DEPARTMANT OF INFORMATION TECHNOLOGY
SCHOOL OF STUDIES (ENGINEERING AND TECHNOLOGY)
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G)
EVALUATION SCHEME FOR Pre- Ph.D. COURSE WORK

EFFECTIVE FROM SESSION 2020-2021

S. No.	Name of Subject	Subject Code	Periods /Week L-T-P	ESE Duration	ESE MARKS		Credits
					Max	Min	
1	Research Methodology in Engineering	IT7100	3-1-0	3Hrs	100	50	4
2	Elective -I		3-1-0	3Hrs	100	50	4
3	Elective -II		3-1-0	3Hrs	100	50	4
4	Seminar	IT7101	-	-	Qualified/ Not Qualified		
	Total		9-3-0	3hrs	400	200*	12
	LIST OF ELECTIVES	**	Duration of Semester will be 6 months • Candidate has to score minimum 60% of the aggregate marks to qualify in ESE. • Two core subjects as Electives (4 Credits each) to be decided by the DRC.				
S.N.	Name of the Subject	Subject Code					
1	Wireless Sensor Network	ITPhD7102					
2	Distributed System and Cloud Computing	ITPhD7103					
3	Machine Learning	ITPhD7104					
4	Internet of Things	ITPhD7105					

ESE: End Semester Examination L: Lecture T: Theory P: Practical

Max: Maximum marks in ESE;

Min: Minimum pass Marks in each subject as 50%

Pre-PhD CORUSE WORK
RESEARCH METHODOLOGY IN ENGINEERING

Unit 1: PHILOSOPHY AND ETHICS

Introduction to philosophy: nature and scope, concept, branches. Ethics: Definition, moral philosophy, nature of moral judgments and reactions.

Ethics with respect to science and research.Intellectual honesty and research integrity. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP).Redundant publication duplicate and overlapping publications, salami slicing. Selective reporting and misrepresentation of data.

Unit 2: ERRORS IN MEASUREMENTS

Types of Errors, Mean Deviation, Standard Deviation and Probable Errors, Propagation of Errors withSummation, Difference, Product and Quotient.

Curve fitting, Method of least square fit, least square fit (straight line) to linear equations and equationreducible to linear equations. Least square fit (parabola) to quadratic equations and equations reducible toquadratic equations.

Unit 3: Data Processing &Analysis

Literature Survey, Defining the equation and formulating hypothesis/hypotheses.Collection of research data,tabulating and cataloging, Sampling and methods of data analysis.Laboratory Safety Measures, Maintenance of equipment's and proper storage and disposal of materials.

Unit 4: Scientific Presentation and Writing Skills

Survey of literature and presentation of data, one seminar paper-preparation in PowerPoint (which includetexts, graphs, pictures, tables, references etc.)-Oral in PowerPoint/poster, development of communicationskills in presentation of scientific seminars- eye to eye contact, facing the audience, question & answersessions etc.

Steps to better writing, flow method, organization of material and style, drawing figures, graphs, tables, footnotes, references etc in research paper.

Unit 5: PUBLICATION ETHICS.

1. Publication ethics: definition, introduction and importance.2. Best practice/standards setting initiatives and guidelines: COPE, WAME, etc. 3. Conflicts of interests 4. Publications misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types 5. Violation of publication ethics, authorship and contributor ship6. Identification of publication misconduct complains and appeals 7. Predatory publishers and journals.

References:

1. D B Resnik, The Ethics of Science: An Introduction, Routledge Publisher, USA (1998).
2. Callahand D & Bok S, Ethics Teaching in Higher Education, Plenum Press, New York, USA (1996).

3. Kanpur J N, Ethical values for excellence in Education and Science, VishwaPrakashan, New Delhi (1996).
4. A. N Tripathi, Human Values, New Age International Publication, New Delhi (2008).
5. A Wilson: Handbook of Science Communication, Institute of Physics publishing, Bristol Philadelphia (1998).
6. Science Communication: Theory and practice; Stocklmayer, Gore MM, Bryant C (Eds), Springer (2002).
7. Laszios P., Communicating Science: A Practical Guide, Springer (2006).
8. C R Kothari, Research Methodology: Methods and Technology, 2nd revised edition, New Age International Publication 2004.
9. K. N. Krishanaswamy, A I Sivakumar, M Mathiranjan, Management Research Methodology: Integration Principles, Methods and Techniques, Pearson Education, New Delhi 2006.
10. C K Sharma, M K Jain; Research Methodology, Shree Publications, New Delhi.

WIRELESS SENSOR NETWORK

UNIT I – FUNDAMENTALS OF MANET

Introduction to MANET & WSN, Motivation for a network of Wireless Sensor nodes- Sensing and sensors-challenges and constraints - node architecture-sensing subsystem, processor subsystem-communication interfaces- prototypes, Application of Wireless sensors

UNITII- COMMUNICATION CHARACTERISTICS AND DEPLOYMENT MECHANISMS Wireless Transmission Technology and systems-Radio Technology Primer-Available Wireless Technologies - Hardware- Telosb, Micaz motes- Time Synchronization-Clock and the Synchronization Problem - Basics of time synchronization-Time synchronization protocols - Localization- Ranging Techniques- Range based Localization-Range Free Localization- Event driven Localization

UNIT III- MAC LAYER Overview-Wireless Mac Protocols-Characteristics of MAC protocols in Sensor networks – Contention free MAC Protocols- characteristics- Traffic Adaptive Medium Access-Y-MAC, Low energy Adaptive Clustering - Contention based MAC Protocols- Power Aware Multi-Access with signalling

UNIT IV- ROUTING IN WIRELESS SENSOR NETWORKS

Design Issues in WSN routing- Data Dissemination and Gathering-Routing Challenges in WSN - Flooding-Flat Based Routing – SAR, Directed Diffusion, Hierarchical Routing- LEACH, PEGASIS - Query Based Routing- Negotiation Based Routing- Geographical Based Routing-Transport layer- Transport protocol Design issues- Performance of Transport Control Protocols.

