Shri Vile Parle Kelavani Mandal's

Institute of Technology, Dhule

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2.6.2 Attainment Evaluation

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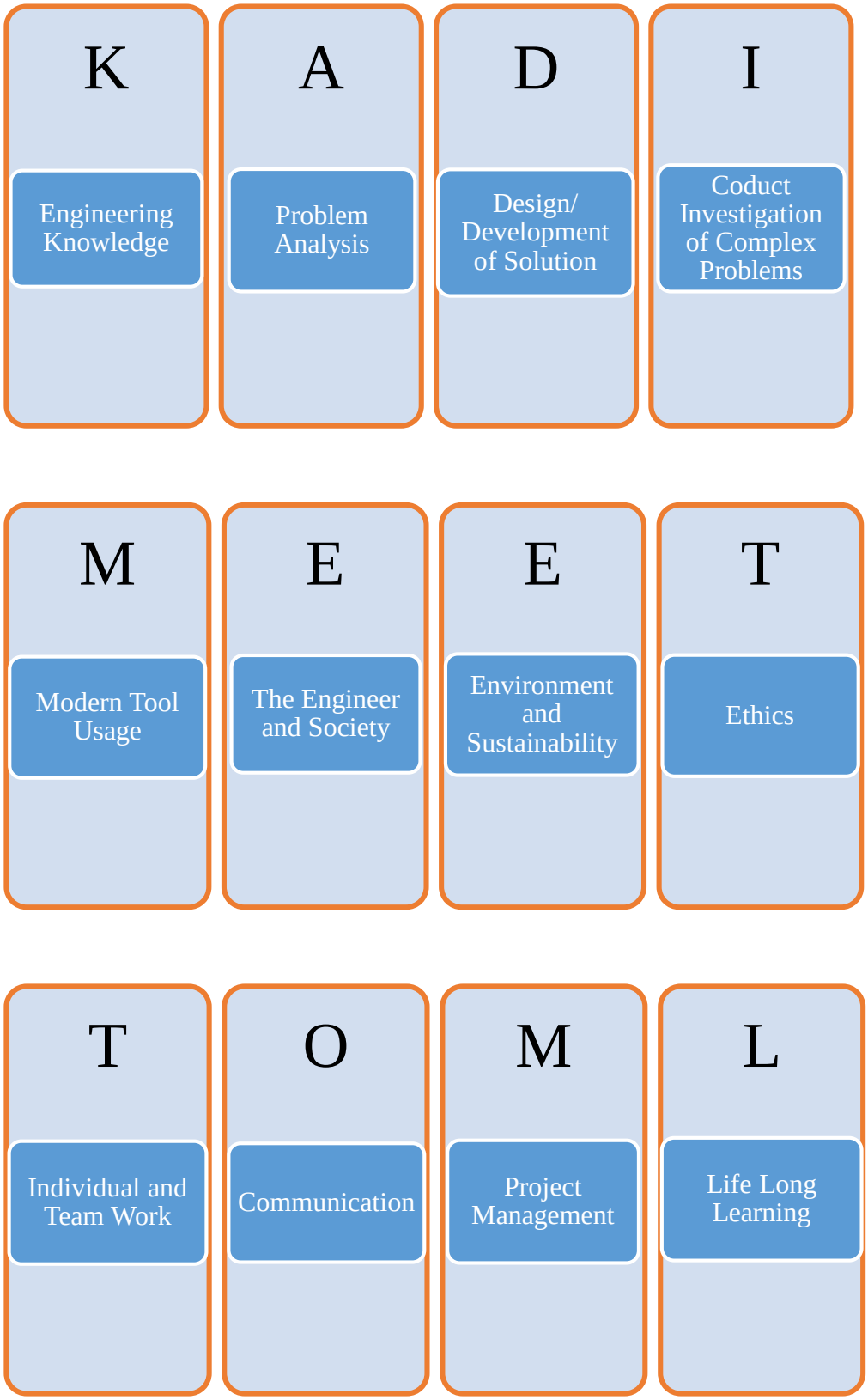
K
Engineering Knowledge
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Problem Analysis
D
Design/ Development of Solution
I
Coduct Investigation of Complex Problems
M
Modern Tool Usage
E
The Engineer and Society
E
Environment and Sustainability
T
Ethics
T
Individual and Team Work
O
Communication
M
Project Management
L
Life Long Learning

Attainment of Course Outcome

Result Analysis of previous years

Set target attainment levels

CO/TLO statement construction by course coordinator as per course syllabus

Verification of CO/TLO statement along with blooms level

CO attaiment calculation through internal assessment(Direct) Tool

CO attainment calculation through University

CO attaiment calculation through indirect assessment Tool

% students scored more than the target value	Attainment level
0-50%	1
50-60%	2
>60%	3

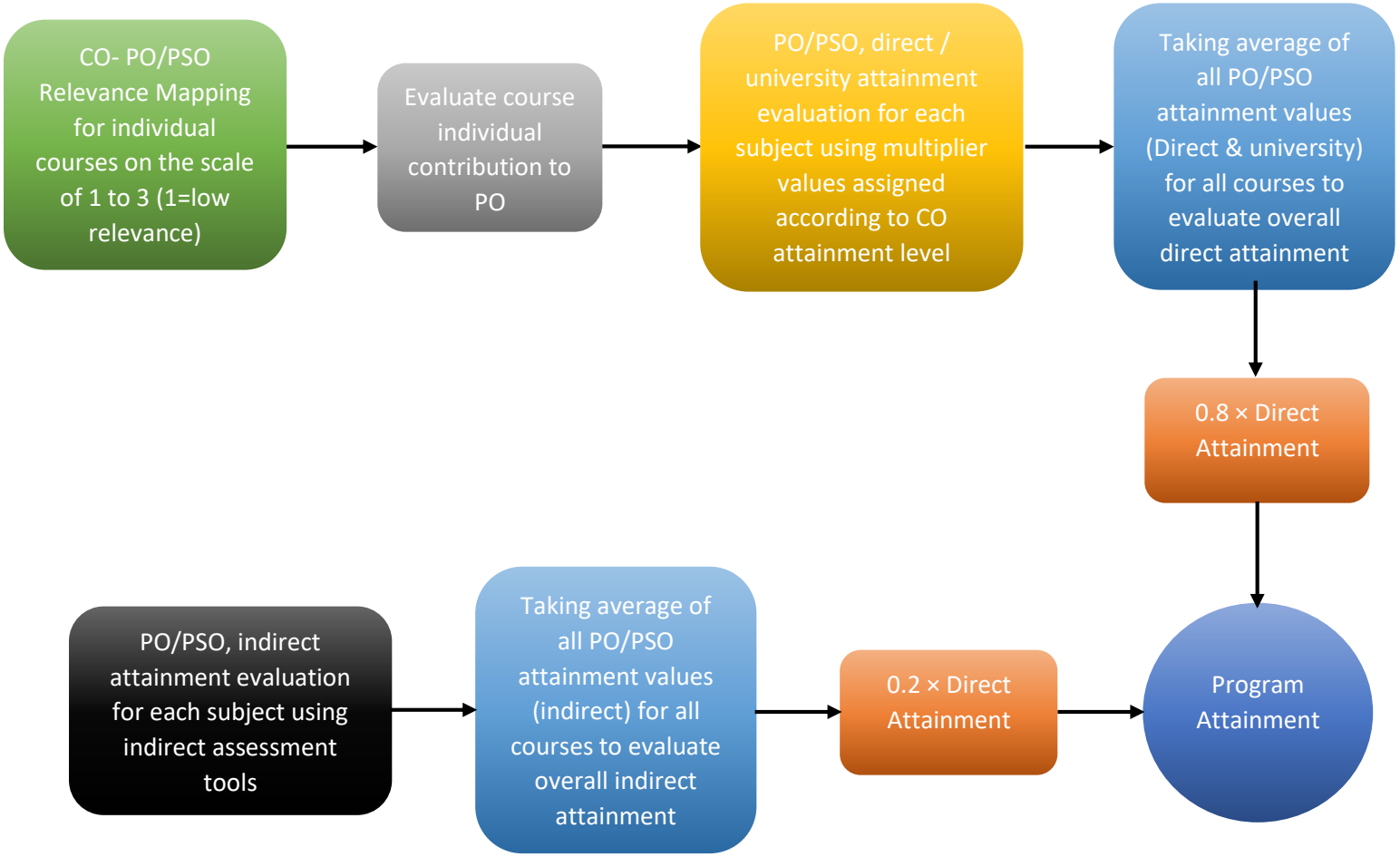
If Attainment level is less than 3

- Reason for low attainment
- Remedial action plan for that sem to cover up
- Action plan for next academic session in order to achieve target value

If Attainment level is equal to 3

- Revsion of taregt for next academic session

Attainment of Program Outcome



If Attainment level is less than target

- Reason for low attainment
- Remedial action plan for that sem to cover up
- Action plan for next academic session in order to achieve target value

If Attainment level is equal to or greater than target

- Revsion of taregt for next academic session

The process of attainment of POs and PSOs of individual course in the four-year engineering degree program requires measuring tools. Respective faculty member prepares course outcomes using the concept of engineering subject. Then, a correlation is established between COs with POs/PSOs on the scale of 0 to 3 where 0 means no correlation and 3 means high correlation. Mapping matrix of COs-POs and COs-PSOs is prepared for all courses in the program.

Assessment tools are categorized into direct and indirect methods to assess whether the program specific outcomes (PSO) and program outcomes (PO) are attained. Direct methods include direct examinations of student, conducted throughout the semester. It is carried out in the form of continuous internal assessment tests, end semester examinations, assignments, unit tests and laboratory assignments etc. Indirect method is based on course exit survey, program exit survey, alumni survey etc. A target value is set for CO, PO and PSO and attainment is calculated with respect to that target value.

For CO attainment, it is calculated how many students have scored more than the target value which is already set by the course coordinator in the internal exam and university exams. Attainment levels are defined as per the following table:

% students scored more than the target value	Attainment level
0-50%	1
50-60%	2
>60%	3

For PO attainment, multiplier factors are defined based on CO attainment as per following table:

Percentage students scored more than the target value	Multiplier factor
0-50%	0.33
50-60%	0.66
>60%	1

This multiplier factor is multiplied with the value assigned in the CO-PO relevance table and final attainment of each PO is calculated as demonstrated in the following steps :

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Step no 1: CO-PO Relevance

Sub code and Subject	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BTCVC503 soil Mechanics	C0503.1	1	2	1	1		1				1		
	C0503.2	3	2	1	2								1
	C0503.3	1	1		3								
CO503 Average		1.66	1.66	1	2		1				1		1

Step no2: Calculation of multiplying factor for each CO and finally PO attainment

Sub code and Subject	CO	PSO1	PSO2	PSO3
BTCVC503 soil Mechanics	C503.1	1	1	1
	C503.2	2	1	1
	C503.3	1	1	
Average		2	1	1

PO attainment (Direct) is calculated by for both the internal assessment test and university exams for each. In the case of indirect attainment, it is calculated only on the basis of the course exit survey which is taken by the course coordinator at the end of the course.

Finally, an articulation matrix is formed, in which all subjects (from Sem I to Sem VIII) are incorporated with their PO and PSO attainment values (Direct/ indirect). For calculating program indirect attainment. Average value of indirect attainment for all subjects is calculated and program indirect This final average value is considered as the program indirect attainment value. Direct attainment of the program is calculated by taking the average of PO values attained through university exams and internal assessment tests.

