ANNEXURE 5

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01EN1101

Subject Name: Basics of Environmental Studies

B. Tech. Year – I

Objective: Students should gain basic understanding of Environment and environmental issues.

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

1. Understand and realize the multidisciplinary nature of Environment & its components.
2. Know the importance of natural resources for the sustainable development of life.
3. Understand the effect of growing population on the Environment.
4. Classify the different types of pollution and measure to control pollution
5. Learn about the Environmental issues faced globally and various steps taken globally to solvesuch Environmental issues.

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
2	0	0	0	50	30	20	00	00	100

Contents:

Unit	Topics	Contact Hours
1	**Introduction and Ecology** Introduction to Environment, Ecology – scope and classifications, Ecosystem - Concept and types, Environmental degradation, Impact of humans on environment, role of environmental education	6
2	**Population and Environment** Factors Affecting Human Settlement, Define Over Population & Explain the Cause, Effect on Environment & Control of it, Methods of Population forecasting	5
3	**Environmental Resources** Forest resources, Energy resources, Water Resources and Land Resources	6
4	**Environmental Pollution** Water pollution, Air & Noise Pollution, Environmental sinks, solid and hazardous waste, E-waste & Biomedical waste, Introduction to Green chemistry	6

5	**Global Environmental Issues** Greenhouse Effect, Global warming, ozone layer depletion, Climate change, Acid Rain, Global Efforts to control issues	3
6	**Governmental bodies for Environmental protection**	2
	Total Hours	28

Suggested Text books / Reference books:

1. Basics of Environmental Studies by U K Khare, 2011 Published by Tata McGraw Hill
2. Environmental Science A Global Concern by William P. Cunningham and Mary Ann CunninghamPublished by Tata Mc Graw Hill

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves asguidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
40%	30%	20%	10%	-	-

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in thelaboratory and class-room.
3. Students will use supplementary resources such as online videos, NPTEL videos, e-courses,Virtual Laboratory

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01CT0101

Subject Name: Introduction to Computer Programming

B. Tech. Year – I (Semester I)

Objective:

In this basic course, we will move through a number of introductory C concepts, such as basic syntax, looping, arrays, pointers, and elementary functions and data types. The course will also aim to stimulate students into thinking like programmers and provide an understanding of programming techniques that reaches beyond familiarity and basic fluency with the C programming language.

Credits Earned: 04 Credits

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

1. Understand Flowchart, Algorithms and Pseudocode that helps to develop logical base of any problem statement
2. Understand the usage of different primitive, derived and user defined datatypes
3. Analyse the use of different conditional and looping control statements in a complex problem
4. Apply the knowledge of decisional control statements to deal with pre-processors, macros, pointers and file management to enhance the coding skills.
5. Apply overall programming knowledge that brings the solution of real-world problems/ use cases

Pre-requisite of course: NA

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
03	00	02	04	50	30	20	25	25	150

Contents:

Unit	Topics	Hours
1	**Introduction to c language** Pseudo code solution to problem, problem solving using flowchart and algorithm, Basic concepts in a C program, Structure of 'C' program, statements, Data Types, operators and expressions, Type Conversion and Type Casting, Programming examples and exercises	06
2	**Branching and looping** Two-way selection (if, if-else, nested if-else, cascaded if-else), switch statement, ternary operator? Go to, Loops (For, while-do, do-while) in C, break and continue, Programming examples and exercises	06
3	**Arrays and strings** ARRAYS AND STRINGS: Using an array, Using arrays with Functions, Multi-Dimensional arrays. String: Declaring, Initializing, Printing, and reading strings, string manipulation functions, String input and output functions, array of strings, Programming examples and Exercises.	06
4	**Functions & pointers** FUNCTIONS: Functions in C, Argument Passing – call by value, call by reference, Functions and program structure, location of functions, void, and parameter less Functions, Recursion, Programming examples and exercises. POINTERS: Introduction to Pointers, Pointers as Function Parameter, Pointer, Arithmetic, Pointers and Arrays, Function Pointers, Programming examples and exercises.	07
5	**Structure, union & file management** STRUCTURE: Need of Structure, Basic of structures, structure declaration and definition, structures and Functions, Array of structures, structure Data types, type definition, UNION: Union declaration and definition, structure vs union, FILE MANAGEMENT: Introduction to file management and its functions, opening and closing of files, Input and output operations, Programming examples and exercises.	08
6	**Pointers and preprocessors & data structures** Pointers and address, pointers and functions (call by reference) arguments, pointers and arrays, address arithmetic, character pointer and functions, pointers to pointer, Initialization of pointer arrays, Dynamic memory allocations methods, Introduction to Preprocessors, compiler control Directives, Programming examples and exercises. Introduction to Data Structures: Primitive and non-primitive data types, Abstract data types, Definition and applications of Stacks, Queues, Linked Lists and Trees.	09
	Total Hours	**42**

Suggested Text books / Reference books:

1. Paul Deitel, Harvey Deitel, C How to Program, Pearson, 7th edition
2. Pradip Dey & Manas Ghosh, Programming in C, Oxford Publication, 2nd edition
3. Ritchie Dennis M, Kernighan Brain W, C: Programming Language, Prentice Hall Of India Private limited, 2nd edition
4. E. Balagurusamy, Programming in ANSI C, Tata Mcgraw-Hill Publishing Com. Ltd., 7th edition
5. Yashavant P. Kanetkar, Let Us C, BPB Publications, 10th edition
6. E.V. Kameshwar, Numerical techniques in C, BPB Publications
7. Schildt, Herbert, The Complete Reference C, Tata Mcgraw-Hill Publishing Com. Ltd., 4th edition

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
10%	15%	30%	15%	15%	15%

Suggested List of Experiments:

Minimum 12 experiments to be performed during the semester

1. Write a program to print student detail.
2. Write a program to calculate simple interest.
3. Write a program that accepts centigrade and convert it into Fahrenheit.
4. Write a program that accepts two numbers in A and B interchange value of A and B variable.
5. Write a program to demonstrate the use of the basic data types int, char and float.
6. Write a program to demonstrate the use of Arithmetic operators by getting two numbers from the user
7. Write a program that accepts a number from keyboard and find weather the number is ODD or EVEN using Conditional operators.
8. Write a program to demonstrate the use of increment and decrement operator.
9. Write a program to demonstrate the use of shorthand operators.
10. Write a program to demonstrate the use of sizeof() of operator.
11. Write a program to demonstrate the use of bitwise operators.
12. Write a program that accepts three numbers from the user and print maximum of them.
13. Demonstrate the use of GOTO statement.

14. Write a program to input the Name and the Salary of an Employee. Calculate and print the Name, Salary and Bonus of the Employee, where bonus= 5.3% if salary is at least Rs. 10,000 and 6.5% otherwise.
15. Admission to professional course is subject to the following conditions. Marks in Mathematics>=60
16. Marks in Physics>=50 Marks in Chemistry>=40
17. Total in all three subjects>=200 or total in mathematics and physics>=150
18. Given the marks in the three subjects, write a program to process the application to list the eligible candidates.
19. Write a program that accepts two numbers and one code (1,2,3,4) from the user. According to the code, the operations to be performed, using switch case statements as follows: (Code: 1→ Addition, 2→ Subtraction, 3→ Multiplication, 4→ Division).
20. Write a program that reads the marks for five subjects of a student. Calculate and print the grade for the student [i.e. Grade A, B, C, D and F] using Else-If ladder.
21. Write a program that do sum=1+3+5+……. N terms Print value of Sum.
22. Write a program to print the Fibonacci Series [i.e. 1,1,2,3,5,8,13…N terms].
23. Write a program to accept one number from the user.
24. Display reverse of that number.
25. Find if it is Armstrong or not.
26. Write a program that accepts a number from the user and print prime numbers from 0 to that number.
27. Write a C program to display various Patterns.
28. Write a program to accept 5 numbers in an array and display it.
29. Write a program to accept 9 numbers in form of matrix and display in matrix form.
30. Write a program to accept 5 numbers in array and find maximum and minimum value of it.
31. Write a program to accept 5 numbers in array and find maximum and minimum value of it.
32. Write a program to sort all elements of 1-D array in ascending and descending order.
33. Write a program to calculate and display addition of two matrix.
34. Write a program to count number of vowels in a given string.
35. Write a program to check whether entered string is palindrome or not.
36. Write a program for string concatenation without using library function.
37. Write a program to demonstrate the Library function for string.
38. Write a function which receives number as argument and return sum of digit.
39. Write a program for calculating Fibonacci series using UDF and call by value
40. Write a program to calculate Factorial using recursion in UDF.
41. Write a program to find Average, maximum and minimum of Array elements using UDF.
42. Write a program to calculate total number of positive, negative and zero value in array using UDF.
43. Write a program to swap two numbers using UDF and pointer.
44. Write a program using pointer to read in an array of integers and print its elements in reverse

order.

45. Write a C program to create a structure of employees with Full Name, Last Name, City and Salary. Display it for n employees.
46. Write a program to demonstrate nested structure. (make structures for circle and rectangle)
47. Write a program to create array of structure. Make a structure for student having student_no, student_name, student_marks.

48. Write a program to create union cricketer having player_name, batting_avg, player_age.P for swapping of two values with help of UDF and call by reference.

49. Write a program to Display contents of a file on screen. Use functions (fopen,fclose, getc,putchar,eof)

50. Write a program to count number of characters in a file.

Supplementary Resources:

1. http://nptel.ac.in/courses/106105085/4
2. http://nptel.ac.in/courses/106104128
3. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087- practical-programming-in-c-january-iap-20

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01EC0101

Subject Name: Basics of Electronics Engineering

B. Tech. Year – I (Semester I)

Objective: After completion of this course, student will be able to:

1. Understand operation of semiconductor devices & Operational Amplifier
2. Understand DC analysis and AC models of semiconductor devices.
3. Apply concepts for the design of Regulators and Amplifiers
4. Verify the theoretical concepts through simulation sessions
5. Implement and analyze the mini projects based on concept of electronics circuit concepts

Credits Earned: 04 Credits

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

1. Understand the Voltage current and operation of semiconductor devices, circuits, and operational Amplifier
2. Apply basic fundamentals of semiconductor devices and operational amplifier to illustrate/show the operation of application
3. Apply the basic knowledge of simulation tool & Circuit level concepts to synthesize real life problems
4. Analyze the behaviour of Electronics circuits containing Semiconductor device, Operational Amplifier or Verify using Modern tools
5. Design, implement and analyse of electronic circuits to solve the problem with in society

Pre-requisite of course: NA

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
03	00	02	04	50	30	20	25	25	150

Content

Unit	Topics	Hours
1	**Fundamentals of Semiconductor Material** Energy Band Diagram of conductor, semiconductor, and insulator; Bhor Atomic Model for Atom, Crystal Structure of Semiconductor Materials, Intrinsic and Extrinsic Semiconductor Materials	04
2	**Semiconductor Diodes** Symbol and Construction, Operating Characteristics in Forward and Reverse Bias, Applications of Diode as Switch, Clipper, Clamper and Rectifier; Special Diode, Seven Segment Display; Other Diodes like Varactor Diode, Schottky Diode, PIN Diode, Tunnel Diode, Step Recovery Diode	06
3	**Bipolar Junction Transistor (BJT)** History of BJT invention; Types, Symbol, and Construction of BJT; Basic Operation of BJT; BJT Configurations: Common Base, Common Emitter, Common Collector with Operation, Input/output Characteristics; Applications of Transistors as Switch and Amplifier.	06
4	**BJT Biasing** DC Operating Point, Fixed (Base) Biasing, Emitter Biasing, Voltage Divider Bias, Emitter Feedback Bias, Collector Feedback Bias, Collector and Emitter Feedback Bias.	07
5	**Field Effect Transistor** Types, Symbol, Construction, Operation, Input/output Characteristics and Applications of Junction Filed Effect Transistor (JFET), Metal Filed Effect Transistor (MOSFET)	06
6	**Operational Amplifiers** Introduction to OpAmp, Differential and Common Mode Operation, OpAmp Basics, Practical OpAmp Circuits, OpAmp Applications as Summer, Integrator and Differentiator.	07
7	**Basic of Organic Electronics** Introduction, Types of Organic Materials, Organic Electronic Devices, Applications	06
	Total Hours	42

Suggested Text books / Reference books:

1. Albert Malvino and David Bates, “Electronics Principles” Tata McGraw-Hill, 7th Edition, 2006.
2. Robert Boylestad and Louis Nashelsky, “Electronic Devices and Circuit Theory”, Pearson Education, 10th Edition, 2009.
3. Hagen Klauk “Organic Electronics: Materials, Manufacturing, and Applications”, WILEY – VCH, 2006, ISBN: 978-3-527-31264-1
4. Thomas L. Floyd, “Electronics Devices: Conventional Current Version”, Pearson Education, 7th Edition, 2008.
5. S Salivahanan and N Suresh Kumar, “Electronics Device and Circuits” Tata McGraw-Hill Education Private Limited, 2nd Edition, 2008.
6. Jacob Milman and Christos C. Halkias, “Electronics Device and Circuits,” Tata McGraw-Hill, 3rd Edition, 2008.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	20%	30%	15%	10%	5%

Suggested List of Experiments:

Minimum 12 experiments to be performed during the semester

1. To study and perform the V-I characteristic of Silicon Diode and Zener Diode.
2. To use the Zener Diode as voltage regulator.
3. To use silicon Diode as a Clipper and Clamper.
4. To analyze the Half Wave, Full Wave and Bridge Rectifiers.
5. To study and perform the Input and Output characteristic of BJT.
6. To use Transistor as a Switch.
7. To Analyze CE, CB and CC Amplifier Circuit.
8. To measure the variation of current gain with variation in temperature for different biasing of a transistor.
9. To study and perform the Input and Output characteristic of FET.
10. To study and perform the Input and Output characteristic of MOSFET.
11. To Study and Perform the Common mode and Differential mode of operation for OpAmp.
12. To use OpAmp as summer, Integrator and Differentiator.
13. To test the performance of negative feedback amplifier and compare gain, BW with and without feedback.
14. To Study and Perform Wien Bridge Oscillator.
15. To Analyze Voltage Regulator by using Integrated Circuit.
16. Design a full wave bridge rectifier for input 50 Hz 10Vp-p AC signal and expected output of 5 V DC signal.
17. Design a regulated power supply using Zener diode for input variation of 10 to 20 Vp-p.
18. A silicon diode has a reverse current of 5 μA at 25°C and 100 μA at 100°C. What are the values of the saturation current and the surface-leakage current at 25°C?
19. Demonstrate Automatic Street light control system using LED.
20. Design a +5 to +25 V variable power supply.

Supplementary Resources:

1. http://textofvideo.nptel.iitm.ac.in/video.php?courseId=117103063
2. https://www.coursera.org/course/eefunlab
3. https://www.coursera.org/course/introtoelectronics
4. https://www.edx.org/course/circuits-electronics-1-basic-circuit-mitx-6-002-1x
5. http://www.learnabout-electronics.org
6. http://www.electronics-tutorials.ws
7. http://101science.com/Radio.htm
8. http://www.electronicsandyou.com

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01MA2101

Subject Name: Differential and Integral Calculus

B. Tech. Year – I (Semester I)

Objective:

This paper aims to provide an essential background of differential and integral calculus to students of science and engineering courses at graduate level. A good science or engineering graduate is expected to have a sound knowledge of these two areas of mathematics as Differential and integral calculus are essential tools for learning Technology, Engineering and Sciences.

Credits Earned: 05 Credits

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

1. Expand functions using Maclaurin's and Taylor's series.
2. Apply and solve first order differential equations to real life problems
3. Verify Euler's theorem and Modified Euler's theorem for given function of several variable
4. Apply Multiple Integral to evaluate the Surface Area and Volume of any 3D objects
5. Apply the concepts of convergence and divergence of infinite series in problem of science, technology and engineering.
6. Apply the method of Lagrange's multiplier to solve the problems of constrained optimization.

Pre-requisite of course: NA

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
04	02	00	05	50	30	20	25	25	150

Contents:

Unit	Topics	Hours
1	**Infinite Series** Concept of sequence, nature of infinite series, Properties for convergence, geometric series, Tests for convergence of positive term series	10
2	**Expansion of functions** Concept of Expansion of functions, Taylor's series expansion, Maclaurin's series expansion	07
3	**Ordinary Differential Equations** Reorientation, order and degree, Variable separable method, Linear differential equations, Bernoulli's and Exact differential equations	10
4	**Partial differentiation** Partial derivatives, Euler's theorem, Modified Euler's theorem and their applications, Implicit functions, Chain rule, Total differentials	08
5	**Applications of Partial differentiation** Errors and approximations, Tangent plane and normal line to a surface, Constrained optimization using Lagrange's multiplier, Jacobian.	07
6	**Multiple Integrals** Calculation of double and triple integrals, reverse the order of integration, Change into polar, spherical and cylindrical coordinates	10
	Total Hours	52

Suggested Text books / Reference books:

1. M. D. Weir et al: Thomas' Calculus, 11th Ed., Pearson Eduaction, 2008.
2. Stewart James: Calculus Early Transcendental, 5th Ed., Thomson India, 2007
3. Wylie & Barrett: Advanced Engineering Mathematics, Mc graw Hill pub.
4. Greenberg M D: Advanced Engineering Mathematics, 2nd ed., Pearson
5. B.S.Grewal: Higher Engineering Mathematics, 43rd ed., Khanna publishers
6. Erwin Kreyszig , Advanced Engineering Mathematics, 9/e, JOHN WILEY & SONS, INC
7. H. K. Dass, Advanced Engineering Mathematics, S Chand Publishing..

