**MAHATMA GANDHI UNIVERSITY**



**SCHEME AND SYLLABI**

**FOR**

**M.TECH DEGREE PROGRAMME**

**IN**

**ELECTRICAL AND ELECTRONICS AND ENGINEERING**

**WITH SPECIALIZATION IN**

**INDUSTRIAL DRIVES AND CONTROL**

**(2013 ADMISSION ONWARDS)**

**SEMESTER III**

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| **Sl. No.** | **Course No.** | **Subject** | **Hrs / Week** | **Evaluation Scheme (Marks)** | **Credits (C)** |
| **L** | **T** | **P** | **Sessional** | **ESE**  | **Total** |
| **TA** | **CT** | **Sub Total** |  |
| 1 | **MCPRM 301** | Research Methodology | 4 | 0 | 0 | 25 | 25 | 50 | 100 | 150 | 4 |
| 2 | **MEEID 302** | Bio Inspired Algorithms and its Applications | 4 | 0 | 0 | 25 | 25 | 50 | 100 | 150 | 4 |
| 3 | **MEEID 303** | Mini Project or Industrial Training  | 0 | 0 | 16 | 25 | 25 | 50 | 100 | 150 | 7 |
| Master’s Thesis Phase - I | 0 | 0 | 3 | 25 | 0 | 25 | 25 | 50 |
| **Total** | **8** | **0** | **19** | **100** | **75** | **175** | **325** | **500** | **15** |

**SEMESTER IV**

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| **Sl. No.** | **Course No.** | **Subject** | **Hrs / Week** | **Evaluation Scheme (Marks)** | **Credits (C)** |
| **L** | **T** | **P** | **Sessional**  | **ESE** | **Total** |  |
| **TA** | **CT** | **Sub Total** |  |  |  |
| 1 | **MEEID 401** | **Master’s Thesis** | **0** | **0** | **27** | **100** | **0** | **100** | **100** | **200** | **12** |
| 2 | **MEEID 402** | **Master’s Comprehensive Viva** | **0** | **0** | **0** | **0** | **0** | **0** | **100** | **100** | **3** |
| **Total** |  |  |  |  |  |  |  | **300** | **15** |
| **Grand Total of four Semesters** | **3000** | **80** |

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| **MCPRM 301** |  **RESEARCH METHODOLOGY** | **L** | **T** | **P** | **C** |  |
|  |  | **4** | **0** | **0** | **4** |  |

**Module 1**

Introduction to research methodology. Types of research, research methods Vs methodology - stages of research process. Literature review – Problem definition- Research design for exploratory, descriptive and experimental research – Brief introduction to completely randomized design, randomized block design and Latin square designs (description only).

**Module 2**

Sampling fundamentals -Types of sampling: probability and non-probability sampling. Sampling theory, sampling distribution and sample size determination. Tools and techniques of data collection: Questionnaire and schedule for field surveys, interview, observation, simulation, experimental and case study methods. Collection, recording, editing, coding and scaling of data. Scale classification and types. Measurement of validity, reliability and practicality. Cronbach’s Alpha

**Module 3**

Descriptive and inferential statistics - Data analysis and interpretation –testing of hypothesis, testing of population mean, variance and proportion –Z test – t test – F test - chi square test. Test for correlation and regression –standard error of the estimate. Testing goodness of fit. Brief introduction to non parametric tests, factor analysis, discriminant analysis and path analysis (description only). Use of SPSS and other software.

**Module 4**

Meaning of interpretation and inference: importance and care for interpreting results. Presentation of reports: popular reports and technical reports - structure and style. Oral and written presentations: Parts of a research report. Guidelines for writing research papers and reports – Writing different sections of a research paper – Introduction, Methodology, Results, Discussion, Conclusion, Abstract – Writing the title. Methods of giving references and appendices: referencing styles. Ethics in research. Use of computers and internet in research.

**References**

1. C. R. Kothari, Research Methodology, Methods and techniques ,New Age International Publishers, New Delhi, 2004.
2. R. Panneerseklvam, Research Methodology ,Prentice Hall of India, New Delhi, 2011.
3. Ranjit Kumar, Research Methodology, A step by step approach (Pearson Publishers, New Delhi, 2005.
4. Management Research Methodology : K. N. Krishnaswami, Appa Iyer and M Mathirajan, Pearson Education, Delhi, 2010
5. Hand Book of Research Methodology : M N Borse, Sree Nivas Publications, Jaipur, 2004
6. Business Research Methods: William G Zikmund, South – Western Ltd, 2003
7. Research Methods in Social Science: P K Majumdar, Viva Books Pvt Ltd, New Delhi, 2005
8. Analyzing Quantitative Data: Norman Blaikie, SAGE Publications , London, 2003
9. SPSS for Windows: Pearson Education New Delhi, 2007

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| **MEEID 302** | **BIO- INSPIRED ALGORITHMS AND ITS APPLICATIONS** | **L** | **T** | **P** | **C** |  |
|  |  | **4** | **0** | **0** | **4** |  |

**Module 1**

**Fuzzy applications in Industrial Drives and Power systems –** Fuzzy Logic-concepts-set theory -operations-membership function-fuzzy rules-fuzzy reasoning-fuzzy inference systems-Mamdani and Sugeno type-defuzzification- fuzzy controllers-applications in electric drives, power systems.

