

**BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA**



Curriculum and Syllabus

of

B.Tech(Computer Science Engg.) from the Batch 2018-19

Semester (3rd)

Director, Curriculum Development
Biju Patnaik University of Technology, Odisha
Rourkela

Third Semester							
Theory							
Sl No	Category	Course Code	Course Title	L-T-P	Credit	University Marks	Internal Evaluation
1	BS	RMA3A001	Mathematics - III	3-0-0	3	100	50
2	ES	ROP3B001	Object Oriented Programming Using JAVA	3-0-0	3	100	50
3	HS	REN3E001 / ROB3E002	Engineering Economics / Organisational Behaviour	3-0-0	3	100	50
4	PC	RCS3C001	Digital Logic Design	3-0-0	3	100	50
5	PC	RCS3C002	Data Structure	3-0-0	3	100	50
6	MC*	RES3F001	Environment Science	3-0-0	0	—	100 (Pass mark is 37)
Total Credit (Theory)					15		
Total Marks						500	250
Practical							
1	PC	RCS3C201	Digital Logic Design Lab.	0-0-3	2		100
2	PC	RCS3C202	Data Structure Lab.	0-0-3	2		100
3	ES	ROP3B201	OOP Using JAVA Lab.	0-0-3	2		100
4	PSI	RIP3H201	Evaluation of Internship - I	0-0-3	1		100
Total Credit (Practical)					7		
Total Semester Credit					22		
Total Marks							400

*Mandatory Non-Credit Courses (MC) result will be reflected with Pass (P) / Fail (F) grade. Thus the grade obtained will not be affecting the grade point average. However it shall appear on the grade sheet as per AICTE rule.

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3rd Semester	RMA3A001	MATHEMATICS – III	L-T-P	3 CREDITS
			3-0-0	

Module-I (10 Hours)

Solution of Non-linear equation in one variable (Bisection, Secant, Newton Rapson Method, Fixed Point Iteration method). Numerical Solutions of system of Linear equations (Gauss-Seidel, Successive Over Relaxation, Doolittle method, Crouts method, Choleskys Method).

Interpolation: Newton's forward and backward interpolation, Newton divided difference interpolation, Lagrange Interpolation.

Module-II (8 Hours)

Numerical Differentiation, integration and Solution of Differential Equations: Numerical Differentiation, The trapezoidal rule, The Simpson's rule, Gauss Integration formulas. Solution of ordinary differential equation: Euler's method, Improvement of Euler's method, Runge-Kutta methods, multi step methods, Methods for system and higher order ordinary differential equations.

Module-III (8 Hours)

Sample Space, Probability, Conditional Probability, Independent Events, Bayes' Theorem, Random variables, Probability distributions, Expectations, Mean and variance, Moments.

Module-IV (9 Hours)

Bernoulli Trials, Binomial, Poisson, Hyper Geometric Distribution, Uniform., Exponential and Normal distribution, Bivariate Distributions.

Module-V (10 Hours)

Correlation and Regression Analysis, Rank Correlation, Maximum Likely hood estimate, Method of Moments, Confidence intervals mean and variance of a Normal Distribution, p-value. Testing of hypothesis: test for goodness of fit, Test for single mean and variance of a Normal Distribution.

Books:

1. E. Kreyszig," Advanced Engineering Mathematics:,Tenth Edition, Wiley India
2. S.Pal and S.C. Bhunia, "Engineering Mathematics" Oxford University Press
3. Jay L. Devore, "Probability and Statistics for Engineering and Sciences", Seventh Edition, Thomson/CENGAGE Learning India Pvt. Ltd
4. R. E. Walpole, R. h. Myers, S. L. Myers, K. E. Ye; "Probability and Statistics, Pearson".
5. R. L. Burden, J. D. Faires, " Numerical Analysis, Cenage Learning India Pvt. Ltd"
6. B.V.RAMANA,"Higher Engineering Mathematics" Tata Magraw Hill



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3rd Semester	ROP3B001	OBJECT ORIENTED PROGRAMMING USING JAVA	L-T-P 3-0-0	3 CREDITS
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Module-I (10 Hrs)

Chapter 1- An introduction to programming.

Different types of programming languages, Description of Compiler and Interpreter, Advantage of Object Oriented Programming, Object Oriented Programming, Features of Object Oriented Programming.

Chapter 2- Introduction to Java.

What is Java?, Why Java?, History behind Java, Different versions of Java, Difference between C/C++ and Java, Features of Java, First Java Program, Prerequisites Before start writing a java program, Writing the program, Compiling the program, How Java program compiles?, Executing the program, How Java program executes?, What is JVM and its significance in executing a program?, Architecture of JVM.