Direct assessment Methods		
Sr. No.	Assessment tool	Method description
1.	Internal assessment test	The internal assessment(IA) marks in a theory paper is based on number of tests, conducted as scheduled in the departmental academic calendar. It is a metric to continuously assess the attainment of course outcomes with respect to course objectives. The total marks of all tests being asked for each CO is calculated for CO attainment purpose

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2.	Lab Assignments	Lab Assignment is one of the measuring criteria to mainly assess student's practical knowledge with their experimental capabilities. In case of practical, the IA marks shall be based on the laboratory records, practical tests and viva-voce
3.	Theory Semester Examination & Practical Semester Examination	Semester examination (theory or practical) are the metric to assess whether all the course outcomes are attained or not, framed by the course owner. Semester Examination is more focused on attainment of course outcomes and uses a descriptive exam.
4.	Seminar	The IA marks in the case of seminar shall be based on continuous evaluation by a faculty coordinator assigned by the department
5.	Mini Project	The IA marks in the case of mini-project shall be based on continuous evaluation by a faculty coordinator (project guide if allotted) assigned by the department
6.	Project	The IA marks in projects in the final years shall be based on the continuous evaluation throughout the semester by an internal committee consisting of the three faculty members of the Department, one of whom shall be the project guide

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Class	Subject Code	Subject	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	Year
FE 1st Sem	BTMA101	CO101	Engineering Mathematics I	2.62	2.33	2.33													
	PHY1202	CO120	Engineering Physics	3	3	3		3		3					3				
	EG1203	CO120	Engineering Graphics	3	3	3						3	3		3				
	BTHM104	CO104	Communication Skills								3	3	3		3				
			Energy and Enviornmental Engineering																
			Basic Civil and Mechanical Engineering	1.33	1	1				0.83					0.87				
	PHY1202L	CO120	Engineering Physics Lab	3	3		3	3		3	3	3			3				
	EG1203L	CO120	Engineering Graphics Lab	3	3	3						3	3		3				
	BTHM109L	CO109	Communication Skills Lab								3	3	3		3				2019-20
FE 2nd Sem	BTMA201	CO201	Engineering Mathematics II	3	3	3													
	CHM1202	CO1202	Engineering Chemistry	3	3	3	3		3										
			Engineering Mechanics	1.66	1.66										0.33				
			Computer Programming in C																
	WS1205	COWS1	Workshop Practice	3	3	3	3	3	3	3	3	3	3	3	3				
	BTES206		Basic Electrical and Electronic Engineering	2.18	2.17	1.98			2.18	1.98		1.98							
	CHM1202L	CO1202	Engineering Chemistry Lab	3					3	3	3	3							
			Engineering Mechanics Lab	2	2	1	2												
SE 3rd Sem	BTBSC301		Mathematics – III													3	3	3	
	BTCVC302		Mechanics of Solids	3	3	3		3								2.5	3	2.5	
	BTCVC303		Hydraulics I	3	3	3	3			2.5					3	1.5	1.5	1.5	
	BTCVC304		Surveying I		1.5				1.5				1.5		1.5	2.5	2.5	2.5	
	BTCVC305		Building Construction	2.5	2.5	2.5		2.5											
	BTCVC306		Engineering Geology	1.5				1.5							1.5	1	1	1	
	BTHM303		Soft Skills Development	2	2	2			2						2	2	2		
	BTCVL307		Hydraulics Laboratory I	2	2	2	2					2	2			2	2	2	
	BTCVL308		Surveying Laboratory I		1.5				1.5				1.5			1.5	1.5	1.5	
	BTCVL309		Building Construction - Drawings Laboratory	2.5		2.5				2.5						2.5	2.5	2.5	
	BTCVL310		Engineering Geology Lab	3	3	3	3									2.5	3	3	
	BTCVS311		Seminar on Topic of Field Visit to Foundation Work	3	3	3	3	3	3	3	3	3	3	3	3	3		3	
	BTCVF312		Field Training / Internship/Industrial Training Evaluation (from semester II)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2020-21
SE 4th Sem	BTCVC401		Hydraulics II	3	3	3										2.9	2.835	3	
	BTCVC402		Surveying – II	3	3	3			3						3	3	3	3	
	BTCVC403		Structural Mechanics-I	2.505	2.505	2.505	2.505						2.505			2.505	2.505	2.505	
	BTID405		Product Design Engineering	2.505	2.505	2.505	2.505	2.505			2.505	2.505	2.505	2.505		2.505	2.505		
	BTCVE404A		Numerical Methods in Engineering	3	3	3	3										3	3	
	BTCVE404B		Planning for Sustainable Development	3						3	3					3	3		
	BTCVC406		Engineering Management								3	3	3	3		3	3		
	BTHM3401		Basic Human Rights							3	3		3	3	3	3	3	3	
	BTCVL407		Hydraulics Laboratory II	2	2			2				2	2			2			
	BTCVL408		Surveying Laboratory II	2			2									2	2	2	
	BTCVL409		Mechanics of Solids Laboratory	2	2	2		2				2	2			2	2		
	BTCVM410		Mini Project					3	3	3	3	3	3	3	3	3	3	3	
	BTCVF411		Seminar on Topic of Field Visit to works involving Superstructure Construction				3	3	3	3	3	3	3	3	3	3	3	3	
	BTCVC 501		Design of Steel Structures	3	3	3			3		3				3	3	3	3	

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TE 5th Sem	BTCVC 502		Structural Mechanics-II	3	3								3			3	3	3		
	BTCVC 503		Soil Mechanics	3	3	3	3		3				3		3	3	3	3		
	BTCVC 504		Environmental Engineering	3	3	3	3		3	3	3		3		3	3	3	3		
	BTCVC 505		Transportation Engineering	3	3	3			3		3				3	3	3	3		
	BTCVE506A		Materials, Testing & Evaluation	3	3				3	3					3	3	3	3		
	BTCVE506C		Development Engineering	2	2	2			2						2	2	2			
	BTHM507		Essence of Indian Traditional Knowledge						3	3	3					3				
	BTCVL508		Soil Mechanics Laboratory	2.5	2.5						2.5	2.5	2.5		2.5	2.5	2.5	2.5		
	BTCVL509		Environmental Engineering Laboratory	2.5	2.5				2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5			
	BTCVL510		Transportation Engineering Laboratory	3	3	3			3		3	3	3		3	3	3	3		
	BTCVS511		Seminar on Topic of Field Visit to works related to Building Services	2	2	2	2	2	2	2	2	2	2	2	2	2		1		2021-22
TE 6th Sem	BTCVC601		Design of Concrete Structures I	1.5	1.5	1.5	1.5		2		2		1.5		1.5	2	1.5	2		
	BTCVC602		Foundation Engineering	2.255	2.17	2.005									1.835	2.305	2.17	2.005		
	BTCVC603		Concrete Technology	2.5	2.5	2.5	2			2	2.5					2	2	2		
	BTCVC604		Project Management	2.505	2.365		2.34	2.01					2.505	2.34		2.01	2.425	2.425		
	BTCVE605A		Waste Water Treatment	1.5	1.5	1.5			1.5	1.5					1.5	2	1.5	2		
	BTCVE605C		Geographic Data Analysis and Applications	3	3			3								3	3			
	BTCVC606		Building Planning and Design	2.5	2.5	2.5			2.5	2.5	2.5				2.5	2.5	2.5	2.5		
	BTCVL607		Concrete Technology Laboratory	2.5	2.5	2.5	2.5			2.5	2.5	2.5				2.5	2.5	2.5		
	BTCVL608		Building Planning, Design and Drawing Laboratory	3	3	3		3	3			3	3		3	3	3	3		
	BTCVL609		Community Project (Mini Project)	3	3	3	3	3	3	3	3	3	3	3	3	3	3			
	BTCVS610		Seminar on Topic of Field Visit Road Construction	1	1	1	1	1	1	1	1	1	1	1	1	1		1		
BE 7th Sem	BTCVC 701		Design of Concrete Structures II	2	2	2				2					2	2	2	2		
	BTCVC 702		Infrastructure Engineering	3	3	3			3	3					3	3	3	3		
	BTCVC 703		Water Resources Engineering	3.000	3.000	3.000			3.000	3.000				3.000	3.000	3.000	3.000	3.000		
	BTCVC 704		Professional Practices	2.875	2.755		2.505				3					2.865	2.835	2.835		
	BTCVE705F		Engineering Economics	2	2	2									2	2	2			
	BTCVOE706E		Town and Urban Planning (Audit Course)		3	3	3	3	3	3						3	3	3		
	BTCVL707		Design & Drawing of RC & Steel Structures	2.5	2.5	2.5						2.5	2.5			2.5	2.5	2.5		
	BTCVL708		Professional Practices	3	3				3		3		3	3	3	3	3			2022-23
	BTCVL709		Field Training /Internship/Industrial	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
	BTCVS710		Seminar	3	2	2	2	2	3	3	2	2	2	2	2	2		2		
	BTCVP711		Project Stage-I	3	3	3	3	3	3	3	3	3	3	3	3	3	3			
BE 8th Sem	BTCVSS801D		Maintenance and Repair of Concrete Structures	3	3			3	3						3	3	3			
	BTCESS802B		Environmental Remediation of Contaminated Sites	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5				1.5	1.5	1.5	1.5		
	BTCEP803		In-house Project or Internship and Project in Industry*	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
	Average of Internal + University Direct Attainment			2.57	2.53	2.52	2.55	2.58	2.64	2.60	2.72	2.65	2.60	2.71	2.51	2.53	2.58	2.51		
	Average of Internal Indirect Attainment			2.94	2.92	2.87	2.89	2.97	2.89	2.86	2.91	2.99	2.94	3.00	2.85	2.96	2.96	2.97		
	Program direct attainment(80%)			2.06	2.02	2.01	2.04	2.06	2.11	2.08	2.18	2.12	2.08	2.17	2.01	2.02	2.06	2.00		
	Program indirect Attainment(20%)			0.59	0.58	0.57	0.58	0.59	0.58	0.57	0.58	0.60	0.59	0.60	0.57	0.59	0.59	0.59		
	Program Attainment			2.65	2.61	2.59	2.61	2.66	2.69	2.65	2.76	2.72	2.67	2.77	2.58	2.61	2.65	2.60		

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PO attainment Passout Batch 2022-23

Class	Subject Code	Subject	Subject Name	Faculty Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	Year
					PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	Year
FE 1st Sem	BTMA101	CO101	Engineering Mathematics I		3	3	3													
	PHY202	CO202	Engineering Physics		3	3	3		3		3					3				
	EG1203	CO1203	Engineering Graphics		3	3	3						3	3		3				
	BTHM104	CO104	Communication Skills									3	3	3		3				
			Energy and Enviornmental Engineering																	
			Basic Civil and Mechanical Engineering		1.4	1	1				1					1				
	PHY1202L	PHY1202	Engineering Physics Lab		3	3		3	3		3	3	3			3				
	EG1203L	CO1203L	Engineering Graphics Lab		3	3	3						3	3		3				
	BTHM109L	CO109L	Communication Skills Lab									3	3	3		3				2019-20
FE 2nd Sem	BTMA201	CO201	Engineering Mathematics II		3	3	3													
	CHM1202	CO1202	Engineering Chemistry		3	3	3	3		3										
			Engineering Mechanics		3	3	3	3								1				
			Computer Programming in C																	
	WS1205	COWS12	Workshop Practice		3	3	3	3	3	3	3	3	3	3	3	3				
	BTES206	CO206	Basic Electrical and Electronic Engineering		3	3	3			3	3		3							
	CHM1202L	CO1202L	Engineering Chemistry Lab		3					3	3	3	3							
			Engineering Mechanics Lab		3	3	3	3												
SE 3rd Sem	BTBSC301		Mathematics – III		3	3	3	3										3	3	
	BTCVC302		Mechanics of Solids		3	3	3		3								3	3	3	
	BTCVC303		Hydraulics I		3	3	3	3			3					3	3	3	3	
	BTCVC304		Surveying I			3				3				3		3	3	3	3	
	BTCVC305		Building Construction		3	2	2		2								2	2	2	
	BTCVC306		Engineering Geology		3				3							3	3	3	3	
	BTHM303		Soft Skills Development		3	3	3		3	3	3					3	3	3		
	BTCVL307		Hydraulics Laboratory I		2.67	2.67	3	2.67					2.7	2.75			2.67	2.67	2.67	
	BTCVL308		Surveying Laboratory I		3		3					3	3	3	3		3	3	3	
	BTCVL309		Building Construction - Drawings Laboratory		3		3				3						3	3	3	
	BTCVL310		Engineering Geology Lab		3	3	3	3									3	3	3	
	BTCVS311		Seminar on Topic of Field Visit to Foundation Work			3	3	3	3	3	3	3	3	3	3	3	3		3	
	BTCVF312		Field Training / Internship/Industrial Training Evaluation (from semester II)		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2020-21
SE 4th Sem	BTCVC401		Hydraulics II		3	3	3										3	3	3	
	BTCVC402		Surveying – II		3	3	3			3						3	3	3	3	
	BTCVC403		Structural Mechanics-I		3	3	3	3									3	3	3	
	BTID405		Product Design Engineering		3	3	3	3	3			3	3	3	3		3	3		
	BTCVE404A		Numerical Methods in Engineering		3	3	3	3										3	3	
	BTCVE404B		Planning for Sustainable Development		3				3		3	3				3	3	3		
	BTCVC406		Engineering Management									3	3	3	3		3	3		
	BTHM3401		Basic Human Rights								3	3		3	3	3	3	3	3	
	BTCVL407		Hydraulics Laboratory II		3	3			3				3	3			3			
	BTCVL408		Surveying Laboratory II		3			3									3	3	3	
	BTCVL409		Mechanics of Solids Laboratory		3	3	3		3				3	3			3	3		
	BTCVM410		Mini Project						3	3	3	3	3	3	3	3	3	3	3	
	BTCVF411		Seminar on Topic of Field Visit to works involving Superstructure Construction					3	3	3	3	3	3	3	3	3	3	3	3	
	BTCVC 501		Design of Steel Structures		3	3	3			3		3				3	3	3	3	

