PET – 2016

SYLLABUS

Faculty **-** Management Science

Subject **–** Computer Application

Dr.Babasaheb Ambedkar Marathwada University,
Aurangabad

RESEARCH METHODOLOGY (50% weightage)

UNIT I

An Introduction ,Meaning of Research ,Objectives of Research ,Motivation in Research ,Types of Research ,Research Approaches ,Significance of Research , Research Methodology, ,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.

Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, Hypothesis formulation.

UNIT II

Research Proposal, Purpose of Research Proposal, Types of Research Proposal, Development of Research Proposal, Contents of research Proposal, Evaluation of Research Proposals.

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 ,Conclusion ,Developing a Research Plan

UNIT III

Census and Sample Survey ,Implications of a Sample Design ,Steps in Sampling Design ,Criteria of Selecting a Sampling Procedure ,Characteristics of a Good Sample Design ,Different Types of Sample Designs ,Random Sample, Random Sample from an Infinite Universe, Complex Random Sampling Designs, Need for Sampling ,Some Fundamental Definitions ,Important Sampling Distributions ,Central Limit Theorem ,Sampling Theory ,Sandler's A-test ,Concept of Standard Error ,Estimation ,Estimating the Population Mean ( ) μ, Precision Rate and Confidence Level.

Measurement and Scaling Techniques, 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 ,Selection of Appropriate Method for Data Collection ,Case Study Method , Guidelines for Constructing Questionnaire/Schedule, Guidelines for Successful Interviewing, Difference between Survey and Experiment

UNIT IV

Processing Operations ,Some Problems in Processing ,Elements/Types of Analysis ,Statistics in Research ,Measures of Central Tendency ,Measures of Dispersion ,Measures of Asymmetry (Skewness) ,Measures of Relationship ,Simple Regression Analysis ,Multiple Correlation and Regression ,Partial Correlation ,Association in Case of Attributes, Other Measures, Analysis of Variance and Covariance

Basic Concepts Concerning Testing of Hypotheses ,Procedure for Hypothesis Testing ,Flow Diagram for Hypothesis Testing ,Measuring the Power of a Hypothesis Test ,Tests of Hypotheses ,Important Parametric Tests ,Hypothesis Testing of Means ,Hypothesis Testing for Differences between Means ,Hypothesis Testing for Comparing Two Related Samples ,Hypothesis Testing of Proportions ,Hypothesis Testing for Difference between Proportions ,Hypothesis Testing for Comparing a

Variance to, Some Hypothesized Population Variance ,Testing the Equality of Variances of Two Normal Populations ,Hypothesis Testing of Correlation Coefficients ,Limitations of the Tests of Hypotheses, Important Nonparametric or Distribution-free Test ,Relationship between Spearman's r's and Kendall's W ,Characteristics of Distribution-free or Non-parametric Tests ,Conclusion, Chi-square Test

UNIT V

Growth of Multivariate Techniques, Characteristics and Applications , Classification of Multivariate Techniques , Variables in Multivariate Analysis, Important Multivariate Techniques ,Important Methods of Factor Analysis ,Rotation in Factor Analysis , R-type and Q-type Factor Analyses, Path Analysis

Meaning of Interpretation, Why 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

COMPUTER APPLICATION (50% weightage)

UNIT I

Sets, Relations, Functions, Pigeonhole Principle, Inclusion-Exclusion Principle, Equivalence and Partial Orderings, Elementary Counting Techniques. Probability, Measure(s) for information and Mutual information.

Graph : Definition, walks, paths, trails, connected graphs, regular and bipartite graphs, cycles and circuits. Tree and rooted tree. Spanning trees. Eccentricity of a vertex radius and diameter of a graph. Central Graphs. Centre(s) of a tree. Hamiltonian and Eulerian graphs, Planar graphs.

Groups : Finite fields and Error correcting/detecting codes.

