

GANPAT UNIVERSITY

Syllabus for the Ph. D. Entrance Examination

Instructions:

1. The question paper of the Ph. D. Entrance Examination shall be of 100 marks, to be attempted in 2 hours duration.
2. The question paper will have 2 sections (Section-A and Section-B).
3. Section-A (From Research Methodology) will consist of 50 objective type questions (Multiple Choice), each carrying one mark. Section A shall be common for all the candidates appear in Entrance Examination.
4. Section-B shall be of 50 marks which is Subject specific depends on respective discipline/branch) will consist two parts.
 - Part - I shall be of 25 marks having 25 objective type of questions with multiple choice answers having only one correct answer.
 - Part - II shall be of 25 marks and having descriptive type of questions.
5. There is no negative marking.

SECTION – A

(Common for all candidates)

RESEARCH METHODOLOGY

Total Marks: 50

Unit	Content	Marks
1	Basics of Research: Research: Meaning, Objective, Characteristics, Steps of research, Methods of research, Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical.	[05]
2	Research Problem and Research Design Introduction to Research Problem, Necessity of Defining the Problem, Selecting the Problem, Techniques Involved in Defining a Problem, Meaning and Types of Research Design, Important Concepts Relating to Research Design	[10]
3	Data Collection and Analysis Methods of Data Collection- Observation, Interview, Questionnaires, Schedules, Survey and Experimental. Selection of Appropriate Method for Data Collection, Different Techniques of Sampling such as Probability and Non-Probability, Basic Statistical Methods of Data Analysis such as Frequency distribution, Measures of central tendency, Measures of Dispersion, Coefficient of variation, correlation and regression.	[20]
4	Ethics in Research: Environmental impacts and Ethical issues, Commercialisation, Copy right, Royalty, Intellectual property rights and Patent law, Plagiarism, Citation, Referencing style and acknowledgement.	[05]

Reference Books

1. 'Research Methodology- A Step-By-Step Guide for Beginners', Ranjit Kumar, (Pearson Education, Delhi) ISBN: 81-317-0496-3.
2. 'Research Methodology- Methods and Techniques', Kothari, C.K., New Age International, New Delhi.
3. Research In Education, John V. Best, John V. Kahn 10th ed., Allyn & Bacon Publisher, 2005.
4. Practical Introduction of copyright by Gavin Mcfarlane, McGraw Hill Inc., USA.
5. Introduction to Scientology Ethics, Hubbard, L. Ron. New Era Publisher, Denmark.
6. Research Methodology by Deepak Chawala, Vikas Publications.
7. Statistics for Management, Levin & Rubin, Pearson Publication

SECTION – B

Faculty of Engineering & Technology

[Computer Science & Information Technology]

Unit	Content	Marks
1	ENGINEERING MATHEMATICS Mathematical Logic: Propositional Logic; First Order Logic. Probability: Conditional Probability; Mean, Median, Mode and Standard Deviation; Random Variables; Distributions; uniform, normal, exponential, Poisson, Binomial. Set Theory & Algebra: Sets; Relations; Functions; Groups; Partial Orders; Lattice; Boolean Algebra. Combinatorics: Permutations; Combinations; Counting; Summation; generating functions; recurrence relations; asymptotics. Graph Theory: Connectivity; spanning trees; Cut vertices & edges; covering; matching; independent sets; Colouring; Planarity; Isomorphism. Linear Algebra: Algebra of matrices, determinants, systems of linear equations, Eigen values and Eigen vectors. Numerical Methods: LU decomposition for systems of linear equations; numerical solutions of non-linear algebraic equations by Secant, Bisection and Newton-Raphson Methods; Numerical integration by trapezoidal and Simpson's rules. Calculus: Limit, Continuity & differentiability, Mean value Theorems, Theorems of integral calculus, evaluation of definite & improper integrals, Partial derivatives, Total derivatives, maxima & minima.	[5]
2	COMPUTER SCIENCE AND INFORMATION TECHNOLOGY Digital Logic: Logic functions, Minimization, Design and synthesis of combinational and sequential circuits; Number representation and computer arithmetic (fixed and floating point). Computer Organization and Architecture: Machine instructions and addressing modes, ALU and data-path, CPU control design, Memory interface, I/O interface (Interrupt and DMA mode), Instruction pipelining, Cache and main memory, Secondary storage. Programming and Data Structures: Programming in C; Functions, Recursion, Parameter passing, Scope, Binding; Abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search trees, Binary heaps. Algorithms:	[5] [8] [5]

Theory of Computation: [5]

Regular languages and finite automata, Context free languages and Push-down automata, Recursively enumerable sets and Turing machines, Undesirability.

Compiler Design: [5]

Lexical analysis, Parsing, Syntax directed translation, Runtime environments, Intermediate and target code generation, Basics of code optimization.

Operating System: [5]

Processes, Threads, Inter-process communication, Concurrency, Synchronization, Deadlock, CPU scheduling, Memory management and virtual memory, File systems, I/O systems, Protection and security.

Databases: [5]

ER-model, Relational model (relational algebra, tuple calculus), Database design (integrity constraints, normal forms), Query languages (SQL), File structures (sequential files, indexing, B and B+ trees), Transactions and concurrency control.

Information Systems and Software Engineering: information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project, design, coding, testing, implementation, maintenance.

Computer Networks: [7]

ISO/OSI stack, LAN technologies (Ethernet, Token ring), Flow and error control techniques, Routing algorithms, Congestion control, TCP/UDP and sockets, IP(v4), Application layer protocols (icmp, dns, smtp, pop, ftp, http); Basic concepts of hubs, switches, gateways, and routers. Network security – basic concepts of public key and private key cryptography, digital signature, firewalls.

Web technologies: HTML, XML, basic concepts of client-server computing.