

Program: B Tech All Program [except CSBS, CSE(DS) 311 (VT)]MBA Tech All Program / B Tech Integrated All Program				Semester : I / V	
Course : Calculus				Code: 702BS0C001	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks - 50)	Term End Examinations (TEE) (Marks- 100)
3	0	1	4	Marks Scaled to 50	Marks Scaled to 50
Pre-requisite: Knowledge of vector algebra, functions, limits, differentiation and integration of functions.					
Course Objective This course aims at providing adequate exposure to the theory and applications of Calculus. This course will help the students achieve sound understanding of the concepts of calculus, develop problem solving skills and apply the concepts and techniques of calculus to solve problems within Engineering domain. This course will equip the students with intermediate to advanced level concepts and aligned tools to help them tackle advanced mathematics and related applications.					
Course Outcomes After completion of the course, students will be able to- <ol style="list-style-type: none"> 1. Implement appropriate techniques of Differential and Integral Calculus to solve problems 2. Analyse functions using the techniques of calculus 3. Apply the knowledge of Differential and Integral Calculus to solve real life problems 					
Detailed Syllabus					
Unit	Description				Duration
1.	Differential Calculus of functions of one variable Rolle's theorem, Lagrange's Mean value theorem, Cauchy's Mean value theorem, Convergence of Sequences and series, Taylor's and Maclaurin's Series Expansion, Indeterminate forms, L'Hospital's rule.				09
2.	Partial Differentiation Functions of several variables: Limits and continuity, Partial differentiation, Taylor's theorem of function of two variables, Maxima, Minima, Lagrange's Method of Undetermined Multiplier.				09

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3.	Integral Calculus of functions of one variable Volume of solid of revolution, Area of the surface of a solid of revolution, Improper Integrals, Special functions: Beta and Gamma functions.	08
4.	Multiple Integrals Double Integral, Change of order of Integration, Change of variables, Jacobian, Application of Double Integral to find area, Triple Integral, Change of variable to spherical and cylindrical co-ordinates, Application of Triple Integral to find volume.	10
5.	Vector Calculus Gradient, Directional Derivative, Divergence, Curl, Scalar Potential, Harmonic function, Line Integral, Surface Integral, Greens Theorem, Stokes Theorem and Gauss Divergence Theorem.	09
	Total	45
Text Books		
1. B.V. Ramana, <i>Higher Engineering Mathematics</i> , 1 st Edition, McGraw Hill Education, 2017. 2. B.S. Grewal, <i>Higher Engineering Mathematics</i> , 44 th Edition, Khanna Publishers, 2017.		
Reference Books		
1. G. B. Thomas, <i>Calculus</i> , 14 th Edition, Pearson, 2018. 2. Veerarajan T, <i>Engineering Mathematics- I</i> , 1 st Edition, McGraw-Hill Education, 2017. 3. Erwin Kreyszig, <i>Advanced Engineering Mathematics</i> , 10 th Edition, Wiley India, 2017. 4. T. M. Apostol, <i>Calculus- Volume – I</i> , 2 nd Edition, Wiley Eastern, 2007. 5. H. K. Dass, <i>Advanced Engineering Mathematics</i> , 22 nd Edition, S. Chand, 2019.		
Tutorial Work		
8 to 10 Tutorial exercises based on the syllabus.		

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Program: B Tech All Program (except B Tech CSBS, CSE (DS) 311 (VT)), MBA Tech (All Program), B Tech Integrated Mechanical, Information Technology, Data Science and Computer				Semester: I / II / III / V / VI	
Course: Elements of Biology				Code:	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks - 50)	Term End Examinations (TEE) (Marks - 100)
3	0	0	3	Marks Scaled to 50	Marks Scaled to 50
Pre-requisite: Fundamental knowledge of physics, chemistry, and mathematics.					
Course Objective: To introduce students to modern biology with an emphasis on evolution of biology as a multi-disciplinary field, to make them aware of application of engineering principles in biology. This will encourage engineering students to think about solving biological problems with engineering tools. They will also be exposed to the application of engineering principles in biology and engineering robust solutions, inspired by biological examples.					
Course Outcomes: After completion of the course, students will be able to – <ol style="list-style-type: none"> 1. Identify key principles of biomimicry and develop engineering solutions for different fields 2. Classify microorganisms and their molecular properties and analyze the role of DNA as genetic material in transferring information among living organisms 3. Describe the fundamental building blocks of life, including carbohydrates, amino acids, proteins, and lipids, and illustrate their functions in cellular processes and metabolism 					
Detailed Syllabus					
Unit	Description				Duration
1.	Introduction to Biomimicry Applications of biology in engineering, Biology as an independent scientific discipline, Importance of studying biology, Exploring biological discoveries of the 19 th century: Brownian motion and beyond. Applications of biology: Biotechnology, Bioremediation, Bioinformatics, etc., Biologically inspired engineering. Biomimicry in engineering using designs, processes, and ecosystems. Sustainable engineering. Case study: The Kingfisher's beak inspired high-speed Bullet trains.				09
2.	The fundamental building blocks of life Unity in diversity of life, Molecules of life. Structure and functions of carbohydrates, amino acids, proteins, and lipids. Hierarchy in protein structure. Primary secondary, tertiary, and quaternary structure. Proteins as enzymes, transporters, receptors, and structural elements. Nucleotides and DNA/RNA.				06
3.	Genetics and Information Transfer Genetics as the foundation of biology, Mendel's laws, Segregation and independent assortment, Gene mapping, Single gene disorders, Molecular basis of genetic information transfer, DNA as genetic material, Genetic code, Universality of genetic				09