Linear Programming : Problem (LPP) in the standard form, LPP in canonical form, Conversion of LPP in standard form to LPP in Canonical form Simplex-Prevention of cyclic computations in Simplex and Tableau, Big Method, dual simplex and revised simplex. Complexity of simplex algorithm(s) Exponential behaviour of simplex.

Ellipsoid method and karmakar's method for solving LPPs, Solving simple LPPs through these methods. Comparison of complexity of these methods.

Assignment and Transportation Problems : Simple algorithms like Hungarian method, etc.

Shortest Path Problems : Dijkstra's and Moore's method, Complexity.

Network Flow Problem : Formulation, Max-Flow Min-Cut theorem, Ford and Fulkerson's algorithm. Exponential behaviour of Ford and Fulkerson's algorithm, Malhotra-Pramodkumar- Maheshwari (MPM) Polynomial algorithm for solving Network flow problem. Bipartite Graphs and matchings; Solving matching problems using Network flow problems.

Matroids : Definition, Graphic and Cographic matroids, Matroid intersection problem.

Non-Linear programming : Kuhn-Tucker conditions, Convex functions and Convex regions, Convex programming problems, Algorithms for solving convex programming problems-Rate of convergence of iterative methods for solving these problems.

Introduction to Digital Computer: Functions and Block Diagram of Computer, Types of Software – System software / Application software / Utility Software. Compilers, Interpreters, Assemblers, Linker, Loader

*Number System and Boolean Algebra:*Binary, Octal, HEX and their inter-conversion 1's and 2's complement, Logic Gates, Binary Arithmetic, Number Systems – BCD, EBCDIC, ASCII, De-Morgan's Theorem, Duality Theorem, Algebra Rules, Logic Circuits.

*Combinational Circuits :*Karnaugh Map Techniques, Half / Full Adder – Subtractor, Multiplexer / Demultiplexer, Digital Comparator, ALU

*Sequential Circuits :*Flip Flops - SR, D, JK, Master – Slave, Shift Register, Introduction to Counter

Memory System : Memory Hierarchy, Primary Memory – DRAM, SDRAM, DDR, RDRAM. ROM, PROM, EPROM, EEPROM, Concepts of Auxiliary, Associative, Cache and Virtual Memory, DMA

CPU Organization: CPU Building Blocks, CPU Registers and BUS Characteristics, Addressing Modes, Interrupts, Instruction sets and Execution cycle, Assembly Programming, Pipelining – Data Path, Time Space Diagram.

*Processor Architecture :*Components of Microprocessor, I/O Ports, 16-Bit (80286) Architecture, 32-Bit (80486) Architecture, Super scalar Architecture in Pentium Processors, 64-Bit (Pentium Dual-Core) Architecture

UNIT II

Programming in C : Elements of C-Tokens, identifiers, data types in C. Control structures in C. Sequence, selection and iteration(s), Structured data types in C arrays, struct, union, string and pointers

O-O Programming Concepts: Class, object, instantiation, Inheritance, polymorphism and overloading.

C++ Programming : Elements of C++-Tokens, identifiers, Variables and constants, Data types, Operators, Control statements, Functions parameter passing, Class and objects, Constructors and destructors, Overloading, Inheritance, Templates, Exception handling.

Object, messages, classes, encapsulation, inheritance, polymorphism aggregation, abstract classes generalization as extension and restriction, Object oriented design. Multiple inheritance, metadata.

JAVA: Introduction to Java Programming, Java – Programming Fundaments, Classes and Objects, Inheritance & Polymorphism, Exception Handling, Threading, Java I/O, Event Programming, Java, Servelets, Applets.

HTML, DHTML, XML, Scripting,

Data, Information, Definition of data structure, Arrays, stacks, queues, linked lists, trees, graphs, priority queues and heaps.

File Structures : Fields, records and files, Sequential, direct, index-sequential and relative files, Hashing, inverted lists and multi-lists B trees and B^+ trees

Definition, Simple and Composite structures, Arrays, Lists, Stacks queues, Priority queues, Binary

trees, B-trees, Graphs.