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TE 5th Sem	BTCVC 502		Structural Mechanics-II		3	3								3			3	3	3		
	BTCVC 503		Soil Mechanics		3	3	3	3		3				3		3	3	3	3		
	BTCVC 504		Environmental Engineering		3	3	2	2		2	2	2		2		2	3	3	3		
	BTCVC 505		Transportation Engineering		3	3	3			3		3				3	3	3	3		
	BTCVE506A		Materials, Testing & Evaluation		3	3				3	3					3	3	3	3		
	BTCVE506C		Development Engineering		3	3	3		3	3	3					3	3	3			
	BTHM507		Essence of Indian Traditional Knowledge							3	3	3					3				
	BTCVL508		Soil Mechanics Laboratory		3	3						3	3	3		3	3	3	3		
	BTCVL509		Environmental Engineering Laboratory		3	3				3	3	3	3	3		3	3	3			
	BTCVL510		Transportation Engineering Laboratory		3	3	3			3		3	3	3		3	3	3	3		
	BTCVS511		Seminar on Topic of Field Visit to works related to Building Services		3	3	3	3	3	3	3	3	3	3	3	3	3		3		2021-22
TE 6th Sem	BTCVC601		Design of Concrete Structures I		3	3	2	2		2		2		2		2	3	3	3		
	BTCVC602		Foundation Engineering		3	3	3									3	3	3	3		
	BTCVC603		Concrete Technology		3	3	3	3			3	3					3	3	3		
	BTCVC604		Project Management		3	3		3	3					3	3		3	3	3		
	BTCVE605A		Waste Water Treatment		2	3	3			2	2					3	3	3	3		
	BTCVE605C		Geographic Data Analysis and Applications		3	3			3								3	3			
	BTCVC606		Building Planning and Design		3	3	3			3	3	3				3	3	3	3		
	BTCVL607		Concrete Technology Laboratory		3	3	3	3			3	3	3				3	3	3		
	BTCVL608		Building Planning, Design and Drawing Laboratory		3	3	3		3	3			3	3		3	3	3	3		
	BTCVL609		Community Project (Mini Project)		3	3	3	3	3	3	3	3	3	3	3	3	3	3			
	BTCVS610		Seminar on Topic of Field Visit Road Construction		3	3	3	3	3	3	3	3	3	3	3	3	3		3		
BE 7th Sem	BTCVC 701		Design of Concrete Structures II	NRC	3	3	3				3					3	3	3	3		
	BTCVC 702		Infrastructure Engineering		3	3	3			3	3					3	3	3	3		
	BTCVC 703		Water Resources Engineering	PVD	3	3	3			3	3				3	3	3	3	3		
	BTCVC 704		Professional Practices	DSB	3	3		3				3					3	3	3		
	BTCVE705F		Engineering Economics	YNB	3	2	2									3	2	2			
	BTCVOE706E		Town and Urban Planning (Audit Course)			3	3	3	3	3	3						3	3	3		
	BTCVL707		Design & Drawing of RC & Steel Structures		3	3	3						3	3			3	3	3		
	BTCVL708		Professional Practices	DSB	3	3				3		3		3	3	3	3	3			2022-23
	BTCVL709		Field Training /Internship/Industrial		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
	BTCVS710		Seminar		3	3	3	3	3	3	3	3	3	3	3	3	3		3		
	BTCVP711		Project Stage-I	DSB	3	3	3	3	3	3	3	3	3	3	3	3	3	3			
BE 8th Sem	BTCVSS801D		Maintenance and Repair of Concrete Structures	NRC	3	3			3	3						3	3	3			
	BTCESS802B		Environmental Remediation of Contaminated Sites		2	2	2	2	3	2	2	2				2	3	3	3		
	BTCEP803		In-house Project or Internship and Project in Industry*	DSB	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
			Average Indirect Attainment		2.94	2.92	2.87	2.90	2.97	2.89	2.86	2.91	2.99	2.94	3.00	2.85	2.96	2.96	2.97		

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DEPARTMENT OF CIVIL ENGINEERING

Class	Subject Code	Subject Name			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	BTMA101	Engineering Mathematics – I	CO101.1	Apply the matrix technique (Linear algebra) to find solutions of system of linear equations arising in many engineering problem	2	2	1												
			CO101.2	Demonstrate the concept of partial derivatives and their applications to Maxima/ Minima, series expansion of multi valued functions & Compute Jacobian of functions of several variables.	3	2	1												
			CO101.3	Identify and sketch of curves in various coordinate system & Evaluate multiple integrals and their applications to area and volume	3	2	1												
	PHY1202	Engineering Physics	CO102.1	Apply the concept of types of oscillations in engineering.	3	2	1		1							1			
			CO102.2	Apply the fundamentals of interference, polarization in LASER, and optical fiber in engineering.	2	3	1		1							1			
			CO102.3	Determine the application of the trajectory of charge particles in the electromagnetic field, with basic principles of quantum physics.	3	2	1		1		1					1			
			CO102.4	Determine the different types of crystal structures using the X-ray diffraction technique, and study the fundamentals of material science and its application in Magnetic material, Superconductors, and semiconductors.	3	2	1		1							1			
	EG1203	Engineering Graphics	CO103.1	Use of drawing instruments effectively for drawing and dimensioning	3								1	3					
			CO103.2	Explain conventions and methods of engineering drawing	3								1			1			
			CO103.3	Apply concepts of projections of points, lines, planes, solids and section of solids	3	2	3						1	3					
			CO103.4	Construct isometric and orthographic views of given objects	3	2	3						1	3					
	BTHM104	Communication Skills	CO104.1	Apply Verbal and Non-Verbal communication in professional and social situations								1	3	3		3			
			CO104.2	Apply communication skills for presentations, group discussion, interpersonal interactions, public speaking, report writing and business correspondence								1	3	3		3			
			CO104.3	Apply phonetics and grammar in communication to develop a neutral accent								1	3	3		3			
			CO105.1	Identify conventional, non-conventional energy sources.	2	2			1	2	2	1				1			
			CO105.2	Know and discuss power consuming and power developing devices for effective utilization and power consumption	2	2			1	2	2	2				1			

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		Energy and Enviornmental Engineering	CO105.3	Identify various sources of air, water pollution and its effects.	2	1			1	2	2	1				1				
			CO105.4	Know and discuss noise, soil, thermal pollution and Identify solid, biomedical and hazardous waste.	2	1			1	2	2	1				1				
		Basic Civil and Mechanical Engineering	CO106.1	Identify various Civil Engineering materials and choose suitable material among various options.	1						1					1				
			CO106.2	Apply principles of surveying to solve engineering problem.	2	1										-				
			CO106.3	Identify various Civil Engineering structural components and select appropriate structural system among various options.	1	1	2									1				
			CO106.4	Explain and define various properties of basic thermodynamics, materials and manufacturing processes.	2	1										-				
			CO106.5	Know and discuss the working principle of various power consuming and power developing devices.	1	1					1					1				
	PHY1202L	Engineering Physics Lab	CO1202L.1	Determine the mechanical & electrical properties of matter.	3	2		1	1			1	1			1				
			CO1202L.2	Determine the wavelength of He-Ne Laser and numerical aperture of optical fibre.	3	2		1	1		1	1	1			1				
			CO1202L.3	Determine the various properties of semiconducting materials.	3	2		1	1		1	1	1			1				
	EG1203L	Engineering Graphics Lab	CO1203L.1	Use of drawing instruments effectively for drawing and dimensioning	3								1	3						
			CO1203L.2	Implement various fundamental geometrical constructions	3								1			1				
			CO1203L.3	Apply concepts of projections of points, lines, planes, solids and section of solids	3	2	3						1	3						
			CO1203L.4	Construct isometric and orthographic views of given objects	3	2	3						1	3						
	BTHM109L	Communication Skills Lab	CO209L.1	To illustrate the process of introduction with RP exercising Transcription, Stress and Intonations								1	3	3		3				
			CO209L.2	To apply Verbal and Non-Verbal communication through Extempore, GD, Debate, Presentation and Interviews.								1	3	3		3				
	BTMA201	Engineering Mathematics – II	CO201.1	Discuss the need and use of complex variables to find roots, to separate complex quantities and to establish relation between circular and hyperbolic functions.	2	1	1													
			CO201.2	Solve first and higher order differential equations and apply them as a mathematical modeling in electric and mechanical systems.	3	2	1													
			CO201.3	Determine Fourier series representation of periodic functions over different intervals.	2	1														
			CO201.4	Demonstrate the concept of vector differentiation and interpret the physical and geometrical meaning of gradient, divergence &curl in various engineering streams. Apply the principles of vector integration to transform line integral to surface integral, surface to volume integral &vice versa using Green's , stokes and Gauss divergence theorems	2	1	1													
			CO1202.1	Develop the importance of water in industrial and domestic usage.	2	1	2	1		1										

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CHM1202	Engineering Chemistry	CO1202.2	Interpret the knowledge of phases, components, degree of freedom and apply it in various phase diagrams.	2	1	1												
		CO1202.3	Describe various methods of metallurgy, types of fuels and lubricants, and also able to define various concepts of electrochemistry.	2	1	1												
BTES203	Engineering Mechanics	CO203.1	Know and apply fundamental Laws of Engineering Mechanics	2	2										1			
		CO203.2	Know and apply conditions of static equilibrium to analyze given force system	2	2										1			
		CO203.3	Compute Centre of gravity and Moment of Inertia of plane surfaces	3	3													
		CO203.4	Compute the motion characteristics of a body /particle for a Rectilinear and Curvilinear motion.	2	2													
		CO203.5	Know and discuss relation between force and motion characteristics	2	2													
	Computer Programming in C																	
WS1205	Workshop Practices	COWS1205.1	Perform carpentry operations like planning, cutting, fitting of joints using hand and power tools	3	2	2	1	1	1	1	2	2	2	2	2			
		COWS1205.2	Perform fitting operations such as marking, cutting, filling, drilling and tapping using hand and power tools and also basic plumbing Operations.	3	2	2	1	1	1	1	2	2	2	2	2			
		COWS1205.3	Perform sheet metal operations such as marking, shearing, bending, punching, and soldering using hand and power tools and Welding operations like joint preparations, electrode selections.	3	2	2	1	1	1	1	2	2	2	2	2			
		COWS1205.4	Understand the simple machining skills on lathe machine operations and its use during their project work	3	2	2	1	1	1	1	2	2	2	2	2			
BTES206	Basic Electrical and Electronic Engineering	CO206.1	Apply basic ideas and principles of electrical engineering	3	2				1	1								
		CO206.2	Identify protection equipment and energy storage devices	3	2				1	1								
		CO206.3	Differentiate electrical and electronics domains and explain the operation of diodes and transistors.	3	2				1	1								
		CO206.4	Acquire knowledge of digital electronics	3	2				1									
		CO206.5	Design simple combinational and sequential logic circuits.	3	3	3			1	1		1						
CHM1202L	Engineering Chemistry Lab	CO1202L.1	Test the quality of water sample by determination of hardness, acidity, alkalinity and dissolve oxygen present in it.	2					2	1	2	3						
		CO1202L.2	Examine chemical or physical property of given sample material.	2					1	1	2	3						