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	code, DNA replication, Protein synthesis, Central dogma of life: transcription and translation. Case study: Breaking the storage barrier by storing massive amounts of data on DNA.	
4.	Enzymes Catalysis as a crucial element for life, Enzymology, Enzyme-catalyzed reactions, Enzyme-substrate complex, Mechanism of action, Enzyme classification, Enzyme kinetics, Enzyme inhibition, Industrial applications of enzymes.	06
5.	Metabolism Metabolism: catabolism and anabolism, Principles of energy transactions, ATP as energy currency, ATP cycle, Cellular respiration, Anaerobic respiration, Aerobic respiration, Metabolic regulation, Bioenergetics.	06
6.	Microbiology and Drug Discovery Introduction to biological classification: criteria of organization and hierarchy of life. Ecological aspects of single-celled organisms, Identification, and classification of microorganisms, Microbial growth kinetics, Microbial biotechnology. Drug discovery, Model organisms for biological studies <i>E. coli</i> , <i>S. cerevisiae</i> , <i>D. melanogaster</i> , <i>C. elegans</i> , <i>A. thaliana</i> , <i>M. musculus</i> . Vaccines, Targeted drug delivery Case study: Development of a nanoparticle-based vaccine delivery system for cancer immunotherapy.	09
	Total	45
Textbooks: <ol style="list-style-type: none"> 1. Arthur T. Johnson, <i>Biology for Engineers</i>, 2nd Edition, CRC Press Taylor & Francis group, 2018. 2. Prescott, L.M J.P. Harley and C.A. Klein, <i>Microbiology</i>, 12th edition, McGraw-Hill Higher Education, 2022. 		
Reference Books <ol style="list-style-type: none"> 1. Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B., <i>Biology: A global approach</i>, 12th edition, Pearson Education Ltd., 2020. 2. Nelson, D. L.; Lehninger, A. L.; and Cox, M. M., <i>Principles of Biochemistry</i>, 8th edition, W.H. Freeman, 2020. 		
Laboratory/Tutorial details <ul style="list-style-type: none"> • Not applicable. 		



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Program: B Tech / MBA Tech (All Branches except CSE (DS)-311(VT)) BTI (IT) BTI (Computer, Data Science, Mechanical)				Semester: I / II III V	
Course: Programming for Problem Solving				Code: 702CO0C001	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks - 50)	Term End Examinations (TEE) (Marks- 100)
2	4	0	4	Marks Scaled to 50	Marks Scaled to 50
Pre-requisite: Nil					
Course Objective Enable students to understand problem statements and solve those using basic programming constructs. Develop skills to analyze real life problem statements and implement using Object Oriented Programming.					
Course Outcomes- After completion of the course, students will be able to- <ol style="list-style-type: none"> 1. Comprehend problem statements, build logic and draw flowchart, 2. Develop complex logic using control structures, 3. Implement programs using arrays, function and pointers, 4. Solve real life problems using Object Oriented paradigm. 					
Detailed Syllabus:					
Unit	Description				Duration
1	Introduction to problem solving skills, flowcharts, algorithms, basic program structure of C++, I/O statements, data types, variables, operators, expressions, pre-processor directives.				04
2	Control structures: Conditional branching, looping, nested looping, recursion.				08
3	Programming constructs 1 – D and 2 - D arrays, strings.				04
4	Modular Programming: functions, parameter passing, inline function, macro functions.				04
5	Programming using structures and pointers				03