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	20%	30%	15%	10%	5%

Supplementary Resources:

1. http://mathworld.wolfram.com/
2. http://en.wikipedia.org/wiki/Mat

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01SL0102

Subject Name: Reading and Writing for Technology

B. Tech. Year – I (Semester I)

Objective:

This course offers an orientation towards reading and writing in technical contexts. It aims at helping learners in acquiring reading and writing ability in English to foster their learning in the specified domain i.e. technology. It engages students through various activities to learn techniques and approaches of reading and writing skills.

Credits Earned: 02 Credits

Pre-requisite of course: NA

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

1. To enhance reading skills for academic purposes
2. To evolve appropriate writing competence for academic purposes
3. To carry out reading and writing tasks in the context of technology and technology related content
4. To express their ideas in formal, academic written form

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
02	00	00	02	00	30	20	25	25	100

Contents:

Unit	Topics	Hours
1	**Introduction to Technical Communication** History/ Story of Technical Writing, English in Technical Communication	03
2	**Reading Strategies** Know your textbook: Exploring the textbook, its parts and purposes, approaching reading: Reading Strategies, Reading for Various Purposes: reference books, stories, articles, technical surveys, reports, blog posts, & reviews	12
3	**Writing Strategies** Understanding the writing process: Thinking about writing processes, key Attributes of academic and technical texts, Writing process - Visualizing your text Approaching Writing: Writing Strategies, Understanding various forms of writing: essay, case study, research paper, term paper, maths/physics problems, lab report, book report/review, surveys, blog posts, & dissertation, Writing for various purposes: essays, writing answers in exam, lab reports, process and instructions, reviews, blog post, & assignments	13
	Total Hours	28

Suggested Text books / Reference books:

1. Tavia, Yasmin. "Story of Technical Writing." *YouTube*, 28 March 2016, https://www.youtube.com/watch?v=QomPdtnZa4k. Accessed 30 June 2017.

2. AbodeTCS. "Future of TechComm." *YouTube*, 16 July 2012, https://www.youtube.com/watch?v=dSdhnyDF0YY. Accessed 30 June 2017.

3. Lowe, Janet. *Google Speaks: Secrets of World's Greatest Billionaire Entrepreneurs, Sergey Brin and Larry Page*. John Wiley & Sons, 2009.

4. Howard, Nicole. *The Life Story of a Technology*. Greenwood Press, 2005.
"Engineering Stories." Engineering Stories, 2017, https://engineerstories.com/. Accessed 30 June 2017.

5. "10 Breakthrough Technologies 2017." MIT Technology Review, 2017, https://www.technologyreview.com/lists/technologies/2017/. Accessed 30 June 2017.

6. High, Peter. "Top 10 Technology Stories of 2016." Forbes, 4 Jan. 2017, https://www.forbes.com/sites/peterhigh/2017/01/04/top-ten-technology-stories-of-2016/2/#2d72b2be9de7. Accessed 30 June 2017.

8. Teaching and Learning Resources for Me. "Understanding the Purpose of Different Types of Texts." YouTube, 12 Sept. 2015, https://www.youtube.com/watch?v=lZtxWTk7tpk. Accessed 30 June 2017.

9. Galloway, Bek. “Purposes and Text Types.” YouTube, 30 Sept. 2016,
10. https://www.youtube.com/watch?v=-LULx42tOA4&t=34s . Accessed 4 July 2017.

Suggested Theory distribution:

The suggested theory distribution as per Bloom’s taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
30%	30%	30%	10%	0%	0%

Supplementary Resources:

1. Kane, Thomas S. The Oxford Essential Guide to Writing. Berkeley, 2000
2. Anderson, P. Technical Communication. Harcourt Brace, 1998.
3. Cox, Kathy, and David Hill. Eap Now!: English for Academic Purposes. Pearson Australia, 2011.
4. Doren, Charles Van, and Mortimer J. Adler. How to Read a Book. Washington Square Press, 1974.
5. Emden, Joan Van. Writing for Engineers. Palgrave Macmillan, 2005.
6. Glendinning, Eric H., and Beverly Holmström. Study Reading: A Course in Reading Skills for Academic Purposes. Cambridge University Press, 2012.
7. Hamp-Lyons, Liz, and Ben Heasley. Study Writing: A Course in Writing Skills for Academic Purposes. Cambridge University Press, 2013.
8. Langan, John, and Judith Nadell. Doing Well in College: A Concise Guide to Reading, Writing, and Study skills. McGraw-Hill Book Col., 1980.
9. Vise, David A., and Mark Malseed. The Google Story. Bantam Dell, 2008.

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01SL0103

Subject Name: Speaking and Presentation Skills

B. Tech. Year – I (Semester I)

Objective:

The course intends to make students confident in speaking in English with the help of various language functions. It also focuses on developing students' presentation skills.

Credits Earned: 02 Credits

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

1. Develop speaking competence for academic purpose
2. Speak on a given topic in the context of technology
3. Express ideas in an organized way for conversations and interactions related to academic requirements
4. Enhance the ability to make a presentation on a given topic

Pre-requisite of course: NA

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
02	00	00	02	00	30	20	25	25	100

Contents:

Unit	Topics	Hours
1	**Speaking/Interacting in an Academic Context** Greetings, introducing self and peers, Asking and sharing information, expressing points of view, Discussions, facing viva voce, Group discussions, Facing an interview (interview skills)	12
2	**Effective Presentation Skills** Introduction to effective presentation skills, Preparing the presentation (Collection of Data/Information, exploring the topic etc.), Using ICT for the presentation, getting ready for the presentation, Effective body language, Effective pronunciation, Interacting with the audience (Q & A), Practice (with video recording), Feedback and Suggestions	16
	Total Hours	28

Suggested Text books / Reference books:

1. TED Talks
2. INK Talks
3. Toastmasters Videos
4. Courtroom Dramas

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
10%	30%	30%	30%	0%	0%

Supplementary Resources:

1. "Communication." themuse. 2017. https://www.themuse.com/tags/communication. Accessed 4 July 2017.
2. Presentation Magazine. 2017. https://www.presentationmagazine.com/. Accessed 4 July 2017.
3. "Presentation Skills." SKIlIS YOU NEED. 2017. https://www.skillsyouneed.com/presentation-skills.html. Accessed 4 July 2017.
4. Siddons Suzy. The Complete Presentation Skills Handbook. Kogan Page, 2008.
5. Sprague Jo, and Douglas Stuart. The Speaker's Handbook. 8th ed., Thomson Wadsworth, 2008.

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01CT1103

Subject Name: Foundation skills in sensor interfacing

B. Tech. Year – I (Semester I)

Objective:

After completion of this course, student will be able to:

1. To stimulate students programming and debugging abilities
2. To improve the logical ability
3. To design programs using open-source integrated development environments and programmable microcontroller-based boards
4. To interface various sensors and modules like IR, ultrasonic, temperature, humidity, etc.
5. To control various actuators and electronics devices
6. To implement data transfer using various protocols like Bluetooth, Wi-Fi, GSM, etc.

Credits Earned: 02 Credit

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

1. Understand application-based programming concept
2. To create programmes for various open-source programmable boards
3. To develop programmes for specific requirements with interfacing of various components and modules
4. To develop hardware and software interfacing for engineering applications

Pre-requisite of course: NA

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
00	00	04	02	00	30	20	25	25	100

Contents:

Unit	Topics	Hours
1	**Open source boards and IDE** Overview, various boards, hardware specifications, components and various pins, gui of ide, installation of ide, combination of software and hardware, connection with hardware and libraries	04
2	**Programming using IDE** Program structure, data types, variables, constants, operators, control statements, loops, functions, arrays, strings	08
3	**Function libraries** Input and output functions, character functions, math functions, tone generation, communication protocols and trigonometric functions	04
4	**Sensors and its interfacing with hardware board** Sensors and its classification, analog and digital sensors, active and passive sensors, application specific sensors, working principle of various sensors, interfacing of various sensors with Arduino board.	12
5	**Actuators** Actuators and its classification, types of motion actuators, types of energy actuators, application specific actuators, working principle of various actuators, interfacing of various actuators with Arduino board.	06
6	**Communication protocols** Wired and Wireless communication protocols, Working principle of various protocols like UART, I2C, SPI, Bluetooth, ZigBee and it's interfacing with Arduino Board, GSM module working and it's interfacing with Arduino board	12
7	**Project Implementation** Designing, developing, coding of electronic projects by making use of sensors, actuators and Arduino to solve the real world problems, troubleshooting and debugging skills to implement the project	06
	Total Hours	52

Suggested Text books / Reference books:

1. Massimo Banzi, "Getting Started with Arduino", O'Reilly Media, September 2011: Second Edition
2. Michael Margolis, "Arduino Cookbook", O'Reilly Media, March 2011, First Edition
3. Rui Santos and Sara Santos, "Arduino For Beginners"
4. Alan G. Smith, "Intro Arduino Book A piece of cake!"

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching- learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
10%	10%	30%	20%	10%	20%

Suggested List of Experiments:

Minimum 12 experiments to be performed during the semester

1. Introduction to open source boards and programing IDEs
2. Various pins available on boards and it's functionally
3. Basic programming to interface LEDs and switches
4. Data types and variables, interfacing of LCD Display
5. Interfacing buzzer with Arduino Board
6. Operators and control statement, Interfacing of Temperature and Humidity sensors
7. Interfacing Pressure sensor with Arduino board
8. Programming using Time, Loops and Functions, Interfacing Ultrasonic sensor for distance measurement
9. Burglar Alarm using PIR motion sensor.
10. Darkness detector using LDR sensor.
11. Arduino-based line follower robot.
12. Fire Alarm System using the Flame sensor.
13. Interfacing force sensor with Arduino board.
14. Health Monitoring System using SpO2 sensor
15. Protecting the electronic circuits by current sensing in low-power equipment using the current sensor.
16. Smart watering plant system using soil moisture sensor.
17. Rain Detection System for the sprinkler system using Arduino and Rain sensor.
18. Gas leakage detection using an MQ2 sensor.
19. Use of Strings and arrays in programming
20. Function Libraries installation and use
21. High voltage applications and controlling, Interfacing of DC Motors
22. Speed and intensity control using PWM
23. IR transmitters and receivers applications
24. Robotics application design using servo motor interfacing
25. Interfacing Bluetooth module with Arduino board.
26. Interfacing GSM/GPRS module with Arduino board
27. Interfacing Wi-Fi module with Arduino board.
28. Communication between Arduino and Raspberry Pi via UART protocols.
29. Communication with 2 Arduinos via SPI protocols.
30. Mini Project

Supplementary Resources:

1. https://www.arduino.cc/en/Main/Education
2. https://www.tutorialspoint.com/arduino
3. http://tronixstuff.com/tutorials
4. https://www.arduino.cc/en/Guide/HomePage
5. https://startingelectronics.org/software/arduino/learn-to-program-course

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01GS0103

Subject Name: Indian Constitution

B. Tech. Year – I (Semester I)

Objective of the Course:

- To Enhance human values, create awareness about law enactment and importance of Constitution
- To create awareness of their Surroundings, Society, Social problems and their suitable solutions while keeping rights and duties of the citizen keeping in mind.

Students learning outcomes:

After successful completion of the course, it is expected that student will be able to,

1. Understand the Fundamental Rights and Fundamental Duties of the Indian Citizen to instill morality, social values, honesty, dignity of life and their social Responsibilities.
2. Understand the National Emergency, Financial Emergency,
3. and their impact on Economy of the country.
4. Understand the distribution of powers and functions of judiciary system.
5. Understand the distribution of powers and functions of major functionaries systems of constitution in India.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term Work (TW)	
01	00	00	00	00	00	00	00	00	00

Detailed Syllabus

Sr No.	Title of the unit	Number of hours
1	**Framing of the Constitution and Major Features**	**04**
	Meaning and Importance of Constitution, Making of Indian Constitution, Constituent Assembly at Work, Preamble and Salient Features, Citizenship, Fundamental Rights, Directive Principles of State Policy, Fundamental Duties, Right to Equality under Article – 14, Right to certain Freedom under Article 19, Scope of the Right to Life and Personal Liberty under Article 21	
2	**Union and State Legislatures**	**04**
	Functions and Responsibilities of Union and states, Composition, Powers and Functions; Presiding Officers, Law Making Process, Committees of Parliament, Decline of Legislatures, Reforms, Issues and challenges pertaining to the federal structure.	

3	**Judiciary**	**04**
	Supreme Court and High Courts – Composition, Jurisdiction and Functions; Judicial Activism, Powers and Procedure for Amendments in Indian Constitution, Emergency Provisions - National Emergency, President Rule, Financial Emergency	
4	**Major Functionaries**	**03**
	Union Public Service Commission, Election Commission, Planning Commission (NITI), Lok Sabha and Rajya Sabha (Composition, Power and Function), President and Prime Minister (Power, Functions and Positions), Governor, Chief Minister and Council of Ministers (Powers and Functions)	
	Total	**15**

Reference Books:

1. Constitutional Law of India, Dr. J.N. Pandey, Central Law Agency
2. Introduction to the Consitution of India, Durga Das Basu, LexisNexis.
3. Indian Constitutional Law, M.P. Jain, LexisNexis
4. V.N.Shukla's Constitution of India, Mahndra Pal Singh, Eastern Book Company
5. Constitutional Law – I Structure, Udai Raj Rai, Eastern Book Company

Appendix "A"

BROAD COURSE DESIGN FOR NCC GENERAL ELECTIVE CREDIT COURSE

NCC GENERAL ELECTIVE CREDIT COURSE DESIGN SUMMARY					
Semester	Credits Allocated			Total	Remarks
	Theory	Practical	Camp		
Semester - I	1	1		2	
Semester - II	1	1		2	
Semester – III	1	1	5	7	Credits of 1st Camp merged with 3rdSem
Semester – IV	2	1		3	
Semester – V	1	1	5	7	Credits of 2nd Camp merged with 5thSem
Semester - VI	2	1		3	
Total	08	6	10	24	Twenty-Four Credits

INSTITUTIONAL TRAINING SYLLABUS

COMMON SUBJECTS				
S no.	Subject	Periods (1 hour duration each)		
		Lectures/Tutorials	Practicals	Total
1.	NCC General	06	-	06
2.	National Integration	04		04
3.	Drill	-	45	45
4.	Weapon Training	-	25	25
5.	Personality Development	25		25
6.	Leadership	12	-	12
7.	Disaster Management	13		13
8.	Social Service & Community Development	08	39	47
9.	Health & Hygiene	-	10	10
10	Adventure	01		01
11	Environmental awareness & conservation	03		03
12.	Obstacle Training	-	09	09
13.	General Awareness	04		04
14.	Border & Coastal Areas	06		06
		82	**128**	**210**
SPECIALZED SUBJECTS (ARMY)				
1.	Armed Forces	09	-	09
2	Map Reading	-	24	24
3	Communications	03	03	06
4	Infantry Weapons	03	03	06
5.	Field Craft & Battle Craft		22	22
6	Military History	23	-	23
TOTAL HOURS SPECIALISED SUBJECTS		**38**	**52**	**90**
GRAND TOTAL HOURS (TOTAL CREDITS)		120 (08 cr)* *15 HOUR THEORY = 1 CREDIT POINT	180 (6 cr)** **30 HOURS PRACTICAL TRAINING = 1 CREDIT POINT	**300**

SEMSTER WISE DISTRIBUTION OF NCC SYLLABUS FOR THEORY

S. NO.	SUBJECT	SEMESTER						TOTAL
		I	II	III	IV	V	VI	
1	NCC General	6	-	-	-	-	-	6
2	National Integration and Awareness	4	-	-	-	-	-	4
3	Personality Development	2	5	5	4	6	3	25
4	Leadership	-	5	4	3	-	-	12
5	Disaster Management	-	-	3	10	-	-	13
6	Social Service and Community Development	3	5	-	-	-	-	8
7	Adventure	-	-	1	-	-	-	1
8	Environmental awareness & conservation	-	-	-	3	-	-	3
9	General Awareness	-	-	-	4	-	-	4
10	Border & Coastal Areas	-	-	2	-	2	2	6
11	Armed Forces	-	-	-	6	-	3	9
12	Infantry Weapons	-	-	-	-	3	-	3
13	Communication	-	-	-	-	-	3	3
14	Military History	-	-	-	-	4	19	23
	Total Periods	15	15	15	30	15	30	120
	Total Credit Points	1	1	1	2	1	2	08

SEMSTER WISE DISTRIBUTION OF NCC SYLLABUS FOR PRACTICAL

S. NO.	SUBJECT	SEMESTER						TOTAL
		I	II	III	IV	V	VI	
1.	Drill	12	12	8	7	3	3	45
2.	Field Craft & Battle Craft	3	4	4	4	4	3	22
3	Map Reading	3	5	4	4	4	4	24
4	Weapon Training	5	4	4	4	4	4	25
5	Communication	-	-	-	-	-	3	03
6	Infantry Weapons	-	-	-	-	-	3	03
7	Social Service and Community Development	7	5	5	6	5	10	38
8	Health & Hygiene	-	-	-	5	5	-	10
9	Obstacle Training	-	-	5	-	5	0	10
10	Total Periods	30	30	30	30	30	30	180
	Total Credit Points	1	1	1	1	1	1	6

NCC CAMP TRAINING SYLLABUS

COMMON SUBJECTS				
S No.	**Subjects**	**Periods**		**Total**
		L/T	P	
1.	Physical Training	-	18	18
2.	Drill	-	32	32
3.	Weapon Training	08	28	32
4.	National Integration and Awareness	08	-	04
5.	Personality Development	08	12	20
6.	Leadership	08	-	04
7.	Disaster Management	08	-	04
8.	Social Service and Community Development	-	08	08
9.	Health & Hygiene	08		04
10.	Obstacle Training	-	04	04
11.	Military History	04	-	-
12.	Communication	04	-	-
13.	Games	-	18	18
14.	Culture	-	18	18
15.	Spare	-	04	04
	TOTAL	**56**	**142**	**170**
SPECIALISED SUBJECTS				
1.	Map Reading			
2.	Infantry Weapons	04	24	24
3.	Field Craft & Battle Craft		02	04
	TOTAL	04	12	12
		60(4 cr)	**180(6 cr)**	**240(10 cr)**

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01CR1103

Subject Name: Value Education

B. Tech Year – I (Semester II , 1st year) (Level - 1)

Branch: All

Objective: This course shall enrich students' value system, creativity, competence and confidence. It will enhance the softer aspects of life skills of students through the games, activities, group interactions and videos.

