**DEPARTMENT OF ARTIFICIAL INTELLIGENCE and DATA STRUCTURE (2017 REGULATION)**

**COURSE OUTCOMES-Regulation–2017–UG**

| YEAR/SEMESTER:I/II | |
|---|---|
| **C101/ HS8151 COMMUNICATIVE ENGLISH** | |
| **C101.1** | Read articles of a general kind in magazines and newspapers. |
| **C101.2** | Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English. |
| **C101.3** | Read different genres of texts adopting various reading strategies. |
| **C101.4** | Comprehend conversations and short talks delivered in English |
| **C101.5** | Write short essays of a general kind and personal letters and emails in English. |

| C102/ MA8151 ENGINEERING MATHEMATICS - I | |
|---|---|
| **C102.1** | Use both the limit definition and rules of differentiation to differentiate functions. |
| **C102.2** | Apply differentiation to solve maxima and minima problems. |
| **C102.3** | Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus. |
| **C102.4** | Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables. |
| **C102.5** | Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts. |

| C103/ PH8151 ENGINEERING PHYSICS | |
|---|---|
| **C103.1** | The students will gain knowledge on the basics of properties of matter and its applications |
| **C103.2** | The students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics |
| **C103.3** | The students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers |
| **C103.4** | The students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes |
| **C103.5** | The students will understand the basics of crystals, their structures and different crystal growth techniques |

| **C104/ CY8151 ENGINEERING CHEMISTRY** | |
|---|---|
| **C104.1** | To make the students conversant with boiler feed water requirements, related problems and water treatment techniques |
| **C104.2** | To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys |
| **C104.3** | Preparation, properties and applications of engineering materials. |
| **C104.4** | Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels. |
| **C104.5** | Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells. |

| **C105/GE8151 PROBLEM SOLVING AND PYTHON PROGRAMMING** | |
|---|---|
| **C105.1** | Develop algorithmic solutions to simple computational problems |
| **C105.2** | Read, write, execute by hand simple Python programs |
| **C105.3** | Structure simple Python programs for solving problems. |
| **C105.4** | Decompose a Python program into functions. |
| **C105.5** | Represent compound data using Python lists, tuples, dictionaries. |

| **C106/GE8152- ENGINEERING GRAPHICS** | |
|---|---|
| **C106.1** | Familiarize with the fundamentals and standards of Engineering graphics |
| **C106.2** | Perform freehand sketching of basic geometrical constructions and multiple views of objects. |
| **C106.3** | Project orthographic projections of lines and plane surfaces. |
| **C106.4** | Draw projections and solids and development of surfaces. |
| **C106.5** | Visualize and to project isometric and perspective sections of simple solids. |

| **C107/BS8161-PHYSICS AND CHEMISTRY LABORATORY** | |
|---|---|
| **C107.1** | Apply principles of elasticity, optics and thermal properties for engineering applications. |
| **C107.2** | The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters. |

| **YEAR/SEMESTER:I/II** | |
|---|---|
| **C201/HS8251-TECHNICAL ENGLISH** | |
| **C201.1** | Read technical texts and write area- specific texts effortlessly |
| **C201.2** | Listen and comprehend lectures and talks in their area of specialisation successfully. |
| **C201.3** | Speak appropriately and effectively in varied formal and informal contexts |
| **C201.4** | Write reports and winning job applications. |

| **C2O2/ MA8252-LINEAR ALGEBRA** | |
|---|---|
| **C2O2.1** | Test the consistency and solve system of linear equations |
| **C2O2.2** | Find the basis and dimension of vector space |
| **C2O2.3** | Obtain the matrix of linear transformation and its eigen values and eigenvectors |
| **C2O2.4** | Find ortho normal basis of inner product space and find least square approximation |
| **C2O2.5** | Find eigen values of a matrix using numerical techniques and perform matrix decomposition |

| **C203/AD8251-DATA STRUCTURES DESIGN** | |
|---|---|
| **C203.1** | Explain abstract data types |
| **C203.2** | Design, implement, and analyse linear data structures, such as lists, queues, and stacks, according to the needs of different applications |
| **C203.3** | Design, implement, and analyse efficient tree structures to meet requirements such as searching, indexing, and sorting |
| **C203.4** | Model problems as graph problems and implement efficient graph algorithms to solve them |