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			CO1202L.3	Determine the concentration of specific ions present in the solution using titration methods.	2					1	1	2	3						
		Engineering Mechanics Lab	CO208L.1	Calculate beam reaction by Parallel Force apparatus and graphics static method and forces in truss.	1	1	1												
			CO208L.2	Evaluate co-efficient of friction and centroid of irregular shaped bodies.		1		1											
			CO208L.3	Evaluate mechanical advantage, Velocity ratio, efficiency and mass moment of inertia.	1			1											
	BTBSC301	Mathematics – III	C301.1	Find Laplace transform of functions using various formulas and properties. Evaluate particular types of integration.	2	2	-	-	-	-	-	-	-	-	-	-		1	2
			C301.2	Find Inverse Laplace transform of functions using various formulas and properties. Solve linear differential/simultaneous linear differential equation using Laplace and inverse Laplace transform.	2	1	1	-	-	-	-	-	-	-	-	-		1	2
			C301.3	Find Fourier and inverse Fourier transform, Fourier sine and inverse Fourier sine transform. Cosine transform and inverse Fourier cosine Transform of functions.	3	1	1	-	-	-	-	-	-	-	-	-		1	2
			C301.4	Form PDE by eliminating arbitrary constant, solve PDE and use PDE to solve one and two dimensional heat flow equation.	2	2	1	-	-	-	-	-	-	-	-	-		1	2
			C301.5	Determine Analytic functions//Bilinear transformation/ apply Cauchy's theorem/Cauchy's integral formula and Residue theorem to solve contour integration.	2	2	-	-	-	-	-	-	-	-	-	-		1	2
	BTCVC302	Mechanics of Solids	C302.1	Perform the stress strain analysis	2	2			2								2	2	1
			C302.2	Draw the force distribution diagram for members and determinant beams	2	2	3		2								2	1	2
			C302.3	Find deflection in determinant beam	2	2	3		2								2	1	1
			C302.4	Visualize force deformation behaviour of bodied	2	2			3								2	1	1
	BTCVC303	BTCVC303	C303.1	To determine the properties of fluid and pressure and their measurement	3	2										1	2	1	1
			C303.2	To interpret the types of forces acting on fluid at rest and in moving condition.	3	2											2		1
			C303.3	To differentiate between laminar and turbulent flow condition.	1	1	1	1									1		1
			C303.4	To analyze the laws of similarity for fluid model studies.	3	2	2	1								1	2	2	1
			C303.5	To understand fundamentals of pipe flow, losses in pipe flow.	3	2	2	1			1						2		1
	BTCVC304	Surveying I	C304.1	Perform measurements in linear/angular methods.		3				2				3		2	2	1	1
			C304.2	Perform plane table surveying in general terrain.		2				3						2	2	1	1
			C304.3	Know the basics of leveling and theodolite survey in elevation and angular measurements.		2				3				2		2	2	1	1
	BTCVC305	Building	C305.1	Understand types of masonry structures.	2	2			2								2		1
			C305.2	Understand composition of concrete and effect of various parameters affecting strength.	2	2	2		2								2	2	

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	5	Construction	C305.3	Comprehend components of building and there purposes.	2	2	2		2								2		1
			CO305.4	Comprehend the precast and pre-engineered building construction techniques	2	2			3								2	2	
	BTCVC306	Engineering Geology	C306.1	Recognize the different land forms which are formed by various geological agents.	2				2							2	2	1	1
			C306.2	Identify the origin, texture and structure of various rocks and physical properties of mineral.	2				2							2	2	1	1
			C306.3	Emphasize distinct geological structures which have influence on the civil engineering structure.	2				2							2	2	1	1
			C306.4	Understand how the various geological conditions affect the design parameters of structures.	2				2							2	2	1	1
	BTCVL307	Hydraulics Laboratory I	C307.1	Calculate the viscosity of fluid and metacentric height of ship model	2	2		1					2	1			2	1	1
			C307.2	Examine the application of Bernoulli's theorem for pipe flow	2	2		1					2	1			2	1	1
SE 3rd Sem			C307.3	Demonstrate the calibration of flow measurement devices in pipe flow.	2	2	2	1					2	2			2	1	1
	BTCVL308	Surveying Laboratory I	C308.1	To Use the theodolite along with chain/tape, compass on the field.	1		1					1	2	1	1		1		
			C308.2	Apply geometric and trigonometric principles of basic surveying calculations.	1		1					1	2	1	1		1		1
			C308.3	Plan a survey, taking accurate measurements, field booking, and adjustment of errors.	1		1					1	2	2	1		1	1	
			C308.4	Apply field procedures in basic types of surveys, as part of a surveying team AND Employ drawing techniques in the development of a topographic map.	1		1					1	2	2	1		1	1	1
	BTCVL309	Building Construction Drawings Laboratory	C309.1	Draw plan, elevation and sections of various structures	2		2				2						3	2	2
			C309.2	Apply the principles pf planning and bye-laws used for building planning	2		2				2						3	2	2
			C309.3	Prepare detailed working drawing for doors and windows	2		2				2						3	2	2
	BTCVL310	Engineering Geology Lab	C310.1	Calculate the linear measurement on surface.	1	1											1	1	1
			C310.2	Find out engineering properties of various geological materials.	1	1											1	1	
			C310.3	Draw subsurface lithologs.	2	1	2	1									1		
			C310.4	Identify minerals and rocks by studying physical properties.	2												1		
	BTCVS311	Seminar on Topic of Field Visit to Foundation Work	C311.1	Understand and prepare chronological order of execution of superstructure construction works	1	1				2	1	1	1	1			1		
			C311.2	Interpreted the collected data and present it in form of technical information		1	1	1	1			2	2	2	2	1	1		
			C311.3	Prepare technical report based on field data of execution of superstructure construction works	1	1		1	1			2	2	2	1	1	1		1
	BTCVF312	Field Training / Internship In dustrial Training	C312.1	To identify the challenges and future potential in internship problem and solve the problem during the internship period.	1	2	1			1	1		1		1	2	2	2	2
			C312.2	To test the theoretical learning and research-based knowledge in practical situations by completing assigned tasks during the internship period.	1	2		2	1	1			1		1	2	1	2	

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		Evaluation (from semester II)	C312.3	To apply various soft skills such as time management, positive attitude and communication skills during presentation in the internship program.					1			1	1	2	2	2	2		2
	BTHM303	Soft Skills Development																		
SE 4th Sem	BTCVC401	Hydraulics II	C401.1	Design open channel sections in a most economical way.	3	3	1										2	1	1
			C401.2	Know about the non-uniform flows in open channel and the characteristics of hydraulic jump.	2	2	2										2	1	1
			C401.3	Apply application of momentum principle of impact of jets on plane.	3	2	1										1	1	
	BTCVC402	Surveying – II	C402.1	Understand basics different types of curves on roads and their preliminary survey.	2	2	1			1						1	2	1	1
			C402.2	Perform setting of curves, buildings, culverts and tunnels.	2	1	1									1	2		1
			C402.3	Comprehend different geodetic methods of survey such as triangulation, trigonometric leveling.	1												1		
			C402.4	Comprehend modern advanced surveying techniques.	1	1										1	1		1
	BTCVC403	Structural Mechanics-I	C403.1	Describe the concept of structural analysis and degree of indeterminacy	3	1	1	1									2	1	2
			C403.2	Calculate slopes and deflection at various locations for different types of beams	3	1	2	1									2	1	2
			C403.3	Analyze indeterminate beams, frames and trusses	3	1	2	1						2			2	1	2
	BTCVE404A	Numerical Methods in Engineering	CO404-1	raic equations using different methods under different condition	2	2	1	1										1	2
			CO404-2	al equations using different numerical methods through the the	2	2	1	1										1	2
			CO404-3	pply various interpolation methods and finite difference concep	2	2	1	1										1	2
			CO404-4	nerical method techniques to find approximate value of definite	2	2	1	1										1	2
			CO404-5	and fitting of curve for given statistical data & Write algorithm	2	2	1	1										1	2
	BTCVE404B	Planning for Sustainable Development	C404.1	Apply principles of sustainable development in engineering works	1					1	3	1					1		
			C404.2	Develop innovation strategies for sustainable development	1					1	2	1				1	1	1	
			C404.3	Analyze role of government in Policies for environmental degradation						1	3	2					1		1
	BTID405	Product Design Engineering	C405.1	Create simple design of components or a system as whole	2	1	1	1	2								3	1	
			C405.2	Create design documents for knowledge sharing									1	3			3		
			C405.3	Manage own work to meet design requirements								2	1		1		1		
			C405.4	Work effectively in a team									3				1		
	BTCVC406	Engineering Management	C402.1	Demonstrate the nuances of management functions.								1	1				1		
			C402.2	Analyse the framework of a business organization.								1					1		
			C402.3	Adopt an empirical approach toward business situations.								2	1				1		
			C402.4	Apply various Management techniques.	1	1									1		1	1	
	BTHM3401	Basic Human Rights	C3401.1	Discuss the significance of human rights to utilize in daily activities.								1				2	1		
			C3401.2	Understand worker's rights at the workplace to avoid exploitation.						1		1	1				1		

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	Rights	C3401.3	Apply ethical and management principles as per the Indian Constitution for life-long learning in the larger perceptive of technological modifications.	1						1	1			1	1	1		1
BTCVL407	Hydraulics Laboratory II	C407.1	To understand various properties of fluids and measurement techniques.	2	2			1				2	1			2		
		C407.2	To carry out calibrations of various flow measuring devices.	2	2			1				2	1			2		
		C407.3	To understand mechanism of hydraulic jump, various jets and pumps.	2	2			2				2	2			2		
BTCVL408	Surveying Laboratory II	C408.1	Determine contour level of field.	1	1							1			1	1		1
		C408.2	Determine the tachometric constants and grade of a line.	2	1							1	1		1	2	1	1
		C408.3	Use sub tense bar for distance measurement	1	1									1	1	2		
BTCVL409	Mechanics of Solids Laboratory	C401.1	Evaluate Young Modulus, torsional strength, hardness and tensile strength of given specimens.	2	2	1		1				1	1			2	1	
		C409.2	Evaluate compressive characteristics or column action of structural members.	2	2	1						1	1			1	1	
		C409.3	Analyze bending action of structural members under transverse loads.	2	2	1		1				1	1			2	1	
BTCVM410	Mini Project	C410.1	Apply reasoning informed by the contextual knowledge to assess societal issues					1	2	1	3	1	1	3	1		1	2
		C410.2	Understand the impact of the professional engineering solutions in societal contexts					1	2	1	1	2	1	2	2	1	1	2
		C410.3	Demonstrate knowledge and understanding of the engineering and management principles as a member and leader in a team							2	1	1	2	1	1	2	2	2
BTCVF411	Seminar on Topic of Field Visit to works involving Superstructur	C411.1	Understand and prepare chronological order of execution of superstructure construction works						2	1	1	1	1			1	2	2
		C411.2	Interpreted the collected data and present it in form of technical information				1	1			2	2	2	2		1	1	
		C411.3	Prepare technical report based on field data of execution of superstructure construction works				1	1			2	2	2	1	1	1		1
BTCVC501	Design of Steel Structures	C501.1	Identify and compute the design loads and the stresses developed in the steel member considering BIS Provision	3	2				1							2	1	1
		C501.2	Analyze and design the various connections and identify the potential failure modes considering BIS Provision	3	3	3			1		1				1	3	3	3
		C501.3	Analyze and design various tension, compression and flexural members considering BIS Provision	3	3	3			1		1				1	3	3	3
BTCVC502	Structural Mechanics-II	C502.1	Have a basic understanding of matrix method of analysis and will be able to analyze the determinate and indeterminate structures	3	2								1			2	2	2
		C502.2	Have a basic understanding of the principles and concepts related to finite difference and finite element method.	2	1											2	2	1
		C502.3	Have a basic understanding of concept of influence line.	2	2								1			2		2
BTCVC503	Soil Mechanics	C503.1	Understand different soil properties and behavior	1	2	1	1		1				1			1	1	1
		C503.2	Understand stresses in soil and permeability and seepage aspects	3	2	1	2								1	2	1	1