Credits Earned: 0 Credit

Course Outcomes: After successful completion of this course, student will be able to

1. Understand importance of role of Values in developing self
2. Inculcate right values, ethics, attitudes, manners and behaviours for life
3. Respond and relate with expectations, competitions and power of networking
4. Contribute in building a healthy nation

Pre-requisite of course: Basic knowledge of English language

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	Mid Sem (M)	Internal (I)	Viva (V)	Term work (TW = CCE)	
2	0	0	0	00	00	00	50	50	100

Contents:

Unit	Topics	Hours
1	Experiencing worth of important personality attributes i.e Taking Initiatives, Thinking on the feet etc through Games	2
2	Values of Honesty and Integrity as corner stone in one's career and Life. Experiencing incidence and case studies related to Honesty, Integrity and Human Values in work set up.	2

3	Value of Creativity in one's career and Life Building an attitude of creativity, thinking out of the box and inculcate virtue of exploration and innovation in various aspects of life.	2
4	Values to self-sustenance in difficult times and failures To Understand failure as stepping stone towards success, its inevitability and earning life lessons which makes an individual well equipped to deal with uncertainties of life.	2
5	Role of emotions in one's professional life Importance of building sound EQ with IQ, Understanding the causes and effects of emotions in life.	2
6	Workplace values 1 – Manners Understanding workplace as a second home and source of livelihood, inculcate spirit of belongingness towards work and exhibit sound manners that projects work place with dignity	2
7	Workplace values 2 – People, Policy and organization Understanding the importance of policies and people, ideal code of conduct at Workplace, building rapport with colleagues, sound behaviors with various stakeholders within the organization	2
8	Value for students' life 1 - Power of Positivity Importance of optimism in life, developing right kind of attitude towards self-career and others. Power of generating right kind of thoughts that translates in right actions and behaviours.	2
9	Value for students' life 2 - Healthy Lifestyle Importance of fitness in life and career. Importance of regular exercising an taking up a sport. Focusing upon eating and sleeping habits that result in physical performance as body is considered to be the temple of soul.	2
10	Value for students' life 3 – Create First Impression Understanding the importance of making right impressions while in public, how to speak/introduce self, basic understanding of dress code, voice tone and body language	2
11	Understanding hazards of Social Networking sites Developing sound habits, breaking bad habits, understanding hazards of bad habits and excess of social media in life.	2
12	Creating Value through Social Networking sites (Linked-In and Quora) To ensure that technology is used to build bridges and not the barriers, focusing upon the career and importance of associating with right content in the virtual world. (Linkedin, Quora, GD communities, India Bix, Bodhi Booster)	2
13	Performance Values 1- How to avoid Procrastination Value and Importance of Time, Cause and effect of procrastination, How to maximize the day, Importance of setting up to –do lists and task lists	2

14	Performance Values 2- How to manage Pressure Situations (Exams and Evaluations) Handling anxiety, Value of planning and smart work, ensuring right state of mind and tips for a successful show.	2
	Total Hours	**28**

Suggested Textbooks/ Reference books:

1. **Creating Values in Life: Personal, Moral, Spiritual, Family and Social Values** – By Ashok Gulla , Publication by https://livingvalues.net/ Author House, Bloomington, 2010
2. **Teaching Your Children Values –** By Linda and Richard Eyre, Publication by Touchstone, 2010
3. Steven R covey, 8th Habit of effective people (From Effectiveness to Greatness), Free Press, Newyork, 2005.
4. Mahatma Gandhi, The story of my experiments with truth, Mahatma Gandhi, penguin classics, 2010.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyse	Evaluate	Create
10%	15%	40%	35%	0%	0%

Instructional Method:

a. The course delivery method will depend upon the requirement of content and need of students. The trainer shall train students through interactions, demonstration, role play, games, brainstorming, group tasks etc.

b. Practical examination (VIVA) will be conducted at the end of semester for evaluation of performance of students.

c. Students will use supplementary resources such as online videos and books.

d. The trainer shall train students through ppts, worksheets and marker board.

Supplementary Resources:

1. https://livingvalues.net/
2. https://www.iberdrola.com/talent/value-education/

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01PY0101

Subject Name: Physical Education/Sports/Yoga

B. Tech. Year – I (Semester II)

Objective: Fitness is the key for any Kind of success, the main aim of this course to make students Fit Mentally and physically by making them participate in different Games .Which includes Indoor Games and Outdoor Games.

Credits Earned: NA

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

1. Students will be able to understand the basic principles and practices of Physical Education, Sports and Yoga.
2. Students will be able to instruct the Physical Activities, Sports and Yoga practices for Healthy Living.
3. To develop professionalism among students to conduct, organize & officiate Physical Education, Sports and Yoga events at Universities and National Level.
4. Students are being given Professional level training in all Games where in they represent the University at national Level.

Pre-requisite of course: NA

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
00	00	02	00	00	00	00	00	00	00

Contents:

Unit	Topics	Hours
1	Introduction to Physical Education/Sports/Yoga	2
2	Health and Wellness	2
3	Adventure Sports/	2
4	Sports & Recreation/	2
5	Fitness for Careers	2

	LIST OF SPORTS GAMES (Outdoor)		
1	Foot ball –Basic Skills taught to all students	3	
2	Cricket : Basic skills of this Game taught to students	3	
3	Basket Ball – Basic skills of this Game taught to students	3	
4	Volley Ball - Basic skills of this Game taught to students	3	
5	Kabaddi - Basic skills of this Game taught to students	3	
6	Yoga _ Basic knowledge of Asanas/ Prayanam	3	

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01CT0105

Subject Name: Object Oriented Programming

B. Tech. Year – I (Semester II)

Objective:

1. To gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
2. To understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms
3. To understand the principles of inheritance, packages and interfaces
4. To understand Multithreading and I/O files in Java
5. To understand the fundamental of AWT, SWING and Graphics based window
6. To understands Collection of classes and basic java utensils packages

Credits Earned: 04 Credits

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

1. Use Object Oriented Programming concepts for problem solving.
2. Apply OOP principles to create java application programs and proper program structuring.
3. Ensure design stability for various applications- by applying exception handling and inheritance
4. Implement multithreading, Interfaces and class collection with the help of Utensils package and Construct GUI and I/O based window application.
5. Analyze the various techniques of OOP to reduce programming complexity.

Pre-requisite of course:
Basic knowledge of C

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
03	00	02	04	50	30	20	25	25	150

Contents:

Unit	Topics	Hours
1	**Introduction to object-oriented programming** Object oriented paradigm, object and classes, data abstraction and encapsulation, inheritance, polymorphism, dynamic binding, benefits and application of OOP.	03
2	**Java evaluation and overview** Java evaluation: Java History, Java features, difference with other language, java with internet, www and web browsers, Java environment, JDK Java overview: Java program structure, java program implementation on various IDE's like NetBeans and Eclipse, Byte Code and JVM	02
3	**Strings** String class, String Buffer class, Operations on string, Command line argument, Use of Wrapper Class.	02
4	**Object, Classes and Methods** Introduction to class, objects, members data and member functions, declaration of fields and methods, accessing class members, constructors and destructors, method overloading, static members, Inheritance, method overriding, final variable, final member, final class, finalizer methods, Abstract method and class, Visibility modifiers in classes	06
5	**Interfaces (Multiple Inheritance)** Introduction to interface, declaration of interface, extending interface, implementing interface, accessing interface variables	04
6	**Java Packages** Introduction and declaration of Packages in Java, creating and accessing package, adding class to a package, static import.	02
7	**Errors and Exception Handling in Java** Types of Errors, Exceptions, syntax of exception handling code, single and multiple catch statements, importance, and execution of throws and Finally statement, Built in Exception, Custom exception, Throwable Class.	04
8	**Collection Framework** Collection Framework, Collection interface, Set and List interfaces, Map interface Generics in the Collection Framework	03
9	**Multithreaded Programming** Introduction to thread, Creating and Extending thread class, stopping and blocking thread class, Life cycle of thread, thread exception, thread priority, Synchronization, implementing "Runnable" interface, Introduction to JavaBeans and Network Programming	05
10	**Managing I/O file in Java** Concept of Stream and Stream classes, Byte Stream, Input/output Stream, Characters Stream, Reader Stream, Writer Stream, File Class, File Input Stream, File Output Stream, Input Stream Reader, Output Stream Writer	03
11	**GUI** Comparing AWT and swing features, AWT Components, Overview of the AWT components, Component properties, Graphics context, Containers, Container class, Layout Managers, Top-level containers, Window class,	08

	Decorated windows Frame and Dialog, Panel class, Events, Event Delegation Model, AWT Events, Adapter classes, Swing and MVC, J component, J option Pane, Showing Message, Confirm and Input Dialogs	
	Total Hours	42

Suggested Text books / Reference books:

1. Programming with Java A Primer, E.Balaguruswamy, Fourthedition, Mc Grawhill.
2. The Complete Reference, Java 2, Herbert Schild, Tata McGraw-Hill
3. Java Fundamentals A comprehensive introduction, Herbert Schildt, Dale Skrien, McGraw Hill Education.
4. Object Oriented Modeling and Design with UML, Michael Blaha and James Rambaugh, Pearson

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
15%	15%	30%	15%	10%	15%

Suggested List of Experiments:

Minimum 12 experiments to be performed during the semester

1. Use eclipse or Netbean platform and acquaint with the various menus, create a test project, add a test class and run it see how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.
3. Develop an applet that displays a simple message
4. Develop an Applet that receives an integer in one text field & compute its factorial value & returns it in another text filed when the button "Compute" is clicked
5. Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed

in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box

6. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

7. Write a java program that connects to a database using JDBC and does add, deletes, modify and retrieve operations

8. Write a java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “stop” or “ready” or “go” should appear above the buttons in a selected color. Initially there is no message show.

9. Write a java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method printArea( ) that prints the area of the given shape.

10. Suppose that a table named Table.txt is stored in a text file. The first line in the file header and the remaining lines correspond to row in the table. The elements are separated by commas. Write a Java program to display the table using labels in grid layout.

11. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes)

12. Write a java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t).it takes a name or phone number as input and prints the corresponding other value from the hash table(hint: use hash tables)

13. Implement the above program with database instead of a text file.

14. Write a java program that takes tab separated data (one record per line) from a text file and inserts them into a database

15. Write a java program that prints the meta-data of a given table.

16. Write a Java program that prints all real solutions to the quadratic equation ax 2 +bx+c = 0. Read in a, b, c and use the quadratic formula. If the discriminate b2 -4ac is negative, display a message stating that there are no real solutions?

17. The Fibonacci sequence is defined by the following rule. The first 2 values in the sequence are 1,

1. Every subsequent value is the sum of the 2 values preceding it. Write a Java program that uses both recursive and non-recursive functions to print the nth value of the Fibonacci sequence?

18. Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer?

19. Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome?

20. Write a Java program for sorting a given list of names in ascending order?
21. Write a Java program to multiply two given matrices?
22. Write a Java program that reads a line of integers and then displays each integer and the sum of all integers. (use StringTokenizer class)?
23. Write a Java program that reads on file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes?
24. Write a Java program that reads a file and displays the file on the screen, with a line number before each line?
25. Write a Java program that displays the number of characters, lines and words in a text.

Supplementary Resources:

1. https://ocw.mit.edu/courses/electrical...and.../6...programming.../lecture-14/
2. https://beginnersbook.com/2013/04/oops-concepts/
3. www.oracle.com/technetwork/java/oo-140949.html
4. nptel.ac.in/courses/106106147/3

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01CT0106

Subject Name: Introduction to R and R Studio

B. Tech. Year – I (Semester II)

Objective:

R Programming will help graduates to be competent in Data Manipulation with R programming, Data visualization, advance analytics topics like regressions, data mining using R Studio. You will work on real life projects and assignments to master data analytics.

Credits Earned: 01 Credit

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

1. Learn Data Science concepts of R and functioning of R-Calculator
2. Learn to create Pie charts, plots and vectors
3. Performing sorting, analyze variance and the cluster
4. ODBC Tables reading, linear and logistic regression
5. Understand database connectivity
6. Understand the applications of machine learning and various prediction models using R

Pre-requisite of course: NA

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
00	00	02	01	00	00	00	25	25	50

Contents:

Unit	Topics	Hours
1	**Introduction to R and R Studio** Evolution of R, Features of R, R environment set up, installation of R Studio, Introduction to R Studio	02
2	**Basics of R language** Basic Syntax of R, R command Prompt, R script file, comments, R-data types, vectors, Lists, Matrices, Arrays, Factors, Data Frames, Variables	02
3	**Operators in R** Arithmetic Operators, Logical Operators, Relational Operators, Assignment Operators, Miscellaneous Operators	02
4	**R-Decision and Control Loop Statements** if condition, if else condition, switch condition, repeat loop, while loop, for loop, break statement, Next statement	02
5	**Flavors in R** Functions in R, R-Strings, String Manipulations, R-vectors, R-Lists, R-Matrices, R- arrays, R-factors, R-data frames, R-Packages, R-Data Reshaping, R-Excel Files	04
6	**Data Representation using R** R- Pie Chart, R-Bar Chart, R-Histograms R-Line Graphs, R-Scatterplots	03
7	**Statistical Analysis using R** Mean, median and Mode, Linear Regression, Multiple Regression, Logistic Regression, Normal Distribution, Binomial Distribution, Poisson Distribution, Analysis of Covariance, Time Series Analysis, R-Decision Tree, R-Random Forest	09
	Total Hours	**24**

Suggested Text books / Reference books:

1. R Cookbook, Paul Teetor, Pub: Penram International.
2. The Art of R Programming: A Tour of Statistical Software Design, Norman Matloff
3. R for Data Science, Garrett Grolemund and Hadley Wickham
4. Hands-On Programming with R: Write Your Own Functions and Simulations, Garrett Grolemund

Suggested Theory distribution:
The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
10%	15%	20%	20%	15%	20%

Suggested List of Experiments:

Minimum 12 experiments to be performed during the semester

1. Installation of R studio and understand different sections
2. Explore various Data types in R
3. Explorer various data structures vectors, Lists, Matrices, Arrays, Factors and Data Frames in R
4. Understand distinct Arithmetic Operators, Logical Operators and Relational Operators
5. Use Assignment Operators and Miscellaneous Operators for various types of operations
6. Understand and apply conditional statements in R
7. Use different types of loops for various operations
8. Create functions for given requirements
9. Learn additional special functions for arrays, factors, data frames, and Data Reshaping
10. Understand package and install it with various methods
11. Read data file like csv, xls and access and modify data
12. Plot various types of graphs for various data set
13. Calculate various statistical parameters like mean, median and mode for data
14. Understand Normal Distribution, Binomial Distribution and Poisson Distribution and identify it for

data

15. Advance topics like Time Series Analysis, Decision Tree, and Random Forest

Supplementary Resources:

1. https://www.r-project.org/about.html
2. https://www.tutorialspoint.com/r/index.htm
3. https://www.computerworld.com/article/2497143/business-intelligence/business-intelligence-beginner-s-guide-to-r-introduction.html
4. https://www.udemy.com/r-basics/learn/v4/overview
5. https://intellipaat.com/r-programming-certification-training/#course-content

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01EC0102

Subject Name: Digital Electronics

B. Tech. Year – I (Semester II)

Objective:

1. To understand the basic of Digital Electronic concepts required in analysis and design of digital electronic circuits and systems.
2. To understand the number system, logic gates, Boolean algebra, etc.
3. To understand Construction and operation of various digital circuits such as Adder, Subtractor, Multiplexer, Demultiplexer, Decoder, Encoder, Flip-flops, Counters, Registers and memory devices.
4. To devolve the capability to Simplify, Analyze and Design the Various Digital Electronic Circuits.

