



Department of Computer Applications

Common Entrance Test – Ph.D Admission 2026

Syllabus

Paper – I (Research Methodology)

Unit I: Foundations of Research and Research Process

Research meaning, objectives, types, approaches, significance, research methodology, scientific method, research process, characteristics of good research, research problems, and problem formulation techniques.

Unit II: Research Design and Experimental Principles

Research design concepts, features and types of research designs, principles of experimental design, research planning, experimental and non-experimental designs, and survey research.

Unit III: Sampling Design and Measurement Techniques

Sampling concepts, sampling procedures and techniques, sample design characteristics, measurement scales, errors in measurement, reliability and validity, scaling methods, and scale construction.

Unit IV: Methods of Data Collection and Data Handling

Primary and secondary data collection methods, observation, interviews, questionnaires, schedules, case studies, selection of appropriate data collection techniques, and research ethics.

Unit V: Interpretation, Report Writing, and Computer Applications in Research

Data interpretation techniques, research report writing, report structure and presentation, documentation practices, computer applications in research, and use of computers for data analysis and reporting.

Reference

Kothari, C. R., & Garg, G. (2019). *Research methodology: Methods and techniques* (4th ed.). New Age International Publishers.

Kothari, C. R. (2004). *Research methodology: Methods and techniques* (2nd ed.). New Age International Publishers.



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Syllabus

Paper – II (Core)

Unit I: Mathematical Foundations and Programming

Discrete mathematics, logic, graph theory, recurrence relations, asymptotic analysis, programming fundamentals (C/C++), object-oriented programming, data structures, recursion, searching, sorting, and complexity analysis.

Unit II: Algorithms and Computer Organization

Algorithm design techniques, algorithm analysis, graph and string algorithms, number systems, digital logic, computer organization, memory hierarchy, instruction set architecture, pipelining, and performance evaluation.

Unit III: Operating Systems and Databases

Process and thread management, CPU scheduling, synchronization, deadlocks, memory and file management, database design, relational model, SQL, transactions, concurrency control, normalization, and database security.

Unit IV: Networks and Artificial Intelligence

Computer network architecture, routing, transport and application protocols, network security fundamentals, AI problem-solving, search techniques, knowledge representation, machine learning, reinforcement learning, and neural networks.

Unit V: Software Engineering and Emerging Technologies

Software development life cycle, software design and testing, project management, quality assurance, maintenance, cloud computing, IoT, cybersecurity, blockchain, quantum computing, big data, data science, AR/VR, federated learning, explainable AI, and robotics.

References

Rosen, K. H. (2019). *Discrete mathematics and its applications* (8th ed.). McGraw-Hill.



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MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE
(Deemed to be University under section 3 of UGC Act, 1956)

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- Patterson, D. A., & Hennessy, J. L. (2017). *Computer organization and design: The hardware/software interface* (5th ed.). Morgan Kaufmann.
- Kernighan, B. W., & Ritchie, D. M. (1988). *The C programming language* (2nd ed.). Prentice Hall.
- Drozdek, A. (2012). *Data structures and algorithms in C++* (4th ed.). Cengage Learning.
- Silberschatz, A., Galvin, P. B., & Gagne, G. (2018). *Operating system concepts* (10th ed.). Wiley.
- Silberschatz, A., Korth, H. F., & Sudarshan, S. (2019). *Database system concepts* (7th ed.). McGraw-Hill.
- Kurose, J. F., & Ross, K. W. (2021). *Computer networking: A top-down approach* (8th ed.). Pearson.
- Russell, S., & Norvig, P. (2021). *Artificial intelligence: A modern approach* (4th ed.). Pearson.
- Sommerville, I. (2016). *Software engineering* (10th ed.). Pearson.
- Goodfellow, I., Bengio, Y., & Courville, A. (2016). *Deep learning*. MIT Press.