



School of Engineering

Ayya Avinashilingam Nagar, Chinna Thadagam Post, Coimbatore – 641 108

Department of Electronics and Communication Engineering

Vision

To offer quality education in the field of Electronics and Communication Engineering, empowering the women students with good technical expertise, professional competence and moral values.

Mission

M1: Foster a conducive learning environment to enable the students to get well versed with the concepts in the field of Electronics and Communication Engineering.

M2: Associate with the industries to make the students develop sufficient skills to compete in the global scenario.

M3: Encourage the students to involve in research to meet the societal demands and lifelong learning.

M4: Educate the students to practice harmony and imbibe team spirit to achieve professional competence.



Program Outcomes (as given by AICTE)

Engineering Graduates will be able to:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.



PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

PSO1: Design and implement electronic systems for real time applications including Communication systems, Signal Processing, VLSI and Embedded systems.

PSO2: Analyse and solve complex Electronics and Communication Engineering problems, using latest hardware and software tools either independently or in a team.



Courses as per 2019-20 Regulation

S. No.	Code	Course Code	Course Name	*L	**T	#P	Credits
1.	C101	18BESM01	Algebra and Calculus	3	1	-	4
2.	C102	18BESP01	Engineering Physics	3	1	-	4
3.	C103	18BESP02	Physics Practicals	-	-	3	1.5
4.	C104	18BEES01	Basic Electrical Engineering	3	1	-	4
5.	C105	18BEES02	Engineering Graphics	1	-	4	3
6.	C106	18BEES03	Basic Electrical Engineering Practicals	-	-	2	1
7.	C107	18BEHS01	English	2	-	2	3
8.	C108	18BESM02	Laplace Transforms and Complex Variables	3	1	-	4
9.	C109	18BESC01	Engineering Chemistry	3	1	-	4
10.	C110	18BESC02	Chemistry Practicals	-	-	3	1.5
11.	C111	18BEES04	Programming for Problem Solving	3	1	-	4
12.	C112	18BEES05	Workshop Practicals	1	-	4	3
13.	C113	18BEES06	Programming for Problem Solving Practicals	-	-	2	1
14.	C201	18BESM03	Transforms, Partial Differential Equations and Applications	3	1	-	4
15.	C202	18BELS01	C++ and Data Structures	2	-	2	3
16.	C203	18BELC01	Electron Devices	3	-	-	3
17.	C204	18BELC02	Digital Electronics	3	1	-	4
18.	C205	18BELC03	Signals and Systems	3	1	-	4
19.	C206	18BELC04	Networks and Transmission Lines	4	-	-	4
20.	C207	18BELC05	Electron Devices and Networks Practicals	-	-	3	1.5
21.	C208	18BELC06	Digital Electronics Practicals	-	-	3	1.5
22.	C209	18BESM08	Probability and Numerical Methods	3	1	-	4
23.	C210	18BELS02	Control Systems	3	-	-	3
24.	C211	18BELC07	Electronic Circuits	4	-	-	4
25.	C212	18BELC08	Integrated Circuits	3	-	2	4
26.	C213	18BELC09	Microprocessor and Microcontroller	3	1	--	4
27.	C214	18BELC10	Electronic Circuits Practicals	-	-	3	1.5
28.	C215	18BELC11	Microprocessor and Microcontroller Practicals	-	-	3	1.5
29.	C301	18BELC12	Analog and Digital Communication	4	-	-	4
30.	C302	18BELC13	Computer Networks	3	-	-	3
31.	C303	18BELC14	Electromagnetics and Waveguides	4	-	-	4
32.	C304	18BELC15	Digital Signal Processing	3	1	-	4
33.	C305	18BELC16	Embedded Systems	3	-	2	4
34.	C306	18BELC17	Analog and Digital Communication Practicals	-	-	3	1.5
35.	C307	18BELC18	Digital Signal Processing Practicals	-	-	3	1.5
36.	C308	18BELE02	Elective – I: Advanced Digital System Design	3	-	-	3
37.	C309	18BEHS02	Professional Ethics in Engineering	3	-	-	3
38.	C310	18BELC19	VLSI Design	4	-	-	4
39.	C311	18BELC20	Microwave and Fiber Optics	3	-	-	3



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40.	C312	18BELC21	Antennas and Wave Propagation	3	-	-	3
41.	C313	18BELC22	VLSI Design Practicals	-	-	3	1.5
42.	C314	18BELC23	Microwave and Fiber Optics Practicals	-	-	3	1.5
43.	C315	18BELC24	Mini project	-	-	4	2
44.	C316	18BELE14	Elective - II: Fundamentals of IoT	3	-	-	3
45.			Open Elective - I	3	-	-	3
46.	C401	18BEHS11	Principles of Management and Economics	3	-	-	3
47.	C402	18BELC25	Mobile Communication	3	-	-	3
48.		18BELC26	Industrial Internship*	-	-	-	1
49.	C403	18BELC27	Project Work - I	-	-	4	2
50.	C404	18BELE03	Elective - III: Programming with Arduino and Raspberry Pi	3	-	-	3
51.	C405	18BELE08	Elective - IV : Wearable Electronics	3	-	-	3
52.	C406	18BELE32	Elective - V : Wireless Sensor Networks	3	-	-	3
53.			Open Elective - II	3	-	-	3
54.		18BEML01	Electronics and Communication Engineering-Computer Based Test	-	-	-	-
55.	C407	18BELC28	Project Work - II and Dissertation	-	-	20	10
56.		18BELC29	Seminar	-	-	1	1
57.	C408	18BELE30	Elective - VI : Soft Computing Techniques	3	-	-	3
58.			Open Elective - III	3	-	-	3
59.			Open Elective - IV	3	-	-	3
Total							175

***L** - Lecture Hours

****T** - Tutorial Hours

#P - Practical Hours



Course Outcomes and Articulation Matrix for 2019 – 23 Batch Courses

18BESM01 Algebra and Calculus												
C101	C101.1: Improve their skills to solve problems of matrices C101.2: Gain knowledge in the applications of differential calculus C101.3: Determine area and volume using multiple integrals C101.4: Solve higher order linear ordinary differential equations C101.5: Able to apply software tools in solving problems in matrices, ordinary differential equations and multiple integrals											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C101.1	3	3	2	-	-	-	-	-	-	-	-	2
C101.2	3	3	2	-	-	-	-	-	-	-	-	2
C101.3	3	3	2	-	-	-	-	-	-	-	-	2
C101.4	3	3	2	-	-	-	-	-	-	-	-	2
C101.5	2	1	2	-	2	-	-	-	-	-	-	2
Average	2.8	2.6	2	-	2	-	-	-	-	-	-	2

18BESP01 Engineering Physics												
C102	C102.1: Gain knowledge on the concepts and applications of Ultrasonic and Acoustics. C102.2: Acquire knowledge on the concepts and applications of Lasers and Fiber optics. C102.3: Understand the basics of crystals, their structures and crystal growth technique. C102.4: Gain knowledge on the concepts of quantum theory and its applications. C102.5: Understand the basics of vacuum, nano science and its devices.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C102.1	3	2	-	-	-	2	1	-	-	-	-	1
C102.2	3	2	-	-	-	2	-	-	-	-	-	1
C102.3	3	2	2	-	-	2	-	-	-	-	-	1
C102.4	3	2	2	-	-	2	-	-	-	-	-	1
C102.5	3	2	-	-	-	2	-	-	-	-	-	1
Average	3	2	2	-	-	2	1	-	-	-	-	1

18BESP02 Physics Practicals												
C103	C103.1: Gain technical skills in handling instruments and the calculation methods. C103.2: Apply the principle of elasticity and optics for various streams of Engineering. C103.3: Gain practical knowledge on Semiconductor, Dielectric and Magnetic properties of materials.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C103.1	3	3	-	2	1	2	1	-	-	-	-	1
C103.2	3	3	-	2		2	-	-	-	-	-	1
C103.3	3	3	-	2	1	2	-	-	-	-	-	1
Average	3	3	-	2	1	2	1	-	-	-	-	1



18BEES01 Basic Electrical Engineering

C104	C104.1: Understand the basic concepts of AC and DC circuits, analyze circuits using Kirchhoff's voltage & current laws. C104.2: Verify networks theorem and resonance. C104.3: Understand the basics of RLC circuit elements and voltage and current sources. C104.4: Analyze the behavior of magnetic circuits and demonstrate the working of basic electrical machines including DC and AC machines.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C104.1	3	2	-	-	1	-	-	-	-	-	-	-
C104.2	3	2	-	-	1	-	-	-	-	-	-	-
C104.3	3	2	-	-	1	-	-	-	-	-	-	-
C104.4	3	2	-	-	-	-	-	-	-	-	-	-
Average	3	2	-	-	1	-	-	-	-	-	-	-

18BEES02 Engineering Graphics

C105	C105.1: To draw orthographic projection of one dimensional, two dimensional and 3 dimensional objects. C105.2: To prepare isometric and perspective sections of simple solids. C105.3: To demonstrate basic skills in computer aided drafting.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C105.1	3	-	-	-	-	-	-	-	1	3	-	-
C105.2	3	-	-	-	-	-	-	-	2	3	-	-
C105.3	3	-	-	-	3	-	-	-		3	-	-
Average	3	-	-	-	3	-	-	-	1.5	3	-	-

18BEES03 Basic Electrical Engineering Practicals

C106	C106.1: Analyze AC and DC circuits and verify networks theorem. C106.2: Understand the working principle of AC and DC machines.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C106.1	3	2	-	-	1	-	-	-	-	-	-	-
C106.2	3	2	-	-	1	-	-	-	-	-	-	-
Average	3	2	-	-	1	-	-	-	-	-	-	-