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			C503.3	Develop ability to take up soil design of various foundations.	1	1		3									1	1		
	BTCVC 504	Environmental Engineering	C504.1	Apply the water treatment concept and methods	2	2	2	1		1	1	1		1		2	2	1	2
			C504.2	Prepare basic process designs of water and wastewater treatment plants.	1	1	1										1	1	1
			C504.3	Apply the wastewater treatment concept and methods	2	2	2	1		1	1	1		1		2	2	1	2
			C504.4	Illustrate the solid waste management and air pollution concepts	2	1				1	1	1				1	1	1	1
	BTCVC 505	Transportation Engineering	C505.1	Comprehend various types of transportation systems and their history of the development	2	1				1		1				1	2	1	
			C505.2	Comprehend to various types of pavements	2	2	1									1	1	1	1
			C505.3	Design the pavements by considering various aspects associated with traffic safety measures.	1	1	1									1	1	1	1
	BTCVE506A	Materials, Testing & Evaluation	C506A.1	To provide an overview to the students about various types of civil engineering materials used in constructions along with their properties.	2	1										1	1		1
			C506A.2	To enable students to know details of various tests to be performed on civil engineering materials to evaluate their quality to know their suitability for use in construction.	2	1				1						1	2	1	1
			C506A.3	To test the materials under the sustainability conditions of an environment as per the site suitability.	1						1						1		
TE 5th Sem	BTCVE506C	Development Engineering	C506C.1	Explain the concept of development engineering and sustainable design.	1					1	1	1				1	1		
			C506C.2	Comprehend the basics of development plans for urban and rural areas.	1		1			2	1	1				2	2	1	
			C506C.3	Demonstrate the applications of geoinformatics for planning and development of urban and rural areas.	2	1	1			2	1					1	2	1	
	BTHM507	Essence of Indian Traditional Knowledge	M3057.1	Ability to understand, connect up and explain basics of Indian traditional knowledge, modern scientific Perspective						2	2								
			M3057.2	Imparting basic principles of thought process, reasoning and inferencing						2	2								
			M3057.3	Importance of holistic science with rapid techno;ogical advancement and societal disruptions						2	2								
			M3057.4	Development of aminities for society						1	1								
	BTCVL508	Soil Mechanics Laboratory	C508.1	Determine different engineering properties of soil.	1	1						1	1	1	1		1	1	1
			C508.2	Identify and classify soils based on standard geotechnical engineering practices	1	1						1	1	1	1		1	1	
			C508.3	C508.3 Perform Laboratory compaction and Shear strength of soil	1	1						1	1	1	1		1	1	
	BTCVL509	Environmental Engineering Laboratory	C509.1	Quantify the pollutant concentration in water, wastewater and ambient air.	2	1				1		1	1	2			2	3	
			C509.2	Recommend the degree of treatment required for the water and wastewater.	2	2				1	1			2		1	2	1	
			C509.3	Analyze the survival conditions for the microorganism and its growth rate.	1					1			1	2			1		
		Transportatio	CVL510..1	Perform tests on various road construction materials.	2	2	1					1		1		1	2	1	1

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	BTCVL510	Transportation Engineering Laboratory	CVL510..2	Perform CBR tests on local soils to determine subgrade properties needed for roadways.	2	2	1			1		1		1		1	2	1	1
			CVL510..3	Identify and apply the design, based on the physical overview of the site.	1								1			1	1		
	BTCVS511	Seminar on Topic of Field Visit to works related to Building Services	C511.1	Understand and prepare chronological order of execution of Building Services	1	1				2	1	1	1	1			1		
			C511.2	Interpreted the collected data and present it in form of technical information		1	1	1	1			2	2	2	2	1	1		
			C511.3	Prepare technical report based on field data of execution of Building Services	1	1		1	1			2	2	2	1	1	1		1
	BTCVC601	Design of Concrete Structures I	C601.1	Comprehend to the various design philosophies used for design of reinforced concrete.	1					1		1					2	1	3
			C601.2	Analyze and design the reinforced concrete slab using limit state and working state method	3	2	3	1		1		1		1		2	2	2	3
			C601.3	Analyze and design the reinforced concrete beam using limit state and working state method	3	2	3	1		1		1		1		2	2	2	3
			C601.4	Analyze and design the reinforced concrete column using limit state and working state method.	3	2	3	1		1		1		1		2	2	2	3
	BTCVC602	Foundation Engineering	C602.1	To predict soil behavior under the application of loads and come up with appropriate solutions to foundation design queries.	2	2	1									1	1	1	1
			C602.2	Analyze the stability of slope by theoretical and graphical methods	3	2											2	1	1
			C602.3	Analyze the results of in-situ tests and transform measurements and associated uncertainties into relevant design parameters	1	1										1	1		
			C602.4	Synthesize the concepts of allowable stress design, appropriate factors of safety, margin of safety, and reliability..	2	1	1									1	1	1	
	BTCVC603	Concrete Technology	C603.1	Apply principles of sustainable development in Engineering works	1	1	1	2									1		2
			C603.2	Develop innovation strategies for sustainable development	1	1	1	2			1						2	1	2
			C603.3	Analyse role of government in Policies for environmental degradation	2	2	2	2				1					2		1
	BTCVC604	Project Management	C604.1	Understand various steps in project Management, different types of charts		2		1							1		1		1
			C604.2	Construct network by using CPM and PERT method	1	1								2	2		2	2	2
			C604.3	Determine the optimum duration of project with the help of various time estimates	2	2		2							2		2	1	2
			C604.4	Know the concept of engineering economics, economic comparisons, and linear break even analysis problems	2	2											1	2	1
			C604.5	Understand the concept of total quality Management including Juran and Deming's philosophy					2						1			1	
			C605A.1	Determine the sewage characteristics and design various sewage treatment plants.	3	2	2				1					1	2	2	1

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TE 6th Sem	BTCVE605A	Waste Water Treatment	C605A.2	Understand municipal water and wastewater treatment system design and operation.	2	1					1						1		1
			C605A.3	Apply environmental treatment technologies and design processes for treatment of industrial waste water.	2	2	2			1	1						2	1	
			C605A.4	Understand the rural sanitation schemes.	1					1	1						1		
	BTCVE605C	Geographic Data Analysis and Applications	C605C.1	To infer about GIS data types for working under digital environment.	2	2			1								1	1	
			C605C.2	To explain the techniques used in GIS data processing.	2	2	1		1								1	1	
			C605C.3	To understand GIS and remote sensing integration in data creation.	2	2			1								1	2	
			C605C.4	To identify the application of GIS in civil engineering.	2	2	1		1									2	
	BTCVC606	Building Planning and Design	C606.1	Apply principles of sustainable development in Engineering works	1	2	2			1	1	1				1	2	2	1
			C606.2	Develop innovation strategies for sustainable development	1	2				1	1					1	1	1	1
			C606.3	Analyse role of government in Policies for environmental degradation	1											1	1		
	BTCVL607	Concrete Technology Laboratory	C607.1	Demonstration with performance of testing of cement and aggregates	1	1		1					1				2	1	1
			C607.2	Demonstration with performance of fresh concrete test and hardened concrete test	1	1		1					1				2	1	1
			C607.3	Understand the effect of admixtures and non-destructing testing of concrete.	1			1			1		1				1		1
			C607.4	Design and validate the concrete mix with help of different concrete mix design methods.	2	2	1	2				1	1				2		1
	BTCVL608	Building Planning, Design and Drawing Laboratory	C608.1	Draw plan, elevation and section of load bearing and framed structures.	2	2	1		1	1			1	1		1	1	1	1
			C608.2	Draw plan, elevation and section of public structures.	2	2	1		1	1			1	1		1	1	1	1
			C608.3	Understand, create and apply appropriate IT tools for drawing purpose	1	1	1		1				1	1		1	1	1	
	BTCVL609	Community Project (Mini Project)	C609.1	Apply reasoning informed by the contextual knowledge to assess societal issues	2	2		1	1	2	1	1	2	2		1	3	2	
			C609.2	Understand the impact of the professional engineering solutions in societal contexts	1	1	2	1	1		1	1	2	2	1	1	2	2	
			C609.3	Demonstrate knowledge and understanding of the engineering and management principles as a member and leader in a team	1	1			1	1	2	1	2	2	2	1	2	2	
	BTCVS610	Seminar on Topic of Field Visit Road Construction	C610.1	Understand and prepare chronological order of execution of Road Construction works	1	1				2	1	1	1	1			1		
			C610.2	Interpreted the collected data and present it in form of technical information		1	1	1	1			2	2	2	2	1	1		
			C610.3	Prepare technical report based on field data of execution of Road Construction works	1	1		1	1			2	2	2	1	1	1		1
			CO701.1	Able to identify the behavior, analyze and design of the beam sections subjected to torsion.	3	3	3			1		1					2	2	2

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BE 7th Sem	BTCVC 701	Design of Concrete Structures II	CO701.2	Able to analyze and design of axially and eccentrically loaded column and construct the interaction diagram for them.	3	3	3			1		1					2	1	1
			CO701.3	Understand various concepts, systems and losses in pre-stressing.	3	2					2						1	1	2
			CO701.4	Able to analyze and design the rectangular and symmetrical I-section pre-stressed beam/girders	3	3	3				2	1				2	2	2	1
	BTCVC 702	Infrastructure Engineering	CO702.1	Know about the basics and design of various components of railway engineering	2	1				1						1	2	1	1
			CO702.2	Understand the types and functions of tracks, junctions and railway stations.	2	1				1						1	2	1	1
			CO702.3	Know about the aircraft characteristics, planning and components of airport	1	1				1							2	1	1
			CO702.4	Understand the types and components of docks and harbors.	1	1				1							2		
	BTCVC 703	Water Resources Engineering	CO703.1	Understand need of Irrigation in India and technical terms like delta, duty related to water requirement in farming practice.	2	1									1	1	1		1
			CO703.2	Demonstrate planning and design for types of dams, selection criterion for spillways and gates.	3	2	2								1		2	2	2
			CO703.3	Comprehend the classification of wells, components used in construction of wells.	2	1											1		
			CO703.4	Estimate values required to plot unit hydrograph, flood hydrograph, S-curve hydrograph.	3	2	1											1	2
			CO703.5	Apply curative measures for water logging and techniques for water conservation.	2	2				1	2					1	1	2	
	BTCVC 704	Professional Practices	CO704.1	Understand the importance of preparing the types of estimates under different conditions for various structures	2												2		
			CO704.2	Evaluate the quantity of materials required and approximate estimates for Civil engineering works as per specifications	2	2		2									3	2	1
			CO704.3	Evaluate and file tenders in construction industry	2							1					3	2	1
			CO704.4	Estimate the valuation of land, various structures, existing and proposed buildings using various methods	2	2											3	2	1
	BTCVE705F	Engineering Economics	CO705F.1	To learn the economics behind any constructional activities	3	2	2									3	2	2	
			CO705F.2	To Emphasis upon develop interest in investment evaluation and financing projects.		2	2									2	2	2	
	BTCVOE 706E	Town and Urban Planning (Audit Course)	CO706.1	Discuss town and urban planning with essential attributes		1	2			2							2	2	2
			CO706.2	Provide information of various aspects involved town and urban planning		1	2	2	1	2	2						2	1	2
			CO706.3	Make students familiar with various standards, acts, laws and guidelines		1	2	2	1	2	2						2		2
	BTCVL707	Design & Drawing of RC & Steel	CO707.1	Design and draw steel structures using IS 800 1984 or 2007	2												2	1	1
			CO707.2	Design and draw industrial structures.	3	2	2						1	2			3	2	1

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		Structures	CO707.3	Design and draw RC structures	3	2	2						1	2			3	2	1
	BTCVL708	Professional Practices	CO803.1	Prepare detailed and approximate estimates for two storyed RCC or load bearing wall building	2	2						1		1	1	1	3	2	
			CO803.2	Present the valuation report including valuation certificate	2	1				1		1		1	1		2		
			CO803.3	Evaluate detailed specification for any civil engineering items	2	1								1			2		
	BTCVL709	Field Training /Internship/Industrial	C709.1	To identify the challenges and future potential in internship problem and solve the problem during the internship period.	1	2	1			1	1		1		1	2	2		1
			C709.2	To test the theoretical learning and research-based knowledge in practical situations by completing assigned tasks during the internship period.	1	2		2		1			1		1	2	2	2	
			C709.3	To apply various soft skills such as time management, positive attitude and communication skills during presentation in the internship program.					1			1	1	2	2	2	2		2
	BTCVS710	Seminar	CO710.1	Understand Recent Developments in Civil Engineering area and interdisciplinary area	1	1				2	1	1	1	1			1		
			CO710.2	Interpreted the collected data and present it in form of technical information		1	1	1	1			2	2	2	2	1	1		
			CO710.3	Prepare technical report based on field data collected	1	1		1	1			2	2	2	1	1	1		1
	BTCVP711	Project Stage-I	CO711.1	Recommend gaps in literature survey on particular topic	3	3	1				1		3	2	1	3	3	2	
			CO711.2	Develop methodology for chosen work	3	2	1	2	1		1	1	3	2	2		3	2	
			CO711.3	Generate Solutions for Recommended gaps by Applying modern tools and techniques	3	3	2	1	2	1	2	1	3	2		2	3	1	
			CO711.4	Formulate detailed report on selected work						3		1	3	3		2	1		
BE 8th Sem	BTCVSS801D	Maintenance and Repair of Concrete Structures	C801D.1	Identify various deterioration or damage mechanisms in concrete structures.	2	1				1							1	1	
			C801D.2	Assess the condition of the structure by using various non-destructive, partially-destructive tools.	2	2			2	1							2	1	
			C801D.3	Select measurable parameters that are useful in deciding the further repair and maintenance practices.	2	2				1						1	2	1	
	BTCESS802B	Environmental Remediation of Contaminated Sites	C802B.1	Understand integrated approaches to remediating contaminated sites.	2	1				1	2						2	2	2
			C802B.2	Screen, choose and design appropriate technologies for remediation.	3	2	3	1	1		1	1				1	2	2	2
			C802B.3	Demonstrate Laws/Regulations for remediation of contaminated sites.	3					1	1	2					1		
			C802B.4	Perform risk assessment due to contamination.	2	2	1	1		2	2	1				1	1	1	1
	BTCEP803	In-house Project or Internship and Project in Industry*	CO803.1	Demonstrate sound technical knowledge of their selected work	3	3	2	1	2	1	2	1	3	2		2	3	1	2
			CO803.2	Design sustainable solutions for chosen work	3	2	3	2	1		1	1	3	2	2	2	3	1	
			CO803.3	Communicate findings beneficial to community at large in written and oral forms						3		1	3	3		2	1		

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The process of attainment of POs and PSOs of individual course in the four-year engineering degree program requires measuring tools. Respective faculty member prepares course outcomes using the concept of engineering subject. Then, a correlation is established between COs with POs/PSOs on the scale of 0 to 3 where 0 means no correlation and 3 means high correlation. Mapping matrix of COs-POs and COs-PSOs is prepared for all courses in the program.

