| S732BLH62 | IoT IN BIG DATA ANALYTICS | L | T | P | EL | Credits | Total Marks |
|---|---|---|---|---|---|---|---|
| | | 3 | 0 | 2 | 0 | 4 | 100 |

**COURSE OBJECTIVES**

- To understand data analytics for IoTapplications.
- To discuss the classification algorithms for big data analytics.
- To elaborate various prediction and clustering algorithms.
- To analyse real time IoT applications.

**UNIT1 INTRODUCTION 12 Hrs.**

Introduction to data analytics for IoT, IoT Applications, Type of sensor, Attributes and Data types, Data pre-processing, Statistical descriptions of Data,Handling missing Data, Datasampling.

**Practical:**

1. Write a Python program for sampling the data using a systematic sampling method.
2. Write a Python program to check for missing data and fill the missing data with constant data using pre-defined functions.
3. Implement word count/ frequency programs using MapReduce.

**UNIT 2 INTRODUCTION TO BIG DATA 12 Hrs.**

Big Data and its Importance – Four V's of Big Data- Drivers for Big Data – Big Data Technologies Hadoop's Parallel World - Data discovery - Open source technology for Big Data Analytics - cloud and Big Data - Predictive Analytics - Mobile Business Intelligence and Big Data - Crowd Sourcing Analytics - Inter-andTrans Firewall Analytics - Information Management.

**Practical:**

4. Implement a MapReduce program that processes a weather dataset and analyzes the hot and cold days in a month.
5. Implement a MapReduce program to find the average age of male and female from a given dataset.
6. Collect sensor data and Implement Decision tree classification technique.

**UNIT 3 CLASSIFICATION 12 Hrs.**

Definition of Classification, Decision tree Induction, Attribute Selection measures, Issues: Over-fitting, tree pruning methods,missing values, continuous classes, Classification and Regression Trees (CART), Bayesian Classification: Bayes Theorem,Naïve Bayes classifier, Bayesian Networks, Linear classifiers, Least squares, SVM classifiers, Lazy Learners (or LearningfromYourNeighbors).

**Practical:**

7. Collect sensor data and Implement Support Vector Machine.
8. Collect sensor data and do Prediction using linear regression.

**UNIT 4 PREDICTION AND CLUSTERING 12 Hrs.**

Prediction: Definition of Prediction Linear regression, Non-linear regression, Logistic regression Clustering: Clustering types: Partitioning Methods, Hierarchical Methods, Distance Measures in Algorithmic Methods, Density Based Clustering.

**Practical:**

9. Collect sensor data and Implement clustering algorithm.
10. Visualize data using visualization techniques.

**UNIT 5 PERFORMANCE EVALUATION 12 Hrs.**

Performance Measures: Precision, recall, F-measure,confusion matrix, cross-validation,bootstrap. Case Studies: Health Care Analytics, Tele medicine, Smart Campus, Intelligent Gym, Weather Prediction, time series modelling.

**Practical:**

11. Model Time series data.
12. Implement an application that stores big data in Hbase/ MongoDB/ Pig.
13. Implement an application for predicting air pollution level using gas sensors.

**Max. 60 Hrs.**

**COURSE OUTCOMES**

On completion of the course, student will be able to

**CO1 -** Analyse various data produced by IoT Applications.
**CO2 -** Describe big data technologies.
**CO3 -** Develop classification algorithms for data analysis.
**CO4 -** Implement prediction and classification algorithms.
**CO5 -** Evaluate algorithms using measures.
**CO6 -** Design solutions for the real time problems.