Sorting and Searching Algorithms, Analysis of Algorithms, Interpolation and Binary Search, Asymptotic notations-big ohm, omega and theta. Average case analysis of simple programs like finding of a maximum of n elements, Recursion and its systematic removal. Quicksort-Non-recursive implementation with minimal stack storage. Design of Algorithms (Divide and Conquer, Greedy method, Dynamic programming, Back tracking, Branch and Bound). Lower bound theory, Non-deterministic algorithm-Non-deterministic programming constructs. Simple non-deterministic programs. NP-hard and NP-complete problems

UNIT III Database Concepts, ER diagrams, Data Models, Design of Relational Database, Normalization, SQL,PL/SQL and QBE, Query Processing and Optimisation, Centralised and Distributed Database, Security, Concurrency and Recovery in Centralised and Distributed Database Systems, Object Oriented Database, Management Systems (Concepts, Composite objects, Integration with RDBMS applications).

SQL : Database objects like-Views, indexes, sequences, synonyms, data dictionary.

Parallel Computing

Parallel virtual machine (pvm) and message passing interface (mpi) libraries and calls. Advanced architectures. Today's fastest computers.

Mobile Computing

Mobile connectivity-Cells, Framework, wireless delivery technology and switching methods, mobile information access devices, mobile data internetworking standards, cellular data communication protocols, mobile computing applications, Mobile databases-protocols, scope, tools and technology, M-business.

E-Technologies

Electronic Commerce : Framework, Media Convergence of Applications, Consumer Applications, Organisation Applications.

Electronic Payment Systems : Digital Token, Smart Cards, Credit Cards, Risks in Electronic Payment System, Designing Electronic Payment Systems.

Electronic Data Interchange (EDI) : Concepts, Applications, (Legal, Security and Privacy) issues, EDI and Electronic Commerce, Standardization and EDI, EDI Software Implementation, EDI Envelope for Message Transport, Internet-Based EDI.

Digital Libraries and Data Warehousing : Concepts, Types of Digital documents, Issues behind document Infrastructure, Corporate data Warehouses.

Software Agents : Characteristics and Properties of Agents, Technology behind Software Agents (Applets, Browsers and Software Agents).

Broadband Telecommunications : Concepts, Frame Relay, Cell Relay, Switched Multimegabit data Service, Asynchronous Transfer Mode.

Main concepts in Geographical Information System (GIS), E-cash, E-Business, ERP packages.

Data Warehousing : Data Warehouse environment, architecture of a data warehouse methodology, analysis, design, construction and administration.

Data Mining : Extracting models and patterns from large databases, data mining techniques, classification,

regression, clustering, summarization, dependency modelling, link analysis, sequencing analysis, mining scientific and business data.

UNIT IV

Network fundamentals : Local Area Networks (LAN), Metropolitan Area Networks (MAN), Wide Area Networks (WAN), Wireless Networks, Inter Networks.

Reference Models : The OSI model, TCP/IP model.

Data Communication : Channel capacity, Transmission Media-twisted pair, coaxial cables, fibre-optic cables, wireless transmission-radio, microwave infrared and millimeter waves. Lightwave transmission, Telephones-local loop, trunks, multiplexing, switching, narrowband ISDN, broadband ISDN, ATM, High speed LANS, Cellular Radio. Communication satellites-geosynchronous and low-orbit.

Internetworking : Switch/Hub, Bridge, Router, Gateways, Concatenated virtual circuits, Tunneling, Fragmentation, Firewalls.

Routing : Virtual circuits and datagrams, Routing algorithms, Congestion control.

Network Security : Cryptography-public key, secret key, Domain Name System (DNS)-Electronic Mail and Worldwide Web (WWW), The DNS, Resource Records, Name servers, E-mail architecture and Serves.

Analog and Digital transmission, Asynchronous and Synchronous transmission, Transmission media, Multiplexing and Concentration, Switching techniques, Polling.