Assessment tools are categorized into direct and indirect methods to assess whether the program specific outcomes (PSO) and program outcomes (PO) are attained. Direct methods include direct examinations of student, conducted throughout the semester. It is carried out in the form of continuous internal assessment tests, end semester examinations, assignments, unit tests and laboratory assignments etc. Indirect method is based on course exit survey, program exit survey, alumni survey etc. A target value is set for CO, PO and PSO and attainment is calculated with respect to that target value.

For CO attainment, it is calculated how many students have scored more than the target value which is already set by the course coordinator in the internal exam and university exams. Attainment levels are defined as per the following table:

% students scored more than the target value	Attainment level
0-50%	1
50-60%	2
>60%	3

For PO attainment, multiplier factors are defined based on CO attainment as per following table:

Percentage students scored more than the target value	Multiplier factor
0-50%	0.33
50-60%	0.66
>60%	1

This multiplier factor is multiplied with the value assigned in the CO-PO relevance table and final attainment of each PO is calculated as demonstrated in the following steps :

Step no 1: CO-PO Relevance

Sub. code Subject	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Design and Analysis of Algorithm BTCOC401	C401.1	2	3	2	1								1
	C401.2	2	3	2									1
	C401.3	2	3	2									1
	C401.4	2	3	2									1
	C401.5	2	3	2	1								1
C401-Average		2	3	2	1								1

Step no2: Calculation of multiplying factor for each CO and finally PO attainment

CO	Course Outcome	% of students receiving more than 60% marks	Attainment level	Multiplication factor
CO1	To Examine the running time of an algorithm using asymptotic analysis and to check correctness of algorithm by solving recurrence relation.	63.77	3	1
CO2	To Describe the Divide-and-Conquer paradigm and use this technique to solve different algorithms.	44.93	1	0.33
CO3	To Describe the Backtracking, Branch and bound paradigm and use this technique to solve different algorithms.	60.87	3	1
CO4	To Describe the Greedy paradigm and use this technique to solve different algorithms.	57.97	2	0.66
CO5	To Describe the Dynamic Programming paradigm and use this technique to solve different algorithms and examine the classes of algorithms based on P, NP, and NP-Complete	52.17	2	0.66

Sub code / Subject	PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Course Code: BTCOC401 Course Title: Design and Analysis of Algorithm	C401.1	2*1=2	3*1=3	2*1=1	1*1=1								1*1=1
	C401.2	2* 0.33=0 .66	3*0.33 =0.99	2*0.33 =0.66									1*0.33 =0.33
	C401.3	2*1=2	3*1=3	2*1=1									1*1=1
	C401.4	2* 0.66 = 1.32	3*0.66 =1.98	2*0.66 =1.32									1*0.66 =0.66
	C401.5	2* 0.66 =1.32	3*0.66 =1.98	2*0.66 =1.32	1*0.66 =0.66								1*0.66 =0.66
SUM		**10**	**15**	**10**	**2**								**5**
Sum of values attained		7.3	10.95	5.3	1.66								3.65
% PO attainment for each element		73%	73%	53%	83%								73%
Attainment Value		**2.19**	**2.19**	**1.59**	**2.49**								**2.19**
*** bold indicate CO attained**													

PO attainment (Direct) is calculated by for both the internal assessment test and university exams for each. In the case of indirect attainment, it is calculated only on the basis of the course exit survey which is taken by the course coordinator at the end of the course.

Finally, an articulation matrix is formed, in which all subjects (from Sem I to Sem VIII) are incorporated with their PO and PSO attainment values (Direct/ indirect). For calculating program indirect attainmentAverage value of indirect attainment for all subjects is calculated and program indirect This final average value is considered as the program indirect attainment value. Direct attainment of the program is calculated by taking the average of PO values attained through university exams and internal assessment tests.

Direct assessment Methods		
Sr. No.	Assessment tool	Method description
1.	Internal assessment test	The internal assessment(IA) marks in a theory paper is based on number of tests, conducted as scheduled in the departmental academic calendar. It is a metric to continuously assess the attainment of course outcomes with respect to course objectives. The total marks of all tests being asked for each CO is calculated for CO attainment purpose
2.	Lab Assignments	Lab Assignment is one of the measuring criteria to mainly assess student's practical knowledge with their experimental capabilities. In case of practical, the IA marks shall be based on the laboratory records, practical tests and viva-voce
3.	Theory Semester Examination & Practical Semester Examination	Semester examination (theory or practical) are the metric to assess whether all the course outcomes are attained or not, framed by the course owner. Semester Examination is more focused on attainment of course outcomes and uses a descriptive exam.
4.	Seminar	The IA marks in the case of seminar shall be based on continuous evaluation by a faculty coordinator assigned by the department
5.	Mini Project	The IA marks in the case of mini-project shall be based on continuous evaluation by a faculty coordinator (project guide if allotted) assigned by the department
6.	Project	The IA marks in projects in the final years shall be based on the continuous evaluation throughout the semester by an internal committee consisting of the three faculty members of the Department, one of whom shall be the project guide

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Shree Vile Parle Kelavani Mandal's
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Department of Computer Engineering
Course Mapping Matrix A.Y. 2021-2022 (ODD Semester)

				CO-PO Mapping												CO-PSO Mapping		
Subject Code	Subject Name	CO No	CO Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTBS301	Engineering Mathematics – III	C301.1	Find Laplace transform of functions using various formulas and properties. Evaluate particular types of integration.	2	2											1	1	
		C301.2	Find Inverse Laplace transform of functions using various formulas and properties. Solve linear differential/simultaneous linear differential equation using Laplace and inverse Laplace transform.	2	1	1										1	1	
		C301.3	Find Fourier and inverse Fourier transform, Fourier sine and inverse Fourier sine transform. Cosine transform and inverse Fourier cosine Transform of functions.	3	1	1										2	1	
		C301.4	Form PDE by eliminating arbitrary constant, solve PDE and use PDE to solve one and two dimensional heat flow equation.	2	2	1										1		
		C301.5	Determine Analytic functions//Bilinear transformation/ apply Cauchy's theorem/Cauchy's integral formula and Residue theorem to solve contour integration.	2	2											1		
BTCOC302	Discrete Mathematics	C302.1	To Understand the basic principles of sets and operations in sets and Interpret mathematical properties formally via the formal language of propositional logic and predicate logic	3	2	1									1	1	2	
		C302.2	To perform operations on various discrete structures such as functions, relations, and sequences. To solve problems using counting techniques, permutation and combination, recursion and generating functions.	3	2	1	1								1	2	2	
		C302.3	To Use graphs as tools to visualize and simplify situations	3	2	2	1								1	2	2	1
		C302.4	To Use trees as tools to visualize and simplify situations	3	2	2	1								1	2	2	1
		C302.5	To solve problems using algebraic structures and understand the concept of morphism	3	2	1	1									1	2	
BTCOC303	Data Structures	C303.1	Understand linear, non-linear data and hashing functions and analyze programs.	2	2	2									1	1	1	
		C303.2	Implementation of stack and queue using sequential and linked allocation.	2	1	2	1								1	2	2	
		C303.3	Understand concepts of link list and implement singly and doubly linked list.	2	2	2	1								1	2		1
		C303.4	Understand concept in trees and graphs and implement binary tree, Heap, Balanced Tree, Graph.	2	2	2									1	2	1	
		C303.5	Understand the concept of dictionaries, file handling, and implement different skip list operations such as insertion, deletion and searching, sorting.	3	2	3	1								2	2	2	1
BTCOC304	Computer Architecture and Organization	C304.1	To Illustrate the concept of computer organization and architecture	1	2	1									1		1	
		C304.2	To Describe instruction sets	1	1	1									1	2	2	
		C304.3	To Perform arithmetic operation	2	2	1									1	2	2	
		C304.4	To Illustrate the concept of memory organization	1	1	1									1	1		
		C304.5	To Describe role of control unit and Input / Output organization	1	1	2	1									1	1	1
BTCOC305	Object - oriented Programming in C++	C305.1	To appreciate and understand the concept of object oriented programming and their utility	1	2	1									1	2	1	
		C305.2	To apply the Object oriented approach to design software	1	1	1									1	2	2	

BTCOC305	Object - oriented Programming in C++	C305.3	To analyze and solve the ambiguity and membership problems using static and dynamic polymorphism.	2	2	1									1		2		
		C305.4	To use different file systems operation and apply different design methodologies based on the problem specification and objectives.	1	1	1									1	1			
		C305.5	To Analyze and solve different features of Object Oriented Methodology with templates, exception handling etc.	1	1	2	1									1	1	1	
BTCOL306	Data Structures Lab	L306A.1	Understand and implement various concepts in stacks and Evaluate polish notation for given expression.	2	2	2										2	1		
		L306A.2	Implement concepts in queue such as circular queue as well as dequeue using array	2	1	2	1									2			
		L306A.3	Design a stack using queues and perform basic operations in linear and constant time. Design a queue using stacks and perform dequeue operations in linear as well as in constant.	2	2	2	1									2	1		
		L306A.4	Implement data structures as single and double linked list. Design stack using link list and perform stack operations with time complexity O (1).	2	2	2	1									1	1		
		L306A.5	Understand and implement concepts in trees and graphs and Construct Search trees.	2	2	2										2	1	1	
		L306A.6	Understand and implement concepts in hashing and different sorting algorithms.	3	2	3	1									2	1	1	
BTCOL306	Object Oriented Programming Lab	L306B.1	To appreciate and understand the concept of object oriented programming and their utility	1	2	1									1	2	1		
		L306B.2	To apply the Object oriented approach to design software	1	1	1									1	2	2		
		L306B.3	To analyze and solve the ambiguity and membership problems using static and dynamic polymorphism.	2	2	1									1		2		
		L306B.4	To use different file systems operation and apply different design methodologies based on the problem specification and objectives.	1	1	1									1	1			
		L306B.5	To Analyze and solve different features of Object Oriented Methodology with templates, exception handling etc.	1	1	2	1									1	1	1	
BTCOS307	Seminar-I (Java Programming Lab)	S307A.1	To Illustrate the concept of basics of Java programming.	1	2										1	1	1		
		S307A.2	To Implement Java programs on Arithmetic Promotion and Method Calling	1		2	1							1	1		2		
		S307A.3	To Implement java program using different java class.	1	2	2									1		2		
		S307A.4	To Use the different java principles like inheritance, polymorphism, packaging and interface	1	1	2		2							1	2	2	1	
BTCOS307	Seminar-I (Web Technology Lab)	S307.1	To design a web page using HTML5 semantic elements.	3	1	3		2					2		2	1	3	1	
		S307.2	To Understand the role of CSS stylesheets and design a Lay out HTML elements using CSS.	2	1	3		2					2		2	1	3	1	
		S307.3	To Implement program logic using JavaScript and design web page	2	1	3	1	2					2		2	1	3	1	
		S307.4	To Understand and implement web page designing using PHP.	2	1	3		2					2		2	1	3	1	
		S307.5	To Understand the role of Ajax in Web page Design.	2	1	3		2					2		2	1	3	1	
BTCOC501	Database Systems	C501.1	To Identify the basic database management system concepts and entity relationship model.	1	1	2		1							1	1	2		
		C501.2	To Describe database relational data model and relational calculus.	2	2	1									1	2	2		
		C501.3	To Implement database concepts using SQL commands and join operations.	2	2	3		1							1	1	2	2	
		C501.4	To Apply various Normalization techniques.	2	2	3									1	1	2		
		C501.5	To Understand indexing and query processing and techniques involved in query optimization of databases.	3	2	2									1		2		
		C501.6	To Describe the principles of transaction processing of databases.	2	2	2									1		2		