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6	Introduction to Object Oriented programming: necessity for OOP, data hiding, data abstraction and encapsulation. Classes and Objects.	02
7	Programming using constructors, polymorphism and inheritance.	05
	Total	30

Text Books:

1. Bjarne Stroustrup, "The C++ Programming Language", 4th Edition, Addison Wesley, Pearson Education, 2022.

Reference Books:

1. Bjarne Stroustrup, "Programming – Principles and Practice Using C++", 2nd Edition, Addison Wesley, 2014.
2. KR Venugopal, Rajkumar Buyya, "Mastering C++", 2nd Edition, Tata McGraw-Hill, Paperback 2013.

Laboratory Work

8 to 10 experiments based on the syllabus

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Program: B Tech Integrated Computer B Tech Integrated Data Science B Tech Integrated IT				Semester: V/ V /IV	
Course: Basic Data Structures				Code: 701CO0C013	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Internal Continuous Assessment (ICA) (Marks - 50)	Term End Examinations (TEE) (Marks - 100)
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50
Pre-requisite: C Programming					
Course Objective To understand and implement the abstract data types Stack, Queues, Linked List and several searching and Sorting algorithms to solve real-life problems.					
Course Outcomes After completion of the course, student will be able to 1. Understand the concept of Abstract Data Types. 2. Demonstrate the concepts of Arrays, Structures and Pointers. 3. Apply Linear Data structure to solve real life problems. 4. Evaluate various searching and sorting techniques.					
Detailed Syllabus					
Unit	Description				Duration
1.	Introduction to Data Structures Basic Terminology: Elementary Data Structure Organization, Classification of Data Structures, Operations on Data Structures, Abstract Data Type				03
2.	Introduction to Arrays, Structures and Pointers Arrays: Introduction to one-dimensional and two-dimensional arrays, Accessing the Elements Calculating the Address of Array Elements, traversing array, Passing array to the functions. Structures: Introduction, Structure Declaration, Initialization of Structures, Accessing the Members of a Structure, Arrays of Structures, Passing Structure to Function Pointers: Introduction, Declaration of pointer variable, accessing values using pointer variable, pointer to arrays and structures, passing pointer to the function.				09

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3.	Linear Data Structure I Stacks: Introduction to Stacks, Array representation of Stacks, Operations of a Stack, Applications of a Stack: Conversion, and Evaluation of Arithmetic Expression, Recursion	09
4.	Linear Data Structure II Queues: Introduction to Queues, Array representation of Queues, Queue operations, Types of Queues: Linear Queues, Circular Queues, Priority Queues, Applications of Queues	07
5.	Linear Data Structure III Linked List: Introduction, Basic terminologies, Linked List versus Arrays, Memory Allocation and Deallocation for a Linked List, Types of Linked Lists: Singly Linked List, Doubly Linked List, Operations of Linked List, Traversing a Linked List, Applications of Linked Lists, Stack implementation using Linked List and Queue implementation using Linked List	10
6.	Searching and Sorting Basic search techniques: Sequential search, Binary search, Sorting definitions, Bubble Sort, Selection Sort, Insertion Sort, Radix Sort	07
	Total	45
Text Books Reema Thareja, <i>Data Structures using C</i> , 3 rd Edition, Oxford University Press, Tata McGraw Hill, 2023.		
Reference Books Schaum's Outlines, Seymour Lipschutz, <i>Data structures with C</i> , 1st Edition, 2017.		
Laboratory Work 8 to 10 experiments (and a practicum where applicable) based on the syllabus. Mini Project and Final Practical Exam will be conducted as a part of ICA		

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Program: B Tech Integrated (Computer) / B Tech Integrated (Data Science)				Semester : V	
Course : Fundamentals of Website Designing				Code : 701CO0C014	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks-50)	Term End Examinations (TEE Practical Exam) (Marks -50 in Question Paper)
2	4	0	4	Marks Scaled to 50	--
Prerequisite: Programming for Problem Solving					
Course Objective The objective of the course is to provide knowledge of front-end technologies, implement responsive web design and develop web application with CMS.					
Course Outcomes After completion of the course, students will be able to: <ol style="list-style-type: none"> Understand fundamentals of web technologies and design front end of web applications using HTML5, CSS3. Implement client-side scripting of web application with Javascript, JQuery and Bootstrap Implement server-side scripting of web application using PHP Design front end of a real time web application with CMS. 					
Detailed Syllabus					
Unit	Description				Duration
1.	Introduction What is Internet, Introduction to World Wide Web, Concept of website, its need and purpose, Types of websites: Static and dynamic website, Introduction to HTML, HTTP, HTTP Methods, Web Browsers, Web Servers, Web Pages, Uniform Resource Locator, DNS, Web Standards, Client Server Model- Two Tier Model, Three Tier Model.				03
2.	HTML5 Languages used for website development, Introduction to HTML, XML and JSON, HTML5: Basic tags, Formatting tags, Images, Lists, Tables, Internal and External linking, Multimedia in Web pages- audio, video, Forms. HTML5 semantic elements- Section, Article, Aside, Header, Footer.				06
3.	CSS3				05