18BEHS01 English

C107	C107.1: Identify the techniques of reading and infer meanings. C107.2: Comprehend the grammatical aspects of language usage. C107.3: Understand and analyse data given in tables, charts and diagrams. C107.4: Learn the basic techniques of presentation and public speaking skills. C107.5: Design and create posters, banners, advertisements.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C107.1	-	-	-	-	-	-	-	-	2	3	2	-
C107.2	2	-	-	-	-	-	-	-	-	2	1	-
C107.3	-	2	-	-	-	-	2	3	-	1	-	-
C107.4	-	-	-	-	-	-	-	-	-	3	3	-



C107.5	-	-	-	-	-	-	-	-	2	-	-	-
Average	2	2	-	-	-	-	2	3	2	2.2	2	-

18BESM02 Laplace Transforms and Complex Variables

C108	C108.1: Apply Laplace transform techniques to solve ordinary differential equations. C108.2: Find the analyticity of function of complex variables and interpret its transformations. C108.3: Evaluate real and complex integrals using the Cauchy integral formula and the residue theorem. C108.4: Find the vector differentials and interpret the relation between line, surface and volume integrals of vector quantities. C108.5: Apply softwares with math tool box to solve problems involving vectors, matrices and complex integration problems.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C108.1	3	3	2	-	-	-	-	-	-	-	-	2
C108.2	3	3	2	-	-	-	-	-	-	-	-	2
C108.3	3	3	2	-	-	-	-	-	-	-	-	2
C108.4	3	3	2	-	-	-	-	-	-	-	-	2
C108.5	2	1	2	-	2	-	-	-	-	-	-	2
Average	2.8	2.6	2	-	2	-	-	-	-	-	-	2

18BESC01 Engineering Chemistry

C109	C109.1: Will be familiar with the techniques used for water treatment. C109.2: Will be able to apply electrochemical concepts to solve corrosion problems. C109.3: Will have an understanding about the thermodynamic concepts and prediction of feasibility of chemical reactions. C109.4: Will be familiar with the properties of polymers and the techniques of polymerization. C109.5: Will acquire a basic understanding about spectroscopic techniques used for the analysis of compounds.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C109.1	3	3	2	1	-	1	1	-	-	-	-	1
C109.2	3	3	2	2	-	1	1	-	-	-	-	1
C109.3	3	2	-	1	-	-	-	-	-	-	-	-
C109.4	3	1	1	1	-	1	1	-	-	-	-	1
C109.5	3	2	-	1	-	-	-	-	-	-	-	-
Average	3	2.2	1.6	1.2	-	1	1	-	-	-	-	1

18BESC02 Chemistry Practicals

C110	C110.1: Will acquire skills in measuring, recording and analysing the results. C110.2: Will be able to assess the quality of water. C110.3: Will develop skills in handling analytical instruments. C110.4: Will acquire practical knowledge in concepts of corrosion.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C110.1	3	3	-	3	-	1	-	1	-	-	-	-



C110.2	3	3	-	3	-	3	2	-	-	-	-	1
C110.3	3	3	-	3	-	2	-	-	-	-	-	-
C110.4	3	3	-	3	-	2	-	-	-	-	-	1
Average	3	3	-	3	-	2	2	-	-	-	-	1

18BEES04 Programming for Problem Solving

C111	C111.1: Gain Knowledge on Problem Formulation and development of simple programs. C111.2: Understand the fundamentals of C programming and decision making statements to solve the problem. C111.3: Implement different Operations on arrays and strings handling. C111.4: Apply functions and Pointers to solve the given problem. C111.5: To have a comprehensive knowledge of Structures and File Handling.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C111.1	2	-	-	-	-	-	-	-	-	-	-	-
C111.2	-	2	-	-	-	-	-	-	-	-	-	-
C111.3	2	-	-	-	-	-	-	-	-	-	-	-
C111.4	-	-	1	-	-	-	-	-	-	-	-	-
C111.5	2	-	-	-	-	-	-	-	-	-	-	-
Average	2	2	1	-	-	-	-	-	-	-	-	-

18BEES05 Workshop Practicals

C112	C112.1: Understand carpentry components in various joints and pipe connections including plumbing works. C112.2: Understand residential house wiring, arc welding, centrifugal pumps, Characteristics of PN Junction Diode, Zener Diode.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C112.1	3	-	-	-	-	-	-	-	-	-	-	1
C112.2	3	-	-	-	-	-	-	-	-	-	-	1
Average	3	-	-	-	-	-	-	-	-	-	-	1

18BEES06 Programming for Problem Solving Practicals

C113	C113.1: Implement and develop a program with operations on arrays and Strings. C113.2: Apply functions and Pointers to solve the given problem. C113.3: Apply structures and union to implement file Operations in C programming for a given application.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C113.1	2	-	-	-	-	-	-	-	-	-	-	-
C113.2	-	2	-	-	-	-	-	-	-	-	-	-
C113.3	-	-	-	2	-	-	-	-	-	-	-	-
Average	2	2	-	2	-	-	-	-	-	-	-	-



18BESM03 Transforms, Partial Differential Equations and Applications

C201	C201.1: Identify the need for a function to approximate as an infinite series to represent discontinuous function which occurs in signal processing, electrical circuits etc. C201.2: Recognise the need of various transforms and partial differential equations to solve complex problems in engineering fields like biomedical, communication etc. C201.3: Formulate mathematical models to analyse complex engineering problems											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C201.1	3	3	2	-	-	-	-	-	-	-	-	2
C201.2	3	3	2	-	-	-	-	-	-	-	-	2
C201.3	3	3	2	-	-	-	-	-	-	-	-	2
Average	3	3	2	-	-	-	-	-	-	-	-	2

18BELS01 C++ and Data Structures

C202	C202.1: Use appropriate OOP methodologies to solve real world problem. C202.2: Design and develop programs employing a variety of linear and non-linear data structures such as stacks, queues, binary trees, search trees, heaps, graphs, and B-trees. C202.3: Identify and develop suitable code for sorting, searching and hashing technique.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C202.1	2	3	3	2	-	-	-	-	-	-	2	2
C202.2	3	3	3	2	1	-	-	-	-	-	3	1
C202.3	3	2	2	3	-	-	-	-	-	-	2	
Average	2.67	2.67	2.67	2.33	1.00	-	-	-	-	-	2.33	1.50

18BELC01 Electron Devices

C203	C203.1: Identify various parameters that affect the operating characteristics of diodes, BJT, FET, SCR, UJT and opto electronic devices. C203.2: Design biasing circuits and implement in the laboratory for obtaining the desired operating point and analyze simple amplifier circuits using BJTs and FETs. C203.3: Analyze dc circuits and relate ac models of semiconductor devices with their physical Operation.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C203.1	3	3	2	-	-	-	-	-	-	-	-	-
C203.2	3	3	2	1	-	-	-	-	3	2	-	-
C203.3	3	3	2	1	-	-	-	-	2	2	-	-
Average	3.00	3.00	2.00	1.00	-	-	-	-	2.50	2.00	-	-

18BELC02 Digital Electronics

C204	C204.1: Use specific reduction methods to simplify and implement digital logic circuits. C204.2: Design and implement combinational and sequential circuits using various methods and VHDL code. C204.3: Distinguish between various logic circuits and distinguish											
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	between their performances to implement in VLSI circuits.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C204.1	3	3	3	-	-	-	-	-	1	-	-	-
C204.2	3	3	3	-	3	-	-	-	2	-	-	-
C204.3	3	3	2	-	-	-	-	-	1	-	-	-
Average	3	3	2.6	-	3	-	-	-	1.3	-	-	-

18BELC03 Signals and Systems

C205	C205.1: Analyze the properties of various signals & systems. C205.2: Apply Laplace transform, Continuous Time & Discrete Time Fourier transform and Z transform for signal analysis. C205.3: Analyze continuous time LTI systems using Fourier and Laplace Transforms, discrete time LTI systems using Z transform and DTF. C205.4: Outline sampling and reconstruction of continuous-time signals.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C205.1	3	3	3	-	2	-	-	-	2	2	-	-
C205.2	3	3	3	-	2	-	-	-	2	2	-	-
C205.3	3	3	3	2	2	-	-	-	2	2	-	-
C205.4	3	3	3	-	2	-	-	-	2	2	-	-
Average	3	3	3	2	2	-	-	-	2	2	-	-

18BELC04 Networks and Transmission Lines

C206	C206.1: Explain, analyze, and design diverse network configurations, filters, and equalizers. C206.2: Categorize and demonstrate the transmission of signals through transmission lines and interpret its parameters by using measurement techniques. C206.3: Apply impedance matching concepts and solve transmission line loss problems using smith chart and other mathematical models.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C206.1	3	3	2	2	-	-	-	-	2	-	1	-
C206.2	3	3	2	3	1	-	-	-	2	-	1	-
C206.3	3	3	3	3	1	-	-	-	2	-	2	-
Average	3	3	2.3	2.6	1	-	-	-	2	-	1.3	-

18BELC05 Electron Devices and Networks Practicals

C207	C207.1: Design, implement and analyse the performance of various semiconductor devices and passive circuits. C207.2: Design, simulate and demonstrate different applications of semiconductor devices and passive circuits.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C207.1	3	3	2	1	2	-	-	-	2	2	-	-
C207.2	3	3	2	1	3	-	-	-	2	2	-	-
Average	3	3	2	1	2.5	-	-	-	2	2	-	-



18BELC06 Digital Electronics Practicals

C208	C208.1: Design and implement combinational and synchronous sequential circuits using universal gates. C208.2: Design and demonstrate simple digital systems using various chips. C208.3: Demonstrate the use of VHDL for simulation of different digital logic circuits.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C208.1	3	3	3	1	1	-	-	-	2	-	-	1
C208.2	3	3	3	1	1	-	-	-	2	-	-	1
C208.3	3	2	2	1	3	-	-	-	2	-	-	1
Average	3	2.6	2.6	1	1.6	-	-	-	2	-	-	1