BTCOC502	Theory of Computation	C502.1	To Understand formal machines, computations, regular expression and Design finite state machines for acceptance of strings	1	2	2										1	1	2	
		C502.2	To Explain Context Free Grammar and Classify different types of Grammars.	1	2	2										1	1	2	
		C502.3	To Illustrate Regular Grammar, its types and translate to different normal forms	1	2	2										1	1	2	
		C502.4	To Develop pushdown automata accepting strings	1	2	2										1	1	2	
		C502.5	To Explain Turing machine and Distinguish between decidability and undecidability	1	2	2	1									1	1	2	1
BTCOC503	Machine Learning	C503.1	To recognize the characteristics of machine learning that makes it useful to real-world problems and Use different linear methods for regression and classification with their optimization through different regularization techniques.	2	3	3	2	1	1							2	1	2	1
		C503.2	To apply theoretical foundations of Instance based learning and probability to perform KNN and Bayesian classifier to label data points.	3	3	3	2	1	1							2	2	3	1
		C503.3	To describe and apply the different supervised learning methods of logistic regression and support vector machine.	3	3	3	2	1	1							2	2	3	1
		C503.4	To Select the appropriate type of neural network architecture and apply for learning non-linear functions.	3	3	3	2	1	1							2	2	3	1
		C503.5	To Compare and Apply different dimensionality reduction techniques.	3	3	3	2									1	1	2	
		C503.6	To Illustrate and apply clustering algorithms and identify its applicability in real life problems.	3	3	3	2		1							2	1	3	1
BTCOE504(A)	Introduction to Research	C504(A).1	Develop Understanding on various kinds of research, objectives of doing research, research process, research designs and sampling.	3	3	2	2										1	1	1
		C504(A).2	To Understand & Apply of qualitative research methods.	3	2	3	2										1	1	1
		C504(A).3	To Understanding & Apply measuring and scaling procedures, as well as quantitative data analysis.	2	3	2	2										1	1	1
		C504(A).4	To Create and Develop Technical writing & Presentations.	1	1	1	2	3	2		3		3	3	2	2	3	3	
		C504(A).5	To Apply Various Research Ethics while making research report.	1	1	3	1	3	1		3		3	2	2	3	3	3	
BTCOE505(A)	Economics & Management	C505A.1	understand about market, demand, supply and cost.	3	2			1											
		C505A.2	apply skills like decision making and process costing.	1	3			2											
		C505A.3	implement financial management, accounting and handling financial risks.		2	3		1											
		C505A.4	Understanding forecasting and capacity planning.		3	2										1			
		C505A.5	Understand inventory management systems and entrepreneurship.																
BTCOC506	Computer Programming-I	C506.1	Discuss the concepts of online Judges and feedback to solve the programming challenges.	1	2			2								1	1	1	
		C506.2	Design and implement the basic programs of Strings, Sorting, Combinatorics, Arithmetic and Algebra etc on Hacker rank, Codechef websites.	2	2	3	2	2								1	3	3	1
		C506.3	Discuss the standard input output and Use the guidelines for designing the test cases for the various programs.	1	2	2	1	1								2	2	2	2
		C506.4	Practice and Participate in the programming challenges on competitive platforms like codechef.com, uva.onlinejudge.com and to succeed in such challenges of reputed recruiting organizations.	1	1	2	2	2								2	3	3	3
BTCOL507	Database System Lab	C507.1	To Implement database language commands for database concepts	2	2	3		2								1	1	2	
		C507.2	To Analyze the data using queries to retrieve data from database.	2	2	3										1	2	2	
		C507.3	To Apply PL/SQL for processing database.	2	3	3										1	1	2	2

		C507.4	To Develop solutions using database concepts for requirements.	2	2	3	1	2							1	1	3	1
BTCOL508	Machine Learning Laboratory	L508.1	To Understand the mathematical and statistical prospective of machine learning algorithms through python programming.	2	2	2	2	2				2	1		2	2	2	1
		L508.2	To evaluate the machine learning models pre-processed through various feature-engineering algorithms by python programming.	2	2	2		1				2			2	2	2	1
		L508.3	To Design and evaluate the supervised models through python in built functions.	2	2	2	2	1	1			2	1		2	3	2	1
		L508.4	To Design and evaluate the unsupervised models through python in built functions.	2	2	2	2	2	1			2	1		2	3	2	1
		L508.5	To Recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.	3	3	3	3	3	1		1	2	1	1	2	3	3	3
BTCOS509	Seminar	S509.1	To study research papers for understanding of a new field, in the absence of a textbook, to summarize and review them.	1	2	1	3	1	1	1	1				1	1	1	
		S509.2	To identify promising new directions of various cutting edge technologies.	2	2	1	1	1	1	1					1	1		2
		S509.3	To impart skills in preparing detailed report describing the project and results	2	1	1	2	2	1	1	1	1	3	1	2	2		1
		S509.4	To effectively communicate by making an oral presentation before an evaluation committee	1	1	1	2	2	1	1	1	1	3	1	2	1		2
BTCOC701	Software Engineering	C701.1	To understand and meet ethical standards and legal responsibilities in the field of software engineering discipline.	1					1		2				1	1		
		C701.2	To provide the idea of decomposing the given problem into various process models and understand the functionality of SDLC models.	1	2	2	2						1	1	1	2	1	2
		C701.3	To Understand the importance of requirement engineering	1	1		2						1		1	1		1
		C701.4	To understand different modeling system with design & implementation using UML	1		2		2					1		1	1	2	
		C701.5	To understand the importance of testing at different level and evaluate dependability properties	1		1		1							1		1	2
BTCOE702	Distributed System	C702B.1	To Understand the concept of architecture and communication systems in Distributed Systems.	2	2	1									2	1	2	
		C702B.2	To Describe the remote procedure call in Distributed Systems.	2	2	2	1	1							2	2	2	1
		C702B.3	To Understand the Distributed shared memory concept and various distributed algorithms related to clock synchronization, deadlock detection.	2	2	1	1								2	2	2	
		C702B.4	To Apply various distributed algorithm related to resource management	2	2	2									2	1	1	
		C702B.5	To Analyze the design and functioning of existing distributed file systems.	2	2	1									2	2	2	1
BTCOE703A	Cloud Computing	C703A.1	To understand the basic terminologies of cloud computing.	3	2			1								3	2	2
		C703A.2	To identify various service models in cloud architecture.	2	1			3								2	2	2
		C703A.3	To know cloud usage and implementation for enterprise level.	1	2	2		3							1	3	3	3
		C703A.4	To deploy Aneka cloud platform	1	2	2		3								2	2	2
		C703A.5	Applying cloud applications and services to various domain specific platforms.	1	2	3	1	3							1	3	3	3
BTCOE703C	Natural Language Processing	C703C.1	To understand natural language processing and learn how to apply basic algorithms in this field.	3	2	2	1	2							2	2	2	2
		C703C.2	To understand the algorithmic description of the main language levels: morphology, syntax, semantics, and pragmatics	3	2	2	1	2							2	2	2	2
		C703C.3	To grasp basics of knowledge representation, inference, and their relations.	3	2	2	1	2							2	2	2	2
		C703C.4	To Design algorithms for natural language processing tasks.	3	3	3	3	2							3	2	3	2

		C703C.5	To Develop useful systems for language processing and related tasks involving text processing.	3	3	3	3	2							3	2	3	3
															1	2	2	3
BTCOE702	Big Data Analytics	C702.1	To Understand the building blocks of Big Data.	3	3	3	3	2							1	3	3	3
		C702.2	To Analyze the various big data platform like Hadoop, Map Reduce.	3	2	3		2							1	1	1	1
		C702.3	To Illustrate the use of various Big Data Streaming Platforms.	3	2	1	1	3							1	3	3	2
		C702.4	To Perform big data application using machine learning and deep learning.	3	3	3	2	3							1	1	3	1
		C702.5	To Understand various big data modern database for web.	3	3	2	1	3								1	1	1
BTCOL707 (A)	Big Data Analytics Lab	C707.1	Execute Installing Hadoop in its two operating modes.	3	1		2	3							1	2	1	1
		C707.2	Execute and implement various file management tasks in Hadoop.	3	1	1	3	3							2	2	3	2
		C707.3	Understand the overall programming architecture using Map Reduce API.	2		3	1	2							2	2	3	2
		C707.4	Implement to Store the basic information about students such as roll no, name, date of birth and address Of student using various collection types such as List, Set and Map & a basic Word Count Map Reduce program to understand Map Reduce Paradigm.	3	3	3	2	3							2	2	3	2
		C707.5	Execute and implement HBase then use HbaseDDl and DML commands, Apache spark applications using Scala and CRUD operations in MongoDB.	3	2	3	3	3							2	2	3	2
		C707.6	Understand and implement concepts of Data analytics using Apache Spark on Amazon food dataset.	2	2	3	2	2							3	2	3	2
BTCOE704	Blockchain Technology	C704 A.1	Explain Public Ledger, Concepts of block and blockchain, hashing function and its properties	3	2										1	2	1	
		C704 A.2	Demonstrate creation of coins in bitcoin along with double spending and explain different consensus algorithms	2	2										1	2		
		C704 A.3	Compare different consensus algorithms for permissioned blockchain model and explain permissioned model and use cases.	2	2										2	2	1	
		C704 A.4	Use different enterprise application of Blockchain such as cross border Payment, KYC, Food security, Blockchain Enabled trade		2												2	
		C704 A.5	Examine and Experiment platforms for writing smart contracts using Hyper ledger, Ethereum, Ripple, Corda.	2				2							2	3		3
BTCOL705	Full Stack Development	C705.1	To learn advanced concepts in front-end web Development.	1		2	1								1	1		1
		C705.2	To design websites using HTML5 and CSS3.	1	1	2	2	2					1		1	2	1	2
		C705.3	To understand the basic and advanced concepts in JavaScript, AngularJS, ExpressJS	1		2	2	2						1	1	1	1	2
		C705.4	To be familiar with back-end development using Ajax, jQuery, ExpressJS, Nodejs and MongoDB.	1	2	2	2	2					1	1	1	2	1	2
BTCOL706	System Administration	L706.1	Demonstrating cross platform virtualization software.	3	2	2		3								3	3	3
		L706.2	Demonstrating installation and configuration of virtual terminal connection.	3	2	2		3								3	3	3
		L706.3	Demonstrating file transfer between client and server.	3	2	2	1	3								3	3	3
		L706.4	Demonstrating web server and networking protocol configuration.	3	2	2	1	3								3	3	3
BTCOL707(B)	Distributed system Lab	L707B.1	To implement the models for distributed processing and communication	2	2	2									2	2	1	
		L707B.2	To Develop Client- server Communication model.	2	2	2									2	2	2	1