TCP/IP protocols suite, Networks security, Network administration

Introduction: Logical View, User View System Calls, Concept of Virtual Machine, Interrupt Concept

Process Management: Process Concept, Process Control Block, Process Schedule , Process operations, Inter-process Communication, Communication in Client-Server

CPU Scheduling: Scheduling Concept, Scheduling Criteria, Scheduling algorithms, Scheduling Evaluation, Simulation Concept

Process Synchronization & Deadlock: Synchronization concept, Synchronization Requirement, Critical Section Problem, Monitors, Deadlock concepts, Deadlock prevention & avoidance, Deadlock Detection, Deadlock Recovery

Memory Management: Memory Management Techniques, Contiguous & Non Contiguous allocation, Logical & Physical Memory, Conversion of Logical to Physical address, Paging, Segmentation, Segment with paging Virtual Memory Concept, Demand paging, Page Replacement algorithm, Allocation of Frames, Page fault.

File management: File Structure, Protection, FILE system Implementation, Directory structure, Free Space Management, Allocation Methods, Efficiency & Performance, and Recovery.

Disk Management: Disk Structure, Disk Scheduling algorithm, Disk management, Swap Space concept and Management, Disk performance issues

Distributed Operating System: Difference Between Distributed & Centralized OS ,Advantages of Distributed OS, Types of Distributed OS, Concept of Global OS, NOS Architecture.

UNIX

The Unix System : File system, process management, bourne shell shell variables, command line

programming. , *Filters and Commands* : Pr, head, tail, cut, paste, sort, uniq, tr, join, etc., grep, egrep, fgrep, etc., sed, awk, etc., *System Calls (like)* : Creat, open, close, read, write, iseek, link, unlink, stat, fstat, umask, chmod, exec, fork, wait, system.

System Development Life Cycle (SDLC) : Steps, Water fall model, Prototypes, Spiral model.

UNIT
V

Software Metrics : Software Project Management.

Software Design : System design, detailed design, function oriented design, object oriented design, user interface design. Design level metrics.

Coding and testing : Testing level metrics, Software quality and reliability, Clean room approach, software reengineering

Software development models, Requirement analysis and specifications. Software design, Programming techniques and tools, Software validation and quality assurance techniques, Software maintenance and advanced concepts, Software management

MIS, Decision Making: An overview: Concept, definition , characteristics, objectives , Role and impact of MIS, Management as a control system, MIS: A support to the management, application of MIS to e-business, organization effectiveness, Decision making concept, decision making process, organizational decision making, MIS and decision making.

Information, Knowledge, Business Intelligence: Information: A quality product, Classification of information, methods of data and information collection, value of information, IT infrastructure, components, Planning, contemporary platforms, IT Capabilities and their organizational impact – Telecommunication, Networks & internet, current trends in technologies & tools –- IT enabled services, e business, wireless technologies etc.

Information systems levels, information system in business, Computer based information system, limitation and disadvantages of IS, Human as an information processor, knowledge and knowledge management system, business intelligence.

System Engineering: Analysis and design, BPR: System: concept and control, types of system, general model of MIS, need of system Analysis, SDM, SSAD, OOA, OOSAD Development Life cycle, development process of MIS, Strategic design of MIS, Business process, Process model of an organization, MIS and BPR

DSS, ESS, OAS: DSS: concept and philosophy, objectives and characteristics of DSS, major functions of DSS, Components of DSS, DSS generators and tools, limitations of DSS, GDSS, components of GDSS, MIS and benefits of DSS, ESS and components of ESS, OAS, EMS, teleconferencing, telecommuting, automated office, off- line and online data processing

Knowledge system , artificial intelligence and ERP: Knowledge system, types of knowledge system, Expert system, application of ES, benefits and Limitations of ES, knowledge base, inference engine, AI, neural network in business, SIS, EMS, ERP, ERP models and modules, benefits of ERP, ERP implementation, SCM, CRM.