Course Code:

ROBOTICS

(Professional Elective V)

Instruction	: 3 Periods / Week	Continuous Internal Evaluation	: 40 Marks
Tutorial	: -	End Examination Marks	: 60 Marks
Credits	: 3	End Exam Duration	: 3 Hours

Course Objectives:

1. To understand the functions of the basic components of a Robot.
2. To study the use of various types of End of Effectors and Sensors
3. To impart knowledge in reactive implementation
4. To learn Robot navigation and topological path planning.

Unit I - Robotic Paradigms

Overview-Teleoperation to Autonomy-How Can a Machine Be Intelligent? What Can Robots Be Used For?-A Brief History of Robotics Teleoperation-The Seven Areas of AI-The Hierarchical Paradigm-Overview-Attributes of the Hierarchical Paradigm-Closed World Assumption and the Frame Problem-Representative Architectures-Advantages and Disadvantages-Programming Considerations

Unit II Biological Foundations of the Reactive Paradigm

Overview-What Are Animal Behaviors?-Coordination and Control of Behaviors-Perception in Behaviors-Schema Theory-Principles and Issues in Transferring Insights to Robots-The Reactive Paradigm-Overview-Attributes of Reactive Paradigm-Subsumption Architecture-Potential Fields Methodologies-Evaluation of Reactive Architectures

Unit III Designing a Reactive Implementation

Overview-Behaviors as Objects in OOP-Steps in Designing a Reactive Behavioral System-Case Study: Unmanned Ground Robotics Competition-Assemblages of Behaviors-Common Sensing Techniques for Reactive Robots-Overview -Behavioral Sensor Fusion-Designing a Sensor Suite-Proprioceptive Sensors-Proximity Sensors-Computer Vision-Range from Vision

Unit IV The Hybrid Deliberative/Reactive Paradigm

Overview-Attributes of the Hybrid Paradigm-Architectural Aspects-Managerial Architectures-State-Hierarchy Architectures-Model-Oriented Architectures-Other Robots in the Hybrid Paradigm-Multi-agents-Overview-Heterogeneity-Control-Cooperation-Goals-Emergent Social Behavior

Unit V Navigation-Topological Path Planning

Overview-Landmarks and Gateways-Relational Methods-Associative Methods-Case Study of Topological Navigation with a Hybrid Architecture -Metric Path Planning-Objectives and Overview-Configuration Space-space Representations-Graph Based Planners-Wave front Based Planners-Interleaving Path Planning and Reactive Execution-Localization and Map Making-Overview-Sonar Sensor Model-Bayesian-Dempster-Shafer Theory-HIMM-Comparison of Methods-Localization-Exploration-On the Horizon -Overview -Shape-Shifting and Legged Platforms-Applications and Expectations

Course Outcomes: After completion of course, students will be able to:

CO 1: Apply the basic engineering knowledge for the design of robotics
CO 2: Study the foundations of the reactive paradigm.
CO 3: Learn designing a reactive implementation.
CO 4: Learn to hyper deliberative and reactive paradigm.
CO 5: Apply the navigation and topological path planning.

Textbooks:

1. Introduction to AI Robotics, Robin R. Murphy, Second Edition, MIT Press, 2019.

References:

1. Robotic Engineering - An Integrated Approach, Klafter R.D., Chmielewski T.A and Negin M., Prentice Hall, 2003.
2. Industrial Robotics -Technology Programming and Applications, Groover M.P., McGraw Hill, 2001.
3. Robotics Control, Sensing, Vision and Intelligence, Fu.K.S.,Gonzalz R.C. and Lee C.S.G., McGraw Hill Book Co., 1987.
4. Introduction to Autonomous Mobile Robots, Roland Siegwart, Illah Reza Nourbakhsh, MIT Press, 2011

Course Code:

INTELLIGENT SECURITY SYSTEMS

(Professional Elective V)

Instruction	: 3 Periods / Week	Continuous Internal Evaluation	:	40 Marks
Tutorial	: -	Semester End Examination	:	60 Marks
Credits	: 3	Semester End Exam Duration	:	3 Hours

Course Objectives:

1. To explain Computer Security and Sources of Security Threat.
2. To demonstrate Process of Firewall Design, Implementation.
3. To understand techniques for Intelligent Security Systems
4. To demonstrate Malware Detection Algorithms

Unit I - Computer Security with Artificial Intelligence

The Current Security Landscape, Computer Security Basic Concepts, Sources of Security Threats, Attacks Against IoT and Wireless Sensor Networks, Introduction into Artificial Intelligence, Machine Learning, and Data Science, Fuzzy Logic & Systems, Machine Learning, Artificial Neural Networks (ANN), Genetic Algorithms (GA), Hybrid Intelligent Systems.

Unit II - Firewall Design and Implementation

Firewall Definition, History, and Functions, Firewall Operational Models, Basic Firewall Architectures, Process of Firewall Design, Implementation, and Maintenance, Firewall Policy Formalization with Rules. Firewalls Evaluation and Current Developments.

Unit III - Intrusion Detection Systems

Goals and functions, Typical IDS architectures topologies, Intrusion Detection Systems types: classification approaches, AI and ML in IDS design, Challenges and their mitigation in IDS design and deployment.

Unit IV - Malware and Vulnerabilities Detection and Protection

Malware Definition, History, and Trends in Development, Malware Classification, Spam, Software Vulnerabilities, Principles of Malware Detection and Anti-malware Protection, Malware Detection Algorithms, Anti-malware Tools.

Unit V - Adversarial Machine Learning

Adversarial Machine Learning Definition, Adversarial Attack Taxonomy, Defense Strategies, Investigation of the Adversarial Attacks, Influence on the Classifier, Performance Use Case, Generative Adversarial Networks.

Course Outcomes: After completion of course, students will be able to:

CO 1: Understand the techniques of current Security systems.
CO 2: Apply Process of Firewall Design and Implementation.
CO 3: Apply different types of Intrusion Detection Systems.
CO 4: Make use of Malware Detection Algorithms.
CO 5: Simulate the Adversarial Machine Learning.

Textbooks:

1. Leon Reznik, Intelligent Security Systems: How Artificial Intelligence, Machine Learning and Data Science Work for and Against Computer Security, John Wiley & Sons, 2021

References:

1. Handbook of Digital Face Manipulation and Detection, From DeepFakes to Morphing Attacks, Christian Rathgeb, Ruben Tolosana, Ruben Vera-Rodriguez, Christoph Busch, Springer International Publishing 2022.
2. Introduction to Intelligent Surveillance, Wei Qi Yan, Springer International Publishing 2016.

Course Code:

BIO-INSPIRED COMPUTING

(Professional Elective V)

Instruction	:	3 Periods / week	Continuous Internal Evaluation	:	40 Marks
Tutorial	:	-	Semester End Examination	:	60 Marks
Credits	:	3	Semester End Exam Duration	:	3 Hours

Course Objectives:

1. To learn bio-inspired computing fundamentals
2. To learn various swarm intelligence optimization algorithms
3. To learn multi-objective optimization problem

Unit I – Introduction

Fundamentals of Optimization, Types of Optimization problems, Examples of Optimization, Formulation of Optimization Problem, Classification of Optimization Algorithms, Traditional vs Nature-inspired algorithms, when to use bio inspired computing, Swarm Intelligence, metaheuristics, no free lunch theorem, Parameter tuning and control.

Unit II – Ant Colony Optimization and Firefly-inspired Optimization

Introduction, Ant Colony Characteristics, ACO: Algorithm, Pseudocode, Travelling Salesperson problem, variants of the algorithm.

Introduction, Firefly Behavior and Characteristics, Firefly-inspired Optimization: Its Algorithm and Pseudocode, variants of the algorithm.

Unit III – Particle Swarm Optimization and ABC Optimization

Introduction, Swarm Behavior, Particle Swarm Optimization: Algorithm and Pseudocode, Variants of the algorithm.

Artificial Bee Colony Optimization: Introduction, Honeybee Characteristics, Its Algorithm and Pseudocode, Variants of the algorithm.