18BESM08 Probability and Numerical Methods

C209	C209.1: Find solution for any number of equations with more unknowns satisfying the system of equations. C209.2: Interpret various techniques and methods in solving ordinary and partial differential equations. C209.3: Apply probability, random variables, discrete and continuous distributions to solve engineering problems.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C209.1	3	3	2	-	-	-	-	-	-	-	-	2
C209.2	3	3	2	-	-	-	-	-	-	-	-	2
C209.3	3	3	2	-	-	-	-	-	-	-	-	2
Average	3	3	2	-	-	-	-	-	-	-	-	2

18BELS02 Control Systems

C210	C210.1: Identify the various control system components and analyse their behaviour under various conditions. C210.2: Examine the various time domain and frequency domain response plots using different methods and plots. C210.3: Evaluate the stability criterions using plots, space model and state variables. C210.4: Design stable control systems for various applications.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C210.1	3	2	1	1	-	-	-	-	1	-	-	1
C210.2	3	2	3	2	-	-	-	-	1	-	-	1
C210.3	3	3	3	2	-	-	-	-	1	-	-	1
C210.4	3	3	3	1	-	-	-	-	1	-	-	1
Average	3	2.5	2.5	1.5	-	-	-	-	1	-	-	1

18BELC07 Electronic Circuits

C211	C211.1: Identify various parameters that effect the operation of Electronic circuits and their performance using BJTs and FETs. C211.2: Design and analyze various amplifier circuits, wave shaping circuits and regulators. C211.3: Study various chips and implement wave shaping circuits and Regulators.											
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C211.1	3	3	2	-	2	-	-	-	2	2	-	-
C211.2	3	3	2	1	2	-	-	-	2	2	-	-
C211.3	3	3	2	2	2	-	-	-	2	2	-	-
Average	3	3	2	1.5	2	-	-	-	2	2	-	-

18BELC08 Integrated Circuits

C212	<p>C212.1: Describe and demonstrate the basic construction of op-amps, AC and DC characteristics and its specification.</p> <p>C212.2: Discuss the concept of various of use of op-amp in various applications including multipliers, PLL and other applications in communication system.</p> <p>C212.3: Design, implement and explain the linear as well as non-linear applications of op-amp and analyse its performance.</p> <p>C212.4: Analyse the op-amp applications for data conversion and of timers, voltage regulators and amplifiers.</p>											
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C212.1	3	2	1	-	1	-	-	-	2	1	1	-
C212.2	3	2	1	-	1	-	-	-	2	1	1	-
C212.3	3	1	1	-	1	-	-	-	2	1	2	-
C212.4	3	2	1	-	1	-	-	-	2	1	1	-
Average	3	1.7	1	-	1	-	-	-	2	1	1.2	-

18BELC09 Microprocessor and Microcontroller

C213	<p>C213.1: Identify the difference between 8086 Microprocessor and 8051 Microcontroller and explain their operation.</p> <p>C213.2: List and apply various instruction sets and addressing modes of 8086 Microprocessor and 8051 Microcontroller for programming and interfacing.</p> <p>C213.3: Apply the interfacing concepts of memory and I/O devices for simple applications.</p>											
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C213.1	3	2	-		-	-	-	-	-	-	1	
C213.2	3	3	2	1	-	-	-	-	1	-	1	1
C213.3	3	3	3	1	-	-	-	-	1	-	1	1
Average	3	2.6	2.5	1	-	-	-	-	1	-	1	1

18BELC10 Electronic Circuits Practicals

C214	<p>C214.1: Design and analyze the response of amplifier circuits, wave shaping circuits and voltage regulators.</p> <p>C214.2: Generate sine, square and triangular waveforms with required frequency, duty cycle and amplitude.</p> <p>C214.3: Design PCBs for various applications.</p>											
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C214.1	3	3	3	2	2	-	-	-	2	2	-	-
C214.2	3	2	3	2	2	-	-	-	2	2	-	-
C214.3	3	2	3	2	2	-	-	-	2	2	-	-
Average	3	2.6	3	2	2	-	-	-	2	2	-	-



18BELC11 Microprocessor and Microcontroller Practicals

C215	C215.1: Write flow chart and compile the basic operations using of 8086 microprocessor and 8051 microcontrollers with assembly language programming and MASM software. C215.2: Demonstrate simple applications of 8086 microprocessor. C215.3: Conceive, design and implement I/O interfaces to 8086 microprocessors for various applications.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C215.1	3	2	2	1	3	-	-	-	2	-	1	1
C215.2	3	3	3	1	3	-	-	-	2	-	1	1
C215.3	3	3	3	1	3	-	-	-	2	-	1	1
Average	3	2.6	2.6	1	3	-	-	-	2	-	1	1

18BELC12 Analog and Digital Communication

C301	C301.1: Explain the various analog, pulse and digital modulation processes and systems. C301.2: Analyze the effect of noise in the communication system and methods of error correction due to Noise. C301.3: Interpret the need of coding and apply source and channel coding techniques.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C301.1	3	2	2	-	1	-	-	-	-	-	-	1
C301.2	3	2	2	-	1	-	-	-	-	-	-	1
C301.3	3	2	2	-	1	-	-	-	-	-	-	1
Average	3.00	2.00	2.00	-	1.00	-	-	-	-	-	-	1.00

18BELC13 Computer Networks

C302	C302.1: Explain the importance of OSI reference model and have a good knowledge about the functionality of all the layers of OSI Model. C302.2: Discuss about the error detection and correction mechanism, routing methods and protocols used in various layers of OSI model. C302.3: Analyse the requirements of a given organizational structure and select the most appropriate networking architecture and technology as per the requirements.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C302.1	3	2	-	1	-	-	-	1	1	-	-	1
C302.2	3	2	-	2	-	-	-	1	2	-	-	1
C302.3	3	3	-	2	-	-	-	1	2	-	-	2
Average	3.00	2.33	-	1.67	-	-	-	1.00	1.67	-	-	1.33

18BELC14 Electromagnetics and Waveguides

C303	C303.1: Apply various mathematical models to static electric-magnetic fields and interpret their behaviour. C303.2: Analyze the waves in free space and various mediums using Maxwell's equations. C303.3: Examine the behaviour of electromagnetic waves in free space and											
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	guided medium so as to suggest for various applications.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C303.1	3	3	-	1	1	-	-	-	1	-	-	1
C303.2	3	3	-	2	1	-	-	-	2	-	-	1
C303.3	3	2	-	2	2	-	-	-	2	-	-	1
Average	3	2.67	-	1.67	1.33	-	-	-	1.67	-	-	3

18BELC15 Digital Signal Processing

C304	C304.1: Appreciate the properties of DFT to apply DFT to digital signals & systems and analyze Quantization effects of Finite Register Length in realization of Digital Filters. C304.2: Design IIR and FIR filters and realize the structures of Linear Digital Filters. C304.3: Compare the properties and addressing modes of various processors and use the DSP Processors for various DSP applications.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C304.1	3	3	3	-	3	-	-	-	2	2	-	-
C304.2	3	3	3	-	3	-	-	-	2	2	-	-
C304.3	3	3	3	2	3	-	-	-	2	2	-	-
Average	3.00	3.00	3.00	2.00	3.00	-	-	-	2.00	2.00	-	-

18BELC16 Embedded Systems

C305	C305.1: Explain the embedded system concepts and architecture of ARM and PIC. C305.2: Write embedded programming in C for simple applications using ARM7 and PIC. C305.3: Conceive and Demonstrate the use of programming and RTOs tasks for various applications.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C305.1	3	2		2	2	-	-	-	-	-	1	1
C305.2	3	2	1	2	2	-	-	-	1	-	1	1
C305.3	3	2	1	3	2	-	-	-	1	-	1	1
Average	3.00	2.00	1.00	2.33	2.00	-	-	-	1.00	-	1.00	1.00

18BELC17 Analog and Digital Communication Practicals

C306	C306.1: Design, implement and evaluate different building blocks of Analog communication and digital communication systems. C306.2: Analyze the behaviour of multiplexers, demultiplexers, modulators, demodulators and various antennas. C306.3: Use Mat lab tools to simulate and observe constellations diagrams of digital modulation schemes and their behaviour.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C306.1	3	2	1	-	2	-	-	-	2	-	2	1
C306.2	3	2	1	2	2	2	-	-	2	-	2	1
C306.3	3	2	1	1	2	-	-	-	2	-	2	1
Average	3	2	1	1.5	2	2	-	-	2	-	2	1



18BELC18 Digital Signal Processing Practicals

C307	C307.1: Perform operations like convolution, FFT, Quantization and apply the same to signal processing. C307.2: Design digital filters using various DSP processors and implementation the same. C307.3: Verify and Analyze arithmetic operations and finite word length effect on DSP systems.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C307.1	3	3	3	-	3	-	-	-	2	3	1	-
C307.2	3	3	3	1	3	-	-	-	2	3	1	-
C307.3	3	3	3	2	3	2	-	-	2	3	1	-
Average	3	3	3	1.5	3	2	-	-	2	3	1	-

18BELE02 Advanced Digital System Design

C308	C308.1: Design combinational circuits using Shannon's theorem, multiplexers and decoders. C308.2: Design and analyse synchronous and asynchronous sequential circuits. C308.3: Compare and use different PLDs and FPGAs for applications.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C308.1	3	3	3	-	2	-	-	-	1	-	-	1
C308.2	3	3	3	-	2	-	-	-	1	-	-	1
C308.3	3	3	2	-	2	-	-	-	1	-	-	1
Average	3	3	2.67	-	2	-	-	-	1.00	-	-	1.00