| **C204/GE8291-ENVIRONMENTAL SCIENCE AND ENGINEERING** | |
|---|---|
| **C204.1** | Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course. |
| **C204.2** | Public awareness of environmental is at infant stage. |
| **C204.3** | Ignorance and incomplete knowledge has lead to misconceptions |
| **C204.4** | Development and improvement in std. of living has lead to serious environmental disasters |

| **C205/BE8255-BASIC ELECTRICAL, ELECTRONICS AND MEASUREMENT** | |
|---|---|
| **C205.1** | Discuss the essentials of electric circuits and analysis. |
| **C205.2** | Discuss the basic operation of electric machines and transformers |
| **C205.3** | Introduction of renewable sources and common domestic loads. |
| **C205.4** | Introduction to measurement and metering for electric circuits. |

| **C206/AD8252 DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION** | |
|---|---|
| **C206.1** | Simplify Boolean functions using kmap |
| **C206.2** | Design and Analyze Combinational and Sequential Circuits |
| **C206.3** | Implement designs using Programmable Logic Devices |
| **C206.4** | Write HDL code for combinational and Sequential Circuits |

| **C207/AD8261 DATA STRUCTURES DESIGN LABORATORY** | |
|---|---|
| **C207.1** | implement ADTs as Python classes |
| **C207.2** | design, implement, and analyse linear data structures, such as lists, queues, and stacks, according to the needs of different applications |
| **C207.3** | design, implement, and analyse efficient tree structures to meet requirements such as searching, indexing, and sorting |
| **C207.4** | model problems as graph problems and implement efficient graph algorithms to solve them |

**DEPARTMENT OF ARTIFICIAL INTELLIGENCE and DATA STRUCTURE (2017 REGULATION)**

**COURSE OUTCOMES -Regulation–2017–UG**

| YEAR/SEMESTER:II/III | |
|---|---|
| **C301/ MA8351- DISCRETE MATHEMATICS** | |
| **C301.1** | Rewrite the mathematical statements into logical values. |
| **C301.2** | Discuss the discrete structure of combinatorial objects. |
| **C301.3** | Solve the recurrence relation with generating functions. |
| **C301.4** | Elaborate the basic concepts of Graph theory. |
| **C301.5** | Elaborate the concepts of Lattices and Boolean Algebra. |

| C302/AD8301 Introduction to Operating Systems | |
|---|---|
| **C302.1** | Outline the basic services and functionalities of operating systems |
| **C302.2** | Analyse various scheduling algorithms, and understand the different deadlock, prevention and avoidance schemes |
| **C302.3** | Illustrate the different memory management schemes |
| **C302.4** | Outline the functionality of file systems |
| **C302.5** | Compare and contrast Linux, Windows and mobile operating systems |

| C303/ AD8302 - Fundamentals of Data Science | |
|---|---|
| **C303.1** | Apply the skills of data inspecting and cleansing |
| **C303.2** | Determine the relationship between data dependencies using statistics |
| **C303.3** | Can handle data using primary tools used for data science in Python |
| **C303.4** | Represent the useful information using mathematical skills |
| **C303.5** | Can apply the knowledge for data describing and visualization using tools. |

| C304/ CS8392 - Object Oriented Programming | |
|---|---|
| **C304.1** | Develop Java programs using OOP principles |
| **C304.2** | Develop Java programs with the concepts inheritance and interfaces |
| **C304.3** | Build Java applications using exceptions and I/O streams |

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|---|---|
| **C304.4** | Develop Java applications with threads and generics classes |
| **C304.5** | Develop interactive Java programs using swings |

| **C305/AD8351 - Design and Analysis of Algorithms** | |
|---|---|
| **C305.1** | Design algorithms for various computing problems. |
| **C305.2** | Analyze the time and space complexity of algorithms. |
| **C305.3** | Critically analyze the different algorithm design techniques for a given problem. |
| **C305.4** | Modify existing algorithms to improve efficiency |
| **C305.5** | Ability to implement techniques in solving real time problems |

| **C306/ CS8311- DATA SCIENCE LABORATORY** | |
|---|---|
| **C306.1** | Develop relevant programming abilities |
| **C306.2** | Demonstrate knowledge of statistical data analysis techniques |
| **C306.3** | Exhibit proficiency to build and assess data-based models. |
| **C306.4** | Demonstrate skill in Data management & processing tasks using Python |
| **C306.5** | Apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively |

| **C307/ CS8383- OBJECT ORIENTED PROGRAMMING LABORATORY** | |
|---|---|
| **C307.1** | Develop simple Java applications using classes and packages. |
| **C307.2** | Develop Java programs using inheritance and interfaces. |
| **C307.3** | Implement exception handling and file concepts. |
| **C307.4** | Develop simple application using multithreading and generic programming. |
| **C307.5** | Develop event driven programming and applications using java concepts. |

| **C308/ HS8381- INTERPERSONAL SKILLS /LISTENING** | |
|---|---|
| **C308.1** | Demonstrate listening skill to give information as part of a simple explanation |
| **C308.2** | Develop speaking skills to give personal information to express ability and ask for clarification to improve pronunciation. |

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|---|---|
| **C308.3** | Interpret information and ideas from multiple sources with reasonable accuracy over a wide range of everyday topics. |
| **C308.4** | Participate confidently and appropriately in conversations both formal and informal. |
| **C308.5** | Make effective presentations and participate in group discussions |

| **YEAR/SEMESTER:II/IV** | |
|---|---|
| **C401/ MA8391 Probability and Statistics** | |
| **C401.1** | Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon. |
| **C401.2** | Understand the basic concepts of one and two dimensional random variables and apply in engineering applications |
| **C401.3** | Apply the concept of testing of hypothesis for small and large samples in real life problems |
| **C401.4** | Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control |
| **C401.5** | Have the notion of sampling distributions and statistical techniques used in engineering and management problems. |

| **C402/ AD8401 Database Design and Management** | |
|---|---|
| **C402.1** | Understand the database development life cycle and apply conceptual modeling. |
| **C402.2** | Apply SQL and programming in SQL to create, manipulate and query the database |
| **C402.3** | Apply the conceptual-to-relational mapping and normalization to design relational database |
| **C402.4** | Determine the serializability of any non-serial schedule using concurrency techniques |
| **C402.5** | Apply the data model and querying in Object-relational and No-SQL databases. |

| **C403/ AD8402 Artificial Intelligence I** | |
|---|---|
| **C403.1** | Explain autonomous agents that make effective decisions in fully informed, partially observable, and adversarial settings |
| **C403.2** | Choose appropriate algorithms for solving given AI problems |
| **C403.3** | Design and implement logical reasoning agents |

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|---|---|
| **C403.4** | Design and implement agents that can reason under uncertainty |

| **C404/ AD8403 DATA ANALYTICS** | |
|---|---|
| **C404.1** | Understand the concept of sampling |
| **C404.2** | Apply the knowledge to derive hypotheses for given data |
| **C404.3** | Demonstrate the skills to perform various tests in the given data |
| **C404.4** | Ability to derive inference using Predictive Analytics |
| **C404.5** | Perform statistical analytics on a data set |

| **C405/ AD8002 HEALTH CARE ANALYTICS** | |
|---|---|
| **C405.1** | Use machine learning and deep learning algorithms for health data analysis |
| **C405.2** | Apply the data management techniques for healthcare data |
| **C405.3** | Evaluate the need of healthcare data analysis in e-healthcare, telemedicine and other critical care applications |
| **C405.4** | Design health data analytics for real time applications |
| **C405.5** | Design emergency care system using health data analysis |

| **C406/ AD8411 DATABASE DESIGN AND MANAGEMENT LABORATORY** | |
|---|---|
| **C406.1** | Understand the database development life cycle |
| **C406.2** | Design relational database using conceptual-to-relational mapping, Normalization |
| **C406.3** | Apply SQL for creation, manipulation and retrieval of data |
| **C406.4** | Develop a database applications for real-time problems |
| **C406.5** | Design and query object-relational databases |

| **C407/ AD8412 Data Analytics Laboratory** | |
|---|---|
| **C407.1** | To become skilled to use various packages in Python |
| **C407.2** | Demonstrate the understanding of data distribution with various samples |