Unit IV – Differential Evolution and Flower Pollination Optimization

Introduction, Differential Evolution: Its Algorithm and Pseudocode, variants of the algorithm.

Introduction, Flower Pollination, Flower Pollination Optimization: Algorithm and Pseudocode, variants of the algorithm.

Unit V – Multi-Objective Optimization

Introduction to Multi-Objective optimization (MOP) problem, Pareto Optimality, The goals of multi-objective optimization, Non-Pareto based Evolutionary Algorithms, Pareto based Evolutionary Algorithms.

Course Outcomes: After completion of course, students will be able to:

CO 1	:	Understand the fundamentals of bio-inspired computing
CO 2	:	Understand Ant Colony Optimization and Firefly-inspired Optimization techniques
CO 3	:	Understand Particle Swarm Optimization and ABC Optimization techniques
CO 4	:	Understand Differential Evolution and Flower Pollination Optimization techniques
CO 5	:	Understand Multi-Objective optimization (MOP) problem

Textbooks:

1. Nature-Inspired Optimization Algorithms, A. Vasuki, CRC Press, 1st Edition, 2020.
2. Evolutionary Optimization Algorithms – Biologically Inspired and Population-Based Approaches to Computer Intelligence, Dan Simon, Wiley, First Edition, 2013.

References:

1. Fundamentals of Natural Computing, Basic Concepts, Algorithms and Applications", Leandro Nunes de Castro, Chapman & Hall/ CRC, Taylor and Francis Group, 2007.
2. Bio-Inspired Artificial Intelligence: Theories, methods, and Technologies, Floreano, D. and C. Mattiussi, IT Press, 2008.

Course Code:

BUSINESS ANALYTICS

(Open Elective) (Common to all)

Instruction	:	3 Periods/week	Continuous Internal Evaluation	:	40 Marks
Tutorial	:	-	Semester End Examination	:	60 Marks
Credits	:	3	Semester End Exam Duration	:	3 Hours

Course Objectives:

1. Understand the role of business analytics within an organization.
2. Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.
3. To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.
4. To become familiar with processes needed to develop, report, and analyze business data.
5. Use decision-making tools/Operations research techniques.
6. Mange business process using analytical and management tools.
7. Analyze and solve problems from different industries such as manufacturing, service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc.

Unit I - Business Analytics

Overview of Business analytics – Scope of Business analytics – Business Analytics Process – Relationship of Business Analytics Process and organization – competitive advantages of Business Analytics.

Statistical Tools: Statistical Notation – Descriptive Statistical methods – Review of probability distribution and data modelling – sampling – and estimation methods overview.

Unit II - Trendiness and Regression Analysis

Modelling Relationships and Trends in Data – simple Linear Regression. Important Resources – Business Analytics Personnel – Data and models for Business analytics – problem solving – Visualizing and Exploring Data – Business Analytics Technology.

Unit III - Organization Structures of Business Analytics

Ensuring Data Quality – measuring contribution of Business analytics – Managing Changes. Descriptive Analytics – predictive analytics – predicative Modelling – Predictive analytics analysis – Data Mining – Data Mining Methodologies – Prescriptive analytics and its step in the business analytics Process – Prescriptive Modelling – nonlinear Optimization.

Unit IV - Forecasting Techniques

Qualitative and Judgmental Forecasting – Statistical Forecasting Models – Forecasting Models for Stationary Time Series – Forecasting Models for Time Series with a Linear Trend – Forecasting Time Series with Seasonality – Regression Forecasting with Casual Variables – Selecting Appropriate Forecasting Models.

Unit V - Decision Analysis

Formulating Decision Problems – Decision Strategies with the without Outcome Probabilities – Decision Trees – The Value of Information – Utility and Decision Making. Recent Trends in Embedded and collaborative business intelligence.

Course Outcomes: Upon the completion of the subject, the students will be able to

CO1 : Understand knowledge of data analytics.
CO2 : Demonstrate the ability of thinking critically in making decisions based on data and deep analytics.
CO3 : Express the ability to use technical skills in business analytics and predictive analysis.
CO4 : Understand various forecasting and simulation models.
CO5 : Evident the ability to translate data into clear, actionable insights and learn decisions strategies.