Credits Earned: 04 Credits

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

1. Develop understanding of basic digital circuits like logic gates, logic families, flip flops and memory devices.
2. Use knowledge of various number systems and binary codes to solve conversion problems.
3. Apply concepts of Boolean algebra and other minimization techniques for digital circuit design.
4. Design digital circuits using different combinational and sequential logic.
5. Implement various combinational and sequential circuits using appropriate hardware/ simulation.

Pre-requisite of course:
Elementary knowledge of science and mathematics

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
03	00	02	04	50	30	20	25	25	150

Contents:

Unit	Topics	Hours
1	**Number Systems and Codes** Analogue versus Digital, Various Number Systems and Conversion between them, Accuracy of Conversion, Floating-Point Numbers, Various Binary Codes.	06
2	**Digital Arithmetic** Basic Rules of Binary Addition and Subtraction, Binary Addition and Subtraction using Complements, BCD Addition and Subtraction, Binary Multiplication and Division, Floating-Point Arithmetic.	04
3	**Logic Gates and Related Device** Positive and Negative Logic, Various Logics Gates with IEEE/ANSI symbols, Boolean equations, truth table and IC Details. Universal Gates, Gates with Open Collector/Drain output, Tristate Gates, AND-ORINVERT Gates, Schmitt Gates, Special Output Gates, Fan-Out of Logic Gates, Buffers and Transceivers	04
4	**Logic Families** Significance of Families, Characteristic Parameters, Types of Logic Families: TTL, ECL, CMOS, Bi-CMOS, NMOS and PMOS, Comparison between various logic families. Interfacing between CMOS and TTL logic families	03
5	**Boolean Algebra and Simplification Techniques** Introduction, Postulates and Theorems, Various types of Boolean expressions, Simplification Techniques - Karnaugh Map Method and Tabulation Method	04
6	**Combinational Logic Circuits** Combinational Circuits and its implementations, Arithmetic Circuits - Adders and Subtractors, BCD Adder, Look-Ahead Carry Generator, ALU, Multiplier, Magnitude comparator. Multiplexer, Encoders, Demultiplexers and Decoders, Parity Generation and Checking.	08
7	**Sequential Logic Circuits** R-S and D Flip-flop, Level Triggered and Edge-Triggered Flip-flops, J-K and T Flip-flop, Synchronous and Asynchronous Input, Flip-flop Timing Parameters, Application of Flip-flop. Ripple Counter, Synchronous Counter, Modulus Counter, Binary Ripple Counter, Synchronous Counters, UP/Down Counters, Decade and BCD Counters, Presettable Counters, Decoding Counter, Cascading Counter, Designing Counter with Arbitrary Sequences, Shift Register, Shift Register Counters, IEEE/ANSI Symbols for counters and Registers.	10
8	**Memory Devices** Anatomy of Computer, A computer Systems, Computer Memory, RAM and ROM, Expanding Memory Capacity	03

Total Hours	42

Suggested Text books / Reference books:

1. Anil K. Maini, "Digital Electronics: Principles, Devices and Applications" Wiley-India Pvt. Ltd, 1st Edition, 2008
2. David J. Comer "Digital Logic & State Machine Design", 3rd Indian Edition, Oxford University Press.
3. M Morris Mano, "Digital Logic and Computer Design", 4th Edition, 2009, Pearson, LPE, R.P.Jain, "Modern Digital Electronics", McGraw-Hill, 4th ed. 2010.
4. Malvino & Leach "Digital Principles and Applications", 7th Edition, McGraw-Hill Education

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
15%	20%	30%	20%	10%	5%

Suggested List of Experiments:

Minimum 12 experiments to be performed during the semester

1. Study data sheet of various digital logic circuits and see how to test these circuits using Digital IC Tester.
2. Study of Digital IC Testers, Logic State Analyzer and Digital Pattern Generators.
3. Verify the truth tables of various Digital Logic Gates.
4. Verify the application of NAND and NOR logic gates as universal gates.
5. Implementation of Boolean Logic Functions using logic gate ICs.
6. Design and implement digital logic for given case study.
7. Measure digital logic gate specifications such as propagation delay, noise margin, fan in and fan out.
8. Implement various combinational logic circuits such as adder, subtractor, decoder, encoder, multiplexers, demultiplexer, etc.
9. Design any one code converter and implement using discrete ICs on the bread board.
10. Verify operation of SR and JK flipflop.
11. Verify operation of D latch and edge triggered D flipflop.

12. Verify the operation of shift registers.
13. Verify the operation of synchronous counter.
14. Verify the operation of asynchronous counter.
15. Design and Implementation of combinational lock circuit with varying number of bits (For example 4, 8 …..)
16. Design and Implementation of visitor counter for Shopping Mall.
17. Design and Implementation of 4 bit Arithmetic and Logic Unit with minimum 4 functions using digital integrated circuits.
18. Design and Implementation of a scrolling display.
19. Design and Implement a digital dice which will generate any random number from 1 to 6. 20. Note: A student and faculty may choose any other such problem which includes the concept used in the course.

Supplementary Resources:

1. https://www.javatpoint.com/digital-electronics
2. https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/
3. https://www.tutorialspoint.com/digital_circuits/index.htm
4. https://www.coursera.org/learn/digital-systems

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01MA0105

Subject: Matrix Algebra and Vector Calculus

B.Tech. Year - I

Objective: This subject aims to provide fundamentals of matrix algebra and vector calculus. The topics delivered in the paper are essential for almost all science and engineering disciplines.

Credits Earned: 4 Credits

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

1. Understand the linear independence of vectors, basis and dimensions of different vector space.
2. Apply Gauss methods to solve linear system of equations and to find rank & inverse of matrix.
3. Apply the concept of Eigen values and vectors in the field of engineering.
4. Find gradient of scalar function and divergence, curl of vector function.
5. Apply Green's theorem, Stoke's theorem, Divergence Theorem.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	Mid Sem (M)	Internal (I)	Viva (V)	Term work (TW)	
3	2	-	5	50	30	20	25	25	150

Contents:

Unit	Topics	Contact Hours
1	**Vector space:** Vector space, Linear independence of vectors, Basis and dimension ofvector space.	6
2	**Matrix Algebra - I:** Rank and nullity of a matrix, Determination of rank by row operations, system of linear equations and its' solutions, Consistency of system of linear equations., Inverse of a matrix by row operations.	8
3	**Matrix Algebra -II:** Matrices , Determinants, Eigen valuesandeigenvector of matrix, LU decomposition.	8
4	**Vector differential Calculus** Vectors and scalars, vector operations, gradient of a scalar point function, divergence and curl of a vector point function, directional derivatives, Irrotational and solenoidal function.	10
5	**Vector Integral calculus:** Line integrals, Path Independence of Line Integrals, Concept of surface integrals, Green's theorem, Stoke's theorem and Divergence theorem.	10
	Total Hours	**42**

Recommended Textbooks:

1. M. D. Weir *et al*: Thomas' Calculus, 11th Ed., Pearson Education, 2008.
2. Stewart James: Calculus Early Transcendental, 5th Ed., Thomson India, 2007
3. Wylie & Barrett: Advanced Engineering Mathematics, McGraw-Hill pub.
4. Greenberg M D: Advanced Engineering Mathematics, 2nd ed., Pearson
5. Erwin Kreyszig, Advanced Engineering Mathematics, 9/ e, John Wiley, INC
6. H. K. Dass, Advanced Engineering Mathematics, SChand Publishing.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	20%	30%	15%	10%	5%

Instructional Method:

a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc .

b. The internal evaluation will be done based on continuous evaluation of students in the laboratory and class -room.

c. Practical examination will be directed toward the completion of semester for assessment of performance of understudies in laboratory.

d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, VirtualLaboratory

Supplementary Resources:

1. http://mathworld.wolfram.com/
2. http://en.wikipedia.org/wiki/Math

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01ME0105

Subject Name: Engineering Drawing and Computer Aided Design

B. Tech. Year – I (Semester II)

Objective:

Engineering Drawing is an effective language of engineers. It is the Foundation block which strengthens the engineering & technological structure. Moreover, it is the transmitting link between ideas and realization.

Credits Earned: 04 Credits

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

1. Interpret engineering drawings using fundamental technical mathematics.
2. Construct basic and intermediate geometry.
3. To improve their visualization skills so that they can apply these skills in developing new products.
4. To improve their technical communication skill in the form of communicative drawings.
5. To sketch engineering objects in freehand mode.
6. To create 3D computer model and its realization using FDM based 3D printing.

Pre-requisite of course: NA

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
02	00	04	04	50	30	20	25	25	150

Contents:

Unit	Topics	Hours
1	**Introduction to Engineering Drawing & Sketching** Drawing instruments and accessories, BIS –SP 46 and Use of Plane Scale. construction of different polygon, divide the line and angle in parts.	06
2	**Orthographic Projections** Fundamental of projection along with classification, Projections from the pictorial view of the object on the principal planes for view from front, top and sides using first angle projection method and third angle projection method, full sectional view.	08
3	**Isometric Projections and Isometric View or Drawing** Isometric Scale, Conversion of orthographic views into isometric projection, isometric view or drawing.	08
4	**Perspective Sketching** Introduction to perspective drawing, concept of Horizon, vanishing point and eye level, 1-Point, 2-Point perspective sketching, looking Up/Down/Straight ahead, Illumination source and shadow, Perspective distortion, perspective sketching by observation, perspective sketching by imagination, Basics f 3- o Point perspective (Bird's eye view)	18
5	**Basics of CAD & 3-D printing** Introduction of CAD tools, Mesh, sketching, extruding using CAD tools, Basics of FDM based rapid prototyping.	12
	Total Hours	52

Suggested Text books / Reference books:

1. Engineering Graphics by Dr. R.L.Jhala- Mc Graw Hill Education Publication, New Delhi.
2. A Text Book of Engineering Graphics by P.J.Shah S.Chand & Company Ltd., New Delhi
3. A text book of Engineering Drawing by R.K.Dhawan, S.Chand & Company Ltd., New Delhi
4. A text book of Engineering Drawing by P.S.Gill, S.K.Kataria & sons, Delhi.
5. Perspective Drawing Handbook by Joseph DÁmelio, Dover Publication
6. Perspective Drawing for Beginners by Len A. Doust, Dover Publication

7. Perspective Made Easy by Ernest Norling, Dover Publication

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
14%	22%	22%	14%	14%	14%

Suggested List of Activities:

1. Practice sheet (which includes dimensioning methods, different types of line, construction of different polygon, divide the line and angle in parts)
2. Orthographic projection.
3. Isometric projection.
4. Freehand sketching with 1-Point perspective by observation and imagination.
5. Freehand sketching with 2-Point perspective by observation and imagination.
6. Freehand sketching with 3-Point perspective by observation and imagination.
7. Incorporating shadow and reflection in perspective sketching.
8. CAD tool-based design of simple 3D solid geometry.
9. Design project including Ideation, Visualization, Sketching, CAD modelling and 3D Printing.

Supplementary Resources:

1. https://www.designtechcadacademy.com/knowledge-base/introduction-to-cad
2. https://fractory.com/engineering-drawing-basics/
3. https://www.autodesk.in/solutions/technical-drawing
4. https://ocw.mit.edu/courses/mechanical-engineering/2-007-design-and-manufacturing-ispring- 2009/related-resources/drawing_and_sketching/

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01CR0104

Subject Name: Professional Ethics

B. Tech. Year – II (Semester III)

Objective:

This course will enable the budding engineers and managers to effectively resolve the ethical issues they will face in their professional lives.

Credits Earned: 01 Credit

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

1. Express the basics of human values.
2. Articulate human values and grow as responsible human beings in the society
3. Develop ethical conduct and deliver their professional duties.
4. Analyze ethical confusions and contradictions to bring harmony at thought, behaviour and action level

Pre-requisite of course: NA

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
01	00	00	01	00	00	00	50	50	100

Contents:

Unit	Topics	Hours
1	**Over view and basic concepts** The concept of terminology of morals and morality, ethics, values, spirituality and stakeholder will enable students to have clarity about the concepts which are important for individuals and organizations.	02

2	**Profession and Professionalism** Introduction to Profession and Professionalism will cultivate the ability to relate to ethical concepts and ethical problems in specific professions and professionalism	02
3	**Ethical Theories** Understand variety of Moral Issues and Examples of Moral Dilemmas and Resolving Moral Dilemmas Conflict to enable the students to differentiate between right and wrong.	02
4	**Responsibilities and rights of professional.** Professional Rights & Responsibilities will impart clarity on Loyalty, Confidentiality, Respect for Authority, Accountability and its importance. Issues related to Pride of Profession, Pride of Employer, Gifts and Bribes, Whistle- blowing, Discrimination, Vishakha Guidelines and Sexual Harassment of Women at Workplace (Prevention, Prohibition And Redressal) Act 2013	03
5	**Ethics in Engineering Profession** Ethics in Engineering Profession will bring clarity about the Roles of Engineers such as Engineers as Managers and Other Roles Played by Engineers.	01
6	**Ethical Codes** Need for Ethical Codes will enable students to understand the prominence of ethical codes and become benchmarks against which individual and organizational performance can be measured. Codes from Other Profession- Advertising Standards Council of India, Corporate Codes-Tata Group of Companies will give them the profound knowledge of ethical codes.	01
7	**GLOBAL ISSUES** Intellectual Property Rights will bring out the broader ethical issues surrounding intellectual property rights. Roles of Media, Positive Aspects of Media, Negative Aspects of Media, Accountability of Media, Regulation of Media Factors in Media Ethics, Advertising Ethics, Corporate Social Responsibility- Concept ISO and CSR, Scenario CSR Rules in India Manufacturing and Marketing of Computers Software, Cybercrimes, Data Stealing, Embezzlement, Hacking.	03
	Total Hours	14

Suggested Text books / Reference books:

1. Professional Ethics by- R. Subramanian
2. Engineering Ethics &Human Values by: M.Govindarajan , S. Natarajan &V.S.Senthilkumar PHI Learning Pvt. Ltd.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	25%	35%	10%	10%	0%

Supplementary Resources:

1. https://ethics.iit.edu/teaching/professional-ethics
2. https://harappa.education/harappa-diaries/professional-ethics-and-professionalism
3. https://www.physio-pedia.com/Professional_Ethics_Course
4. https://onlinecourses.swayam2.ac.in/ntr19_ge06/preview
5. https://www.udemy.com/course/value-education-and-professional-ethics/
6. https://www.coursera.org/learn/ethics-technology-engineering

Appendix "A"

BROAD COURSE DESIGN FOR NCC GENERAL ELECTIVE CREDIT COURSE

NCC GENERAL ELECTIVE CREDIT COURSE DESIGN SUMMARY					
Semester	Credits Allocated			Total	Remarks
	Theory	Practical	Camp		
Semester - I	1	1		2	
Semester - II	1	1		2	
Semester – III	1	1	5	7	Credits of 1st Camp merged with 3rdSem
Semester – IV	2	1		3	
Semester – V	1	1	5	7	Credits of 2nd Camp merged with 5thSem
Semester - VI	2	1		3	
Total	08	6	10	24	Twenty-Four Credits

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

INSTITUTIONAL TRAINING SYLLABUS

COMMON SUBJECTS				
S no.	Subject	Periods (1 hour duration each)		
		Lectures/Tutorials	Practicals	Total
1.	NCC General	06	-	06
2.	National Integration	04		04
3.	Drill	-	45	45
4.	Weapon Training	-	25	25
5.	Personality Development	25		25
6.	Leadership	12	-	12
7.	Disaster Management	13		13
8.	Social Service & Community Development	08	39	47
9.	Health & Hygiene	-	10	10
10	Adventure	01		01
11	Environmental awareness & conservation	03		03
12.	Obstacle Training	-	09	09
13.	General Awareness	04		04
14.	Border & Coastal Areas	06		06
		82	**128**	**210**
SPECIALZED SUBJECTS (ARMY)				
1.	Armed Forces	09	-	09
2	Map Reading	-	24	24
3	Communications	03	03	06
4	Infantry Weapons	03	03	06
5.	Field Craft & Battle Craft		22	22
6	Military History	23	-	23
TOTAL HOURS SPECIALISED SUBJECTS		**38**	**52**	**90**
GRAND TOTAL HOURS (TOTAL CREDITS)		120 (08 cr)* *15 HOUR THEORY = 1 CREDIT POINT	180 (6 cr)** **30 HOURS PRACTICAL TRAINING = 1 CREDIT POINT	**300**