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	Introduction to web page styling with CSS, Types of CSS, CSS selectors, CSS Properties- Colors, Backgrounds, Text, Font.	
4.	JavaScript and JQuery JavaScript Introduction, variables, operators, datatypes, functions, objects, condition and looping structures, Form Validation. JQuery Introduction, Syntax, Selectors, Events, JQuery Effects.	06
5.	BootStrap4 Introduction, Grids, Tables, Images.	04
6.	PHP: Introduction to server-side scripting, PHP- Variables, Datatypes, Strings, Arrays, Function, Selection and Iterative statements, Superglobals, Cookies and Session.	04
7.	Content Management System (CMS) Introduction to CMS: WordPress, Jhoomla, Drupal, Comparison of various CMS.	02
	Total	30
Text Books		
<ol style="list-style-type: none"> 1. Kogent Learning Solutions Inc, HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery) Black Book, Dreamtech Press, 2nd Edition, 2016. 2. Jacob Daniel Foreman, Bootstrap 5 Foundations, 1st edition, 2021. 3. Deane Barker, Web Content Management Systems: Features and Practices, O'Reilly Media Inc, 1st Edition, 2016. 		
Reference Books		
<ol style="list-style-type: none"> 1. Ben Frain, Responsive Web Design with HTML5 and CSS, Packt Publishing, 3rd Edition, 2020 		
Laboratory Work		
8 to 10 experiments (and a practicum where applicable) based on the syllabus		




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Program: B Tech All Programs [except CSBS, CSE(DS) 311 (VT)] / MBA Tech All Programs / B Tech Integrated All Programs				Semester: I / II/V/VI	
Course: Critical Thinking				Code: 702BS0C007	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Internal Continuous Assessment (ICA) (Marks - 100)	Term End Examinations (TEE)
2	0	0	0	Marks Scaled to 50	---
Pre-requisite: Nil					
Course Objective This course examines the basic nature of reasoning and the fallacies which prevent good reasoning and decision making. Both the theory and practice of critical thinking are covered. Emphasis will be on understanding the logical structure of an argument and on recognizing the influence of bias and emotional persuasion on decision making.					
Course Outcomes After completion of the course, students will be able to <ol style="list-style-type: none"> 1. Solve problems or take decisions by processing information in a clear, logical, reasoned and reflective manner 2. Recognise, build and appraise arguments 3. Analyse contexts effectively 4. Recognise bias and its impact on decision making 					
Detailed Syllabus					
Unit	Description				Duration
1.	Brain and Thinking: Introduction to Thinking, Types of Thinking, Brain and Thinking, Curiosity, Creativity and Different thinking, Critical thinking basics, Meta thinking				10
2.	Social, Psychological Aspects of Thinking: Top barriers to critical thinking, Rationality Bounded Rationality and its model, Fast and Slow Thinking, Objectivity, Subjectivity, Assumptions and Skepticism. Paradigm shift, Perception, prejudice and stereotype, Attribution, Heuristics, Cognitive Biases and Errors, examining critical thinking, Critical Thinking Process, Framework, & Tools, Problems and critical				10

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	thinking.	
3.	Deductive and Inductive: Arguments, Principle of Clarity, Truth, Deductive validity, Conditional Propositions, Inductive reasoning, Inductive inferences, Deductive v/s Inductive, Formal fallacies, Informal fallacies.	10
	Total	30
Text Books 1. Paul Herrick, <i>Think with Socrates: An Introduction to Critical Thinking</i> , 1 st edition, 2014. 2. Lewis Vaughan, <i>The Power of Critical Thinking</i> , 5th edition, 2012		
Reference books: NA		