Textbooks:

1. Marc J. Schniederjans, Dara G. Schniederjans and Christopher M. Starkey, Business Analytics: Principles, Concepts and Applications, Pearson FT Press.
2. James Evans, Business Analytics, Persons Education.

References:

1. R N Prasad and Seema Acharya, Fundamentals of Business Analytics, 2nd edition, Wiley.
2. U Dinesh Kumar, Business Analytics: The Science of Data Driven Decision Making, Wiley.
3. Halday P, Business Analytics: An Application Focus, PHI.

Course Code:

COST MANAGEMENT OF ENGINEERING PROJECTS

(Open Elective) (Common to all)

Instruction	:	3 Periods/week	Continuous Internal Evaluation	:	40 Marks
Tutorial	:	-	Semester End Examination	:	60 Marks
Credits	:	3	Semester End Exam Duration	:	3 Hours

Course Objectives:

1. To study the parameters involved in the strategic cost management process.
2. To acquire knowledge on various technical and non-technical activities involved in the Project Management.
3. To study the relation between project planning and cost analysis.
4. To learn different types of budgets and application in Civil Engineering projects.
5. To study different costing methods and valuation techniques for different projects.

Unit I – Introduction Project Management

Project – Meaning – Stages in Conception to commissioning – Technical and non–technical activities – detailed Engineering activities – Bar charts and Network diagram – PERT & amp; CPM Techniques– Project execution and Project cost control. Project Crashing.

Unit II – Introduction and Overview of the Strategic Cost Management Process

Introduction to Cost Accounting – Objectives – Cost Concepts in decision–making; Relevant cost – Differential cost – Incremental cost and Opportunity cost – Creation of a Database for operational control.

Unit III – Cost Behavior and Project Planning – Marginal costing

Distinction between Marginal Costing and Absorption costing – Cost–Volume–Profit analysis – Break– Even Point – Various Decision–Making Problems – Analysis of Cost for Pricing Strategies (Simple Problems).

Unit IV – Budgets and Budgetary Control Techniques

Introduction to budgeting – Types of budgets – Flexible budgets – Performance Budgets – Zero Based Budgets – Measurement of Divisional Profitability – Transfer Pricing. (Simple Problems)

Unit V – Contemporary Application of different Costing Methods

Target costing – Life cycle costing and Costing of service sector – Inventory valuation techniques – Material requirement planning – JIT Approach – Activity based costing – Bench marking – Value Chain Analysis and Balanced Scorecard

Course Outcomes: Upon the completion of the subject, the students will be able to

CO1	:	Understand the parameters involved in the strategic cost management process.
CO2	:	Comprehend the technical and non-technical activities involved in the Project Management.
CO3	:	Know the relation between project planning and cost analysis.
CO4	:	Identify different types of budgets and application in Civil Engineering projects.
CO5	:	Compare different costing methods and valuation techniques for different projects.

Textbooks:

1. Charles T. Horngren, Srikant M. Datar and Madhav V. Rajan, Cost Accounting a Managerial Emphasis, 14th edition, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting.

References:

1. Robert S. Kaplan and Anthony A. Atkinson, Management & Cost Accounting, Pearson.
2. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting, A. H. Wheeler Publisher.
3. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw-Hill Book Co. Ltd.

Course Code:

ENERGY FROM WASTE

(Open Elective) (Common to all)

Instruction	:	3 Periods/week	Continuous Internal Evaluation	:	40 Marks
Tutorial	:	-	Semester End Examination	:	60 Marks
Credits	:	3	Semester End Exam Duration	:	3 Hours

Course objectives:

1. To familiarize the types of waste and its energy conversion.
2. To understand the solid waste disposal and environmental impacts.
3. To familiarize the students about Bio-chemical Conversion.
4. To discuss about the process of Biogas production.
5. To aware the students about E-waste management in India.