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

SEMSTER WISE DISTRIBUTION OF NCC SYLLABUS FOR THEORY

S. NO.	SUBJECT	SEMESTER						TOTAL
		I	II	III	IV	V	VI	
1	NCC General	6	-	-	-	-	-	6
2	National Integration and Awareness	4	-	-	-	-	-	4
3	Personality Development	2	5	5	4	6	3	25
4	Leadership	-	5	4	3	-	-	12
5	Disaster Management	-	-	3	10	-	-	13
6	Social Service and Community Development	3	5	-	-	-	-	8
7	Adventure	-	-	1	-	-	-	1
8	Environmental awareness & conservation	-	-	-	3	-	-	3
9	General Awareness	-	-	-	4	-	-	4
10	Border & Coastal Areas	-	-	2	-	2	2	6
11	Armed Forces	-	-	-	6	-	3	9
12	Infantry Weapons	-	-	-	-	3	-	3
13	Communication	-	-	-	-	-	3	3
14	Military History	-	-	-	-	4	19	23
	Total Periods	15	15	15	30	15	30	120
	Total Credit Points	1	1	1	2	1	2	08

SEMSTER WISE DISTRIBUTION OF NCC SYLLABUS FOR PRACTICAL

S. NO.	SUBJECT	SEMESTER						TOTAL
		I	II	III	IV	V	VI	
1.	Drill	12	12	8	7	3	3	45
2.	Field Craft & Battle Craft	3	4	4	4	4	3	22
3	Map Reading	3	5	4	4	4	4	24
4	Weapon Training	5	4	4	4	4	4	25
5	Communication	-	-	-	-	-	3	03
6	Infantry Weapons	-	-	-	-	-	3	03
7	Social Service and Community Development	7	5	5	6	5	10	38
8	Health & Hygiene	-	-	-	5	5	-	10
9	Obstacle Training	-	-	5	-	5	0	10
10	Total Periods	30	30	30	30	30	30	180
	Total Credit Points	1	1	1	1	1	1	6

NCC CAMP TRAINING SYLLABUS

COMMON SUBJECTS				
S No.	**Subjects**	**Periods**		**Total**
		L/T	P	
1.	Physical Training	-	18	18
2.	Drill	-	32	32
3.	Weapon Training	08	28	32
4.	National Integration and Awareness	08	-	04
5.	Personality Development	08	12	20
6.	Leadership	08	-	04
7.	Disaster Management	08	-	04
8.	Social Service and Community Development	-	08	08
9.	Health & Hygiene	08		04
10.	Obstacle Training	-	04	04
11.	Military History	04	-	-
12.	Communication	04	-	-
13.	Games	-	18	18
14.	Culture	-	18	18
15.	Spare	-	04	04
	TOTAL	**56**	**142**	**170**
SPECIALISED SUBJECTS				
1.	Map Reading			
2.	Infantry Weapons	04	24	24
3.	Field Craft & Battle Craft		02	04
	TOTAL	04	12	12
		60(4 cr)	**180(6 cr)**	**240(10 cr)**

Subject Code: 01CT0301

Subject Name: Computer Organization and Architecture

B. Tech. Year – II (Semester III)

Objective: To conceptualize the concepts of organizational and architectural issues of a digital computer. Further, analyze performance issues in processor and memory design of a digital computer. Also, understanding various data transfer techniques in digital computer and to analyze processor performance improvement using instruction level parallelism.

Credits Earned: 04 Credits

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

1. Apply knowledge of the processor's internal registers and operations by use of a PC based microprocessor simulator (Apply).
2. Understand and describe the basics of various architectural units of the computer system (Understand).
3. Apply the knowledge of combinational and sequential logical circuits to mimic a simple computer architecture (Apply).
4. Analyze various features of microprocessor, memory and I/O devices including concepts of system bus (Analyze).
5. Write assembly language programs and download the machine code that provides solution to real-world control problems (Apply).
6. Analyze the importance of parallelism and stall in computer architecture (Analyze).

Pre-requisite of course: Digital Electronics

Teaching and Examination Scheme:

Teaching Scheme (Hours)			**Credits**	**Theory Marks**			**Tutorial / Practical**		**Total Marks**
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
3	0	2	4	50	30	20	25	25	150

Contents:

Unit	Topics	Contact Hours
1	**Introduction to Computer Architecture:** Basic computer data types, instruction codes, instruction cycle, computer registers, computer instructions, timing and control, memory-reference instructions, input-output and interrupt, complete computer description, design of basic computer	06
2	**Introduction to Computer Organization:** Instruction codes, computer registers, computer instructions, timing and control, instruction cycle, memory-reference instructions, input-output andinterrupt, complete computer description.	05
3	**Fundamentals of Micro programmed Control:** Control Memory, Address sequencing, Micro program Example, design ofcontrol Unit	04
4	**Concepts of Central Processing Unit:** Introduction, general register organization, stack organization, instruction format, addressing modes, data transfer and manipulation,program control, reduced instruction set computer (RISC)	07
5	**Computer Arithmetic:** Introduction, addition and subtraction, multiplication algorithms (booth multiplication algorithm), division algorithms, floating point arithmetic operations, decimal arithmetic unit.	07
6	**Introduction to Pipeline:** Flynn's taxonomy, parallel processing, pipelining, arithmetic pipeline,instruction, pipeline, RISC Pipeline	04
7	**Input-Output Organization:** Input-output interface, asynchronous data transfer, modes of transfer, DMA, input - output processor (IOP) priority interrupt, CPUIOP communication, serial communication.	05
8	**Memory Organization:** Memory hierarchy, main memory, auxiliary memory, associativememory, cache memory, virtual memory.	04
	TOTAL HOURS	**42**

Suggested Text books / Reference books:

1. M. Morris Mano, Computer System Architecture, Pearson 3e, 1992.
2. Andrew S. Tanenbaum and Todd Austin, Structured Computer Organization, PHI, 6e, 2016.
3. M. Murdocca & V. Heuring, Computer Architecture & Organization, WILEY, 2007.
4. John Hayes, Computer Architecture and Organization, McGraw Hill, 1998.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	20%	30%	15%	10%	05%

Suggested List of Experiments:

1. Introduction to 8085 Microprocessor Trainer board with explanation of necessary hardware connection with microprocessor.
2. Data Transfer (Copy) Operations
    a. Write the data 41h into register C and copy it to Accumulator
    b. Load Register H with 34h and Register L with ABh.
    c. Copy 32h in all the Registers.
    d. Load accumulator with the content of memory whose address is D000h using three different techniques.
    e. Exchange the content of memory location D000h and D001h using direct addressing and indirect addressing.
3. Arithmetic Operations
    a. Load Register B and C with 55h and 66h. Add Register B, C and store the result in Register D.
    b. Add two 16-bit numbers with and without using DAD. (HL+BC and store the answer in HL)
    c. Add the content of memory location D000h, D001h and store the result at memory locations D040h and D041H.
    d. Transfer the array (3 byte) of data starting from D000h to the locations starting from D050h by memory pointer with and without LDA/STA.
    e. Subtract two 16-bit numbers. (HL-BC and store answer in HL)

4.
    a. Assume register B holds 93h and the accumulator holds 15h. Illustrate the result of instruction ORA B, XRA B and CMA.
    b. Load the data byte 8EH in register D and F7H in register E. Mask the higher order bits (D7-D4) from both the data bytes.
5. Write an assembly language program to generate time delay using following three different approaches. No need to generate specific delay. You can load the value of your choice.
    a. Using a simple Register
    b. Using Register Pair
    c. Using loop within a loop
6. Write an assembly language program to count from 0 to 9(modulo 10 counter) with some delay between each count. Also display the count at output port 00H. At the count of 9 the counter should reset to 0 and repeat the sequence continuously.
7. Write an assembly language program to clear all the flag bits in flag register. Use the concept of PUSH and POP instruction to demonstrate this task. Load the accumulator with 00H. Logically OR the accumulator with itself to set zero flag and display flag bits on port 01H.
8. Write an assembly language program to convert a BCD number into Binary. Assume any two-digit number of your choice as an input BCD number.
9. Write an assembly language program to convert a binary number into un-packed BCD number.

    (Assume any binary number available in memory).
10. Write an assembly language program to convert a packed BCD number into seven segment code and display. Use common cathode type seven segment display. Assume the packed BCD number is available in memory.
11. Write an assembly language program to multiply two 8-bit numbers stored in Register A & Register B.
12. Write an assembly language program to divide two 8-bit numbers stored in Register A & Register B.
13. Write an assembly language program to find out largest number from given array stored at 5 consecutive memory locations starting from C030H and store the result to memory location C040h.
14. Write an assembly language program to find out smallest number from given array stored at 5 consecutive memory locations starting from C030H and store the result to memory location C040h.

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

3. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

1. https://www.javatpoint.com/computer-organization-and-architecture-tutorial
2. https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/
3. https://nptel.ac.in/courses/106/103/106103068/
4. https://tutorialspoint.dev/computer-science/computer-organization-and-architecture
5. https://www.studytonight.com/computer-architecture/

Subject Code: 01CT1302

Subject Name: Signals and Systems

B. Tech. Year – II (Semester III)

Objective: The objective of the course is to provide understanding of classification of signals and systems. Students learn applications of mathematical tools like Laplace Transform, Fourier Transform and Z-Transform in analysis of signals and systems. Students understand the importance of different domain representation of signals and systems.

Credits Earned: 03 Credits

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

1. Understand various types of signals and systems and classify them. (Understand)
2. Apply various operations and transforms on signals and systems. (Apply)
3. Analyze different signals and systems in the time domain. (Analyze)
4. Analyze different signals and systems in frequency domain. (Analyze)
5. Development of mathematical skills to solve problems involving filtering, modulation and sampling (Apply).

Pre-requisite of course: Basic knowledge of differentiation, integration, differential equations and difference equations

Teaching and Examination Scheme:

Teaching Scheme (Hours)			**Credits**	**Theory Marks**			**Tutorial / Practical**		**Total Marks**
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
3	0	0	3	50	30	20	00	00	100

Contents:

Unit	Topics	Contact Hours
1	**Continuous time and discrete time signals and systems:** Definition of signal, classification of signals, basic continuous and discrete time signals, sampling of continuous time signals, Sampling theorem, reconstruction of a signal from its samples, aliasing, concept of quantization and quantization error, concept of analog to digital conversion and digital to analog conversion, basic operations on signals, definition of system, classification of systems, properties of systems	10
2	**Analysis of continuous time signals and systems:** Representation of signals in terms of impulses, continuous time LTI systems: The convolution integral, Unit impulse response, properties of continuous-time LTI systems, linear constant coefficient differential equations, representation of LTI systems by differential equations, singularity functions, Laplace transform, one sided Laplace transform of commonly used signals	8
3	**Analysis of discrete time signals and system:** Discrete time LTI systems: The convolution sum, Unit impulse response, properties of discrete-time LTI systems, linear constant coefficient difference equations, representation of LTI systems by difference equations, recursive and non-recursive discrete time systems, solution of linear constant coefficient difference equations, Z- transform, Region of Convergence (ROC), properties of ROC, properties of Z-transform, Inverse Z-transform: power series expansion and partial fraction expansion, solution of difference equation using Z-transform, analysis of LTI systems in Z-domain	12
4	**Frequency domain analysis:** Representation and existence of Fourier series, trigonometric and complex exponential Fourier series representation, Fourier spectrum, Gibbs phenomenon, properties of continuous time Fourier series, Fourier transform representation of non-periodic functions, Fourier transform of standard signals, properties of continuous time Fourier transform, relationship between Laplace and continuous time Fourier transform, Fourier series representation of discrete time periodic signals, Discrete Time Fourier Transform, relation between Z-transforms and Fourier transform, properties of discrete time Fourier transform, transfer function, frequency response of discrete time systems	12
	Total Hours	**42**

Suggested Text books / Reference books:

1. Alan V. Oppenheim, Alan S. Willsky with S. Hamid Nawab, "Signals & Systems",2nd edition, Pearson Education, 1997.
2. A. Anand Kumar, "Signals and Systems", 3rd edition, PH, 2013
3. John G. Proakis, Dimitris G. Manolakis, "Digital Signal Processing", 4th edition, Pearson Education, 2007.
4. Simon Hykin, Barry Van Veen, "Signals and Systems", 2nd edition, John Wiley and Sons, 2007
5. B. P. Lathi, "Signal Processing and Linear System", 2nd edition, Oxford University Press, 2000.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
05%	15%	25%	15%	20%	20%

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
3. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

1. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011
2. https://nptel.ac.in/courses/108106163
3. https://nptel.ac.in/courses/108104100

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01CT1303

Subject Name: Introduction to Communication Engineering

B. Tech. Year – II (Semester III)

Objective: This course explores the fundamentals of electronic communication systems it provides the basic knowledge of Analog and Digital transmission, multiplexing, Transmission medium and reception. It also provides a brief overview of satellite and fiber optics communication.

Credits Earned: 03 Credits

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

1. Understand various concepts of Signals, data communication, networking, switching techniques, transmission media and communication systems (Understand).
2. Compare various analog to analog, analog to digital, digital to analog and digital to digital modulation techniques (Analyze).
3. Analyze various concepts and methods for enhancement of channel capacity (Analyze).
4. Analyze performance parameters of radio receiver (Analyze).
5. Understand concepts of optical and satellite communication system (Understand).

Pre-requisite of course: Basic electronics, Digital Electronics, and Basic Mathematics

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
3	0	0	3	50	30	20	00	00	100

Contents:

Unit	Topics	Contact Hours
1	**Introduction to Electronic Communication:** Significance of Human Communication, Communication systems, Types of electronic Communication, Modulation and Multiplexing, The electromagnetic Spectrum, A survey of Communication Applications.	04
2	**Introduction to Data Communication:** Data Communication, Networks, The internet, Protocols and Standards.	02
3	**Data and Signals:** Analog and Digital, Periodic analog signals, Digital Signals, Transmission Impairment, Data rate limits, Performance	04
4	**Digital and Analog Transmission:** Digital to Digital conversion, Analog to Digital conversion, Transmission modes, Digital to Analog conversion, Analog to Analog conversion.	04
5	**Multiplexing and Spreading:** Frequency division multiplexing, Wavelength division multiplexing, Time division multiplexing Spread Spectrum.	04
6	**Radio Receiver:** Tuned circuit, Filters, Classification of Noise, Functions of radio receivers, Types of Receivers, working of super heterodyne radio receivers, tuning ranges, tracking, sensitivity and gain, image rejection, spurious responses.	07
7	**Transmission Media:** Guided media- Twisted Pair Cable, Co-axial cable, Fiber optic cable, Unguided media- Radio waves, Microwaves, Infrared	03
8	**Switching Network:** Circuit switched network, Datagram networks, Virtual circuit networks.	03
9	**Introduction to telecommunication system:** Telephone network, Dial-up modems, Digital subscriber line, Cable TV networks.	03
10	**Introduction to satellite communication system:** Satellite orbits, Three categories of satellite, Satellite communication systems, Satellite application, Global Positioning System (GPS).	05
11	**Introduction to Optical Communication:** Optical Principles, Optical Communication systems, Advantages and application of optical fiber.	03
	Total hours	**42**

Suggested Text books / Reference books:

1. Principles of Electronic Communication Systems by Louis E. Frenzel (3rd Edition), Tata-McGraw Hill, 2007.
2. Data Communication and Networking by Behrouz A Forouzan (5th Edition), Tata- McGraw Hill, 2012.
3. Introduction to Data and Network Communications by Michael A. Miller, Cengage Learning, 2010.
4. Satellite Communication, by Dennis Roddy (4th Edition), TataMcGraw Hill, 2017.
5. Optical Fiber Communications: Principles and Practice (3rd Edition) by John M. Senior, PHI/Pearson, 2014.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	20%	35%	15%	05%	05%

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
3. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
4. Students will use supplementary resources such as online videos, NPTEL videos, e- courses, Virtual Laboratory

Supplementary Resources:

1. www.mhhe.com/frenzel/ecs3e
2. https://nptel.ac.in/courses/117/102/117102059/
3. https://www.tutorialspoint.com/principles_of_communication/principles_of_communication_introduction.htm

Subject Code: 01CT0308

Subject Name: Data Structure using C++

B. Tech. Year – II (Semester III)

Objective: The objective is this course is to teach efficient storage mechanisms of data for an easy access and to design and implementation of various basic and advanced data structures. Further, this course introduces various techniques for representation of the data in the real world and helps in designing and developing application using efficient data structures for protection and management of data and improving the logical ability.