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|---|---|
| **C407.3** | Ability to Implement T-Test ,Anova and Z-Test on sample data sets |
| **C407.4** | Understanding of Mathematical models in real world problems. |
| **C407.5** | Conduct time series analysis and draw conclusion |

| **C408/ AD8413 Artificial Intelligence – I Laboratory** | |
|---|---|
| **C408.1** | Implement simple PEAS descriptions for given AI tasks |
| **C408.2** | Develop programs to implement simulated annealing and genetic algorithms |
| **C408.3** | Demonstrate the ability to solve problems using searching and backtracking |
| **C408.4** | Ability to Implement simple reasoning systems using either backward or forward inference mechanisms |
| **C408.5** | Will be able to choose and implement a suitable techniques for a given AI task |

| **C409/ HS8461 ADVANCED READING AND WRITING** | |
|---|---|
| **C409.1** | Write different types of essays. |
| **C409.2** | Write winning job applications |
| **C409.3** | Read and evaluate texts critically |
| **C409.4** | Display critical thinking in various professional contexts. |

| **YEAR/SEMESTER:III/V** | |
|---|---|
| **C501/ AD8501 Optimization Techniques** | |
| **C501.1** | Formulate and solve linear programming problems (LPP) |
| **C501.2** | Evaluate Integer Programming Problems, Transportation and Assignment Problems |
| **C501.3** | Obtain solution to network problems using CPM and PERT techniques. |
| **C501.4** | Able to optimize the function subject to the constraints. |
| **C501.5** | Identify and solve problems under Markovian queuing models |

**DEPARTMENT OF ARTIFICIAL INTELLIGENCE and DATA STRUCTURE (2017 REGULATION)**

| C502/ CS8691 - COMPUTER NETWORKS | |
|---|---|
| **C502.1** | Comprehend the basic layers and its functions in computer networks. |
| **C502.2** | Evaluate the performance of a network. |
| **C502.3** | Understand the basics of how data flows from one node to another |
| **C502.4** | Analyze and design routing algorithms. |
| **C502.5** | Understand the working of various application layer protocols. |

| C503/ AD8502 Data Exploration and Visualization | |
|---|---|
| **C503.1** | Understand the basics of Data Exploration |
| **C503.2** | Use Univariate and Multivariate Analysis for Data Exploration |
| **C503.3** | Explain various Data Visualization methods |
| **C503.4** | Apply the concept of Data Visualization on various datasets |
| **C503.5** | Apply the data visualization techniques using R language |

| C504/ AD8551 Business Analytics | |
|---|---|
| **C504.1** | Explain the real world business problems and model with analytical solutions. |
| **C504.2** | Identify the business processes for extracting Business Intelligence |
| **C504.3** | Apply predictive analytics for business fore-casting |
| **C504.4** | Apply analytics for supply chain and logistics management |
| **C504.5** | Use analytics for marketing and sales. |

| C505/ AD8552 Machine Learning | |
|---|---|
| **C505.1** | Understand the basics of ML |
| **C505.2** | Explain various ZMachine Learning methods |
| **C505.3** | Demonstrate various ML techniques using standard packages. |
| **C505.4** | Explore knowledge on Machine learning and Data Analytics |
| **C505.5** | Apply ML to various real time examples |

| **C506/ OAN551 Sensors and Transducers** | |
|---|---|
| **C506.1** | Expertise in various calibration techniques and signal types for sensors |
| **C506.2** | Apply the various sensors in the Automotive and Mechatronics applications |
| **C506.3** | Study the basic principles of various smart sensors |
| **C506.4** | Implement the DAQ systems with different sensors for real time applications |
| **C507/ AD8511/ Machine Learning Laboratory** | |
| **C507.1** | Understand the implementation procedures for the machine learning algorithms |
| **C507.2** | Design Java/Python programs for various Learning algorithms. |
| **C507.3** | Apply appropriate Machine Learning algorithms to data sets |
| **C507.4** | Identify and apply Machine Learning algorithms to solve real world problems. |

| **C508/ AD8512 / Mini Project on Data Sciences Pipeline** | |
|---|---|
| **C508.1** | Install analytical tools and configure distributed file system. |
| **C508.2** | Have skills in developing and executing analytical procedures in various distributed frameworks and databases. |
| **C508.3** | Develop, implement and deploy simple applications on very large datasets. |
| **C508.4** | Implement simple to complex data modeling in NoSQL databases. |
| **C508.5** | Implement real world applications by using suitable analytical framework and tools. |