Unit I - Waste Management and its Treatment

Solid Waste Sources – types – composition – Properties – Global warming – Municipal Solid Waste: Physical, chemical and biological properties – Waste Collection and Transfer stations– Waste minimization and recycling of municipal waste – Segregation of waste – Size Reduction – Managing Waste – Status of technologies for generation of Energy from Waste Treatment and Disposal Aerobic composting, incineration, Furnace type and design – Medical waste/Pharmaceutical waste treatment Technologies – Incineration – Environmental impacts – Measures to mitigate environmental effects due to incineration.

Unit II - Land Fills

Land Fill method of Solid waste disposal Land fill classification – Types – methods and Sitting consideration – Layout and preliminary design of landfills: Composition – characteristics – generation – Movement and control of landfill leach ate and gases – Environmental monitoring system for land fill gases.

Unit III - Energy Generation from Bio-Chemical Process

Energy Generation from Waste Bio-chemical Conversion: Sources of energy generation, anaerobic digestion of sewage and municipal wastes – Direct combustion of MSW – refuse derived solid fuel – Industrial waste – agro residues – Anaerobic Digestion.

Unit IV - Biogas Conversion

Biogas production – Land fill gas generation and utilization – Thermo-chemical conversion – Sources of energy generation – Gasification of waste using Gasifies, Briquetting, Utilization, and advantages of briquetting – Environmental benefits of Bio-chemical and Thermo-chemical conversion.

Unit V - E-Waste Management in India

E-waste in the global context – Growth of Electrical and Electronics Industry in India – Environmental concerns and health hazards – Recycling e-waste: a thriving economy of the unorganized sector – Global trade in hazardous waste – Impact of hazardous e-waste in India. Management of e-waste: e-waste legislation – Government regulations on e-waste management – International experience – need for stringent health safeguards and environmental protection laws of India.

Course Outcomes: Upon the completion of the subject, the students will be able to

CO1	:	Analyze the types of various energy conversion units from waste.
CO2	:	Gain the knowledge on the solid waste disposal techniques.
CO3	:	Understand the biochemical conversion of various residues.
CO4	:	Familiarize the step-by-step process of Biogas Conversion.
CO5	:	Understand E-waste Management in India.

Textbooks:

1. Nicholas P. Cheremisinoff, Handbook of Solid Waste Management and Waste Minimization Technologies, an Imprint of Elsevier, New Delhi, 2003.
2. M. Dutta, B. P. Parida, B. K. Guha and T. R. Surkrishnan, Industrial Solid Waste Management and Landfilling Practice, Narosa Publishing House, New Delhi, 1999.
3. Amalendu Bagchi, Design, Construction and Monitoring of Landfills, John Wiley and Sons. New York, 1994.

References:

1. Colin, Parker and Tim Roberts, (Editors), Energy from Waste: An Evaluation of Conversion Technologies, Environmental Resources Limited, London, UK., Elsevier Applied Science Publishers, London/New York, 1985.
2. McKendry Peter, Energy Production from Biomass (part 2): Conversion Technologies, Bio- resource Technology, 83, no. 1: 47-54, 2002.
3. AD Bhide and BB Sundaresan, Solid Waste Management in Developing Countries, INSDOC, New Delhi, 1983.
4. Hieronymi, Klaus, Ramzy Kahhat and Eric Williams (Editors), E-Waste Management: From Waste to Resource, Routledge, 2012.
5. C. S. Rao, Environmental Pollution Control Engineering, Wiley Eastern Ltd, New Delhi, 1995.
6. George Tchobanoglous, Hilary Theisen and Samuel A Vigil, Integrated Solid Waste Management: Engineering Principles and Management Issues, McGraw Hill, New York, 1993.

Course Code:

ENGLISH FOR RESEARCH PAPER WRITING

(Audit Course - Common to ALL branches)

Instruction	:	2 Periods / week	Continuous Internal Evaluation	:	100 Marks
Tutorial	:	-			
Credits	:	-			

Course Objectives:

1. Understand that how to improve your writing skills and level of readability
2. Learn about what to write in each section
3. Understand the skills needed when writing a Title

Unit I

Planning and Preparation, Word Order, breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.

Unit II

Sections of a Paper, Abstracts. Introduction, Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism.

Unit III

Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

Unit IV

Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, key Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions.