Credits Earned: 04 Credits

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

1. Implement object-oriented concepts in C++ (Apply).
2. Differentiate linear and non-linear data structures like stacks, queues, linked list etc (Analyze).
3. Choose appropriate data structure as applied to specified problem definition (Evaluate).
4. Demonstrate operations like searching, insertion, deletion, traversing mechanism etc. on various data structures through programming (Apply).
5. Select appropriate sorting and searching algorithm based on problem definition in order to get optimum solution (Evaluate).
6. Compare and contrast the benefits of dynamic and static data structures implementation (Analyze).

Pre-requisite of course: Basic knowledge of C language, Object Oriented Concepts

Teaching and Examination Scheme:

Teaching Scheme (Hours)			**Credits**	**Theory Marks**			**Tutorial / Practical**		**Total Marks**
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
3	0	2	4	50	30	20	25	25	150

Contents:

Unit	Topics	Contact Hours
1	**Introduction of C++:** Introduction, Data types, Expression and control statements Iteration statements in C++, Arrays and String, Functions, Structures, Class, Object, Friend Function, Static variables and Functions in class, Constructors and Destructors, Inheritance in C++, Types of Inheritance, Pointers, Virtual Functions, Polymorphism, Abstract classes, Templates in C++, Exception Handling in C++	8
2	**Linked List:** Linked List as an ADT, Linked List Vs. Arrays, and Memory Allocation & De-allocation for a Linked List, Linked List operations, Types of Linked List, Implementation of Linked List, Application of Linked List	8
3	**Stack:** The Stack as an ADT, Stack operation, Array Representation of Stack, Link Representation of Stack, Application of stack – Recursion, Polish Notation	4
4	**Queues:** The Queue as an ADT, Queue operation, Array Representation of Queue, Linked Representation of Queue, Circular Queue, Priority Queue, & Dequeue, Application of Queues – Johnsons Algorithm, Simulation	4
5	**Trees:** Basic trees concept, Binary tree representation, Binary tree operation, Binary tree traversal, Binary search tree (BST) implementation, Thread Binary tree, The Huffman Algorithm, Expression tree, Introduction to Multiway search tree and its creation (AVL, B-tree, B+ tree), AVL tree balancing; B-tree; Application of trees	6
6	**Graphs:** Basic concepts, Graph Representation, Graph traversal (DFS & BFS)	4
7	**Sorting:** Sort Concept, Shell Sort, Radix sort, Insertion Sort, Quick Sort, Merge sort, Heap Sort	4
8	**Searching:** List Search, Linear Index Search, Index Sequential Search, Hashed List Search, Hashing Methods, Collision Resolution (One way and Two way);	4
	TOTAL HOURS	**42**

Suggested Text books / Reference books:

1. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons, 2e, 2011.
2. Data Structures, Algorithms and Applications in C++, Sartaj Sahani, 2e, 2004.
3. Object Oriented Programming with C++, E.Balaguruswamy, TMH, 6e, 2013.
4. C++: The Complete Reference- Schildt, McGraw-Hill Education (India), 4e, 2017

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
15%	20%	25%	15%	15%	10%

Suggested List of Experiments:
Minimum 14 experiments to be performed during the semester

1. Implementations of Linked Lists menu driven program.
2. Implementation of different operations on linked list – copy, concatenate, split, reverse, count no. of nodes etc.
3. Representation of Sparse matrix using multilinked structure. Implementation of sparse matrix multiplication.
4. Implementation of polynomials operations (addition, subtraction) using Linked List.
5. Implementations of Linked Lists menu driven program (stack and queue).
6. Implementations of Double ended queue using Linked Lists.
7. Implementation of Priority queue program using Linked Lists.
8. Implementations of stack menu driven program.
9. Implementation of multitask in one array.
10. Implementations of Infix to Postfix Transformation and its evaluation program.
11. Implementations of Infix to Prefix Transformation and its evaluation program.
12. Simulation of recursion.
13. Implementations of circular queue menu driven program.
14. Implementations of double ended queue menu driven program.
15. Implementations of queue menu driven program.
16. Implementation of Priority queue program using array.
17. Implementation of Johnsons Algorithm.

18. Implementation of Simulation Problem.
19. Implementations of Binary Tree menu driven program.
20. Implementation of Binary Tree Traversal program.
21. Implementation of construction of expression tree using postfix expression.
22. Implementations of Huffman code construction.
23. Implementations of BST program.
24. Implementation of various operations on tree like – copying tree, mirroring a tree, counting the number of nodes in the tree, counting only leaf nodes in the tree.
25. Implementations of B-tree menu driven program.
26. Implementations of B+ tree program.
27. Implementation of Preorder traversal of a threaded binary tree.
28. Implementations of AVL Tree menu driven program.
29. Implementations of Shell sort, Radix sort and Insertion sort menu driven program.
30. Implementations of Quick Sort, Merge sort and Heap Sort menu driven program.
31. Implementations of searching methods (Index Sequential, Interpolation Search) menu driven program.
32. Implementation of hashing functions with different collision resolution techniques.
33. Implementations of Graph menu driven program (DFS & BSF).

Supplementary Resources:

1. http://www.nptelvideos.in/2012/11/programming-and-data-structure.html
2. http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html
3. http://www.geeksforgeeks.org/data-structures/
4. https://www.hackerrank.com/domains/data-structures/arrays
5. Data Structures And Algorithms Made Easy -To All My Readers By Narasimha Karumanchi

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01CT1309

Subject Name: Programming with Python

B. Tech. Year – II (Semester III)

Objective: The objective of this course is to describe the core syntax and semantics of Python programming language and make student understand the need for working with the strings and functions. Further, this course will include Object-oriented Programming concepts and develop the ability to write GUI and database applications in Python using NumPy, pandas and matplotlib python libraries.

Credits Earned: 02 Credits

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

1. Understand flowcharts and algorithms that help to develop a creating a logical foundation for any real problem (Understand).
2. Understand how to use various data structures, modules, primitive datatypes and user defined functions (Understand).
3. Analyse how various control flow statements (such as iterative, transfer and conditional statements) are used in a complex problem (Analyse).
4. Apply the knowledge of decisional control statements to deal with pre-processors, functions, modules, and file handling to enhance coding skills. (Apply)
5. Create a model for analysis of data using NumPy, pandas and matplotlib (Create).

Pre-requisite of course: Basic knowledge of Programming, Object Oriented Concepts

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
0	0	4	2	00	00	00	50	50	100

Contents:

Unit	Topics	Contact Hours
1	**Introduction:** Introduction to Python programming language; data and expressions: literals; variables and identifiers; operators; expressions and data types; control structures, Boolean expressions	5
2	**Statements, List, Dictionaries, Sets and Functions:** Selection Control, Iterative Control, Lists: List Structures; Lists in Python; Iterating over Lists in Python, Dictionary, Set and Tuple in Python Program routes; Calling Value Returning Functions; Calling Non-value Returning Functions; Parameter Passing; Keyword and Default Arguments in Python	11
3	**Modules and OOP, GUI Programming and File Handling and Database Connectivity:** Python modules, classes and OOP, exception handling, string processing and regular expression, introduction to GUI programming, controls, event handling, file handling: opening, reading and writing text files, database connectivity with python	12
4	**Introduction to Python Libraries:** introduction to data science, exploratory data analysis and data science process. motivation for using python for data analysis, introduction of Jupyter Notebook, Overview of NumPy, pandas, matplotlib, SciPy	4
5	**Getting Started with Pandas:** Arrays and vectorized computation, introduction to Pandas data structures, essential functionality, summarizing and computing descriptive statistics, data loading, storage and file formats, reading & writing data in text format, web scraping, binary data formats, interacting with web API's, interacting with databases, data cleaning and preparation, handling missing data, data transformation.	8
6	**Getting Started with NumPy:** Array, NumPy array, indexing and slicing, operations on arrays, concatenating arrays, reshaping arrays, splitting arrays, statistical operations on arrays, loading arrays from files, saving numpy arrays in files on disk	8
7	**Signal Processing using Python:** continuous and discrete time elementary signals, basic signal processing operations, convolution and correlation, sampling and reconstruction, LTI systems, frequency domain analysis: Z-transform and	8
	Total Hours	56

Suggested Text books / Reference books:

1. Mark Lutz, "Learning Python", O Reily, 4th Edition, 2009, ISBN: 978-0-596-15806-4
2. Mark Lutz, "Programming Python", O Reily, 4th Edition, 2010, ISBN 9780596158118
3. Tim Hall and J-P Stacey, "Python 3 for Absolute Beginners", 2009, SBN:9781430216322
4. Magnus Lie Hetland, "Beginning Python: From Novice to Professional", 2nd Edition, 2009, ISBN:978159059982
5. C. Dierbach, "Introduction to Computer Science Using PYTHON: A Computational Problem-Solving Focus" 1st edition, Wiley, 2015. ISBN 978-0470555156.
6. Yashavant Kanetkar, "Let Us Python" 1st edition, BPB Publishers, 2019. ISBN 978-9388511568.
7. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist" 2nd edition, O'Reilly, 2015. ISBN 978-9352134755.
8. Martin C. Brown, "Python: The Complete Reference" 1st edition, McGraw-Hill, 2001. ISBN 978-9387572942.
9. McKinney, W. (2017). Python for Data Analysis: Data Wrangling with Pandas, NumPy and IPython. 2nd edition. O'Reilly Media.
10. O'Neil, C., & Schutt, R. (2013). Doing Data Science: Straight Talk from the Frontline O'Reilly Media
11. José Unpingco, Python for Signal Processing, Springer, ISBN 13 9783319013428,

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
15%	20%	25%	15%	15%	10%

Suggested List of Experiments:

Minimum 24 experiments to be performed during the semester

1. Write a program to demonstrate different number datatypes in python.
2. Write a program to perform different arithmetic operations on numbers in python.
3. Write a program to create, concatenate and print a string and accessing substring from a given string.
4. Write a python script to print the current date in following format "Sun August 01 10:10:10 IST 2021"
5. Write a python program to create, append and remove lists in python.

6. Develop programs to understand the control structures of python.
7. Write a program to demonstrate working with tuples in python.
8. Write a program to demonstrate working with dictionaries in python.
9. Write a python program to find largest of three numbers.
10. Write a python program to convert temperature to and from Celsius to Fahrenheit.
11. Write a python program to print prim numbers less than given number.
12. Write a python program to find factorial of a number using recursion
13. Write a python program to that accepts length of three sides of a triangle as
14. inputs. The program should indicate whether or not the triangle is a right-angled triangle (use Pythagorean theorem)

15. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
16. Write a python program to define a module and import a specific function in that module to another program.
17. Write a python Program to call data member and function using classes and objects.
18. Write a program to read 3 subject marks and display pass or failed using class and object.
19. Write a program to validate PAN card number and Email ID.
20. Write a GUI program to create Tic-tac-toe in python.
21. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first the second file.
22. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
23. Write a GUI program to implement CRUD operation on Student record. (rollno, name, percentage)

[Use data set of your choice from Open Data Portal (https://data.gov.in/) for the following exercises]

24. Practical based on NumPy ndarray
25. Practical based on Pandas Data Structures
26. Practical based on Data Loading, Storage and File Formats
27. Practical based on Interacting with Web APIs
28. Simulate continuous time elementary signals.
29. Simulate basic operations on continuous time elementary signals.
30. Simulate discrete time elementary sequences.
31. Simulate basic operations on discrete time elementary sequences.
32. Simulate sampling on continuous time signals and generate frequency spectrums of signal before and after sampling.
33. Simulate reconstruction of continuous time signals from discrete time sequences, observe effect of sampling rate changes and aliasing in frequency domain spectrums.

34. Simulate a program to analyze discrete time LTI System.
35. Find poles, zeros and gain from a given transfer function and plot it on Z-plane.
36. Simulate the Fourier series representation of a continuous time periodic signal.
37. Simulate frequency domain analysis of discrete time sequences.
38. Simulate correlation and convolution operation discrete time sequences.

Supplementary Resources:

1. https://docs.python.org/3/tutorial/
2. https://www.learnpython.org/
3. https://nptel.ac.in/courses/106/106/106106182/

Subject Code: 01CT0310

Subject Name: Discrete Mathematics and Graph Theory

B. Tech. Year – II (Semester III)

Objective: Engineering Mathematics is one of the very useful tools for learning Technology, Engineering and Sciences. In this course Learners will come across a number of standard concepts which helps them to solve core real world problems. This course is aimed to cover a variety of different concepts in Graph Theory. Theorems will be stated and proved formally using various Mathematical rules. Various graphs algorithms will also be discussed along with detail analysis.

Credits Earned: 04 Credits

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

1. Understand and apply logical propositions using logic & predicate and Boolean algebra (Apply).
2. Understand the properties of relations, equivalence and partial order relations (Understand).
3. Apply concept of Boolean algebra in switching theory and building basic electronic circuits (Apply).
4. Apply and analyze the concepts of shortest path algorithm to determine the solution to complex optimization problem (Analyze).
5. Apply concepts of graph theory to solve real life problems (Apply).

Pre-requisite of course: NA

Teaching and Examination Scheme:

Teaching Scheme (Hours)			**Credits**	**Theory Marks**			**Tutorial / Practical**		**Total Marks**
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
3	2	0	4	50	30	20	25	25	150

Contents:

Unit	Topics	Contact
1	**Logic and Predicates:** Introduction, logical expressions and operators, predicates, rules of quantifiers, rules of inference for predicates and propositions.	6
2	**Lattices:** Different types of relations, partially ordered set, Hasse diagram, lattice as partially ordered set, properties of lattices, lattice as an algebraicsystem, concept of duality	6
3	**Boolean Algebra:** Introduction to Boolean algebra and properties, sub-Boolean algebra, atoms and anti-atoms, Boolean expression and it's equivalences, midterms and maxterms, values of Boolean expressions, canonical forms, Karnaugh map	6
4	**Graphs and Trees:** Introduction to graph theory, degree and incidence, walks, paths, circuits, reachability in graphs, Hamilton graphs and Euler graphs, introduction to acyclic graph(tree) and its properties, binary tree, spanning tree and minimal spanning tree.	8
5	**Representation Graph using Matrix:** Edge and vertex connectivity, separability, fundamental cycles and cut sets graph isomorphism: 1-isomorphic and 2-isomorphic graphs, matrix form of graphs, adjacency and incidence matrix, Dijkstra's algorithm.	8
6	**Planar and Non-planar Graphs:** Planar and non-planar graphs, stereographic graph embedding on a sphere, Kitowski's first and second graphs, Euler's formula, detection of planarity and elementary reduction.	8
	Total Hours	42

Suggested Text books / Reference books:

1. Rosen Kenneth: Discrete Mathematics and its Applications. McGraw HillPublication- New Delhi, 8th edition, 2021.
2. Stanat and McAlister: Discrete Mathematics for Computer Science, PHI, 1st editon, 1977
3. Narsingh Deo: Graph Theory with Applications to Engineering and ComputerScience, PHI, 1st edition 1974.
4. B.Kolman and R.C. Busby: Discrete Mathematical Structures for Computer Science, Prantice Hall, New-Delhi, 2nd edition 1984.
5. J.P. Tremblay and Manohar: Discrete Mathematical Structures with Application to Computer Science, McGraw Hill Publication- New Delhi, 8th edition 2017.
6. S. Malik and M. K. Sen: Discrete Mathematics, Cengage Learning India Pvt. Ltd. 1st edition, 2012

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	20%	30%	15%	10%	05%

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
3. Practical exam will be conducted at the end of semester for evaluation of learners in tutorial work.
4. Students will use supplementary resources such as online videos, NPTEL videos, E-courses, etc.

Supplementary Resources:

1. www.tutorialspoint.com/graph_theory
2. www.ied.edu.hk/has/phys/de/de-ba.htm

Subject Code: 01CT1401

Subject Name: Probability and Statistics

B. Tech. Year – II (Semester IV)

Objective:

To provide a foundation in probability theory and statistical method in order to solve applied problems and to prepare for more advanced courses in probability and statistics.

Credits Earned: 04 Credits

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

1. Understand the needs of probability and distribution
2. Apply the mathematical treatment for random variable and joint probability distribution
3. Draw various graphs for the descriptive statistical analysis for the given data set and develop basic inference sense from it.
4. Apply appropriate probability distribution model, central limit for the given test cases.
5. Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases also Learn non-parametric test such as the Chi-Square test for Independence as well as Goodness of Fit.
6. Perform Statistical analysis study like descriptive statistics, correlation and regression using professional software.

