

Ph.D. ENTRANCE EXAMINATION SYLLABUS

PART-A (RESEARCH METHODOLOGY)

UNIT I – DESIGN AND PROBLEM OF RESEARCH

Research Objectives, Research Methodology, Types of Research, Defining and Formulating the Research Problem, Social Benefit of the Research, Educational Benefit of Research, Problem Selection, Necessity of Defining the Problem, Significance of Literature Review, Literature Review-Primary And Secondary Sources, Critical Literature Review, Identifying Gap Areas From Literature And Research Database, Working Hypothesis Development, Hypothesis, Different Types, Significance, Development of Working Hypothesis.

UNIT II – DATA COLLECTION AND ANALYSIS

Sample Survey, Inferences of a Sample Design, Steps in Sampling Design, Criteria of Selecting a Sampling Procedure, Different Types of Sample Designs, How to Select a Random Sample? Observation and Collection of Data, Accepts of Method Validation, Methods of Data Collection, Data Processing and Analysis, Strategies and Tools, Data Analysis With Statically Package (Sigma STAT, SPSS for student t-test, ANOVA, etc.), Hypothesis Testing.

UNIT III – SOFT COMPUTING

Word Processing, Spread Sheet and Database Software. Plotting of Graphs, Internet and Its Applications, Web Browsing, Acquiring Technical Skills, Drawing Inferences From Data, Introduction of Statistics – Probability Theories, Estimates of Means and Proportions, Chi Square Test, Association of Attributes, Use of Statistical Software SPSS.

UNIT IV –RESEARCH ETHICS AND SCHOLARY PUBLISHING

Ethical Issues, Ethical Committees, Commercialization, Copy Right, Intellectual Property Rights And Patent Law, Preparing Research Papers for Journals and Conferences, Design of Paper using Template, Calculations of Impact Factor, Citation Index, Reproduction of Published Material, Plagiarism, Citation And Acknowledgement, Reproducibility And Accountability.

UNIT V – INTERPRETATION AND REPORT WRITING

Interpretation and its Technique, Precaution in Interpretation, Preparation of Project Proposal, Time Frame and Work Plan, Budget and Justification Structure and Components of Research Report, Types of Report, Title, Abstract, Introduction, Literature, Objectives, Methodology, Scientific Writing Results, Pictures and Graphs, Conclusions, References Documentation and Citation Styles, Bibliography.

Ph.D. ENTRANCE EXAMINATION SYLLABUS

PART-B (MECHANICAL ENGINEERING)

UNIT I – ENGINEERING MECHANICS & FLUID MECHANICS

Stress and Strain, Elastic Constants, Poisson's Ratio, Shear Force and Bending Moment Diagrams, Deflection of Beams, Torsion of Circular Shafts, Euler's Theory of Columns, Energy Methods, Theory of Failures, Kinematics and Dynamics of Particles, Rigid Bodies in Plane Motion, Impulse and Momentum, Center of Gravity, Moment of Inertia, Friction, Energy Formulations, Virtual Work.

UNIT II –ENGINEERING DESIGN

Design for Static and Dynamic Loading, S-N Diagram, Design of Machine Elements, Design of Shafts, Gears, Brakes and Springs, Kinematic and Dynamic Analysis of Linkages, Balancing of Reciprocating and Rotating Masses, Fly Wheel, Free Vibration and Forced Vibration of Single Degree of Freedom Systems, Effect of Damping; Critical Speeds of Shafts.

UNIT III – THERMAL ENGINEERING

Concepts and Definitions, Properties of Gas and Pure Substance, First Law of Thermodynamics, Closed and Open System, Application of Steady State Flow Process, Second Law of Thermodynamics; Carnot Cycle, Otto Cycle, Diesel Cycle, Rankine Cycle, Brayton Cycle, Vapour Compression Refrigeration Cycle, Modes of Heat Transfer, General Heat Conduction Equation, Steady and Unsteady Heat Conduction, Natural and Forced Convection, Laws of Radiation, Heat Exchanger Performance.

UNIT IV – MATERIALS SCIENCE

Types of Castings, Design of Patterns, Allowances, Moulds and Cores, Origin of Defects, Plastic Deformation and Yield Criteria, Fundamentals of Hot and Cold Working Processes, Load Estimation for Bulk and Sheet, Metal Forming Processes, Atomic Packing Factor, Volume, Stress and Strain in Metals, Molding of Composites, Powder Processing, Production of Metal/Ceramic Powders, Compaction and Sintering of Metals and Ceramic Powders.

UNIT V – MANUFACTURING AND INDUSTRIAL ENGINEERING

Tool Wear and Tool Life, Calculation of Machining Time, Lathe, Drilling and Milling Operations, Metal Forming Processes, Blanking and Punching Force Measurement, Basic Concepts of CAD/CAM, Product Design and Development, Work System Design, Facility Design, Production Planning and Control, Inventory Control, Operations Management, Engineering Economy and Costing, Human Quality and Culture, Human Factor in Quality.