fibre and manufacture, viscoelasticity and flow behaviour, fibre reinforced composites, blends, nanocomposites, biopolymers, testing methods.

Reference

1. F.W. Billmeyer, A Text Book of Polymer Science, 3rd Edn., Wiley & Sons (2009).
2. D. C. Blackley, Polymer Latices, Vol.1 & 3, 2nd Edn., Springer Science (1997).
3. C. M. Blow, C. Hepburn, Rubber Technology and Manufacture, 2nd Edn., Butterworth Scientific (1982)
4. S. S. Schwartz, S. H. Goodman, Plastics Materials and Processes, Van Nostrand Reinhold Company Inc. (1982).



5. V.B. Gupta, V.K. Kothari (Eds.), Manufactured Fibre Technology, Chapman & Hall (1997).
6. Vishu Shah, Handbook of Plastic Testing Technology, 3rd Edn., John Wiley & Sons (2007).
7. R. J. Crawford, P. J. Martin, Plastics Engineering, 4th Edn., Butterworth-Heinemann (2020).



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