18BEHS02 Professional Ethics in Engineering

C309	C309.1: Identify the basic perception of profession, professional ethics, various moral & social issues, industrial standards, code of ethics and role of professional ethics in engineering field. C309.2: Analyze the professional rights and responsibilities of an engineer, responsibilities of an engineer for safety and risk benefit analysis. C309.3: Outline the knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C309.1	2	-	3	3	-	3	2	-	-	2	3	-
C309.2	3	-	2	-	-	2	3	2	-	3	-	-
C309.3	2	-	2	-	-	2	3	2	-	-	-	3
Average	2.33	-	2.33	1	-	2.33	2.67	2	-	1.67	1	1

18BELC19 VLSI Design

C310	C310.1: Explain fabrication, properties, and behaviour of MOS Transistors. C310.2: Identify the concepts of VLSI Design process, synthesise digital VLSI systems using modern simulation tools. C310.3: Design different digital logic circuits and arithmetic building blocks using NMOS and CMOS.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12



C310.1	3	3	3	1	2	-	-	-	2	2	-	-
C310.2	3	2	2	1	2	-	-	-	2	2	-	-
C310.3	3	3	3	1	2	-	-	-	2	2	-	-
Average	3	2.67	2.67	1	2	-	-	-	2	2	-	-

18BELC20 Microwave and Fiber Optics

C311	C311.1: Explain various microwave as well as fiber optic devices their microwave parameters and discriminate diverse microwave components. C311.2: Recall and calculate parameters of microwave tubes and optical devices. C311.3: Identify, predict and illustrate the propagation and design microwave and fiber optic links.											
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C311.1	3	3	3	2	1	-	-	-	1	-	2	2
C311.2	3	2	1	1	1	-	-	-	1	-	2	1
C311.3	3	3	2	1	1	-	-	-	1	-	2	1
Average	3	2.67	2	1.33	1	-	-	-	1	-	2	1.33

18BELC21 Antennas and Wave Propagation

C312	C312.1: Discuss various antennas and their properties and predict their performance. C312.2: Identify and design various special antennas for specific application and measure test its performance. C312.3: Explain and analyze the propagation characteristics of waves in various mediums.											
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C312.1	3	3	2	3	-	-	-	-	-	-	1	2
C312.2	3	3	3	2	-	-	-	-	-	-	1	-
C312.3	3	2	3	2	-	1	3	-	-	3	1	2
Average	3	2.67	2.67	3	-	0.33	1	-	-	1	1	1.33

18BELC22 VLSI Design Practicals

C313	C313.1: Use modern design tools like Xilinx to simulate CMOS inverter and logic gates using MOS Transistor. C313.2: Design and simulate combinational and sequential logic circuits using MOS transistors. C313.3: Conceive and design digital sub systems including ALU and memory.											
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C313.1	2	2	1	1	3	-	-	-	2	2	1	1
C313.2	2	2	1	1	3	-	-	-	2	2	1	1
C313.3	2	2	2	1	3	-	-	-	2	2	1	1
Average	2	2	1.3	1	3	-	-	-	2	2	1	1



18BELC23 Microwave and Fiber Optics Practicals

C314	C314.1: Identify the electromagnetic field components and verify the specifications of various microwave components. C314.2: Evaluate the characteristics of antennas and compute the parameters of microwave as well as fiber-optics components. C314.3: Design and evaluate data transmission in optical fiber link by building multiplexed base band.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C314.1	3	2	1	3	1	-	1	-	-	-	3	2
C314.2	3	2	1	2	1	-	1	-	-	-	3	2
C314.3	3	3	2	3	1	-	1	-	-	-	2	2
Average	3.00	2.33	2.66	2.66	1.00		1.00				2.66	2.00

18BELE14 Fundamentals of IoT

C316	C3016.1: Discuss fundamentals of IoT protocols, levels and design methodology C3016.2: Design a portable IoT application using Arduino/ equivalent boards and connect to the Cloud C3016.3: Develop web services to access/control IoT devices											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C3016.1	3	2	1	-	1	-	-	-	1	-	-	1
C3016.2	3	3	3	-	1	-	-	-	1	-	-	1
C3016.3	3	3	3	-	1	-	-	-	1	-	-	1
Average	3.00	3.00	3.00		1.00				1.00			1.00

18BEHS11 Principles of Management and Economics

C401	C401.1: Compile the history of Organizational Behaviour, dynamics of marketing in business and theories of moral development C401.2: Analyze and Apply the cost concepts using PERT, CPM and SQC techniques. C401.3: Apply the principles of Management, Economics and quality control in an organization. C401.4: Apply project management software tools in modern Project Management scenario.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C401.1	2	2	2	-	-	-	2	-	-	2	2	-
C401.2	-	-		3	3	-	2	2	3	-	-	3
C401.3	2	2	2	-	-	-	3	-	3	2	-	-
C401.4	-	-	-	-	-	2	2	2	-	-	2	-
Average	2	2	2.33	3	3	2	2.25	2	3	2	2	3



18BELC25 Mobile Communication

C402	C402.1: Classify various mobile networks, propagation models, equalisation, coding techniques and spectrum efficient modulation techniques. C402.2: Compare use of cell configuration, modulation techniques, multiple access techniques and various generations of mobile networks. C402.3: Identify different wireless systems and standards for different applications.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C402.1	3	3	2	1	-	-	-	-	1	1	-	-
C402.2	3	3	2	1	-	-	-	-	1	1	-	-
C402.3	3	2	2	1	-	-	-	-	1	1	-	-
Average	3	2.66	2	1	-	-	-	-	1	1	-	-

18BELE03 Programming with Arduino and Raspberry Pi

C404	C405.1: Define the use of Microprocessor and Microcontroller in Arduino uno and Raspberry Pi. C405.2: Develop simple programs with embedded c and interface I/O devices for different application using Arduino uno and Raspberry Pi. C405.3: Write simple programs with MATLAB for different application using Raspberry Pi. C405.4: Build their own IoT system using Arduino Uno and Raspberry pi for real time application.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C405.1	3	2	2	1	2	-	-	-	1	-	-	1
C405.2	3	2	2	1	2	-	-	-	1	-	-	1
C405.3	3	2	2	1	2	-	-	-	1	-	-	1
C405.4	3	2	2	1	2	-	-	-	1	-	-	1
Average	3	2	2	1	2	-	-	-	1	-	-	1

18BELE08 Wearable Electronics

C405	C406.1: Explain the need of wireless health systems, energy resources and signal processing technique used in the design of wearable systems. C406.2: Apply the energy harvesting techniques in the wearable devices. C406.3: Define the state of the art in research and development on wearable computing, wireless Body Area Network (BSNs), wearable systems integrated with mobile computing, wireless networking, and cloud computing.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C406.1	3	2	1	-	1	1	-	-	1	1	1	2
C406.2	3	2	1	-	1	1	-	-	1	1	1	1
C406.3	3	2	1	-	1	1	-	-	1	1	1	1
Average	3	2	1	-	1	1	-	-	1	1	1	1.33



18BELE32 Wireless Sensor Networks												
C406	C407.1: Explain the concepts, network architectures and applications of wireless sensor networks. C407.2: Design MAC and routing protocols for wireless sensor networks. C407.3: Create WSN infrastructure. C407.4: Use WSN mote programming platform and tools.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C407.1	3	2	2	1	1	-	-	-	2	2	-	-
C407.2	3	2	2	1	1	-	-	-	2	2	-	-
C407.3	3	2	2	1	1	-	-	-	2	2	-	-
C407.4	3	2	2	1	1	-	-	-	2	2	-	-
Average	3	2	2	1	1	-	-	-	2	2	-	-

18BELE30 Soft Computing Techniques												
C408	C412.1: Design of various neural networks C412.2: Use the concepts of fuzzy logic. C412.3: Discuss and design hybrid soft computing. C412.4: Apply genetic programming for soft computing applications.											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C412.1	3	2	2	2	-	-	-	-	1	-	-	1
C412.2	3	2	1	-	-	-	-	-	1	-	-	1
C412.3	3	2	1	-	-	-	-	-	1	-	-	1
C412.4	3	2	1	1	-	-	-	-	1	-	-	1
Average	3	2	1.25	1.50	-	-	-	-	1	-	-	1



Attainment of Course Outcomes

A. CO Assessment Processes:

The key aspects in Outcome-Based Education (OBE) are the assessment of course outcomes. At the initial stage of OBE implementation, the Course Outcomes (COs) for each course are defined based on the Programme Outcome (POs) and other requirements. Course outcomes are statements that specify what a learner will know or be able to do as a result of a learning activity. Outcomes are usually expressed as knowledge, skills, or attitudes. It is a measurable, observable, and specific statement that clearly indicates what a student should know and be able to do as a result of learning. It describes what students are able to demonstrate in terms of knowledge, skills and values upon completion of a course/a span of several courses.

At the end of each course, the COs needs to be assessed and evaluated, to check whether it has been attained or not. Assessment is one or more processes, carried out by the department, that identify, collect, and prepare data to evaluate the achievement of Programme Outcomes and Programme Educational Objectives.

Course correlation matrix shows the learning relationship (Level of Learning Achieved) between Course Outcomes and Program Outcomes of a course. This matrix strongly indicates whether the students are able to achieve the course objectives/ outcomes. The below Table 1 gives information about the action verbs used in the POs and the nature of POs, stating whether the POs are technical or non-technical, with an understanding of the intention of each PO and the Bloom's level to which each of these action verbs in the Pos correlates to. After understanding the POs, write the COs for a course and correlate the COs with the POs.

