**PET SYLLABUS FOR INFORMATION TECHNOLOGY (SCIENCE)
STUDENTS
2020 ONWARDS**

PAPER I   Research Methodology

1. **Research Methodology**: An Introduction, Meaning of Research, Objectives of Research 2 Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India.

2. **Defining the Research Problem** : What is a Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration, Conclusion.

3. **Methods of Data Collection**: Collection of Primary Data, Observation Method, Interview Method,   Collection of Data through Questionnaires, Collection of Data through Schedules, Difference between Questionnaires and Schedules, Some Other Methods of Data Collection, Collection of Secondary Data, Contents xiii Selection of Appropriate Method for Data Collection, Case Study Method.

4. **Sampling, data collection and analysis:** Concept of Statistical population, Sample, Sampling Frame, Sampling Error, Sample size, Non Response. Characteristics of a good sample, sample distribution, Probability and Probability distributions. Determining size of the sample - Practical considerations in sampling and sample size. Testing of Hypotheses-I (Parametric or Standard Tests of Hypotheses) What is a Hypothesis?, Basic Concepts Concerning Testing of Hypotheses, Procedure for Hypothesis Testing, Flow Diagram for Hypothesis Testing.

5. **Reasoning and Mental ability**: Analogy, Logical reasoning and aptitude, Classification, Series, Coding-Decoding, Direction Sense, Representation Through Venn Diagrams, Mathematical Operations, Arithmetical Reasoning, Inserting the Missing Character, Number, Ranking and Time Sequence Test, Eligibility Test, Representation through Venn- diagrams, Number & symbols

ordering, Comprehension questions, Statement & assumptions, Statement & conclusions, Statement & actions.

Reference books:

1. **Kothari C. R., 1990. Research Methodology: Methods and Techniques, II Edition and above, New Age International.**
2. **Misra R.P, Research Methodology – A Hand Book, Concept publishing Company, New Delhi, 1988.**
3. **Research Methodology: Principle, Methods and Practices-Joshua O.Miluwi and Hina Rashid.**
4. **Research Methodology: A Step By Step Guide for beginners- Ranjeet Kumar**

PAPER II CORE SUBJECT: INFORMATION TECHNOLOGY

1. **Datamining:**
   Introduction, Data, knowledge representation, Data preprocessing, Mining Frequent Patterns, Associations, and Correlations, Classification and Prediction, Cluster Analysis, Graph Mining, Social Network Analysis, and Multirelational Data Mining, .Mining Object, Spatial, Multimedia, Text, and Web Data.

2. **Distributed Systems**: Characterization Of Distributed Systems, System Models, Networking And Internetworking, Interprocess communication, Remote Invocation, Indirect Communication, Web Services, Coordination And Agreement, Name Services, Time And Global States, Distributed Transactions, Mobile And Ubiquitous Computing

3. **Software Testing**: Test basics, Test Processes, Test management, Test Techniques, Tests of Software Characteristics, Reviews, Incident Management, Standards and Test Process Improvement, test Techniques, People Skills and Team Composition.

4. **Cloud Computing**: Distributed System Models and Enabling Technologies, Computer Clusters for scalable parallel computing, Public Cloud Platforms:

GAE, AWS, and Azure, Programming Support of Google App Engine, Ubiquitous Clouds and the Internet of Things.

5. **Advance Database Concepts** : The Extended Entity Relationship Model and Object Model, Object-Oriented Databases, Object Relational and Extended Relational Databases, Parallel and Distributed Databases and Client-Server Architecture, Databases on the Web and Semi Structured Data, Enhanced Data Models for Advanced Applications

6. **Artificial Intelligence:** Intelligent Agents, Propositional and Predicate logic, Games, First order logic, planning, Probabilistic Reasoning , Uncertain Knowledge and reasoning, Simple decision making, Knowledge in learning, statistical and reinforced learning, Natural Language Processing, Robotics

7. **IT Infrastructure Management:** The Service Lifecycle, Service Strategy, Service design, Service Transmission, Service operation, Continual Service Improvement

8. **Information Security Management:** Security Risk Assessment and Management, Security Management of IT Systems, Key Management in Organizations, Auditing and Business continuity Planning, Computer forensics

9. **Digital Image Processing:** Introduction to image processing, Visual Preliminaries, Intensity transformations, Spatial filtering, Colour image processing, Morphological Image Processing, Segmentation, Representation and Description, Object Recognition, Image Analysis, Medical image processing, Feature Extraction and Statistical Measurement.

10. **Embedded Systems:** Typical Embedded systems**,** Characteristics of embedded systems, Embedded Product Development Life Cycle, Hardware, Software, Co design and Program modelling, Embedded hardware and firmware Design and Development, Real Time Operating Systems, Memories and Memory Subsystems, programming Concepts and Trends in embedded systems industry

11. **Cyber Security and Forensics:** Introduction to ethical hacking, System hacking, Viruses and worms, Social Engineering, Hacking Web Applications, SQL Injection, Hacking Wireless Networks, Hacking Mobile Platforms, Evading IDS, Firewalls and Honeypots, Buffer Overflows, Cryptography, Penetration Testing, Computer Forensics and Investigation Processes, Understanding Computing Investigations, The Investigator's Office and Laboratory, Data Acquisitions, Processing Crime and Incident Scenes, Working with Windows and DOS Systems, Current Computer Forensics Tools, Virtual Machines, Network Forensics, and Live Acquisitions, E-mail Investigations, Cell Phone and Mobile Device Forensics

REFERENCE MATERIAL:

As prescribed for the University of Mumbai M.Sc in Information Technology Syllabus.