Pre-requisite of course:
Differential and Integral Calculus and Basic Integration

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
03	01	00	04	50	30	20	25	25	150

Contents:

Unit	Topics	Hours
1	**Introduction to Probability** Classical and axiomatic definitions of probability, sample space, probability of an event, addition rule and conditional probability, multiplication rule, total probability, Bayes' theorm and independence.	06
2	**Random variable** Introduction to the concept, Discrete and continuous random variable: definitions and examples, Probability density function and cumulative distribution functions of continuous random variables, Probability mass function of discrete random variables, expected values and variance of discrete random variable.	08
3	**Probability distribution** Moments, probability and moment generating functions, Some special probability distributions: Uniform, Exponential, Poisson, geometric, Binomial and Normal distribution.	06
4	**Two – dimensional random variable** Joint distributions – Marginal and Conditional distributions, Covariance, regression, correlation, Independence of random variables.	06
5	**Transformation** Transformation of random variables of two dimensions, Central limit theorem (for independent and identically distributed random variables), convergence in probability. Introduction to statistics, Measure of central tendency (mean, median, mode) and measures of dispersion (standard deviation, mean deviation, range, variance etc.)	04
6	**Estimation** Consistency, Unbiasedness, the method of moments and the method of maximum likelihood estimation, confidence intervals for proportions, confidence intervals for parameters in one sample and two sample problems of normal populations.	06
7	**Testing of Hypotheses** Null and alternative hypotheses, the critical and acceptance regions, two types of error, power of the test, tests for one sample and two sample problems for normal populations, tests for proportions the most powerful test and Neyman- Pearson Fundamental Lemma, Chi square goodness of fit test and its applications.	06
	Total Hours	42

Suggested Text books / Reference books:

1. Introduction to Probability and Statistics for Engineers and Scientists, S. M. Ross, Academic Press, 2009.
2. Introduction to Probability and Statistics, J.S. Milton & J. C. Arnold, Cengage Learning, 2008
3. A First Course in Probability, S.M. Ross, Prentice Hall, 2001.
4. Introduction to Probability Theory and Statistical Inference, H.J. Larson, Wiley, 1982
5. Introductory Statistics, Neil A. Weiss, 10th Edition, Pearson

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	20%	30%	15%	10%	5%

Suggested List of Tutorial:

1. Plot different graph using excel.
2. Plot different graph using R and Python.
3. Write a program to generate random numbers for given range and find mean, median and mode using R/Python.
4. Calculation of deviation, variance, correlation coefficient and code for it.
5. Calculation on basics of probability concepts.
6. Examples on moment, Probability distributions.
7. Calculation of Binomial, Poisson, and Hyper Geometric.
8. Calculation of Gaussian, Standard, Normal distribution, Confidence interval and P test.
9. Simulation for continuous and discrete distributions.
10. Calculation on central limit theorem (with simulation).
11. Calculation on hypothesis problems (with simulation).
12. Calculation on chi square goodness fit test.
13. Case study on regression.
14. Case study on correlation.

Technology Supplementary Resources:

1. https://www.mathsisfun.com/data/
2. https://nptel.ac.in/courses/111/105/111105041/
3. https://www.coursera.org/browse/data-science/probability-and-statistics
4. https://ocw.mit.edu/courses/mathematics/18-05-introduction-to-probability-andstatistics- spring-2014/

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01CT0403
Subject Name: Microcontroller and Interfacing
B. Tech. Year – II (Semester IV)

Objective:

This course introduces the architecture, assembly language and C language programming of ATmega32 AVR family microcontroller. It gives a hands-on training of interfacing external sensors andactuators with microcontroller. The course objective is to introduce the basic concepts of small and medium scale embedded system design using microcontroller and to develop assembly and C language programming skills for real time applications of Microcontroller.

Credits Earned: 04 Credits

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

1. Acquire basic knowledge of microcontroller and utilize real time software and hardware for embedded systems using AVR Atmega-32 microcontroller.
2. Understand architecture of Atmega-32, its pin configuration, data-types, instruction set, addressing modes and advance communication protocols like SPI, I2C etc.
3. Develop assembly and C language programs for ADC, EEPROM, PWM and Timer by applying various instructions like data transfer, ALU, Branch, subroutine etc.
4. Analyze I/O peripherals like LCD, Keyboard, Relay, Sensor, Motor etc. by interfacing it with AVR microcontroller.
5. Evaluate minor microcontroller-based projects that solves real world problems.

Pre-requisite of course:

Basics of Digital Logic Design, Microprocessor architecture and basics of C programming

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
03	00	02	04	50	30	20	25	25	150

Contents:

Unit	Topics	Hours
1	**Introduction to microcontroller** Microprocessor and Microcontroller difference, RISC and CISC programmer's model, Criterial for selecting microcontroller	04
2	**Introduction to AVR microcontroller** Overview of AVR family, AVR Microcontroller architecture, status register, Special function registers, RAM, ROM & EEPROM space, On-Chip peripherals, ATmega32 pin configuration & function of each pin, Fuse bits of AVR.	07
3	**AVR assembly language programming** AVR data types and assembler directives, addressing modes of AVR, Data transfer, Arithmetic, Logic and Compare, Rotate and Shift, Branch and Call instructions, AVR studio setup for assembly language programming, AVR I/O Port Programming, Time delay loop, Look-up table, Bit addressability, MACROs, Intel HEX file.	08
4	**AVR programming in C** AVR Data types, AVR I/O port programming, Timer programming, Input capture and Wave Generator, PWM programming External Interrupt programming, ADC programming, EEPROM programming.	08
5	**Serial communication protocols** UART protocol, I2C protocol, SPI protocol, Serial Port programming using polling and interrupt, I2C Programming, SPI Programming	07
6	**Peripheral interfacing** LCD and Keyboard Interfacing, Relay interfacing, Stepper and DC Motor control, DS1307 RTC Interfacing, LM35 Temperature sensor interfacing, MAX7219 display controller interfacing,	08
	Total Hours	42

Suggested Text books / Reference books:

1. The AVR Microcontroller and Embedded Systems Using Assembly and C, By Muhammad AliMazidi, Sarmad Naimi and Sepehr Naimi, Pearson Education.
2. Programming and Customizing the AVR Microcontroller, By Dhananjay Gadre, McGraw HillEducation
3. AVR ATmega32 data sheet

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves asguidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
25%	20%	30%	5%	5%	15%

Suggested List of Experiments:

Minimum 12 experiments to be performed during the semester

1. Installation of AVR STUDIO and familiarization of ATMega32 AVR Development Board.
2. Hands-on experimentation of ATMega32 GPIO programming in Assembly and C.
3. Hands-on experimentation of ATMega32 Timer to generate accurate delay using polling inAssembly and C.
4. Hands-on experimentation of ATMega32 Timer to generate accurate delay using Interrupt inAssembly and C.
5. Hands-on experimentation of ATMega32 Timer to generate waveforms in Assembly and C
6. Hands-on experimentation of Seven Segment Display interfacing with ATMega32 in Assembly andC.
7. Hands-on experimentation of 16x2 LCD interfacing with ATMega32 in Assembly and C.
8. Hands-on experimentation of ATMega32 UART programming in Assembly and C.
9. Hands-on experimentation of 4x4 matrix keyboard interfacing with ATMega32 in Assembly and C
10. Hands-on experimentation of ATMega32 on-chip ADC for interfacing analog sensors inC.
11. Hands-on experimentation of DC motor interfacing and speed/direction control with ATMega32in C.

12. Hands-on experimentation of Stepper motor interfacing with ATMega32 in C.
13. Hands-on experimentation of DS1307 RTC Interfacing with ATMega32 in C using I2C protocol.
14. Hands-on experimentation of MAX7219 LED matrix driver Interfacing with ATMega32 in C using SPI protocol.
15. Design Frequency Counter which displays frequency of unknown pulse on 16x2 LCD using ATMega32 on-chip Timer.
16. Design Pulse period meter which displays ON-time of unknown pulse on 16x2 LCD using ATMega32 on-chip Timer
17. Design Bluetooth controlled 2-ch variable frequency square wave generator using ATMega32 UART and on-chip Timer.
18. Design 4 Channel Data Logger which measures Voltage between 0-5V on 4 ADC Channels of ATMega32 and transmit it to Host PC at every 1 second where it stored in excel sheet with timestamp for future analysis.

Supplementary Resources:

1. http://nptel.ac.in/courses/106108100/7
2. http://nptel.ac.in/courses/Webcourse- contents/IIT-KANPUR/microcontrollers/micro/ui/TOC.htm
3. https://swayam.gov.in/course/4446-microprocessors-and-microcontrollers
4. https://www.coursera.org/courses?languages=en&query=microcontroller
5. http://www.study-hub.com/avr-microcontroller-programming.html

Subject Code: 01CT0404

Subject Name: Analog and Digital Communication

B. Tech. Year – II (Semester IV)

Objective:
This course explores the fundamentals of electronic communication systems it provides the knowledge of various analog and digital modulation and demodulation techniques used in communication system. Comparison of various techniques will enable the student to select most appropriate technique for the application

Credits Earned: 04 Credits

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

1. To understand basics of analog and digital communication techniques.
2. To learn working of AM-FM Transmitters and receivers.
3. To facilitate the understanding of the baseband and carrier modulation.
4. To understand the effect and performance of communication systems in presence of noise.
5. Analyze Communication System based on different Modulation & Demodulation Techniques and analyze performance.

Pre-requisite of course:
Basic electronics, Digital Electronics, Basic Mathematics and Introduction to communication engineering

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
03	00	02	04	50	30	20	25	25	150

Contents:

Unit	Topics	Hours
1	**Linear Modulation: Amplitude modulation** Concept of amplitude modulation, Double Sideband suppressed carrier modulation, Single side band suppressed carrier modulation, Generation of AM-Chopper circuit, Balanced modulator, Modulation by multitone modulating signal. Independent Side band, Theme example- VSB transmission of Analog and Digital Television.	08
2	**Angle modulation** Concept of instantaneous frequency and phase modulation, sinusoidal FM and its time domain representation, spectral components of angle modulated signals, power in sinusoidal FM and modulation index, Carson's rule, Multitone wideband FM, Generation of Wideband FM from Narrow band FM , Generation of WBFM by Armstrong method.	06
3	**Noise in communication systems** Classification of noise, Signal to noise ratio (SNR), Noise factor and noise figure, Equivalent input noise generators, Noise temperature, Narrow band noise, PSD of in-phase and quadrature noise, Noise performance in AM, FM, Digital baseband and carrier communication systems, Concept of optimum threshold detection, matched filter, correlation receiver, optimum binary receiver, bit error rate (BER).	05
4	**Base Band Modulation** Base band system, sampling theorem, Sampling and signal reconstruction, Aliasing, Types of sampling, Quantization, PCM, Companding, DPCM, ADPCM, Delta modulation, Adaptive delta modulation. Theme Example- Digitization of video and MPEG.	11
5	**Digital Modulation Techniques** Modulation techniques for ASK, QASK, FSK, M-ary FSK, BPSK, DPSK, QPSK, M-ary PSK, QAM. Comparison of Noise performance of various PSK and FSK systems. Theme Example- Orthogonal Frequency Division Multiplexing (OFDM).	12
	Total Hours	42

Suggested Text books / Reference books:

1. Electronic Communications by Kennedy McGraw Hill Publication.
2. Electronic Communications by Dennis Roddy & John Coolen IV Edition PHI.
3. Communication Systems: Analog and Digital by R. P. Singh and B. D. Sapre, Tata-McGraw Hill.

4. Modern Digital and Analog Communication Systems, B. P. Lathi, (3rd Edition), Oxford Publication
5. Principles of Communication Systems, Taub & Schilling, (2nd Edition), Tata McGraw Hill Publication.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
10%	25%	25%	20%	10%	10%

Suggested List of Experiments:

Minimum 12 experiments to be performed during the semester

1. To observe amplitude modulation waveforms for different modulation index.
2. To observe frequency modulation waveform and to measure peak frequency deviation.
3. To observe frequency spectrum of AM and FM waveforms.
4. To understand block diagram of AM receiver and observe signals at different stages.
5. To understand block diagram of FM receiver and observe signals at different stages.
6. To Study and Perform sampling theorem and reconstruction.
7. To perform TDM-PCM Transmission and Reception.
8. Experiment on Companding techniques
9. To study Delta Modulation.
10. To transmit and receive digital signal using Amplitude shift keying.
11. To transmit and receive digital signal using Frequency Shift Keying.
12. 12 To transmit and receive digital signal using Phase Shift Keying (BPSK and QPSK)
13. Simulation of various analog and digital modulation and demodulation techniques
14. Simulation of effect of noise in communication systems

Supplementary Resources:

1. https://www.tutorialspoint.com/digital_communication/digital_communication_analog_to_digital.html
2. https://www.classcentral.com/course/swayam-analog-communication-13893
3. https://www.udemy.com/course/analog-communication

Subject Code: 01CT0407

Subject Name: Database Management System

B. Tech. Year – II (Semester IV)

Objective:
To know how huge data is managed by each and every application is modern technologies. To store and retrieve data in efficient manner, how query language is useful will be helpful. This course will give deep knowledge about data storage and querying functionalities used in real life applications.

Credits Earned: 04 Credits

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

1. Understand the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra, normalization and SQL
2. Solve the given problem using Relational Algebra, Relational Calculus, SQL and PL/SQL
3. Analyze basic data storage schemes and real-life database applications
4. Apply efficient query optimization techniques to solve different problems
5. Perform PL/SQL programming using concept of Cursor Management, Error Handling, Package and Triggers

Pre-requisite of course:
The proper understanding of data structures and algorithms will help you to understand the DBMS quickly.

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
03	00	02	04	50	30	20	25	25	150

Contents:

Unit	Topics	Hours
1	**Introduction to DBMS** Introduction to Database System, Purpose of Database Systems, View of Data, Introduction to Database Languages and Database Design, Database and Application Architecture, Database Users and Administrators	04
2	**Database Design and E-R Model** Overview of the Design Process, The Entity-Relationship Model, Complex Attributes, Mapping Cardinalities, Primary Key, Reducing E-R Diagrams to Relational Schemas, Extended E-R Features, and Entity-Relationship Design Issues	06
3	**Introduction to RDBMS & SQL** Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, The Relational Algebra Overview of the SQL Query Language, SQL Data Definition. Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Modification of the Database	08
4	**Advanced SQL** Join Expressions, Views, Integrity Constraints, SQL Data Types and Schemas, Index Definition in SQL, Accessing SQL from a Programming Language, Functions and Procedures, Triggers, Recursive Queries	08
5	**Functional Dependencies & Normalization** Theoretical overview of types of functional dependencies: Trivial and Non-trivial, Multilevel dependencies, Algorithms for decomposition using multilevel dependencies. Purpose of normalization, Introduction and definition of normalization, Normalization techniques: 1NF, 2NF, 3NF, 4NF and BCNF	08
6	**Concurrency and Recovery in Transactional DBMS** Introduction to transaction, ACID properties of Transaction, Locking mechanism, solution to concurrency related problems, deadlock, two-phase locking protocol, Deadlock, Concurrency handling protocols and schemes, Transactional Recovery Algorithms, System recovery, Two- Phase Commit protocol, Recovery and Log-based recovery	08
		42

Suggested Text books / Reference books:

1. Database System Concepts, Abraham Silberschatz, Henry F. Korth & S. Sudarshan, McGraw Hill.
2. An introduction to Database Systems, C J Date, Addition-Wesley.
3. Understanding SQL by Martin Gruber, BPB
4. Oracle – The complete reference – TMH /oracle press
5. SQL – PL/SQL by Ivan Bayross

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
15%	15%	40%	10%	10%	10%

Suggested List of Experiments:

Minimum 12 experiments to be performed during the semester

1. Introduction to MySQL Workbench and MySQL server
2. Use of Create and Alter command in SQL
3. Use of Drop and Truncate command in SQL
4. Implementation and use of Constraints in SQL
5. Use of insert, select and delete command in SQL
6. Use of in-built and aggregate functions in SQL
7. Use of relational, like and in operator in SQL
8. Implementation & use of nested queries in SQL.
9. Implementation and use of keys in SQL
10. Implementation of various join operations in SQL.
11. Implementation and use of Views in SQL
12. Implementation & use of procedures in SQL.
13. Implementation & use of functions in SQL.
14. Implementation & use of triggers in SQL.

Supplementary Resources:

1. https://www.geeksforgeeks.org/dbms
2. http://nptel.iitm.ac.in/video.php?subjectId=106106093
3. http://holowczak.com/oracle-sqlplus-tutorial
4. http://www.roseindia.net/programming-tutorial/Database- Tutorialsiv.
5. http://www.w3schools.com/sql
6. http://beginner-sql-tutorial.com/sql.htm

Subject Code: 01CT0408

Subject Name: Internet and Web Technology

B. Tech. Year – II (Semester IV)

Objective:
To acquire knowledge and skills for creation of web site considering both client and server-side programming. To gain ability to develop responsive web applications. Increasing use of Internet and web encourage everyone to use web solution. Web technology is the bridge between end-user devices like computer/mobile communication with each other. To create dynamic web site and web portal it involves the use of web language like HTML, CSS, JavaScript and PHP with advance framework. This subject will attempt to give you a basic understanding of various aspects of web technologies.

Credits Earned: 04 Credits

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

1. Understand basis functioning of Internet by studying its architecture.
2. Apply different types of style sheets and their properties
3. Apply client side and server-side scripting techniques as per requirements
4. Analyze design pattern-based approaches and frameworks of PHP.
5. Create dynamic web-based solution based on user requirements.

