


# CURRICULUM
# ON
# MASTER LEVEL
# ENTRANCE EXAMINATION

**FACULTY OF SCIENCE AND TECHNOLOGY**

## POKHARA UNIVERSITY

**2018**

Pokhara University

Faculty of Science and Technology

**Entrance Examination Curriculum**

Master of Science in Computer Engineering/Computer Science/ Information System Engineering

Total marks: 150 Qualifying marks: 75/53

Time: 3 hrs

Entrance curriculum mainly covers common topics of all streams covering Mathematics, Physics, Computer and Verbal Ability of Bachelor's level.

| Section | Course | Weightage (%) |
|---|---|---|
| A | Fundamentals of Mathematics | 30 |
| B | Computational Foundation | 70 |
| | Total | 100 |

**Section A: Fundamental of Mathematics**

1. **Basic of Set, Continuity, Derivative, Vector and Scalar:** Set and functions, limit, continuity and differentiability of functions, Integration by using different integration techniques, standard integrals, definite integrals parts, vectors and scalars, resolution of vectors, scalar and vector product of two and more vectors, gradient, divergence, curl and directional derivative of vectors.
2. **Linear Algebra:** Definition and basic properties of matrices and determinants Rank of matrix, system of linear equations, inverse of a matrix, Eigen values and Eigen vectors.
3. **Infinite series:** Definitions of sequence and infinite series, the necessary conditions for convergence of an infinite series, test of convergence, alternating series test.
4. **Fourier series:** Periodic functions, Fourier series on the functions of period $2\pi$, Euler's formula, Fourier series of a function having arbitrary period, even and odd functions and their Fourier series, half range functions
5. **Laplace transformation:** Laplace transform, Application of Laplace transform, Inverse Laplace transform, Convolution theorem on Laplace transform and application, Differential ewuation (ODE and PDE).
6. **Z-transform:** Definitions, one-sided and two-sided z-transform, linear time invariant system, Unit impulse function, properties of z-transform, region of convergence, inverse z-transform by residue and partial fraction, Parseval theorem, convolution.
7. **Nonlinear Equations:** Review of calculus and Taylor's theorem, errors in numerical calculations, trial and error method, Bisection method, Newton's method, Secant method
8. **Introduction of Descriptive Statistics:** Presentation and classification data frequency distribution, histogram, measures of central tendency -mean, median, mode, quartiles and percentiles, measures of dispersion (variability).

**Section B: Computational Foundation**

1. **Programming Paradigms:**

**C programming:-** Procedural programming, structured programming, Object-oriented programming, control structures, function, arrays, pointers, functions, preprocessor directives, C libraries, Macros, Header files and prototyping.

**Object-oriented programming:-** Classes and Methods, Message, message passing formalization, message passing syntax in C++, mechanism for creation and initialization (constructor and its types), Issues in creation and initialization: memory map, memory allocation methods and memory recovery, Object Inheritance and Reusability, Template and generic programming-template classes, template functions.

2. **Computer Architecture and Organization:** CPU organization, register organization, Instruction cycle, Computer Arithmetic, Instruction sets, addressing modes, Control Unit- hardwired control Unit, micro-programmed control unit, Cache memory- catch principle, mapping catch memory, write policy, replacement algorithms, Input-output organization- programmed I/O, interrupt driven I/O, Direct memory access, RISC vs. CISC, RISC pipelining, parallel processing- parallelism in uni-processor system, multiprocessor system and their characteristics, Flynn's classification, Cache coherence, vector processing and array processor, multi-core organization, dual core and quad core processors.
3. **Operating system and concepts:** Operating system concepts and functionalities, operating system structure, process states and transition, process control block (PCB), inter-process communication, critical regions and conditions, mutual exclusion, Dekker's and Peterson's algorithm, Dead lock, dead-lock avoidance, detection and prevention, threads, advantage of threads, process scheduling techniques, paging, segmentation, Distributed operating system-network architecture, Asynchronous Transfer Mode, Client-Server model.
4. **Object-oriented Software Engineering:** Software process and framework, process models, Agile development, Extreme programming, Scrum, Software modeling, quality management and testing, CMMI.
5. **Database Management System:** Need of DBMS, concept of DDL, DML and DCL, ER Model, UML class diagram, relational algebra, schema and views, SQL, normalization and normal forms, security.

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**Entrance Examination Curriculum**

Master of Science in Construction Management

Total marks: 150 Qualifying marks: 75/53

Time: 3 hrs

Entrance curriculum mainly covers common topics of all streams covering Engineering Economics, Project Engineering, Construction Management and Engineering Professional Practice.

| Section | Course | Weightage (%) |
|---|---|---|
| A | Engineering Economics | 30 |
| B | Project Engineering | 30 |
| C | Construction Management | 30 |
| D | Engineering Professional Practice | 10 |
| | Total | 100 |

**Section A: Engineering Economics:**

Interest and Time Value of Money, Payback Period, Net Present Value, Internal Rate of Return, External Rate of Return, Benefit Cost Analysis, Financial and Economic Analysis, Breakeven Analysis, Sensitivity Analysis, Law of Demand and Supply.