Chapter 3- Understanding First Program and a step forward, Understanding every term of the program, Java Tokens, Datatypes, Operators, What are Operators?, Different types of Operators, Typecasting, Control Structures and Arrays, Different types of control structures, Conditional Statements, Loops/ Iterators, Jumping Statements, Java Arrays, Multidimensional Arrays, Taking Input from keyboard, Command Line Arguments, Using Scanner Class, Using Buffered Reader class.

Module-II: (08 Hrs.)

Chapter 1- Introduction to Classes and Objects.

Classes, Methods, Objects, Description of data hiding and data encapsulation, Constructors, Use of static Keyword in Java, Use of this Keyword in Java, Array of Objects, Concept of Access Modifiers (Public, Private, Protected, Default).

Chapter 2- Inheritance

Understanding Inheritance, Types of Inheritance and Java supported Inheritance, Significance of Inheritance, Constructor call in Inheritance, Use of super keyword in Java, Polymorphism, Understanding Polymorphism, Types of polymorphism, Significance of Polymorphism in Java, Method Overloading, Constructor Overloading, Method Overriding, Dynamic Method Dispatching.

Chapter 3- String Manipulations.

Introduction to different classes, String class, String Buffer, String Builder, String Tokenizer, Concept of Wrapper Classes, Introduction to wrapper classes, Different predefined wrapper classes, Predefined Constructors for the wrapper classes. Conversion of types from one type (Object) to another type (Primitive) and Vice versa, Concept of Auto boxing and unboxing.

Module-III: (09 Hrs.)

Chapter 1:-Data Abstraction

Basics of Data Abstraction, Understanding Abstract classes, Understanding Interfaces, Multiple Inheritance Using Interfaces, Packages, Introduction to Packages, Java API Packages, User-Defined Packages, Accessing Packages, Error and Exception Handling, Introduction to error and exception, Types of exceptions and difference between the types, Runtime Stack Mechanism, Hierarchy of Exception classes, Default exception handling in Java, User defined/Customized Exception Handling, Understanding different keywords (try, catch, finally, throw, throws), User defined exception classes, Commonly used Exceptions and their details.

Chapter 2:-Multithreading

Introduction of Multithreading/Multitasking, Ways to define a Thread in Java, Thread naming and Priorities, Thread execution prevention methods. (yield(), join(), sleep()), Concept of

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Synchronisation, Inter Thread Communication, Basics of Deadlock, Demon Thread, Improvement in Multithreading, Inner Classes, Introduction, Member inner class, Static inner class, Local inner class, Anonymous inner class.

Module-IV: (10 Hrs.)

Chapter 1:-IO Streams (java.io package)

Introduction, Byte Stream and Character Stream, Files and Random Access Files, Serialization, Collection Frame Work (java.util), Introduction, Util Package interfaces, List, Set, Map etc, List interfaces and its classes, Setter interfaces and its classes.

Chapter 2:-Applet

Introduction, Life Cycle of an Applet, GUI with an Applet, Abstract Window Toolkit (AWT), Introduction to GUI, Description of Components and Containers, Component/Container hierarchy, Understanding different Components/Container classes and their constructors, Event Handling, Different mechanisms of Event Handling, Listener Interfaces, Adapter classes.

Module-V: (08 Hrs.)

Chapter 1:-Swing (JFC)

Introduction Diff b/w awt and swing, Components Hierarchy, Panes, Individual Swings Components JLabel, JButton, JTextField, JTextArea.

Chapter 2:-JavaFX

Getting started with JavaFX, Graphics, User Interface Components, Effects, Animation, and Media, Application Logic, Interoperability, JavaFX Scene Builder 2, Getting Started with scene Builder.

Working with scene Builder.

Books :-

1. Programming in Java. Second Edition. OXFORD HIGHER EDUCATION. (SACHIN MALHOTRA/SAURAV CHOUDHARY)
2. CORE JAVA For Beginners. (Rashmi Kanta Das), Vikas Publication
3. JAVA Complete Reference (9th Edition) Herbalt Schelidt.

3rd Semester	ROP3B201	OOP USING JAVA LAB.	L-T-P 0-0-3	2 CREDITS
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JAVA programs on:

1. Introduction, Compiling & executing a java program.
2. Data types & variables, decision control structures: if, nested if etc.
3. Loop control structures: do, while, for etc.
4. Classes and objects.
5. Data abstraction & data hiding, inheritance, polymorphism.
6. Threads, exception handlings and applet programs
7. Interfaces and inner classes, wrapper classes, generics

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3rd Semester	REN3E001	ENGINEERING ECONOMICS	L-T-P	3 CREDITS
			3-0-0	

Module - I (08 hours)

Engineering Economics- Nature, Scope, Basic problems of an economy, Micro Economics and Macro Economics.

