M. Tech (QROR) Admission Test 2019
Syllabus

PART I: STATISTICS / MATHEMATICS STREAM

Statistics (S1)
- Descriptive statistics for univariate, bivariate and multivariate data.
- Standard univariate probability distributions [Binomial, Poisson, Normal] and their fittings, properties of distributions. Sampling distributions.
- Theory of estimation and tests of statistical hypotheses.
- Simple and Multiple linear regression, linear statistical models, ANOVA.
- Principles of experimental designs and basic designs [CRD, RBD & LSD], Full factorial design, Confounding and blocking in 2^k factorial designs
- Elements of non-parametric inference.
- Elements of categorical data analysis.
- Sample surveys – simple random sampling with and without replacement, stratified and cluster sampling.

Probability (S2)
- Classical definition of probability and standard results on operations with events, conditional probability and independence.
- Distributions of discrete type [Bernoulli, Binomial, Multinomial, Hypergeometric, Poisson, Geometric and Negative Binomial] and continuous type [Uniform, Exponential, Normal, Gamma, Beta] random variables and their moments.
- Bivariate distributions (with special emphasis on bivariate normal), marginal and conditional distributions, correlation and regression.
- Multivariate distributions, marginal and conditional distributions, regression, independence, partial and multiple correlations.
- Order statistics [including distributions of extreme values and of sample range for uniform and exponential distributions].
- Distributions of functions of random variables.
- Multivariate normal distribution [density, marginal and conditional distributions, regression].
- Weak law of large numbers, central limit theorem.
- Basics of Markov chains and Poisson processes.

PART II: ENGINEERING STREAM

Mathematics (E1)
- Quadratic equations, Roots of polynomial, AP, GP, HP, Divisibility and Prime numbers, Binomial theorem
- Inequalities, permutation and combination, complex numbers and De Moivre's theorem.
- Elementary set theory, functions and relations, matrices, determinants, solutions of linear equations.
- Trigonometry [multiple and sub-multiple angles, inverse circular functions, identities, solutions of equations, properties of triangles].
- Coordinate geometry (two dimensions) [straight line, circle, parabola, ellipse and hyperbola], plane geometry, Mensuration.
- Sequences, series and their convergence and divergence, power series, limit and continuity of functions of one or more variables, differentiation and its applications, maxima and minima, integration, definite integrals areas using integrals, ordinary and partial differential equations (up to second order)

Engineering and Technology (E2)
Engineering Mechanics and Thermodynamics
- Forces in plane and space, analysis of trusses, beams, columns, friction, principles of strength of materials, work-energy principle, moment of inertia, plane motion of rigid bodies, belt drivers, gearing.
- Laws of thermodynamics, internal energy, work and heat changes, reversible changes, adiabatic changes, heat of formation, combustion, reaction, solution and dilution, entropy and free energy and maximum work function, reversible cycle and its efficiency, principles of internal combustion engines, principles of refrigeration.

Electrical and Electronics Engineering
- DC circuits, AC circuits (1-ϕ), energy and power relationships, transformer, DC and AC machines, concepts of control theory and applications.
- Network analysis, 2 port network, transmission lines, elementary electronics (including amplifiers, oscillators, op-amp circuits), analog and digital electronic circuits, basics of computer architecture.

Engineering Drawing
- Concept of projection, point projection, line projection, plan, elevation, sectional view (1st angle / 3rd angle) of simple mechanical objects, isometric view, dimensioning, sketch of machine parts.
  (Use of Set Square, compass and diagonal scale should suffice).