

Preliminary Exams

Compulsory exams – Four required

20-Prelim-1 Calculus

Limits, continuity; differentiation, derivatives of the elementary functions (including trigonometric and exponential functions and their inverses), related rates, the mean Value Theorem, curve sketching, extremum problems, the definite integral, the Fundamental Theorem of Calculus, techniques of integration, area, volume, arc length, moments and centres of mass, parametric and polar considerations, sequences, series, Taylor series functions of several variables, partial derivatives, and applications.

20-Prelim-2 Computing

Candidates must develop familiarity with a high level programming language – one of Fortran, Pascal C or Matlab – and develop facility in writing computer programs.

Organization of stored program computers; principles of structured programming – input/output, assignment, selection and repetition, modular design using functions and procedures/subroutines, data structures including arrays and text files; design and testing of algorithms; introduction to numerical methods – curve fitting, numerical integration, root finding.

20-Prelim-3 Physics

Basic mechanics (Motion: in one and two dimensions. Conservation Laws: energy and momentum. Newton's Laws: applied to point masses. Equilibrium of point masses and rigid bodies); Waves and related subjects (simple harmonic motion, travelling waves, simple acoustics); Electricity (electric forces and fields, electrostatic potential, capacitors); Magnetism (magnetic fields, electro-magnetic induction); Circuits (simple D.C. and A.C. circuits).

20-Prelim-4 Chemistry

Stoichiometry; Chemical periodicity; Basic reaction types; Gases; Condensed phases; Chemical equilibrium; Acid-base equilibria; Thermochemistry; Entropy and chemical spontaneity; Electrochemistry; Chemical kinetics; Atomic structure and quantum theory; Chemical bonding; Solids; liquids; intermolecular forces; Organic chemistry; Nuclear chemistry.



ENGINEERING PRELIMINARY & BASIC STUDIES SYLLABUS OF EXAMINATIONS 2004 EDITION

For textbook information please refer to the **Textbooks** section on page 3 of the document entitled **Information for Students and Examinations Candidates**.

PRELIMINARY EXAMINATIONS

04-Prelim-1 Calculus

Limits, continuity; differentiation, derivatives of the elementary functions (including trigonometric and exponential functions and their inverses), related rates, the mean Value Theorem, curve sketching, extremum problems, the definite integral, the Fundamental Theorem of Calculus, techniques of integration, area, volume, arc length, moments and centres of mass, parametric and polar considerations, sequences, series, Taylor series functions of several variables, partial derivatives, and applications.

04-Prelim-2 Computing

Candidates must develop familiarity with a high level programming language – one of Fortran, Pascal or C – and develop facility in writing computer programs.

Organization of stored program computers; principles of structured programming – input/output, assignment, selection and repetition, modular design using functions and procedures/subroutines, data structures including arrays and text files; design and testing of algorithms; introduction to numerical methods – curve fitting, numerical integration, root finding.

04-Prelim-3 Physics

Basic mechanics (Motion: in one and two dimensions. Conservation Laws: energy and momentum. Newton's Laws: applied to point masses. Equilibrium of point masses and rigid bodies); Waves and related subjects (simple harmonic motion, travelling waves, simple acoustics); Electricity (electric forces and fields, electrostatic potential, capacitors); Magnetism (magnetic fields, electro-magnetic induction); Circuits (simple D.C. and A.C. circuits).

04-Prelim-4 Chemistry

Stoichiometry; Chemical periodicity; Basic reaction types; Gases; Condensed phases; Chemical equilibrium; Acid-base equilibria; Thermochemistry; Entropy and chemical spontaneity; Electrochemistry; Chemical kinetics; Atomic structure and quantum theory; Chemical bonding; Solids; liquids; intermolecular forces; Organic chemistry; Nuclear chemistry.



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PRELIMINARY EXAMINATIONS

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04-Prelim-3 Physics

Basic mechanics (Motion: in one and two dimensions. Conservation Laws: energy and momentum. Newton's Laws: applied to point masses. Equilibrium of point masses and rigid bodies); Waves and related subjects (simple harmonic motion, travelling waves, simple acoustics); Electricity (electric forces and fields, electrostatic potential, capacitors); Magnetism (magnetic fields, electro-magnetic induction); Circuits (simple D.C. and A.C. circuits).

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Preliminary Examination Syllabi and Texts

94-Prelim-1 Calculus

Limits, continuity, differentiation, derivatives of the elementary functions (including trigonometric and exponential functions and their inverses), related rates, the Mean Value Theorem, curve sketching, extremum problems, the definite integral, the Fundamental Theorem of Calculus, Techniques of integration, area, volume, arc length, moments and centres of mass, parametric and polar considerations, sequences, series, Taylor series functions of several variables, partial derivatives, and applications.

Prime Text:

Calculus. James Stewart (2nd edition) Brooks/Cole Publishing, 1991. ISBN 053413212X (Solution Manuals Vol I & II)

94-Prelim-2 Computing

Candidates must develop familiarity with a high level programming language - one of Fortran, Pascal, or C - and develop facility in writing computer programs.

Organization of stored program computers: principles of structured programming - input/output, assignment, selection and repetition, modular design using functions and procedures/subroutines, data structures including arrays and text files; design and testing of algorithms; introduction to numerical methods - curve fitting, numerical integration, root finding.

Prime Text:

The candidate should select one of the following three texts according to his or her choice of programming language:

Fortran with Engineering Applications (5th edition). Koffman, E.B. and Friedman, F.L., Addison Wesley, 1993. Chapters 1-8 and 12 cover examination material.

Turbo Pascal (4th edition). Savitch, W.J., Benjamin/cummings, 1993. Chapters 1-10 and 12 cover examination material.

C program Design for Engineers. Hanly, J.R. and Koffman, E.B., with Horvath, J.C., Addison-Wesley, 1995. Chapters 1-8 and 10 cover examination material.

Regardless of his or her choice of programming language, the candidate should use the following text as a reference on numerical methods:

Numerical Mathematics and Computing (3rd edition). Cheney W. and Kincaid, D., Brooks/Cole, 1994. Chapters 1-5 cover examination material.

94-Prelim-3 Physics

Basic mechanics (Motion: in one and two dimensions. Conservation Laws: energy and momentum. Newton's Laws: applied to point masses. Equilibrium of point masses and rigid bodies); Waves and related subjects (simple harmonic motion, travelling waves, simple acoustics); Electricity (electric forces and fields, electrostatic

potential, capacitors); Magnetism (magnetic fields, electro-magnetic induction); Circuits (simple D.C. and A.C. circuits).

Prime Text:

Physics for Scientists and Engineers (3rd edition). Serway, R.A., Saunders College Publishing, 1992. ISBN 0-03-096026-6.

or

General Physics (1st edition). Giancoli, D.C., Prentice-Hall, 1984.

or

University Physics (7th edition). Sears, F.W., Addison-Wesley, 1987.

94-Prelim-4 Chemistry

Stoichiometry; Chemical periodicity; Basic reaction types; Gases; Condensed phases; Chemical equilibrium; Acid-base equilibria; Thermochemistry; Entropy and chemical spontaneity; Electrochemistry; Chemical kinetics; Atomic structure and quantum theory; Chemical bonding; Solids; liquids; intermolecular forces; Organic chemistry; Nuclear chemistry.

Prime Text:

Chemistry for Science and Engineering (2nd edition). Breck, Brown and McCowan. McGraw-Hill-Ryerson, 1989.

or

Chemistry (2nd edition). Zumdahl, 1989.

and

Introduction to the Properties of Fluids. Havelena & Others.