Demand - Meaning of demand, Demand function, Law of Demand and its exceptions, Determinants of demand, Elasticity of demand & its measurement (Simple numerical problems to be solved), Demand Forecasting – Meaning

Supply-Meaning of supply, Law of supply and its exception, Determinants of supply, Elasticity of supply, Determination of market equilibrium (Simple numerical problems to be solved).

Module - II (08 hours)

Production - Production function, Laws of returns: Law of variable proportion, Law of returns to scale

Cost and Revenue Concepts - Total Costs, Fixed cost, Variable cost, Total revenue, Average revenue and Marginal revenue, Cost-Output Relationships in the Short Run, and Cost-Output Relationships in the Long Run, Analysis of cost minimization.

Module III (08 hours)

Market - Basic understanding of different market structures, Determination of equilibrium price under perfect competition (Simple numerical problems to be solved), Break Even Analysis-linear approach (Simple numerical problems to be solved).

Module - IV (12 hours)

Time Value of Money- Interest - Simple and compound, nominal and effective rate of interest, Cash flow diagrams, Principles of economic equivalence.

Evaluation of Engineering Projects-Present worth method, Future worth method, Annual worth method, Internal rate of return method, Cost benefit analysis for public projects.

Depreciation- Depreciation of capital asset, Causes of depreciation, Methods of calculating depreciation - Straight line method, Declining balance method, SOYD method, After tax comparison of project.

Module -V (06 Hours)

Inflation-Meaning of inflation, types, causes, measures to control inflation.

National Income-Definition, Concepts of national income, Method of measuring national income.

Banking -Commercial bank, Functions of commercial bank, Central bank, Functions of Central Bank.

Books:

1. Principles of Economics by Deviga Vengedasalam and Karaünagaran Madhavan, Oxford
2. Riggs, Bedworth and Randhwa, "Engineering Economics", McGraw Hill Education India
3. C. S. Park, Contemporary Engineering Economics, 6th Edition, Pearson Education, 2015.
4. Engineering Economy by William G.Sullivan, Elin M.Wicks, C. Patric Koelling, Pearson
5. R.Paneer Selvan, " Engineering Economics", PHI
6. Ahuja,H.L., "Principles of Micro Economics" , S.Chand & Company Ltd
7. Jhingan,M.L., "Macro Economic Theory"
8. Macro Economics by S.P.Gupta, TMH

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Course Outcomes of Engineering Economics

At the end of the course the engineering graduates will be able to

1. **Remembering** : Define the basic concept of micro and macro economics, engineering economics and their application in engineering economy.
2. **Understanding** : Evaluate numerically the effects of changes in demand and supply on price determination of products and services.
3. **Analyze** : the macroeconomic environment and financial systems of the country and its impact on business, society and enterprise.
4. **Develop** : the ability to account for time value of money using engineering economy factors and formulas.
5. **Apply**: knowledge of mathematics, economics and engineering principles to solve engineering problems and to analyze decision alternatives in engineering projects considering upon depreciation, taxes and inflation.

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3rd Semester	ROB3E002	ORGANISATIONAL BEHAVIOUR	L-T-P	3 CREDITS
			3-0-0	

Objectives:

1. To develop an understanding of the behavior of individuals and groups inside organizations
2. To enhance skills in understanding and appreciating individuals, interpersonal, and group process for increased effectiveness both within and outside of organizations.
3. To develop theoretical and practical insights and problem-solving capabilities for effectively managing the organizational processes.

Module-I: **(06 Hrs.)**

Fundamentals of OB: Definition, scope and importance of OB, Relationship between OB and the individual, Evolution of OB, Theoretical framework (cognitive), behavioristic and social cognitive), Limitations of OB.

Module-II: **(12 Hrs.)**

Attitude: Importance of attitude in an organization, Right Attitude, Components of attitude, Relationship between behavior and attitude, Developing Emotional intelligence at the workplace, Job attitude, Barriers to changing attitudes.

Personality and values: Definition and importance of Personality for performance, The Myers-Briggs Type Indicator and The Big Five personality model, Significant personality traits suitable to the workplace (personality and job – fit theory), Personality Tests and their practical applications.