Type	POs	POs action Verbs	POs Blooms Levels	COs Bloom's Level(s)
Technical Skills	PO1	Apply	L3	L1 to L4: Theory Courses L1 to L5: Laboratory Courses L1 to L6: Mini Project and Major Project
		Identify	L2	
	PO2	Formulate	L6	
		Review	L2	
	PO3	Design	L3,L6	
		Develop	L3,L6	
	PO4	Analyze	L4	
		Interpret	L2,L3	
		Design	L6	
		Create	L6	
	PO5	Select	L1,L2,L6	
		Apply	L3	
	PO6	Apply	L3	
		Assess	L5	



Transferable Skills	PO7	THUMB RULE: If L1 Action Verbs of a CO » Correlates with any of PO7 to PO12 »»» then assign 1 If L2 to L3 Action Verbs of a CO » Correlates with any of PO7 to PO12 »»» then assign 2 If L4 to L6 Action Verbs of a CO » Correlates with any of PO7 to PO12 »»» then assign 3
	PO8	
	PO9	
	PO10	
	PO11	
	PO12	

Table 1 Process for mapping the values for CO-PO Matrix

The first six POs are purely technical in nature, while the other POs are transferable skills. The CO level is set between 1 and 4 for the theory courses. The CO level is set between 1 and 5 for the laboratory courses. The CO level is extended up to 6th level only for mini projects and major projects. For a given course, the course faculty member has to involve all other faculty members who teach that course and ask them to come up with the CO-PO mapping.

Procedure followed while assigning the values by mapping COs to POs.

- Select action verbs for a CO from different Bloom's levels based on the importance of the particular CO for the given course.
- Stick onto single action verbs while composing COs and use for multiple action verbs if the need arises.
- Values to CO-PO (technical POs in particular) matrix are assigned by
 - ❖ Judging the importance of the particular CO in relation to the POs. If the CO matches strongly with a particular PO criterion then 3 is assigned, if it matches moderately then 2 is assigned, if the match is low then 1 is assigned and if the CO does not match with the particular PO, it is marked with "-" symbol.
 - ❖ If an action verb used in a CO is repeated at multiple Bloom's levels, then reconsider which Bloom's level is the best fit for that action verb.

Setting CO Attainment Targets

The target is set based on categorizing the courses into three levels: Difficult, Moderately Difficult and Other courses. The Table 2 shows the courses categorization.

S. No.	Course Name	Semester	Target
Difficult Courses			
1	Transforms, Partial Differential Equations and Applications	III	60 %
2	Digital Electronics	III	
3	Signals and Systems	III	
4	Probability and Numerical Methods	IV	
5	Control Systems	IV	
6	Electronic Circuits	IV	



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7	Digital Signal Processing	V	
8	Advanced Digital System Design	V	
9	Soft Computing Techniques	VII	
Moderately Difficult Courses			
10	Electron Devices	III	65%
11	C++and Data Structures	III	
12	Networks and Transmission Lines	III	
13	Integrated Circuits	IV	
14	Microprocessor and Microcontroller	IV	
15	Analog and Digital Communication	V	
16	Computer Networks	V	
17	Electromagnetics and Waveguides	V	
18	Embedded Systems	V	
19	VLSI Design	VI	
20	Microwave and Fiber Optics	VI	
21	Antennas and Wave Propagation	VI	
22	Fundamentals of IoT	VI	
23	Mobile Communication	VII	
24	Programming with Arduino and Raspberry Pi	VII	
25	Wearable Electronics	VII	
26	Wireless Sensor Networks	VIII	
Other Courses			
27	Electron Devices and Networks Practicals	III	75%
28	Digital Electronics Practicals	III	
29	Electronic Circuits Practicals	IV	
30	Microprocessor and Microcontroller Practicals	IV	
31	Analog and Digital Communication Practicals	V	
32	Digital Signal Processing Practicals	V	
33	Professional Ethics in Engineering	VI	
34	VLSI Design Practicals	VI	
35	Microwave and Fiber Optics Practicals	VI	
36	Mini Project	VI	
37	Principles of Management and Economics	VII	
38	Industrial Internship	VII	
39	Project Work-I	VII	
40	Electronics and Communication Engineering-Computer Based Test	VII	
41	Project Work–II & Dissertation	VIII	

Table 2 Course Categorization

The rubrics for the target set is given in Table 3



Difficult Courses	
High	: 3 \geq 65% of students scoring more than 60% of marks
Medium	: 2 \geq 60% of students scoring more than 60% of marks
Low	: 1 \geq 50% of students scoring more than 60% of marks
Moderately Difficult Courses	
High	: 3 \geq 65% of students scoring more than 65% of marks
Medium	: 2 \geq 60% of students scoring more than 65% of marks
Low	: 1 \geq 50% of students scoring more than 65% of marks
Other Courses	
High	: 3 \geq 65% of students scoring more than 75% of marks
Medium	: 2 \geq 60% of students scoring more than 75% of marks
Low	: 1 \geq 50% of students scoring more than 75% of marks

Table 3 Rubrics for Attainment

Attainment of COs

1. Attainment of COs are measured using **direct assessment tools**.
2. Direct attainment of COs can be determined from the student's performance in all the relevant assessment tools, namely Continuous Internal Assessments, Assignments and Semester End Examination.

The process of CO attainment is described in Figure 1.

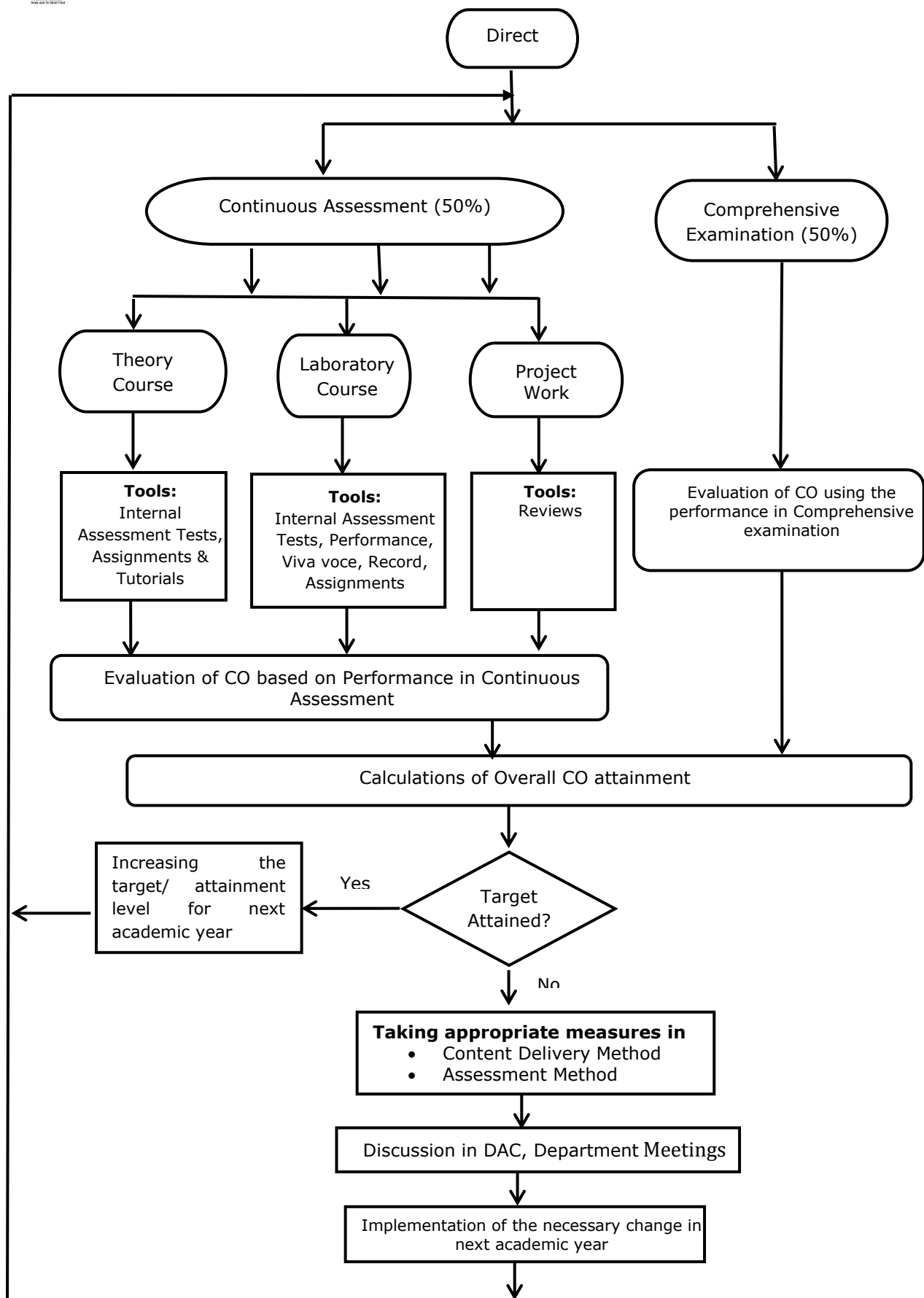


Figure 1 Flowchart of CO Attainment



CO Assessment Tools:

The tools used for CO assessment are Continuous Internal Assessment (CIA), Assignment and Comprehensive Examination (CE)/Semester End Examination (SEE). This direct method provides a sampling of what students know and/or can do and provide strong evidence of student learning. Assessment tools considered for the calculation of CO attainment is shown in the Table 4.

