



ಶರಣಬಸವ
SHARNBASVA



ವಿಶ್ವವಿದ್ಯಾಲಯ
UNIVERSITY



A State Private University approved by Govt. of Karnataka vide Notification No. ED 144 URC 2016 dated 29-07-2017
Recognised by UGC under Section 2f vide No. F.8-29/2017 (CPP-I/PU), dated 20-12-2017 & AICTE, CoA, PCI New Delhi

SYLLABUS FOR PH.D. ENTRANCE EXAMINATION 2026

Faculty of Computer Applications

Part I: Research Methodology (Weightage 50%)

Module 1:

Research Methodology: Research Methodology: Introduction, Meaning of Research, Objectives of Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India.

Defining the Research Problem: Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration.

Module 2:

Reviewing the literature: Place of the literature review in research, Bringing clarity and focus to research problem, Improving research methodology, Broadening knowledge base in research area, Enabling contextual findings, Review of the literature, searching the existing literature, reviewing the selected literature, Developing a theoretical framework, Developing a conceptual framework, Writing about the literature reviewed.

Research Design: Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Important Experimental Designs

Module 3:

Design of Sample Surveys: Design of Sampling: Introduction, Sample Design, Sampling and Non-sampling Errors, Sample Survey versus Census Survey, Types of Sampling Designs.

Measurement and Scaling: Qualitative and Quantitative Data, Classifications of Measurement Scales, Goodness of Measurement Scales, Sources of Error in Measurement, Techniques of Developing Measurement Tools, Scaling, Scale Classification Bases, Scaling Technics, Multidimensional Scaling, Deciding the Scale.

Data Collection: Introduction, Experimental and Surveys, Collection of Primary Data, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method.

Module 4:

Testing of Hypotheses: Hypothesis, Basic Concepts Concerning Testing of Hypotheses, Testing of Hypothesis, Test Statistics and Critical Region, Critical Value and Decision Rule, Procedure for Hypothesis Testing, Hypothesis Testing for Mean, Proportion, Variance, for Difference of Two Mean, for Difference of Two Proportions, for Difference of Two Variances, P-Value approach, Power of Test, Limitations of the Tests of Hypothesis.

Chi-square Test: Test of Difference of more than Two Proportions, Test of Independence of Attributes, Test of Goodness of Fit, Cautions in Using Chi Square Tests

Module 5:

Interpretation and Report Writing: Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports.

Intellectual Property: The Concept, Intellectual Property System in India, Development of TRIPS Complied Regime in India, Patents Act, 1970, Trade Mark Act, 1999, The Designs Act, 2000, The Geographical Indications of Goods (Registration and Protection) Act 1999, Copyright Act, 1957, The Protection of Plant Varieties and Farmers' Rights Act, 2001, The Semi-Conductor Integrated Circuits Layout Design Act, 2000, Trade Secrets, Utility Models, IPR and Biodiversity, The Convention on Biological Diversity (CBD) 1992, Competing Rationales for Protection of IPRs, Leading International Instruments Concerning IPR, World Intellectual Property Organisation (WIPO), WIPO and WTO, Paris Convention for the Protection of Industrial Property, National Treatment, Right of Priority, Common Rules, Patents, Marks, Industrial Designs, Trade Names, Indications of Source, Unfair Competition, Patent Cooperation Treaty (PCT), Advantages of PCT Filing, Berne Convention for the Protection of Literary and Artistic Works, Basic Principles, Duration of Protection, Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement, Covered under TRIPS Agreement, Features of the Agreement, Protection of Intellectual Property under TRIPS, Copyright and Related Rights, Trademarks, Geographical indications, Industrial Designs, Patents, Patentable Subject Matter, Rights Conferred, Exceptions, Term of protection, Conditions on Patent Applicants, Process Patents, Other Use without Authorization of the Right Holder, Layout-Designs of Integrated Circuits, Protection of Undisclosed Information, Enforcement of Intellectual Property Rights, UNSECO.

References:**Text Books:**

- C.R. Kothari, Gaurav Garg, “Research Methodology: Methods and Techniques”, New Age International, 4th Edition, 2018.
- Ranjit Kumar, “Research Methodology a step-by-step guide for beginners. (For the topic Reviewing the literature under module 2)” , SAGE Publications Ltd, 3rd Edition, 2011.
- Study Material (For the topic Intellectual Property under module 5), Professional Programme Intellectual Property Rights, Law and Practice, The Institute of Company Secretaries of India, Statutory Body Under an Act of Parliament, September 2013.

Reference Books:

- Trochim, “Research Methods: the concise knowledge base” , Atomic Dog Publishing, 2005.
- Fink A, “Conducting Research Literature Reviews: From the Internet to Paper”, Sage Publications, 2009.

Computer Applications (Weightage 50%)

Unit 1

Data Structures and its applications:

Introductions, primitive, arrays, strings, stacks recursion, queues, linked lists, trees, sorting and searching

Reference:

1. Erns Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, Universities Press,
2. Seymour Lipschutz, Data Structures Schaum's Outlines, McGraw Hill

Unit 2

Discrete Mathematical Structures:

Fundamentals of logics, properties of Integers, principles of counting, relations and functions, inclusion and exclusion, graph theory

Reference:

Ralph P, Grimaldi: Discrete and Combinatorial Mathematics, Pearson Education.

Unit 3

Software Engineering:

Introduction, requirement engineering,, RUP, UML, software testing, project planning, agile software development.

Reference:

Ian Sommerville: Software Engineering,, Pearson Education

Unit 4

Computer Organization:

Machine instructions and programs, input/output organization, memory, Arithmetic, and basic processing unit

Reference:

Carl Hamacher, honk° Vranesic, Safwat Zaky, Computer Organization, 5th Edition, Tata McGraw Hill, 2002

Unit 5**Design and Analysis of Algorithms:**

Introduction to algorithms, performance, divide and conquer, greedy, dynamic programming, backtracking

Reference:

1. Introduction to the Design and Analysis of Algorithms, Anany Levitin. Pearson.
2. Computer Algorithms/C4—I., Ellis Horowitz, Shirai Salmi and Rajasekaran,Universiuts Press

Unit 6**Operating system:**

Introduction, multi threaded programming, Deadlocks, virtual memory management, secondary storage structures and protections,

Reference:

Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles , Wiley-India.

Unit 7

Data Communication and Computer Network; Introduction, Digital transmission, bandwidth utilization, Data link control, media access control, wired LAN and Ethernet. Application layer, Transport layer, Network layer, Network security

Reference:

Behrouz A, Forouzan, Data Communications and Networking

James F Kurose and Keith W Ross, Computer Networking, A Top•Down Approach, Sixth edition, Pearson

Unit 8

Object Oriented Modelling and Design(c++/Java):

Introduction, use case modelling, Process overview, use case realization, Design patterns

Reference:

1. Michael Olaha, James Rumbaugh: Object Oriented Modelling and Design with UML, Pearson Education
2. Erich Gamma. Richard Helm. Ralph Johnson and John Vlissides: Design Patterns —Elements of Reusable Object-Oriented Software, Pearson Education

Unit 9

Data Base Management System:

Introduction, relational model, Relational algebra, SQL, Normalization, transaction processing, External Sorting.

Reference:

Fundamentals of Database Systems, Ram/. Elmasri and Shamkant II, Navathe,, Pearson,

Unit 10

System modelling and simulation:

Introduction, statistical modelling, queuing models, random number generation, input modelling, estimation, verification, calibration and validation.

Reference:

Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol: Discrete-Event System Simulation,