Perception: Meaning and concept of perception, Factors influencing perception, Selective perception, Attribution theory, Perceptual process, Social perception (stereotyping and halo effect).

Motivation: Definition & Concept of Motive & Motivation, The Content Theories of Motivation (Maslow's Need Hierarchy & Herzberg's Two Factor model Theory), The Process Theories (Vroom's expectancy Theory & Porter Lawler model), Contemporary Theories – Equity Theory of Work Motivation.

Module-III: **(10 Hrs.)**

Foundations of Group Behavior: The Meaning of Group & Group behavior & Group Dynamics, Types of Groups, The Five – Stage Model of Group Development.

Managing Teams: Why Work Teams, Work Teams in Organization, Developing Work Teams, Team Effectiveness & Team Building.

Leadership: Concept of Leadership, Styles of Leadership, Trait Approach Contingency Leadership Approach, Contemporary leadership, Meaning and significance of contemporary leadership, Concept of transformations leadership, Contemporary theories of leadership, Success stories of today's Global and Indian leaders.

Module-IV: **(08 Hrs.)**

Organizational Culture : Meaning & Definition of Organizational Culture, creating & Sustaining Organizational Culture, Types of Culture (Strong vs. Weak Culture, Soft Vs. Hard Culture & Formal vs. Informal Culture), Creating Positive Organizational Culture, Concept of Workplace Spirituality.

Module-V: **(09 Hrs.)**

Organizational Change: Meaning, Definition & Nature of Organizational Change, Types of Organizational Change, Forces that acts as stimulants to change.

Implementing Organizational Change : How to overcome the Resistance to Change, Approaches to managing Organizational Change, Kurt Lewin's-Three step model, Seven Stage model of Change & Kotter's Eight-Step plan for Implementing Change, Leading the Change Process, Facilitating Change, Dealing with Individual & Group Resistance, Intervention Strategies for Facilitating Organizational Change, Methods of Implementing Organizational Change, Developing a Learning Organization.

Books:

1. Understanding Organizational Behaviour, Parek, Oxford
2. Organizational Behaviour, Robbins, Judge, Sanghi, Pearson.
3. Organizational Behaviour, K. Awathappa, HPH.
4. Organizational Behaviour, VSP Rao, Excel
5. Introduction to Organizational Behaviour, Moorhead, Griffin, Cengage.
6. Organizational Behaviour, Hitt, Miller, Colella, Wiley

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3rd Semester	RCS3C001	Digital Logic Design	L-T-P 3-0-0	3 CREDITS
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Module-I: **(10 Hrs.)**

Introduction: Logic design, transistors as switches, CMOS gates, sequential circuits, some examples.

Digital Systems: Representation of numbers, binary codes, Gray code, error-detecting and error-correcting codes, registers, binary logic, basic logic gates.

Boolean Algebra: Boolean operations, Boolean functions, algebraic manipulations, minterms and maxterms, sum-of-products and product-of-sum representations, two-input logic gates, functional completeness.

Module-II: **(08 Hrs.)**

Minimization of Boolean Functions: Karnaugh map, don't-care conditions, prime implicants, Quine–McCluskey technique, Logic gates, NAND/NOR gates, Universal gates.

Module-III: **(10 Hrs.)**

Combinational Circuits: Adder, subtractor, multiplier, comparator, decoders, encoders, multiplexers, demultiplexers, MUX Realization of switching functions, Parity bit generator, Code-converters, Hazards and hazard free realizations.

Module-IV: **(08 Hrs.)**

Synchronous Sequential Circuits: Finite-state machines, latches and flip-flops (SR, D, JK, T), synthesis of clocked sequential circuits, Steps in synchronous sequential circuit design. Design of modulo-N Ring & Shift counters, Serial binary adder.

Module-V: **(09 Hrs.)**

Registers and Counters: Registers and shift registers, sequential adders, binary and BCD ripple counters, synchronous counters

Algorithmic State Machines: Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples of Weighing machine and Binary multiplier.