Assessment Tool	Particulars	Process
Continuous Internal Assessment	Theory Courses:	Two Internal Assessment Tests are conducted per semester. Each question is mapped with COs and blooms level. The marks given for each question is considered for attainment of course outcomes.
	a. Continuous Internal Assessment	
	b. Assignment (Written Assignment/ Presentation/ Quiz)	Two assignments are given to the students based on the subject nature for each course. These two assignments are evaluated and mapped with COs.
	Laboratory Courses:	The evaluation criteria for each experiment is based on performance, viva-voce and record mark. The attainment of COs is calculated through continuous assessment of experiments conducted.
	a. Continuous Internal Assessment	
Comprehensive Examination	b. Assignment (Observation Book /Record/ Open End Experiment)	Two assignments are given based on the laboratory experiments. These two assignments are evaluated and mapped with COs.
	Project work:	Three reviews are conducted periodically to monitor and evaluate the progress of the project using project rubrics.
	Project Reviews	
Comprehensive Examination	Theory, Laboratory and Project Viva Voce	<ul style="list-style-type: none"> At the end of each semester, final examination is conducted for Theory and Laboratory courses in which question paper covers the entire syllabus and all the COs are covered in the question papers. Based on the percentage of students scoring above the target %, the attainment level is calculated. Project final Viva Voce is conducted at the end of the semester as per Institute norms. The mapping is done based on the overall marks scored by individual students.

Table 4 Assessment Tools for CO Attainment



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The weightages for CIA and CE/SEE for 2019 -2023 batch student is shown in Table 5.

S. No.	Category of Course	CIA (%)	CE/SEE (%)	Total (%)
a.	Theory course	50	50	100
b.	Laboratory courses	50	50	100
c.	Mini project	100	-	100
d.	Project work I	100	-	100
e.	Project work II & Dissertation	100 marks	100 marks	200 marks

Table 5 Weightages for CIA and CE/SEE for 2018 -2019 Scheme

Course Outcome Attainment Levels for all Theory and Laboratory courses

CO attainment level is set for the courses based on the Continuous Internal assessment (CIA), Assignment and Comprehensive Examinations (CE).

For the batch 2019 - 23, Attainment of a CO for a course is set as,

- 50% weightage for Continuous Internal Assessment (Inclusive of Assignments)
- 50% weightage for Comprehensive examinations.

Measuring Course Outcomes attained through Semester End Examinations (SEE)

Based on Comprehensive examination marks, the attainment level of COs is calculated. The attainment level is decided based on the following criteria, shown in Table 6.

S. No.	Rubrics	Attainment level
1	65% of the students scoring more than or equal to the Target % (60/65/75) of Marks in the Comprehensive Examination	3
2	60% of the students scoring more than or equal to the Target % (60/65/75) of Marks in the Comprehensive Examination	2
3	50% of the students scoring more than or equal to the Target % (60/65/75) of Marks in the Comprehensive Examinations	1

Table 6 Comprehensive Examination Attainment level

The target % is set by averaging the previous three year comprehensive marks scored in a course by the students and the difficulty of the subject decided by the course instructor.



Measuring CO attainment through Continuous Internal Assessment (CIA)

Targets are set based on categorising courses into three levels: Difficult, Moderately Difficult and Others. A target of 60% is given to difficult courses, 65% to moderately difficult and 70 % to other courses. The assessment tools (CIA I, CIA II, assignments and mini projects) are mapped with the COs. The CO attainment is measured using the following target levels for I to VIII Semester Courses, shown in Table 7.

S. No.	Rubrics	Attainment level
1	65% of the Students scoring more than or equal to Target % of Marks in CO _{x_i}	3
2	60% of the Students scoring more than or equal to Target % of Marks in CO _{x_i}	2
3	50% of the Students scoring more than or equal to Target % of Marks in CO _{x_i}	1

Table 7 Continuous Internal Examinations Attainment level

The procedure followed to measure the course outcome is,

- Questions of the Continuous Internal Assessment are mapped to various course outcomes and their contribution is calculated.
- The course outcomes for all the courses are calculated in terms of percentage using the formula.

$$COx_i \text{ in } \% = \frac{\text{Marks obtained by the students in } COx_i}{\text{Maximum Marks allotted in } COx_i} \times 100$$

Where,

$$x_i = [1 \text{ to } N], N = \text{Number of Course Outcomes}$$

- The same procedure is carried out for all the students.
- The average of the attainment of the individual student CO's will give each CO attainment for the entire course.

CO_{x_i} Attainment in %

$$= \frac{\text{No. of students scored greater than or equal to target \% of marks in } COx_i}{\text{No. of students}} \times 100$$

Where,

$$x_i = [1 \text{ to } N], N = \text{Number of Course Outcomes}$$



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- The average attainment level of the entire class for each CO is computed and compared to the % threshold set up.
- After calculating the attainment levels of each COs from the performance of Continuous Internal Assessment Test 1, 2 and the assignments, the attainment level is calculated with ratio of sum of all Cos attained by total number of Cos as shown below:

$$CIA \text{ Attainment level} = \frac{\text{Sum of all COs attained by students}}{\text{Total No. of COs}}$$

Attainment is measured in terms of actual percentage of students getting above the target percentage of marks. If targets are achieved, then all the COs are attained for that year and if targets are not achieved necessary actions are planned for further improvement.

CO Attainment for all the courses of 2019 – 23 batch is shown in Table 8.

Course outcome	Course Name	CO set target Level	CO attainment in percentage For CIA	CO attainment in percentage for CE	Attainment Level In CIA	Attainment Level in CE	Average CO attainment level
18BESM01	Algebra and Calculus	60%	78.8%	94%	1.2	1.5	2.7
18BESP01	Engineering Physics	60%	68.2%	35.3%	1.0	0.0	1.0
18BESP02	Physics Practicals	75%	91.18%	93.1%	1.5	1.5	3.0
18BEES01	Basic Electrical Engineering	65%	61.77%	58.8%	0.83	0.5	1.33
18BEES02	Engineering Graphics	65%	43.13%	35.3%	0.5	0.00	0.5
18BEES03	Basic Electrical Engineering Practicals	75%	75.98%	77.9%	3.0	3.0	3.0
18BEHS01	English	75%	98.8%	100%	1.5	1.5	3.0
18BESM02	Laplace Transforms and Complex Variables	60%	84.7%	100%	1.3	1.5	2.8
18BESC01	Engineering Chemistry	60%	71.77%	100%	1.2	1.5	2.7
18BESC02	Chemistry Practicals	75%	91.18%	93.1%	1.5	1.5	3.0
18BEES04	Programming for Problem Solving	65%	87%	100%	1.3	1.5	2.8
18BEES05	Workshop Practicals	75%	80.88%	85.3%	0.85	1.5	2.37



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18BEES06	Programming for Problem Solving Practicals	75%	81%	58%	1.5	0.0	1.5
18BESM03	Transforms, Partial Differential Equations and Applications	60%	92.59%	67%	1.5	1.0	2.5
18BELS01	C++ and Data Structures	65%	77.7%	88%	1.0	1.5	2.5
18BELC01	Electron Devices	65%	83.3%	89%	1.5	1.5	3.0
18BELC02	Digital Electronics	60%	83.3%	94%	1.5	1.5	3.0
18BELC03	Signals and Systems	60%	86.1%	72.2%	1.5	1.5	3.0
18BELC04	Networks and Transmission Lines	65%	92.5%	100%	1.5	1.5	3.0
18BELC05	Electron Devices and Networks Practicals	75%	91.2%	91.2%	1.5	1.5	3.0
18BELC06	Digital Electronics Practicals	75%	80.87%	88.9%	1.25	1.5	2.75
18BESM08	Probability and Numerical Methods	60%	62.96%	83%	1.0	1.5	2.5
18BELS02	Control Systems	60%	100%	100%	1.5	1.5	3.0
18BELC07	Electronic Circuits	60%	96.29%	83%	1.5	1.5	3.0
18BELC08	Integrated Circuits	65%	91.67%	100%	1.5	1.5	3.0
18BELC09	Microprocessor and Microcontroller	65%	79.63%	89%	1.17	1.5	2.67
18BELC10	Electronic Circuits Practicals	75%	78%	77%	0.83	1.0	1.83
18BELC11	Microprocessor and Microcontroller Practicals	75%	79.8%	83.3%	1.08	1.5	2.58
18BELC12	Analog and Digital Communication	65%	92.59%	39%	1.5	0	1.5
18BELC13	Computer Networks	65%	96.29%	33%	1.5	0	1.5
18BELC14	Electromagnetics and Waveguides	65%	98.15%	72%	1.5	1.0	2.50
18BELC15	Digital Signal Processing	60%	92.59%	78%	1.5	1.5	3.0
18BELC16	Embedded Systems	65%	98.15%	61%	1.5	0.5	2.0
18BELC17	Analog and Digital Communication Practicals	75%	76.5%	61.1%	1.25	1.0	2.25
18BELC18	Digital Signal Processing Practicals	75%	63%	50%	0.66	0.0	0.66



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18BELE02	Elective – I: Advanced Digital System Design	60%	96.29%	72%	1.5	1.5	3.0
18BEHS02	Professional Ethics in Engineering	75%	75.9%	83%	1.0	1.5	2.5
18BELC19	VLSI Design	65%	46.30%	89%	0.83	1.5	2.33
18BELC20	Microwave and Fiber Optics	65%	79.63%	83%	1.5	1.5	3.0
18BELC21	Antennas and Wave Propagation	60%	59.26%	61%	1.0	1.0	2.0
18BELC22	VLSI Design Practicals	75%	73.73%	61%	0.92	1.0	1.92
18BELC23	Microwave and Fiber Optics Practicals	75%	89.6%	83.3%	1.5	1.5	3.00
18BELC24	Mini project	75%	100%	-	3.00	-	3.00
18BELE14	Elective – II: Fundamentals of IoT	65%	66.67%	78%	1.17	1.5	2.67
18BEHS11	Principles of Management and Economics	75%	63.89%	61%	1.0	0.0	1.0
18BELC25	Mobile Communication	65%	74%	67%	1.17	1.5	2.67
18BELC27	Project Work - I	75%	100%	-	3.00	-	3.00
18BELE03	Elective – III: Programming with Arduino and Raspberry Pi	65%	66.67%	83.3%	0.67	1.5	2.17
18BELE08	Elective - IV: Wearable Electronics	65%	61.1%	67%	0.83	1.5	2.33
18BELE32	Elective – V: Wireless Sensor Networks	65%	56.95%	94.4%	0.63	1.5	2.13
18BELC28	Project Work – II and Dissertation	75%	100%	100%	1.50	1.50	3.00
18BELE30	Elective - VI: Soft Computing Techniques	60%	72.2%	100%	1.17	1.5	2.67