**Section B: Project Engineering:**

Definition and Characteristics of Project, Project Cycle, Types of Project, Feasibility Analysis, Project Proposal, Bar Chart, CPM, PERT, Resource Levelling, Project Monitoring and Control, Earned Value Analysis, Time Cost Trade off Analysis, Capital Budgeting Techniques, Capital Structure Planning.

**Section C: Construction Management:**

Construction Management Framework, Material Management, Construction Equipment, Job Layout, Method of Contract, Types of Contract, Request for Proposal, Expression of Interest, Bidding Document, Tender Notice, Bid Evaluation, Conditions of Contract, Contract Document, Running Bill, Project Completion Report, Personnel Management, Project Maintenance, Health and Safety at site.

**Section D: Engineering Professional Practice:**

Ethics and Profession, Code of Conduct, Professional Associations, Nepal Engineering Council Act, Liability and Negligence, Professional Liability Insurance, Detailed duties of Engineers, Types of Business Organizations, Labor Law, Intellectual Property right.

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**Entrance Examination Curriculum**

Master of Science in Environmental Management

Total marks: 150 Qualifying marks: 75/53

Time: 3 hrs

Entrance curriculum mainly covers common topics of all streams covering Critical Reasoning, Mathematics (Quantitative aptitude), General Awareness, Basic content related to Bachelor of Environmental Science, Engineering and Management.

| Section | Course | Weightage (%) |
|---|---|---|
| A | Verbal Ability | 10 |
| B | Fundamental of Mathematics | 10 |
| C | General Awareness | 10 |
| D | Environmental Management | 30 |
| E | Basic Water Supply and Sanitary System | 20 |
| F | Environmental Management Issues and Agencies | 20 |
| | Total | 100 |

**Section A: Verbal Ability:**

Article, Voice, Reported speech, Tense Contrast, Events in rapid succession (No sooner…than/had only just…when), Correct form of verbs, Stress/Intonation, Causative verbs, Question tag, Sentence transformation ( Negative/Positive, Verbal/Wh etc), Decision and intentions, Suggestions/Advice, AmE/BrE English words, Connectives, Right order/ Wrong order with Tenses, Singular/Plural nouns, Subject verb agreement, Relative clause, Expressing new experience, Co-relative conjunctions, Homophones/homonyms, Sense verbs with bare infinitive and gerund, To +infinitive & gerund, Discovering similarities, Conditional sentence, Requests & Offer, Prepositions, Word formation, Parts of speech, Degrees of Adjectives, Verbs and their forms, Synonyms & Antonyms, Identification of Simple, Compound and Complex sentences, Formal and informal words/sentences, Slang/Colloquial/Derogative words, English language or literature related quotations, Standard academic abbreviations ( IELTS, GRE, GMAT, SAT etc), Single word for personality traits, Standard vocabulary ( Kleptomania, chauvinism, supercilious, rationalize etc), General Knowledge on current affairs of the globe.

**Section B: Fundamental of Mathematics**

Basic Mathematics (Numbers: Fractions, Decimals and Percentages; Ratio and Proportion; Roots and Power; Logarithms; Progressions; Elementary Geometry; Elementary Trigonometry; Introductory Set Theory) Algebra (Polynomial, Equations and Inequalities; Simultaneous equations and solutions; Elementary Linear Programming, Vector Algebra); Calculus (limits and continuity, differentiation, integration, ordinary first order linear differential equation, partial differential equation), Introduction of Probability and Statistics, Permutations and Combinations.

**Section C: General Awareness:**

This section covers the general knowledge of environment, geography, environment / water law and regulations; economics and human development indicators in Nepal, general water supply and sanitary knowledge related to bachelor of science and engineering.

**Section D: Environmental Management:**

Concept of Environmental Chemistry, Air pollution: sources, types, gaseous and particulate matter, smog, green house effect, acid rain and ozone depletion. Water pollution: types, sources and classification of water pollution, ground water pollution, marine water pollution. Concept of DO, BOD, CODS their effects on flora and fauna. Soil pollution: sources and types – classification of soil pollutants, effects of pollution on soil, to health and productivity. Sewage – municipal sewage, lake/pond, river water.

**Section E: Basic Water Supply & Sanitary System:**

Sources of water, quantity of water, quality of water, intake works, water treatments- natural, artificial, sedimentation, filtration, disinfection, reservoirs and distribution system, conveyance of water, valves and fittings, quantity of waste water, characteristics and examination of sewage, construction of sewers, sewer appurtenances, sewage disposal, sewage treatment, sludge treatment and disposal, solid waste management and practices in Nepal.

**Section F: Environmental Management Issues and Agencies:**

National Environmental Protection Guideline, Concept of Environmental System, Environmental Impact assessment process and its requirement. Global / national environmental management issues, agencies, existing National policy and plan for environmental management.