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Program : B Tech / MBA Tech / BTI				Semester : II/III/IV/V/VIII	
Course : Management Accounting for Engineers				Code :	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks - 50)	Term End Examinations (TEE) (Marks- 100)
2	0	0	2	Marks Scaled to 50	Marks Scaled to 50
Pre-requisite: NIL					
Course Objective					
The course provides a conceptual understanding of various aspects of cost accounting – cost ascertainment, cost analysis, and use information for managerial decision making					
Course Outcomes					
After completion of the course, the student will be able to -					
1. Explain the concepts of financial, cost and management Accounting					
2. Understand different types of costs and prepare a cost sheet of a product					
3. Analyse the profitability and recommend a suitable decision					
4. Calculate the various types of variances in costs					
5. Build a flexible budget					
Detailed Syllabus					
Unit	Description				Duration
1	Introduction to Accounting, Importance of Accounting for Engineers, Users of Accounting Information, Financial Statements, Branches of Accounting, Limitations of Financial Accounting, Evolution of Cost and Management Accounting				4
2	Cost Accounting – Meaning and Definition – Need and Importance of Cost Accounting – Differences Between Financial Accounting and Cost Accounting and Management Accounting				2
3	Cost Concepts and Classifications				2
4	Material Control – Meaning, Objectives, Advantages, Techniques and Types of Material Control – ABC, VED,FSN,MRP,JIT, Material Levels and EOQ				4
5	Calculation of Cost and Preparation of Cost Sheet				5
6	Marginal Costing and Cost-Volume-Profit Analysis				5
7	Standard Costing and Variance Analysis – Material Variances – Cost, Price and Usage, Labour Variances – Cost, Rate and Efficiency				4
8	Budgeting – Meaning, Types of Budgets, Advantages of Budgeting, Preparation of Flexible Budget				4
	Total				30
Text Books					
1. Lal. J., & Srivastava, S, “Cost accounting”, 5 th Edition, Tata McGraw Hill , New Delhi, 2013.					

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2. Ramanathan, S., "*Accounting for Management*", Latest Reprint Oxford University Press, New Delhi, 2014.

Reference Book

1. Horngren C. T., Sundem G. L., & Stratton W. O., "*Introduction to Management Accounting*", 17th Edition, Pearson Educación, 2022.



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Program: B Tech/ MBA Tech / B Tech Integrated				Semester : I/ II/ IV/ V/VI/ VII/ VIII	
Course: Environmental Science				Code: 702CI0C014	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks - 50)	Term End Examinations (TEE) (Marks- ---)
1	0	1	2	Marks Scaled to 50	--
Pre-requisite: Fundamental Knowledge of physics, chemistry and mathematics					
Course Objective This course aims to understand the multidisciplinary nature of environmental sciences, greenhouse effect and climate change. It also aims to discuss the basics of natural resources, biodiversity, environmental pollution.					
Course Outcomes After completion of the course, the student will be able to - <ol style="list-style-type: none"> 1. Explain the concept of natural resources, ecosystem and biodiversity 2. Relate the various aspects of environmental pollutions with its cause and effect 3. Explain the greenhouse effect and climate change 					
Detailed Syllabus					
Unit	Description				Duration
1	Multidisciplinary nature of environmental science Definition, scope and importance of environmental sciences.				01
2	Natural Resources Natural resources: Forest resources, Water resources, Mineral resources, Food resources. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.				02
3	Ecosystems Concept of an ecosystem. Structure and function of an ecosystem. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features of the following ecosystem:- a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems.				02
4	Biodiversity Definition: genetic, species and ecosystem diversity. Value of biodiversity: consumptive use, productive use. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.				02
5	Environmental Pollution Definition, Cause and effects for Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards and Solid waste pollution.				04
6	The Science of Climate Change Greenhouse effect, Global warming, Global environmental changes, Acid rain Ozone layer depletion, Carbon footprint				04
	Total				15

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Text Books

1. Erach Bharucha, *Textbook of Environmental Studies*, 2nd Edition, University Press, 2019.
2. Soli J Arceivala, Dr. Shyam R. Asolekar; *Environmental Studies: A Practitioner's Approach*, 1st Edition, McGraw-Hill Education Private Limited, 2012. (Classic Book)

Reference Books

1. MP Poonia & SC Sharma, *Environmental Studies*, 1st Edition, Khanna Publishing House, 2017. (Classic Book)
2. Rajagopalan, *Environmental Studies*, 3rd Edition, Oxford University Press, 2015. (Classic Book)

Tutorial Work

8 to 10 Tutorial exercises based on the syllabus.



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