**TEXT / REFERENCE BOOKS**

1. Michael Minelli, Michehe Chambers, "Big Data, Big Analytics: Emerging Business Intelligence and Trends for Today's Business", 1st Edition, Ambiga Dhiraj, Weily CIO Series, 2013.
2. Arvind Sathi,"Big data Analytics:Disruptive Technologies for Changing the Game", 1st Edition, IBM Corporation,2012.
3. Ian H.Witten,EibeFrank Data Mining:Practical Machine Learning Tools and Techniques, Elsevier/(MorganKauffman), ISBN:9789380501864.
4. Introduction to Data Mining (2005) By Pang-NingTan,Michael Steinbach,Vipin Kumar Addison Wesley ISBN:0-321-32136-7.
5. [Research-Papers]:Some of the relevant research papers that contain recent results and developments in data analytics field.

| SMTB1603 | OPTIMIZATION TECHNIQUES FOR COMPUTING | L | T | P | EL | Credits | Total Marks |
|---|---|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 0 | 3 | 100 |

**COURSE OBJECTIVES**

- To Understand importance of optimization of industrial process management.
- To solve problems in linear programming and Integer programming.
- To develop in a student efficient and effective deployment of an organization's resources when they are needed.
- To analyze and appreciate variety of performance measures for various optimization problems.

**UNIT 1 INTRODUCTION TO LINEAR PROGRAMMING PROBLEM 9 Hrs.**

Operations Research(OR)- Nature – Characteristics – Phases - Role of OR in Decision making – Outline of OR Models Linear Programming – Formulation of L.P .problems –Solution by graphical method, simplex method, Big M methods - Dual Simplex Method.

**UNIT 2 LINEAR PROGRAMMING EXTENSIONS 9 Hrs.**

Transportation problem – Initial Basic feasible solution- Northwest corner method, Least Cost method, Vogel's approximation method – Test for optimality-MODI. Assignment problems- Hungarian assignment models- Travelling salesman problems.

**UNIT 3 RESOURCE SCHEDULING AND NETWORK ANALYSIS 9 Hrs.**

Problem of Sequencing – Problem with N jobs and 2 machines N Jobs 3 machines N Jobs and m machines. Project Management -Basic concepts–Network construction and scheduling Critical Path Method (CPM) & Program evaluation review technique (PERT).

**UNIT 4 INVENTORY CONTROL 9 Hrs.**

Inventory Control – Various Types of inventory models – Deterministic inventory models – Production model, Purchase model– with and without shortage- Economic Order Quantity (EOQ) – Buffer stock – Shortage quantity, Probabilistic inventory models

**UNIT 5 REPLACEMENT MODELS 9 Hrs.**

Replacement policy for items whose maintenance cost increases with time- Consideration of time value of money - Replacement policy- Individual, Group replacement of items that fail completely and suddenly.

**Max. 45 Hrs**

**COURSE OOUTCOMES**

On completion of the course, student will be able to **CO1 -**
Formulate the linear programming problems. **CO2 -**
Analyze transportation and assignment problems. **CO3 -**
Analyze CPM and PERT methods.
**CO4 -** Describe the different inventory models.
**CO5 –** Analyze complex replacement models involving different cost structures and time limit.
**CO6 -** Design the replacement model for an organization

**TEXT / REFERENCE BOOKS**

1. K. Malik, S. K. Yadav, S. R. Yadav, Optimization Techniques. I K International Publishing House Pvt. Ltd; First Edition edition, 2013.
2. PK Gupta, D.S Hira, Operations Research. S Chand, Seventh Rrevised edition, 2014.
3. Sharma S.D, Operation Research Theory, Methods and Application, 17th Edn.,KedarNath Ram Nath Publication, 2010.
4. Nita H Shah, Ravi M Gor&HardikSoni, Operation Research, 4th Edn., PHI, 2010.
5. Edwin K. P. Chong & Stanislaw H. Zak, An Introduction to Optimization, Wiley India, 2017.
6. Mohan, Kusum Deep, Optimization Techniques, New Age Science, 2009.

**END SEMESTER EXAM QUESTION PAPER PATTERN**

**Max. Marks: 100** **Exam Duration: 3 Hrs.**

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|---|---|
| **PART A :** 10 Questions of 2 marks each-No choice | 20 Marks |
| **PART B :** 2 Questions from each unit with internal choice, each carrying 16 marks | 80 Marks |