Unit V

Useful phrases, how to ensure paper is as good as it could possibly be the first-time submission

Course Outcomes: At the end of the course the student will be able to:

CO 1	:	Write coherent and concise sentences.
CO 2	:	Produce good research paper with ethical practices.
CO 3	:	Develop error-free research paper in proper framework.
CO 4	:	Use language techniques appropriately.
CO 5	:	Fulfil the requirement of a good research paper.

Suggested Studies:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books).
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press.
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.

Course Code:

DISASTER MANAGEMENT

(Audit Course - Common to ALL branches)

Instruction	:	2 Periods / week	Continuous Internal Evaluation	:	100 Marks
Tutorial	:	-			
Credits	:	-			

Course Objectives:

1. Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
4. Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in.

Unit I - Introduction

Disaster: Definition, Factors and Significance; Difference Between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

Unit II - Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction Of Ecosystem.

Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War And Conflicts.

Unit III - Disaster Prone Areas in India

Study Of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post-Disaster Diseases and Epidemics.

Unit IV - Disaster Preparedness and Management

Preparedness: Monitoring of Phenomena Triggering a Disaster or Hazard

Evaluation Of Risk: Application of Remote Sensing, Data from Meteorological and Other Agencies, Media Reports: Governmental and Community Preparedness.

Unit V - Risk Assessment

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.

Disaster Mitigation: Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.

Course Outcomes: At the end of the course the student will be able to:

CO 1 : Understand the factors that contribute to natural and man-made disasters and distinguish between them.
CO 2 : Identify the disaster-prone areas in India.
CO 3 : Assess the disaster and analyze by collecting the data from different sources.
CO 4 : Know the concept of risk reduction and risk assessment and evolve strategies for disaster mitigation.

Suggested Studies:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.
2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences and Reflections", Prentice Hall of India, New Delhi.
3. Goel S. L., Disaster Administration and Management Text and Case Studies", Deep & Deep Publication Pvt. Ltd., New Delhi.

Course Code:

SANSKRIT FOR TECHNICAL KNOWLEDGE

(Audit Course - Common to ALL branches)

Instruction	:	2 Periods / week	Continuous Internal Evaluation	:	100 Marks
Tutorial	:	-			
Credits	:	-			

Course Objectives: The objectives of this course for the student are to:

1. To get a working knowledge in illustrious Sanskrit, the scientific language in the world
2. Learning of Sanskrit to improve brain functioning
3. Learning of Sanskrit to develop the logic in mathematics, science & other subjects
4. Enhancing the memory power
5. The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

Unit I

Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences

Unit II

Order, Introduction of roots, technical information about Sanskrit Literature

Unit III

Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

Course Outcomes: At the end of the course the student will be able to:

CO 1 : Understand basic Sanskrit language
CO 2 : Ancient Sanskrit literature about science & technology can be understood
CO 3 : Being a logical language will help to develop logic in students

Suggested Studies:

1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication.
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

Course Code:

VALUE EDUCATION

(Audit Course - Common to ALL branches)

Instruction	:	2 Periods / week	Continuous Internal Evaluation	:	100 Marks
Tutorial	:	-			
Credits	:	-			

Course Objectives:

1. Understand value of education and self- development
2. Imbibe good values in students
3. Let they should know about the importance of character

Unit I

Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements

Unit II

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Patriotism, Love for nature, Discipline

Unit III

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

Unit IV

Character and Competence – Holy books vs Blind faith. Self-management and good health. Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

Course Outcomes: At the end of the course the student will be able to:

CO 1	:	Knowledge of self-development
CO 2	:	Learn the importance of Human values
CO 3	:	Developing the overall personality

Suggested Studies:

1. Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi.

Course Code:

CONSTITUTION OF INDIA

(Audit Course - Common to ALL branches)

Instruction	:	2 Periods / week	Continuous Internal Evaluation	:	100 Marks
Tutorial	:	-			
Credits	:	-			

Course Objectives:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Unit I – History of Making of the Indian Constitution

History of Making of the Indian Constitution: History, Drafting Committee, (Composition & Working)

Unit II - Philosophy of the Indian Constitution

Philosophy of the Indian Constitution: Preamble, Salient Features

Unit III – Contours of Constitutional Rights & Duties

Contours of Constitutional Rights & Duties: Fundamental Rights - Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties

Unit IV – Organs of Governance

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Unit V - Local Administration:

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation.