Table 8 CO Attainment for all the courses of 2019 – 23 batch



CO – PO Articulation Matrix

S. No.	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1.	C101	2.8	2.6	2	-	2	-	-	-	-	-	-	2	1	2
2.	C102	3	2	2	-	-	2	1	-	-	-	-	1	1	1
3.	C103	3	3	-	2	1	2	1	-	-	-	-	1	1	1
4.	C104	3	2	-	-	1	-	-	-	-	-	-	-	1	2
5.	C105	3	-	-	-	3	-	-	-	1.5	3	-	-	1	1
6.	C106	3	2	-	-	1	-	-	-	-	-	-	-	1	1
7.	C107	2	2	-	-	-	-	2	3	2	2.2	2	-	-	-
8.	C108	2.8	2.6	2	-	2	-	-	-	-	-	-	2	1	2
9.	C109	3	2.2	1.6	1.2	-	1	1	-	-	-	-	1	1	1
10.	C110	3	3	-	3	-	2	2	-	-	-	-	1	-	1
11.	C111	2	2	1	-	-	-	-	-	-	-	-	-	1	1
12.	C112	3	-	-	-	-	-	-	-	-	-	-	1	1	1
13.	C113	2	2	-	2	-	-	-	-	-	-	-	-	1	2
14.	C201	3	3	2	-	-	-	-	-	-	-	-	2	1	2
15.	C202	2.67	2.67	2.67	2.33	1	-	-	-	-	-	2.33	1.50	1	1
16.	C203	3	3	2	1	-	-	-	-	2.50	2	-	-	1	2
17.	C204	3	3	2.6	-	3	-	-	-	1.3	-	-	-	2	2
18.	C205	3	3	3	2	2	-	-	-	2	2	-	-	2	2
19.	C206	3	3	2.3	2.6	1	-	-	-	2	-	1.3	-	1	2
20.	C207	3	3	2	1	2.5	-	-	-	2	2	-	-	1	2
21.	C208	3	2.6	2.6	1	1.6	-	-	-	2	-	-	1	2	2
22.	C209	3	3	2	-	-	-	-	-	-	-	-	2	1	2
23.	C210	3	2.5	2.5	1.5	-	-	-	-	1	-	-	1	1	2
24.	C211	3	3	2	1.5	2	-	-	-	2	2	-	-	2	2
25.	C212	3	1.7	1	-	1	-	-	-	2	1	1.2	-	2	2
26.	C213	3	2.6	2.5	1	-	-	-	-	1	-	1	1	2	2
27.	C214	3	2.6	3	2	2	-	-	-	2	2	-	-	2	2
28.	C215	3	2.6	2.6	1	3	-	-	-	2	-	1	1	2	2
29.	C301	3	2	2	-	1	-	-	-	-	-	-	1	1	2
30.	C302	3	2.33	-	1.67	-	-	-	1	1.67	-	-	1.33	1	1
31.	C303	3	2.67	-	1.67	1.33	-	-	-	1.67	-	-	3	1	2
32.	C304	3	3	3	2	3	-	-	-	2	2	-	-	2	2
33.	C305	3	2	1	2.33	2	-	-	-	1	-	1	1	2	2
34.	C306	3	2	1	1.5	2	2	-	-	2	-	2	1	2	1
35.	C307	3	3	3	1.5	3	2	-	-	2	3	1	-	2	2
36.	C308	3	3	2.67	-	2	-	-	-	1	-	-	1	2	2
37.	C309	2.33	-	2.33	1	-	2.33	2.67	2	-	1.67	1	1	-	-
38.	C310	3	2.67	2.67	1	2	-	-	-	2	2	-	-	2	2
39.	C311	3	2.67	2	1.33	3	-	-	-	3	-	2	1.33	1	2
40.	C312	3	2.67	2.67	3	-	0.33	1	-	-	1	1	1.33	2	1
41.	C313	2	2	1.3	1	3	-	-	-	2	2	1	1	2	2
42.	C314	3	2.33	2.66	2.66	1		1				2.66	2	1	1
43.	C315	2	1	2	2	2	2	2	2	3	2	2	3	2	2
44.	C316	3	3	3		1				1			1	1	1
45.	C401	2	2	2.33	3	3	2	2.25	2	3	2	2	3	-	-
46.	C402	3	2.66	2	1	-	-	-	-	1	1	-	-	2	1
47.	C403	1.7	2.3	2.3	2.3	3.0	2.0	2.3	3.0	2.3	1.3	1.0	1.7	2	2
48.	C404	3	2	2	1	2	-	-	-	1	-	-	1	2	1
49.	C405	3	2	1	-	1	1	-	-	1	1	1	1.33	1	1
50.	C406	3	2	2	1	1	-	-	-	2	2	-	-	1	2

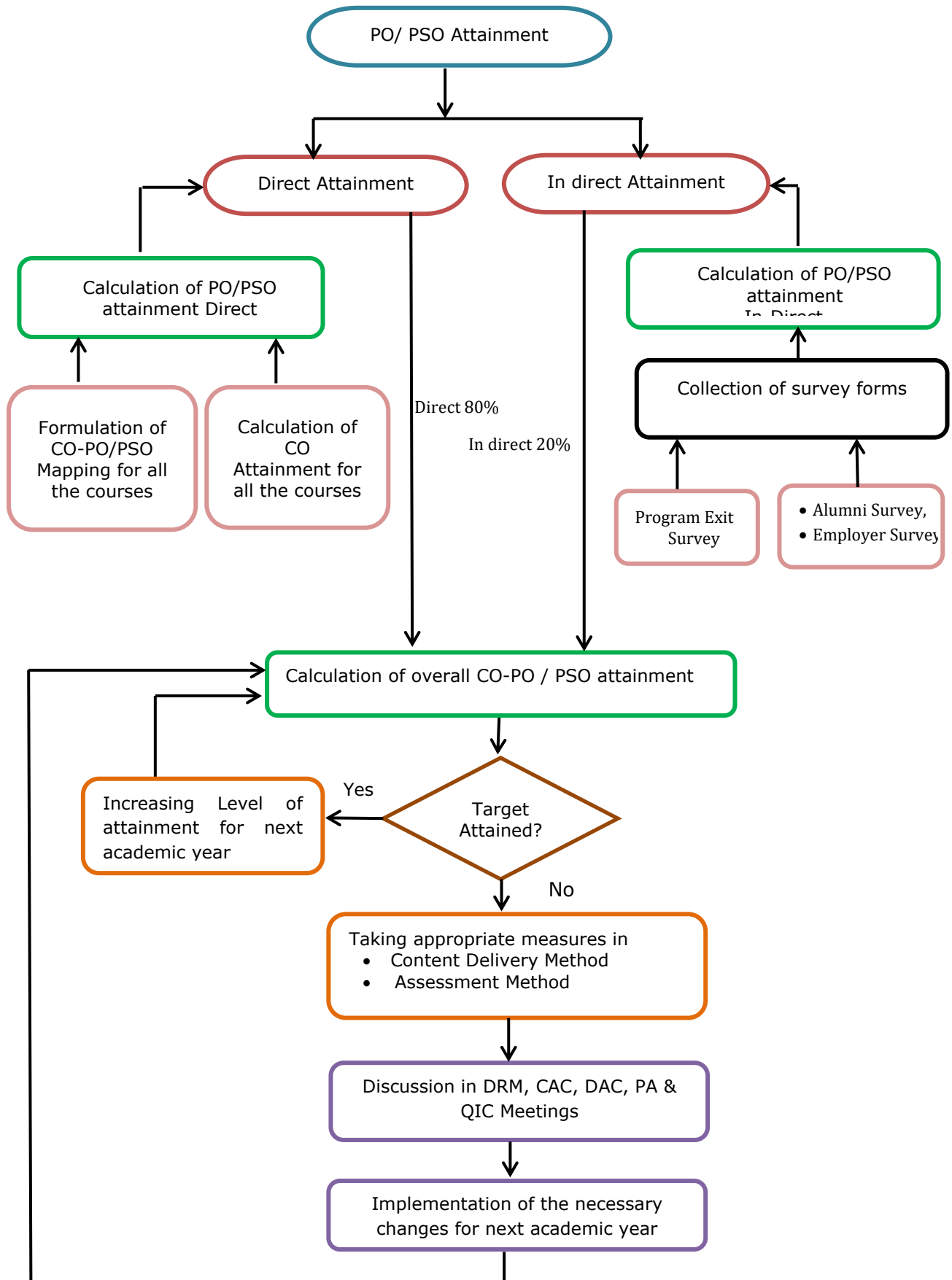


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51.	C407	1.7	2.3	2.3	2.3	3.0	2.0	2.3	3.0	2.3	1.3	1.0	1.7	2	2
52.	C408	3	2	1.25	1.50	-	-	-	-	1	-	-	1	1	1
Target		2.81	2.31	1.73	1.15	1.32	0.44	0.39	0.31	1.18	0.74	0.53	0.91	1.33	1.56

Attainment of Program Outcomes and Program Specific Outcomes

Direct and indirect methods are used to assess the Program Outcomes and Program Specific Outcomes. 80% weightage is given for computing POs and PSOs by direct method and 20% weightage is given for indirect method. The direct part is computed through the attainment of COs from all courses, using the course articulation matrix. The indirect attainments of POs and PSOs are computed through survey among stakeholders.