UNIT V - MIDDLEWARE AND SECURITY ISSUES WSN middleware principles-Middleware Architecture-Existing middleware - operating systems for wireless sensor networks-performance and traffic management - Fundamentals of network security-challenges and attacks - Protocols and mechanisms for security.

REFERENCES

1. WaltenegusDargie, Christian Prelabour, “Fundamentals of Wireless Sensor Networks, Theory and Practice”, Wiley Series on wireless Communication and Mobile Computing, 2011
2. KazemSohraby, Daniel manoli, “Wireless Sensor networks- Technology, Protocols and Applications”, Wiley InterScience Publications 2010.
3. Bhaskar Krishnamachari , “ Networking Wireless Sensors”, Cambridge University Press, 2005
4. C.S Raghavendra, Krishna M.Sivalingam, Taiebznati , “Wireless Sensor Networks”, Springer Science 2004.

Distributed System and Cloud Computing

UNIT-1

Systems Modeling, Clustering and Virtualization: Distributed System Models and Enabling Technologies, Computer Clusters for Scalable Parallel Computing, Virtual Machines and Virtualization of Clusters and Data centers.

UNIT-2

Foundations: Introduction to Cloud Computing, migrating into a Cloud, Enriching the 'Integration as a Service' Paradigm for the Cloud Era, The Enterprise Cloud Computing Paradigm.

UNIT-3

Infrastructure as a Service (IAAS) & Platform and Software as a Service (PAAS / SAAS): Virtual machines provisioning and Migration services, On the Management of Virtual machines for Cloud Infrastructures, Enhancing Cloud Computing Environments using a cluster as a Service, Secure Distributed Data Storage in Cloud Computing. Aneka, Comet Cloud, T-Systems', Workflow Engine for Clouds, Understanding Scientific Applications for Cloud Environments.

UNIT-4

Monitoring, Management and Applications: An Architecture for Federated Cloud Computing, SLA Management in Cloud Computing, Performance Prediction for HPC on Clouds, Best Practices in Architecting Cloud Applications in the AWS cloud, Building Content Delivery networks using Clouds, Resource Cloud Mashups.

UNIT-5

Governance and Case Studies: Organizational Readiness and Change management in the Cloud age, Data Security in the Cloud, Legal Issues in Cloud computing, Achieving Production Readiness for Cloud Services.

Text Books

1. Cloud Computing: Principles and Paradigms by RajkumarBuyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.

2. Distributed and Cloud Computing, Kai Hwang, GeofferyC.Fox, Jack J.Dongarra. Elsevier, 2012.

Reference Books

1. Cloud Computing: A Practical Approach, Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, Tata McGraw Hill, rp2011.
2. Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2010.
3. Cloud Computing: Implementation, Management and Security, John W. Rittinghouse, James F.Ransome, CRC Press, rp2012.

MACHINE LEARNING

Course Objectives:

- Tobeabletoformulatemachinelearningproblemscorrespondingtodifferentapplications.
- Tounderstand arrange of machine learningalgorithmsalongwiththeirstrengthsand weaknesses.
- To understand the basic theory underlying machinelearning.
- Tobeabletoapplymachinelearningalgorithmstosolveproblemsofmoderatecomplexity.
- Tobeabletoreadcurrentresearchpapersandunderstandstheissuesraisedbycu rrent research.

UNIT - I

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning

Conceptlearningandthegeneraltospecificordering–Introduction,Aconceptlearningtask,Concept learningassearch,Find-S:findingamaximallyspecifichypothesis,Versionspacesandthecandidate eliminationalgorithm,Remarksonversionspacesand candidateelimination,Inductivebias

UNIT - II

Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning **Artificial Neural Networks –** Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition

Advanced topics in artificial neural networks

Evaluation Hypotheses – Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms

UNIT - III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm **Computational learning theory –** Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces, The mistake bound model of learning - **Instance-Based Learning-** Introduction, k -Nearest Neighbour Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager

Learning

Genetic Algorithms – Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

UNIT - IV

Learning Sets of Rules – Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary,LearningFirstOrderRules,LearningSetsofFirstOrderRules:FOIL,InductionasInverted Deduction, InvertingResolution

AnalyticalLearning-Introduction,LearningwithPerfectDomainTheories:Prolog-EBGRemarkson Explanation-Based Learning, Explanation-Based Learning of Search ControlKnowledge.

UNIT - V

Combining Inductive and Analytical Learning – Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators,

Reinforcement Learning – Introduction, The Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming

TEXT BOOKS:

1. Machine Learning – Tom M. Mitchell, - MGH
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis(CRC)

REFERENCE BOOKS:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford UniversityPress, 1995.
4. Machine Learning by Peter Flach ,Cambridge.

INTERNET OF THINGS

Course Objectives:

- To introduce the terminology, technology and itsapplications
- To introduce the concept of M2M (machine to machine) with necessaryprotocols
- To introduce the Python Scripting Language which is used in many IoTdevices
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web-based services on IoTdevices

Unit - I

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs, IoTenabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

Unit - II

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT, Basics of IoT System Management with NETCOZF, YANG-NETCONF, YANG, SNMP NETOPEER

Unit - III

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling, Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

Unit - IV

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C)

Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

Unit - V

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs.Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759.