Books:

- Digital Design – Morris Mano, PHI, 3rd Edition, 2006.
- Digital Electronics by G.K. Kharate, Oxford University Press
- Switching & Finite Automata theory – Z. Kohavi, TMH, 2nd Edition.
- An Engineering Approach To Digital Design – Fletcher, PHI.
- Fundamentals of Logic Design – Charles H. Roth, Thomson Publications, 5th Edition, 2004.
- Digital Logic Applications and Design – John M. Yarbrough, Thomson Publications, 2006

3rd Semester	RCS3C201	Digital Logic Design Lab.	L-T-P 0-0-3	2 CREDITS
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Laboratory Experiments

1. Digital Logic Gates: Investigate logic behavior of AND, OR, NAND, NOR, EX-OR, EX-NOR, Invert and Buffer gates, use of Universal NANDGate.
2. Gate-level minimization: Two level and multi level implementation of Boolean functions.
3. Combinational Circuits: design, assemble and test: adders and subtractors, comparators.
4. Design and Implementation of code converters, gray code to binary and BCD to seven segment display.
5. Design and Implementation of a function using MUX/ DEMUX.
6. Design of functions using encoder, decoder.
7. Flip-Flop: assemble, test and investigate operation of SR, D & J-K flip-flops.
8. Shift Registers: Design and investigate the operation of all types of shift registers with parallel load.
9. Counters: Design, assemble and test various ripple and synchronous counters - decimal counter, Binary counter with parallel load.
10. Design of Binary Multiplier.
11. Verilog/VHDL simulation and implementation of Experiments listed at Sl. No. 1 to 10.
12. C/C++ implementation of Experiments listed at Sl. No. 1 to 10.



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3rd Semester	RCS3C002	Data Structure	L-T-P 3-0-0	3 CREDITS
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Module - I **(12 Hrs.)**

Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. **Searching:** Linear Search and Binary Search Techniques and their complexity analysis.

Module – II **(08 Hrs.)**

Stacks and Queues: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

Module - III **(08 Hrs.)**

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.

Module - IV **(10 Hrs.)**

Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.

Module - V **(07 Hrs.)**

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

Books:

- “Fundamentals of Data Structures”, Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.
- Algorithms, Data Structures, and Problem Solving with C++”, Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
- “How to Solve it by Computer”, 2nd Impression by R.G. Dromey, Pearson Education.

3rd Semester	RCS3C202	Data Structure Lab.	L-T-P 0-0-3	2 CREDITS
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Laboratory Experiments

Course Objective: The objective is to develop linear and non-linear data structure, express different operation on AVL tree, evaluate infix to postfix expression, and apply searching and sorting algorithms in real life applications.

1. (a) Write a C Program to create a stack using an array and perform – i) Push operation, ii) Pop operation (b) Write a C Program to create a queue and perform – i) Push, ii) Pop, iii) Traversal
2. Write a C Program that uses Stack Operations to perform the following:- i) Converting an infix expression into postfix expression ii) Evaluating the postfix expression
3. (a) Write a C Program that uses functions to perform the following operations on a single linked list : i) Creation, ii) Insertion, iii) Deletion, iv) Traversal (b) Write a C Program that uses functions to perform the following operations on a double linked list: i) Creation, ii) Insertion, iii) Deletion
4. Write a C Program that uses functions to perform the following operations on a Binary Tree : i) Creation, ii) Insertion, iii) Deletion
5. Write a C Program to construct an AVL-Tree and delete the selective nodes.
6. C Programs on : i) Bubble sort, ii) Selection sort, iii) Insertion sort, iv) Quick sort, v) Radix sort vi) Heap sort, vii) 2 Way Merge Sort
7. C Programs on : i) Sequential Search, ii) Binary Search

Course Outcome:

- CO1: Develop linear and non-linear data structure
- CO2: Express different operation on AVL tree
- CO3: Evaluate infix to postfix expression
- CO4: Apply searching and sorting algorithms in real life applications

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3rd Semester	RES3F001	ENVIORMENT SCIENCE	L-T-P 3-0-0	0 CREDIT
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We as human being are not an entity separate from the environment around us rather we are a constituent seamlessly integrated and co-exist with the environment around us. We are not an entity so separate from the environment that we can think of mastering and controlling it rather we must understand that each and every action of ours reflects on the environment and vice versa. Ancient wisdom drawn from Vedas about environment and its sustenance reflects these ethos. There is a direct application of this wisdom even in modern times. Idea of an activity based course on environment protection is to sensitize the students on the above issues through following two type of activities.

(a) Awareness Activities:

- i) Small group meetings about water management, promotion of recycle use, generation of less waste, avoiding electricity waste
- ii) Slogan making event
- iii) Poster making event
- iv) Cycle rally
- v) Lectures from experts

(b) Actual Activities:

- i) Plantation
- ii) Gifting a tree to see its full growth
- iii) Cleanliness drive
- iv) Drive for segregation of waste
- v) To live some big environmentalist for a week or so to understand his work
- vi) To work in kitchen garden for mess
- vii) To know about the different varieties of plants
- viii) Shutting down the fans and ACs of the campus for an hour or so

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