Flowchart for Computation of PO/PSO Attainment



Assessment of POs and PSOs by Direct Method:

Using Program Outcomes prescribed by NBA, the program instructor evaluates the Program Outcomes and Program Specific Outcomes through Course Attainments computed by all the course instructors. PO attainment is computed by the CO-PO Mapping with the attainment value for each course.

Course level PO & PSO Attainment Calculation:

The PO & PSO attainment for the course is calculated using the following formula.

$$\text{CO Attainment Ratio of Course}(x) = \frac{\text{CO Attainment of Course}(x)}{3 \text{ (Maximum Attainment Value)}}$$

$$\text{POm Attainmnet of Course}(x)$$

$$= \text{CO Attainment Ratio of Course}(x) \times \text{POm Mapping value of Course}(x)$$

$$\text{PSOm Attainmnet of Course}(x)$$

$$= \text{CO Attainment Ratio of Course}(x) \times \text{PSOm Mapping value of Course}(x)$$

Where, $m = [1 \text{ to } M]$, $M = \text{Number of Program Specific Outcomes}$.

Program level PO & PSO Attainment Calculation:

The PO & PSO attainment for Program is calculated using the following formula.

$$\text{POm Direct Attainment} = \frac{\sum_{i=1}^x \text{POm Attainment of Course}(i)}{x}$$

Where, $m = \text{Program Outcomes varies from 1 to 12 and}$
 $x = \text{Number of Courses Mapped with POm}$

$$\text{PSOm Direct Attainment} = \frac{\sum_{i=1}^x \text{PSOm Attainment of Course}(i)}{x}$$

Where, $m = \text{Program Specific Outcomes varies from 1 to 4 and}$
 $x = \text{Number of Courses Mapped with PSOm}$

Assessment of POs and PSOs by Indirect Method:

The tools used to assess the attainment of POs and PSOs by Indirect Method is shown in Table 9.



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S. No.	Tools for Assessment by Indirect Method	Batch 2018-22	Batch 2019-23	Batch 2020-24
1	Course End Survey (CES)	✓	✓	✓
2	Program Exit Survey (PES)	✓	✓	✓
3	Alumni Survey (AS)	✓	✓	✓
4	Employer Survey (ES)	✓	✓	✓

POs and PSOs attainment by direct method of all the courses for 2019-2023 batch students

S. No.	Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1.	C101	2.19	2.00	1.58		1.98							1.58	0.90	1.80
2.	C102	2	1.32	1.32			1.32	0.33					0.66	0.33	0.33
3.	C103	3.00	3.00		1.98	0.99	1.98	0.99					0.99	1.00	1.00
4.	C104	1.32	1.5	0.66	0.908	0.66					0.66	0.99	0.7	0.44	0.89
5.	C105	1.00				3				0	1			0.17	0.17
6.	C106	3.00	1.98			0.99								1.00	1.00
7.	C107	1.98	1.98					1.98	3.00	1.98	2.24	1.99	1.98	1.00	1.00
8.	C108	2.6	2.60	1.72		0.99							1.72	0.93	1.87
9.	C109	2.4	1.66	1.21	0.92		0.77	0.77					0.77	0.90	0.90
10.	C110	3.00	3.00		3.00		1.98	1.98					0.99	1.00	1.00
11.	C111	1.72	2.20	0.86	1.06	0.86					0.86	0.99	0.86	0.93	0.93
12.	C112	2.38											0.78	0.79	0.79
13.	C113	1.50	1.00	1.17	1.17	1.00					0.50	0.50	0.50	0.50	1.00
14.	C201	3.00	3.00	1.98									1.98	0.83	1.67
15.	C202	1.66	1.66	1.66	1.66	0						1.32	0.99	0.83	0.83
16.	C203	3.00	3.00	1.98	0.99					2.49	1.98			1.00	2.00
17.	C204	3.00	3.00	2.66		3.00				1.32				2.00	2.00
18.	C205	3.00	3.00	3.00	1.98	1.98				1.98	1.98			2.00	2.00
19.	C206	3.00	3.00	2.32	2.66	0.99				1.98		1.32		1.00	2.00



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20.	C207	3.00	3.00	1.98	0.99	2.49				1.98	1.98			1.00	2.00
21.	C208	2.75	2.41	2.41	0.91	1.58				1.82			0.91	1.83	1.83
22.	C209	2.00	2.00	1.32									1.32	0.83	1.67
23.	C210	3	2.49	2.49	1.485					0.99			0.99	1.00	2.00
24.	C211	3	3.00	1.98	1.49	1.98				1.98	1.98			2.00	2.00
25.	C212	3	1.73	0.99		0.99				1.98	0.99	1.23		2.00	2.00
26.	C213	2.33	1.99	1.49	0.66					0.66		0.77	0.66	1.78	1.78
27.	C214	1.83	1.38	1.83	1.21	1.21				1.21	1.21			1.22	1.22
28.	C215	2.58	2.33	2.33	0.85	2.58				1.71		0.85	0.85	1.72	1.72
29.	C301	3.00	1.98	1.98		0.99							0.99	0.50	1.00
30.	C302	3.00	2.32		1.65				0.99	1.65			1.32	0.50	0.50
31.	C303	3.00	2.66		1.65	1.32				1.65			0.99	0.83	1.67
32.	C304	3.00	3.00	3.00	1.98	3.00				1.98	1.98			2.00	2.00
33.	C305	3.00	1.98	0.99	2.32	1.98				0.99		0.99	0.99	1.33	1.33
34.	C306	2.25	1.49	0.74	1.11	1.49	1.49			1.49		1.49	0.74	1.50	0.75
35.	C307	0.67	0.67	0.67	0.37	0.67	0.50			0.44	0.67	0.22		0.44	0.44
36.	C308	3.00	3.00	2.66		1.98				0.99			0.99	2.00	2.00
37.	C309	1.32		1.66	3.00		1.66	1.66	0.99		0.99	3.00	3.00	0.83	0.83
38.	C310	1.67	1.67	1.67	0.55	1.10				1.10	1.10			1.55	1.55
39.	C311	3.00	2.66	1.99	1.32	0.99				0.99		1.98	1.32	1.00	2.00
40.	C312	2.00	1.66	1.89	1.43		0.99	3.00			3.00	0.66	1.32	1.33	0.67
41.	C313	0.94	0.94	0.63	0.47	1.42				0.94	0.94	0.47	0.47	1.28	1.28
42.	C314	3.00	2.32	1.32	2.66	0.99		0.99				2.66	1.98	1.00	1.00
43.	C315	2.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00	2.00	2.00	3.00	2.00	2.00
44.	C316	2.33	1.99	1.66		0.77				0.77			0.77	0.89	0.89
45.	C401	1.32	1.32	1.32	2.00	2.00	1.32	1.41	1.32	1.50	1.32	1.65	2.00	0.33	0.33
46.	C402	2.33	1.99	1.54	0.77					0.77	0.77			1.78	0.89
47.	C403	1.70	2.30	2.30	2.30	3.00	2.00	2.30	3.00	2.30	1.30	1.00	1.70	2.00	2.00
48.	C404	1.75	1.16	1.16	0.58	1.16				0.58			0.58	1.45	0.72
49.	C405	1.67	1.10	0.55		0.55	0.55			0.55	0.55	0.55	0.66	0.78	0.78



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50.	C406	1.25	0.83	0.83	0.41	0.41				0.83	0.83			0.71	1.42
51.	C407	1.70	2.30	2.30	2.30	3.00	2.00	2.30	3.00	2.30	1.30	1.00	1.70	2.00	2.00
52.	C408	2.50	1.65	1.07	1.49	-	-	-	-	0.83	-	-	0.83	0.89	0.89
Attainment by Direct Method		2.28	1.94	1.44	0.95	1.05	0.22	0.34	0.27	0.97	0.55	0.44	0.74	1.15	1.31

Table 10 PO and PSO attainment by direct method of all the courses for 2019-23 batch

PO and PSOs attainment by Indirect Method is computed by taking all surveys addressing that PO. Table 11 indicates the indirect attainment level of each program outcome based on Course End survey, Program Exit Survey, Alumni Survey and Employer Survey for the batch 2019-2023. The overall attainment combining 80% of direct method and 20% of indirect method is given in Table 12.

POs and PSOs attainment by indirect method of all the surveys for 2019-2023 batch students

Survey	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Course End Survey	2	2	3	2	2	1	1	1	1	1	1	1	2	2
Graduate Exit Survey	3	2	3	1	2	2	1	1	1	1	1	1	2	2
Alumni Survey	3	3	2	1	2	1	1	1	1	2	1	1	3	3
Employer Survey	2	2	3	2	2	1	1	1	1	1	1	1	2	2
Final Attainment by Indirect Method	2.5	2.25	2.75	1.5	2	1.25	0.5	0.25	0.5	1.25	0.5	0.5	2.25	2.25

Table 11 POs and PSOs attainment by indirect method of all the surveys for 2019-2023 batch students

POs and PSOs final attainment (Direct + Indirect)

Particulars	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Direct Method (80%)	1.82	1.55	1.15	0.76	0.84	0.18	0.27	0.21	0.78	0.44	0.35	0.59	0.87	1.02
Indirect Method (20%)	0.50	0.45	0.55	0.30	0.40	0.25	0.10	0.05	0.20	0.25	0.10	0.20	0.45	0.45
Final Attainment	2.32	2.00	1.70	1.06	1.24	0.43	0.37	0.26	0.98	0.69	0.45	0.79	1.32	1.47

Table 12 POs and PSOs Overall attainment for 2019 - 23 Batch