Pre-requisite of course:
Programming Fundamentals

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
03	00	02	04	50	30	20	25	25	150

Contents:

Unit	Topics	Hours
1	**Internet Basics** Introduction, Concept of Internet- History of Internet, Protocols of Internet, World Wide Web, URL, Web Server, Web Browser, Internet Connectivity, Internet Network, Services on internet, Current Trends on Internet, Concept of WWW, HTTP Response and Request, Features of Web 2.0	05
2	**HTML and CSS** Basics of HTML, HTML tags and attributes, Meta tags, Character entities, hyperlink, table, lists, images, forms, divs, XHTML, Browser Architecture and website structure, Overview and features of HTML 5, Need for CSS, basic syntax and structure, background images, colors and properties, manipulating texts, fonts, borders and boxes, margin, padding, lists, positioning using CSS, Gradients, Shadow effects, transformation, transition and animations, etc. CSS flex, media queries. Overview of CSS, CSS2 and features of CSS3.	10
3	**Java Script** Client-side scripting with JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes. Advance JavaScript: JavaScript and objects, JavaScript own objects, the DOM and web browser environments, Manipulation using DOM, forms and validations, DHTML: Combining HTML, CSS and JavaScript, Events and buttons Introduction to jQuery, jQuery syntax, selectors, events, effects, jQuery HTML, Access / Manipulate web browser elements using jQuery.	11
4	**XML** Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Using XML with application. Transforming XML using XSL and XSLT	03
5	**PHP** Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions, Object Oriented Programming with PHP	04
6	**PHP and MySQL** Basic commands with PHP examples, Connection, to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP my admin and database bugs	05
7	**Latest Trends in PHP** Overview of Laravel, Laravel Application Structure, Overview of CodeIgniter, CodeIgniter Application Structure, Introduction to WordPress, WordPress	04

	Dashboard, Overview of Joomla, Joomla Architecture, Application of Joomla	
	Total Hours	42

Suggested Text books / Reference books:

1. Black Book - HTML 5, DT Editorial Services, Second Edition, Dreamtech Press
2. Black Book - Web Technologies, DT Editorial Services, Dreamtech Press
3. Developing Web Applications, Ralph Moseley and M.T. Savaliya, Second Edition, Wiley-India
4. jQuery Cookbook, Cody Lindley, O'Reilly Media
5. Head First jQuery – A Brain- Friendly Guide, Ryan Benedetti, Roman Cranley, O' Reilly Media

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
5%	25%	30%	20%	10%	10%

Suggested List of Experiments:

1. Design wireframe for your semester project based on web design principles
2. Create table using HTML tags.
3. Design Online Quiz Web Page using HTML tag and elements.
4. Formatting web pages with CSS [Create semester project website's inner pages]
5. Create Home Page for any Website which contains image slider, header and footer and navigation menu bar.
6. Browser interaction and form validation (Web browser environments, forms and validation, image sliders) [Image slider plugins of jQuery, Client-side validation of Registration & Login page to be created in semester project website].
7. Use the on () method to attach a click event handler to all <p> elements using jQuery.
8. Choose the correct conditional (ternary) operator to alert "Too young" if age is less than 18, otherwise alert "Old enough" using JavaScript.
9. Design and Implement Tic-Tac-Toe game using HTML, CSS and JavaScript.
10. Introduction to PHP (Starting to script on server side, Arrays, function, validations) [Server-side validations for Registration and Login of semester project website]
11. Advance PHP (Management of session and cookies) [Implement Admin login/logout functionality and cookie wherever required]
12. Create PHP Form which demonstrate Insert, Update, Delete and Select operation with database. (Take required data from user).

13. PHP with mysql connectivity (Forms, Advance PHP and database handling) [Semester Project]
14. PHP framework (Use framework in Management Portal for semester project website]

Supplementary Resources:

1. http://nptel.ac.in
2. http://www.w3schools.com/
3. http://getbootstrap.com/
4. http://www.tutorialspoint.com/
5. https://www.phptpoint.com/
6. https://www.codeigniter.com/

Subject Code: 01CT1409
Subject Name: Operating System
B. Tech. Year – II (Semester IV)

Objective:
Student will understand Modern Operating System and their principles. The course will cover theory as well as practice aspects of a subject through scheduled lectures and labs, course will cover details of processes, CPU scheduling, memory management, file system, storage subsystem, and input/output management.

Credits Earned: 03 Credits

Course Outcomes: After completion of this course, student will be able to:
1. Understanding the role of operating system with its function andservices
2. Compare Various Algorithm used for CPU Scheduling, Memory managementand Disk SchedulingAlgorithm.
3. Apply Various Concepts related with Deadlock to solveProblems.
4. Analyze Protection and Security Mechanism in OperatingSystem.
5. Analyze and illustrateshell commands and scripts that can manipulate text-based data, either in files or data streams.

Pre-requisite of course:
Data structures like stack, queue, linked list, tree, graph, hashing, file structures, any structured programming language

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
03	00	00	03	50	30	20	00	00	100

Contents:

Unit	Topics	Hours
1	**Operating Systems** Operating Systems Overview- Overview and Functions of operating systems, protection and security, distributed systems, operating systems structures, services, system calls and their working. History and generationof operating system.	03
2	**Process and Threads** Process and Threads - Process concepts, threads, scheduling-criteria,algorithms, and their evaluation. Process Scheduling, Thread scheduling, **Case studies UNIX. Linux. Windows**	06
3	**Concurrency Control (IPC)** Process synchronization, critical- section problem. classic problems of synchronization, Software Solutions for synchronization problem. Hardware Solutions for synchronization problem. Synchronization and their applications. [Understanding of Semaphore – Mutex – Monitor –Event Counters]	08
4	**Memory Management** Memory: Swapping, contiguous memory allocation, paging, page table, segmentation, virtual memory, demand paging, page- replacement, Allocation of frames **Virtual Memory**: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging (Concepts only) – Page Replacement policies : Least Recently used (LRU) Optimal (OPT) ,Second Chance (SC), First in First Out (FIFO), Not recently used (NRU).	12
5	**Principles of deadlock** Deadlock - system model, deadlock and its characterization with example, deadlock prevention techniques with example, detection and avoidance of a deadlock, methods to get recovery from deadlock.	06
6	**File system Interface** File system Interface- the concept of a file, Access Methods. Directory structure. File system mounting, file protection and sharing mechanism. File System implementation- File system structure, file/directory implementation, efficiency and performance, file allocation methods, free-space management.	03

7	**Mass-storage structure & I/O systems** Mass-storage structure- RAID structure, Disk structure, disk attachment, disk scheduling, swap-space management. stable-storage implementation. overview of Mass-storage structure. Tertiary storage structure. I/O systems- Hardware, application l/o interface, kernel I/O subsystem, Transforming I/O requests to Hardware operations.STREAMS, performance.	04
	Total Hours	42

Suggested Text books / Reference books:

1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 8th edition.
2. Operating Systems - Internals and Design Principles. Stallings, 6th Edition-2009. Pearsoneducation.
3. Operating systems- A Concept based Approach-D.M.Dhamdhere. 3rd Edition.TMH
4. Modern Operating Systems, Andrew S Tanenbaum 3rd editionPHI.
5. Principles of Operating Systems, B.L.Stuart. Cengage learning, IndiaEdition.
6. Operating Systems. A.S. Godboie.2nd Edition,TMH

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching- learningprocess.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	25%	25%	15%	10%	5%

Suggested Hands On Activities :

1) CPU scheduling Algorithm
   a. First Come First Serve(FCFS)
   b. Shortest Job First(SJF)
   c. Round Robin
   d. Priority
2) Memory Management Techniques
   a. Multi Programming with fixed number of tasks
   b. Multi Programming with variable number of tasks
3) Contiguous Memory Allocation
   a. Worst Fit

   b. Best Fit
   c. First Fit
4) Page Replacement Algorithm
   a. First In First Out (FIFO)
   b. Least Recently Used (LRU)
   c. Optimal
5) Deadlock Avoidance
6) Deadlock Prevention
7) Disc Scheduling Algorithm
   a. FCFS
   b. SCAN

Supplementary Resources:

1. http://williamstallings.com/OS/Animation/Animations.html
2. http://nptel.ac.in/courses/106106144/
3. http://nptel.ac.in/courses/106108101/
4. http://codex.cs.yale.edu/avi/os-book/OS9/slide-dir

Marwadi University
Faculty of Technology
Department of Information and Communication Technology

Subject Code: 01CT0410

Subject Name: Data Visualization and Dashboard

B. Tech. Year – II (Semester IV)

Objective:
This course will teach students how to analyze, import, summarize, and visualize data. The students will evaluate the advantages and disadvantages of multiple visualization techniques. Moreover, they will be exposed to several tools for visualization.

Credits Earned: 02 Credits

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

1. Create compelling, interactive dashboards to combine several visualizations into a cohesive and functional whole. (Understand).
2. Visualization tools to conduct data analysis, especially exploration of an unfamiliar dataset. (Analyze).
3. Employ best practices in data analysis through visualization to develop charts, maps, tables, and other visual representations of data. (Analyze).
4. Utilize advanced features including parameters, data blending, very large datasets, custom date hierarchies, and use data visualizations, dashboards, and Stories to support relevant communication for diverse audiences. (Apply).

Pre-requisite of course:
This subject is focused on analyzing data, importing, summarizing, and visualizing data.

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
01	00	02	02	0	30	20	25	25	100

Contents:

Unit	Topics	Hours
1	**Introduction and Overview:** Basic of Data analytics tools, Debug and troubleshoot installation and configuration of the software, Configuring Data Environment, Connecting to Data, Metrics vs dimensions, Data types and defaults, Aliases and names, Introduction to Looker and its associated functions.	04
2	**Plot Types:** Basic plotting and applied visualization: Line plot, Bar plot, Pie Chart, pivot chart, Scatter Plot, Histogram, Box plot, Density Plot, Heat map	01
3	**Understanding Data:** Data Attribute, Data transformation, data cleaning, normalization, standardization, data correlation	02
4	**Data Visualization Concepts:** Exploratory Visualization, Data Joins, Creating visualizations with analytics tool, Sorting, Top N, bottom N, Filtering	02
5	**Visual Analytics:** Optimal visualization types, Binning values, Calculated fields, Table calculations, Level of Detail calculations, Dashboard development, Dashboard design principles, Dashboard interactivity, Connected "drill-down" dashboards.	02
6	**Advanced Concepts:** Handling Large datasets, Fiscal Year Calculations, Parameters, working with stakeholders and creating analytical products, Stakeholder categories, receiving feedback, performing design iterations, ETL (e chart, transform and load), over data.	03
	Total Hours	14

Suggested Text books / Reference books:

1. Few Stephen, Show Me the Numbers: Designing Tables and Graphs to Enlighten (2 ed.), Analytics Press, 2012.
2. Steve Wexler, Jeffrey Shaffer and Andy Cotgreave, The Big Book of Dashboards: Visualizing Your Data Using Real-World Business Scenarios (1 ed.), John Wiley & Sons, 2017.
3. Stephen Few, Information Dashboard Design: Displaying Data for At-a-glance Monitoring (2 ed.), Analytics Press, 2013.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching- learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
5%	25%	30%	25%	10%	5%

Suggested List of Experiments:

1. To create basic charts and pivot charts in Excel.
2. Draw the following plots/graphs using plotly, matplotlib and seaborn libraries in python on random dataset. Also, save the plots/graphs to a file (png, jpg, etc). Give the appropriate label to x axis, y axis and title. (Line plot, Scatter plot, Box plot)
3. Draw the Horizontal Bar chart, Histogram with Plotnine, and Stacked Bar Plot using plotly, matplotlib and seaborn libraries in python on random dataset.
4. Draw basic plots using Tableau (Dual axis chart, Waterfall chart, Bubble chart and Timeline charts)
5. Creating and customizing line charts using Matplotlib
6. Visualizing relationships between two or more variables using scatter plots
7. Visualizing two-dimensional data using heatmaps
8. Visualizing data with Seaborn with Python
9. Visualizing data with Pandas and Plotnine
10. Visualization of semi-structured data using python
11. Crating Interactive Visualization using plotly in Python
12. Create Infographs for Dashboards and Storytelling in Excel
13. Creating visualizations & dashboards using data analytics tool with Case study 1
14. Creating visualizations & dashboards using data analytics tool with Case study 2
15. Creating visualizations & dashboards using data analytics tool with Case study 3

Supplementary Resources:

1. Data Visualization with Tableau Specialization https://www.coursera.org/specializations/data-visualization
2. Visualizing Data with Google Data Studio https://in.coursera.org/projects/googlecloud-visualizing-data-with-google-data-studio-linat
3. Share Data Through the Art of Visualization https://in.coursera.org/learn/visualize-data
4. Power BI for Beginners https://www.simplilearn.com/learn-power-bi-basics-free-course-skillup

Subject Code: 01OE0008

Subject Name: Fundamental Skills in Sensor Interfacing

B. Tech. Year – II (Semester III)

Objective:
After completion of this course, student will be able to:

1. Introduction to various types of sensors and their working principles
2. Types of sensors and their applications
3. Sensor interfacing with microcontroller like Arduino
4. Intelligent systems using sensors and communication modules like Wi-Fi, Bluetooth.

Credits Earned: 03 Credits

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

1. Understand application-based programming concept
2. To create programmes for various open-source programmable boards
3. To develop programmes for specific requirements with interfacing of various components and modules
4. To develop hardware and software interfacing for engineering applications

Pre-requisite of course: NA

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
03	00	00	03	50	30	20	00	00	100

Contents:

Unit	Topics	Hours
1	**Open source boards and IDE** Overview, various boards, hardware specifications, components, and various pins, gui of ide, installation of ide, combination of software and hardware, connection with hardware and libraries	03
2	**Programming using IDE** Program structure, data types, variables, constants, operators, control statements, loops, functions, arrays, strings	07
3	**Function libraries** Input and output functions, character functions, math functions, tone generation, communication protocols and trigonometric functions	03
4	**Sensors and its interfacing with hardware board** Sensors and its classification, analog and digital sensors, active and passive sensors, application specific sensors, working principle of various sensors, interfacing of various sensors with Arduino board.	10
5	**Actuators** Actuators and its classification, types of motion actuators, types of energy actuators, application specific actuators, working principle of various actuators, interfacing of various actuators with Arduino board.	05
6	**Communication protocols** Wired and Wireless communication protocols, Working principle of various protocols like UART, I2C, SPI, Bluetooth, ZigBee and it's interfacing with Arduino Board, GSM module working and it's interfacing with Arduino board	05
7	**Project Implementation using Cloud Connectivity** RFID Case Study, Designing, developing, coding of electronic projects by making use of sensors, actuators and Arduino, communication protocols and internet connectivity to solve the real world problems, troubleshooting and debugging skills to implement the project	09
	Total Hours	42

Suggested Text books / Reference books:

1. Massimo Banzi, "Getting Started with Arduino", O'Reilly Media, September 2011: Second Edition
2. Michael Margolis, "Arduino Cookbook", O'Reilly Media, March 2011, First Edition
3. Rui Santos and Sara Santos, "Arduino For Beginners"
4. Alan G. Smith, "Intro Arduino Book A piece of cake!"

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching- learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
10%	10%	30%	20%	10%	20%

Suggested List of Hands-on Activities:

1. Introduction to open source boards and programing IDEs
2. Various pins available on boards and it's functionally
3. Basic programming to interface LEDs and switches
4. Data types and variables, interfacing of LCD Display
5. Interfacing buzzer with Arduino Board
6. Operators and control statement, Interfacing of Temperature and Humidity sensors
7. Interfacing Pressure sensor with Arduino board
8. Programming using with Time, Loops and Functions, Interfacing Ultrasonic sensor for distance measurement
9. Burglar Alarm using PIR motion sensor.
10. Darkness detector using LDR sensor.
11. Arduino based line follower robot.
12. Fire Alarm System using Flame sensor.
13. Interfacing force sensor with Arduino board.
14. Health Monitoring System using SpO2 sensor
15. Protecting the electronic circuits by current sensing in low power equipment using current sensor.
16. Smart watering plant system using soil moisture sensor.
17. Rain Detection System for the sprinkler system using Arduino and Rain sensor.
18. Gas leakage detection using MQ2 sensor.
19. Use of Strings and arrays in programming
20. Function Libraries installation and use
21. High voltage applications and controlling, Interfacing of DC Motors
22. Speed and intensity control using PWM
23. IR transmitters and receivers applications
24. Robotics application design using servo motor interfacing
25. Interfacing Bluetooth module with Arduino board.
26. Interfacing GSM/GPRS module with Arduino board
27. Interfacing Wi-Fi module with Arduino board.
28. Communication between Arduino and Raspberry Pi via UART protocols.
29. Communication with 2 Arduinos via SPI protocols.
30. Mini Project

Supplementary Resources:

1. https://www.arduino.cc/en/Main/Education
2. https://www.tutorialspoint.com/arduino
3. http://tronixstuff.com/tutorials
4. https://www.arduino.cc/en/Guide/HomePage
5. https://startingelectronics.org/software/arduino/learn-to-program-course