Panchayati raj: Introduction, PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Position and role.

Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

Unit VI – Election Commission:

Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Course Outcomes: At the end of the course the student will be able to:

CO 1	:	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO 2	:	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.

CO 3 : Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.

CO 4 : Discuss the passage of the Hindu Code Bill of 1956.

Suggested Studies:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Course Code:

PEDAGOGY STUDIES

(Audit Course - Common to ALL branches)

Instruction	:	2 Periods / week	Continuous Internal Evaluation	:	100 Marks
Tutorial	:	-			
Credits	:	-			

Course Objectives:

1 : Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers
2 : Identify critical evidence gaps to guide the development.

Unit I

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology.

Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and searching.

Unit II

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries, Curriculum, Teacher education.

Unit III

Evidence on the effectiveness of pedagogical practices: Methodology for the in-depth stage- quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

Unit IV

Professional development: alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community, Curriculum and assessment.

Barriers to learning: limited resources and large class sizes

Unit V

Local Administration: Research gaps and future directions, Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact

Unit VI

Election Commission: Election Commission - Role and Functioning. Chief Election Commissioner and Election Commissioners.

State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

Course Outcomes: At the end of the course the student will be able to:

CO 1 : What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
CO 2 : What is the evidence on the effectiveness of these pedagogical practices, in what

conditions, and with what population of learners?

CO 3 : How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

Suggested Studies:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

Course Code:

STRESS MANAGEMENT BY YOGA

(Audit Course - Common to ALL branches)

Instruction	:	2 Periods / week	Continuous Internal Evaluation	:	100 Marks
Tutorial	:	-			
Credits	:	-			

Course Objectives:

1. To achieve overall health of body and mind
2. To overcome stress

Unit I

Definitions of Eight parts of yog. (Ashtanga)

Unit II

Yam and Niyam: Do`s and Don't's in life. i) Ahinsa, satya, astheya, bramhacharya and aparigraha, ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

Unit III

Asan and Pranayam: i) Various yog poses and their benefits for mind & body, ii) Regularization of breathing techniques and its effects-Types of pranayam

Course Outcomes: At the end of the course the student will be able to:

CO 1 : Develop healthy mind in a healthy body thus improving social health also
CO 2 : Improve efficiency

Suggested Studies:

1. 'Yogic Asanas for Group Training-Part-I": Janardan Swami Yogabhyasi Mandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata.

Course Code:

PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

(Audit Course - Common to ALL branches)

Instruction	:	2 Periods / week	Continuous Internal Evaluation	:	100 Marks
Tutorial	:	-			
Credits	:	-			

Course Objectives:

1. To learn to achieve the highest goal happily
2. To become a person with stable mind, pleasing personality and determination
3. To awaken wisdom in students

Unit I

Neetisatakam: Holistic development of personality. Verses- 19,20,21,22 (wisdom), Verses- 29,31,32 (pride & heroism), Verses- 26,28,63,65 (virtue), Verses- 52,53,59 (dont's), Verses- 71,73,75,78 (do's)

Unit II

Approach to day-to-day work and duties: Shrimad Bhagwad Geeta: Chapter 2-Verses 41, 47,48, Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35, Chapter 18-Verses 45, 46, 48.

Unit III

Statements of basic knowledge: Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68, Chapter 12 -Verses 13, 14, 15, 16,17, 18.

Personality of Role model: Shrimad Bhagwad Geeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, Chapter 4-Verses 18, 38,39, Chapter18 – Verses 37,38,63.

Course Outcomes: At the end of the course the student will be able to:

CO 1	:	Study of Neetishatakam will help in developing versatile personality of students.
CO 2	:	Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life.
CO 3	:	Improve efficiency.

Suggested Studies:

1. '"Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata.
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath,
3. Rashtriya Sanskrit Sansthanam, New Delhi.