**Module 2**

**Genetic Algorithm Applications -** Modern Heuristic Search Techniques, Genetic Algorithm-Introduction--Encoding-Fitness Function, Premature Convergence, Slow Finishing, Basic Operators, Selection-Tournament Selection, Truncation Selection, Linear Ranking Selection, Exponential Ranking Selection, Elitist Selection, Proportional Selection,-Crossover, Mutation, Control Parameters Estimation, Niching Methods, Parallel Genetic Algorithms, - Application in Drives.- Tunning of membership function using genetic algorithm. Applications of GA to neural network.- Tunning of controllers.

**Module 3**

**Swarm Intelligence: Ant Colony Optimization –** Swarm intelligence general characteristics, Ant Colony Optimization: Basic Concepts- The Ant Colony System-Ants’ Foraging Behavior and Optimization,- The Max-Min Ant System Minimum Cost Paths, Combinatorial Optimization, Major Characteristics of Ant Colony Search Algorithms- Positive Feedback: Rapid Discovery of GoodSolution - Use of Greedy Search and Constructive Heuristic Information- Ant Colony Optimization Algorithms Applications.

**Module 4**

**Particle swarm optimization and Firefly Algorithm –** Particle swarm optimization: -Fundamentals- Concepts of PSO-Comparison with Genetic Algorithm- Application and Implementation. Fire Fly Algorithm –Basic Concepts-Application in optimization, power electronics and power system problems.

**References**

1. Leandro Nunes de Castro (2007). Fundamentals of Natural Computing: Basic Concepts, Algorithms, and Applications. Chapman & Hall/CRC, 2006.
2. G. Rozenberg, T. Bäck, J. N. Kok (Editors) Handbook of Natural Computing Springer Verlag, 2010.
3. Melanie Mitchell: An Introduction to Genetic Algorithms. MIT Press, 1996.
4. Mohamed E. El-Hawary,Modern Heuristic Optimisation technique –Theory and application to power system,IEEE Press.
5. Xin-She Yang: Nature-Inspired Metaheuristic Algorithms. Luniver Press 2010.
6. J. R. Koza: Genetic Programming: On the programming of computers by means of natural selection, MIT Press, 1992

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| **MEEID 303** | **MINI PROJECT/ INDUSTRIAL TRAINING & MASTER’S THESIS PHASE-1** | **L** | **T** | **P** | **C** |
| **0** | **0** | **19** | **7** |

 In Industrial Training/Mini Project the student shall undergo Industrial training of one month duration or Mini Project of two months duration. Industrial training should be carried out in an industry / company approved by the institution and under the guidance of a staff member in the concerned field. At the end of the training, he / she has to submit a report on the work being carried out. The mini project is designed to develop practical ability and knowledge about practical tools/techniques in order to solve the actual problems related to the industry, academic institutions or similar area. Students can take up any application level/system level project pertaining to a relevant domain. Projects can be chosen either from the list provided by the faculty or in the field of interest of the student. For external projects, students should obtain prior permission after submitting the details to the guide and synopsis of the work. The project guide should have a minimum qualification of ME/M.Tech in relevant field of work. At the end of each phase, presentation and demonstration of the project should be conducted, which will be evaluated by a panel of examiners. A detailed project report duly approved by the guide in the prescribed format should be submitted by the student for final evaluation. Publishing the work in Conference Proceedings/ Journals with National/ International status with the consent of the guide will carry an additional weightage in the review process.

 In Master’s Thesis Phase-I, the students are expected to select an emerging research area in the field of specialization. After conducting a detailed literature survey, they should compare and analyze research work done and review recent developments in the area and prepare an initial design of the work to be carried out as Master’s Thesis. It is mandatory that the students should refer National and International Journals and conference proceedings while selecting a topic for their thesis. He/She should select a recent topic from a reputed International Journal, preferably IEEE/ACM. Emphasis should be given for introduction to the topic, literature survey, and scope of the proposed work along with some preliminary work carried out on the thesis topic.

 Students should submit a copy of Phase-I thesis report covering the content discussed above and highlighting the features of work to be carried out in Phase-II of the thesis. The candidate should present the current status of the thesis work and the assessment will be made on the basis of the work and the presentation, by a panel of internal examiners in which one will be the internal guide. The examiners should give their suggestions in writing to the students so that it should be incorporated in the Phase–II of the thesis.

 Both Mini project/Industrial training and Master’s Thesis-1 undergo an evalution by a panel of examiners including atleast one external examiner appointed by university.

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| **MEEID 401** | **MASTER’S THESIS** | **L** | **T** | **P** | **C** |
| **0** | **0** | **27** | **12** |

In the fourth semester, the student has to continue the thesis work and after successfully finishing the work, he / she has to submit a detailed bounded thesis report. The evaluation of M Tech Thesis will be carried out by a panel of examiners including atleast one external examiner appointed by university. The work carried out should lead to a publication in a National / International Conference or Journal. The papers received acceptance before the M.Tech evaluation will carry specific weightage.

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| **MEEID 402**  | **MASTER’S COMPREHENSIVE VIVA**  | **L** | **T** | **P** | **C** |
| **0** | **0** | **0** | **3** |

 A comprehensive viva-voce examination will be conducted at the end of the fourth semester by a panel of internal examiner and external examiners appointed by the university to assess the candidate’s overall knowledge in the respective field of specialization.