BTCOL707(B)	Distributed system Lab	L707B.3	To Apply shared memory concept on distributed system	2	2	2									2	2	2	2
		L707B.4	To Understand different election and Mutual Exclusion algorithms in distributed system.	2	2	2									2	2	2	
BTCOL708A	Cloud Computing Laboratory	L708A.1	To develop PaaS using various cloud platforms.	3	3	3		3								3	3	3
		L708A.2	To use SaaS cloud services from various service providers.	3	2	2		3								3	3	3
		L708A.3	Design and develop IaaS to provide physical environment.	3	3	3		3								3	3	3
		L708A.4	Implement and use sample cloud services from various service prov	3	3	3		3								3	3	3
BTCOL708C	Natural Language Processing Laboratory	L708C.1	Demonstrate the understanding of basic text processing techniques in NLP.	2	2	2	1	2							2	2	2	2
		L708C.2	Analyze morphological analyzers and stemmers.	2	2	2	1	2							2	2	2	2
		L708C.3	Build language models and demonstrate Word Sense Disambiguation using WordNet.	2	2	2	1	2							2	2	2	2
		L708C.4	Design, implement and evaluate part-of-speech taggers and parsers.	2	2	2	1	2							2	2	2	2
BTCOP709	Project Phase-1	709.1	To Analyse current trends in computer-related domains in order to uncover real-world issues and domain requirements.	1	3		1			1	1	2	2		2	1		1
		709.2	To Apply software engineering principles in planning, formulating an innovative design/ approach and computing requirements which are appropriate to solve the problem within the context of legal, global and environment constraint.	2	2	2	2	1	1	1	1	2		2	2	2	2	2	1
		709.3	To design and create projects using the proper methods, materials, and modern equipment while upholding integrity and moral conduct in engineering practices.	2	3	2	2	3	1	1	1	2	2	2	2	2	2	2	3
		709.4	Ability to schedule, monitor, and manage project's resources, finance and work assignments to assure timely completion and to validate and verify project's performance with respect to proposed solution.	2			2	2	1	1	1	2	2	3	2	2	2	2	1
		709.5	Ability to effectively communicate in both formal and informal environments with team members and mentors; professional performance as a team member; acceptance of responsibility, initiative, and leadership required to present and create technical documents for successful project.					1	2	2	2	3	3	1	2		2	1	

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Program Mapping Matrix A.Y. 2021-2022 (ODD Semester)

			CO-PO Mapping Average											CO-PSO Mapping Average		
Subject Code	CO Code	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTBS301	C301	Engineering Mathematics – III	2.2	1.6	1										1.2	1	
BTCOC302	C302	Discrete Mathematics	3	2	1.4	1								1	1.6	2	1
BTCOC303	C303	Data Structures	2	1.8	1.8	3								1	1.8	1.5	1
BTCOC304	C304	Computer Architecture and Organization	1.2	1.4	1.2	1								1	1.5	1.25	1
BTCOC305	C305	Object - oriented Programming in C++	1.2		1.2	1								0.8	1.5	1.25	1
BTCOC306	C306	Data Structures Lab	2.17	1.83	2.17	1								1.17	1.8	1.5	1
BTCOS307	S307A	Seminar-I (Java Programming Lab)	1	1.67	2	1	2						1	1	1	1.75	1
BTCOS307	S307B	Seminar-I (Web Technology Lab)	1	1.67	2	1	2						1	1	1	1.75	1
BTCOC501	C501	Database Systems	2	1.83	2.16		1							1	1.25	2	2
BTCOC502	C502	Theory of Computations	2	1.83	2.16		1							1	1.25	2	2
BTCOC503	C503	Machine Learning	1	2	2	1								1	1	2	1
BTCOE504	C504	Introduction to Research	2.8	3	3	2	1	1						1.8	1.5	2.66	1
BTCOE505	C505	Economics & Management	2	1.4	2.2	1.8	1.2	0.6		1.2		1.2	1	0.8	1.6	1.8	1.8
BTCOC506	C506	Competitive Programming-I	1.4	2.4	0.6		1.4							0.2		2.4	1
BTCOL507	L507	Database Systems lab	2	2.25	3	1	2							1	1.25	2.25	1.5
BTCOL508	L508	Machine Learning Laboratory	2	2.25	3	1	2							1			
BTCOC701	C701	Software Engineering	2.2	2.2	2.2	2.25	1.8	1		1	2	1	1	2			
BTCOE702	C702A	Big Data Analytics	1.5	1.5	1	2	1.5	1	1	1	1	3	1	1.5	1.25	1	1.6
BTCOE702	C702B	Distributed System	1	1.5	1.33	1.33	1.5	1		2		1	1	1	1.25	1.33	1.33
BTCOE703	C703A	Cloud Computing	3	2.6	2.4	1.4	2.6							1	2	2.4	2
BTCOE703	C703C	Natural Language Processing	2	2	1.4	1	1							2	1.6	1.8	1
BTCOE704	C704	Blockchain Technology	1.7	1.8	2.3	1	2.6										1
BTCOL705	C705	Full Stack Development	3	2.4	2.4	1.8	2							2.4	2	2.4	2.2
BTCOL706		System Administration	2.25	2	2		2							1.5	2.25	1.33	3
BTCOL707	C707	Big Data Analytics Lab	1	1.5	2	1.75	2					1	1	1	1.5	1	1.75
BTCOL708	L708A	Cloud Computing Laboratory	3	2	2	1	3								3	3	3
BTCOL708	L708C	Natural Language Processing Laboratory	2.67	1.8	2.16	2.16	3.2							1.6	1.8	2.33	1.66
BTCOP709	P709	Project Phase-I	1.75	2.66	2	1.75	1.75	1.2	1.2	1.2	2.2	2.25	2	2			
Program Mapping Average			1.93	1.96	1.93	1.45	1.84	0.97	1.10	1.28	1.73	1.58	1.13	1.23	1.56	1.82	1.49

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Program Articulation Matrix (Attainment) A.Y. 2021-2022 (ODD Semester)

			CO-PO Direct Attainment											CO-PSO Direct Attainment		
Subject Code	CO Code	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTBS301	C301	Engineering Mathematics – III	3	3	3										3	3	
BTCOC302	C302	Discrete Mathematics	3	3	3	3								3	3	3	3
BTCOC303	C303	Data Structures	3	3	3	3								3	3	3	3
BTCOC304	C304	Computer Architecture and Organization	1.98	1.98	2.15	3								1.73	1.82	1.82	3
BTCOC305	C305	Object - oriented Programming in C++	3	3	3	3								3	3	3	3
BTCOC306	C306	Data Structures Lab	3	3	3	3								3	3	3	3
BTCOS307	S307A	Seminar-I (Java Programming Lab)	3	3	3	3	3						3	3	3	3	3
BTCOS307	S307B	Seminar-I (Web Technology Lab)	3	3	3	3								3	3	3	3
BTCOC501	C501	Database Systems	2.91	2.98	2.84		2.49							2.82			
BTCOC502	C502	Theory of Computations	2.32	2.79	2.79	3								2.79	2.79	2.79	3
BTCOC503	C503	Machine Learning	3	3	3	3	3	3						3	3	3	3
BTCOE504	C504	Introduction to Research	3	1.98	3	3	3	3		3		3	3	3	3	3	3
BTCOE505	C505	Economics & Management	3	3	3		3							3		3	3
BTCOC506	C506	Competitive Programming-I	3	3	3	3								3	3	3	3
BTCOL507	L507	Database Systems lab	3	3	3	3	3							3	3	3	3
BTCOL508	L508	Machine Learning Laboratory	3	3	3	3	3	3		3	3	3	3	3	3	3	3
BTCOC701	C701	Software Engineering	3	3	3	3	3	3		3		3	3	3	3	3	3
BTCOE702	C702A	Big Data Analytics	3	3	3	3								3	3	3	3
BTCOE702	C702B	Distributed System	2.79	2.79	2.85	3	3							2.59	2.87	2.77	3
BTCOE703	C703A	Cloud Computing	1.74	2.33	3		2.38							3	2.22	2.15	2.15
BTCOE703	C703C	Natural Language Processing	2.19	2.32	2.32	2.55	2.19							2.32	2.19	1.83	2.26
BTCOE704	C704	Blockchain Technology	3	3	3		3							3	3	3	3
BTCOL705	C705	Full Stack Development	3	3	3	3	3					3	3	3	3	3	3
BTCOL706	C706	System Administration	3	3	3	3	3								3	3	3
BTCOL707	C707	Big Data Analytics Lab	3	3	3	3	3							3	3	3	3
BTCOL708	L708A	Cloud Computing Laboratory	3	3	3		3								3	3	3
BTCOL708	L708C	Natural Language Processing Laboratory	3	3	3	3	3							3	3	3	3

Average			2.85	2.86	2.92	2.98	2.89	3.00		3.00	3.00	3.00	3.00	2.89	2.88	2.86	2.94
			CO-PO Indirect Attainment												CO-PSO Indirect Attainment		
Subject Code	CO Code	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTBS301	C301	Engineering Mathematics – III	3	3	3										3	3	
BTCOC302	C302	Discrete Mathematics	3	3	3	3								3	3	3	3
BTCOC303	C303	Data Structures	3	3	3	3								3	3	3	3
BTCOC304	C304	Computer Architecture and Organization	3	3	3	3								3	3	3	3
BTCOC305	C305	Object - oriented Programming in C++	3	3	3	3								3	3	3	3
BTCOL306	L306A	Data Structures Lab	3	3	3	3								3	3	3	3
BTCOL306	L306B	Object Oriented Programming Lab	3	3	3	3								3	3	3	3
BTCOS307	S307A	Seminar-I (Java Programming Lab)	3	3	3	3	3						3	3	3	3	3
BTCOS307	S307B	Seminar-I (Web Technology Lab)	3	3	3	3	3							3	3	3	3
BTCOC501	C501	Database Systems	3	3	3	3								3	3	3	3
BTCOC502	C502	Theory of Computations	3	3	3	3								3	3	3	3
BTCOC503	C503	Machine Learning	3	3	3	3	3	3						3	3	3	3
BTCOE504	C504	Introduction to Research	3	3	3	3	3							3	3	3	3
BTCOE505	C505	Economics & Management	3	3	3		3							3		3	3
BTCOC506	C506	Competitive Programming-I	3	3	3	3								3	3	3	3
BTCOL507	C507	Distributed System Lab	3	3	3	3	3							3	3	3	3
BTCOL508	L508	Machine Learning Laboratory	3	3	3	3	3	3		3	3	3	3	3	3	3	3
BTCOC701	C701	Software Engineering	3	3	3	3	3	3		3		3	3	3	3	3	3
BTCOE702	C702A	Big Data Analytics	3	3	3	3	3	3					3	3	3	3	3
BTCOE702	C702B	Distributed System	3	3	3	3								3			
BTCOE703	C703A	Cloud Computing	3	3	3		3							3	3	3	3
BTCOE703	C703C	Natural Language Processing	3	3	3	3	3							3	3	3	3
BTCOE704	C704	Blockchain Technology	3	3	3	3	3							3	3	3	3
BTCOL705	C705	Full Stack Development	3	3	3		3							3	3	3	3
BTCOL706	L706	System Administration	3	3	3	3	3					3	3	3	3	3	3
BTCOL707	C707	Big Data Analytics Lab	3	3	3	3	3	3						3	3	3	3
BTCOL708	L708A	Cloud Computing Laboratory	3	3	3		3								3	3	3
BTCOL708	L708C	Natural Language Processing Laboratory	3	3	3	3	3							3	3	3	3
Average Indirect Attainment			3	3	3	3	3	3		3	3	3	3	3	3	3	3
Average attainment of Internal Assessment			2.85	2.86	2.92	2.98	2.89	3.00		3.00	3.00	3.00	3.00	2.89	2.88	2.86	2.94
Average attainment through University			2.6679	2.6617	2.6248	2.6263	2.76	2.592		2.49	1.98	2.49	2.49	2.6133	2.661905	2.64696	2.646957
Average Direct attainment			2.7586	2.7599	2.7744	2.8024	2.8229	2.796		2.745	2.49	2.745	2.745	2.7494	2.768752	2.75348	2.791678

Program Direct attainment (80%)	*2.21*	*2.21*	*2.22*	*2.24*	*2.26*	*2.24*		*2.20*	*1.99*	*2.20*	*2.20*	*2.20*	*2.22*	*2.20*	*2.23*
Program Indirect attainment (20%)	*0.60*	*0.60*	*0.60*	*0.60*	*0.60*	*0.60*		*0.60*	*0.60*	*0.60*	*0.60*	*0.60*	*0.60*	*0.60*	*0.60*
Program Attainment	*2.81*	*2.81*	*2.82*	*2.84*	*2.86*	*2.84*		*2.80*	*2.59*	*2.80*	*2.80*	*2.80*	*2.82*	*2.80*	*2.83*

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Department of Computer Engineering
CO-PSO Attainment through University A.Y. 2021-2022 (ODD Semester)

			CO-PO Attainment through University											CO-PSO Attainment through University		
Subject Code	CO Code	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTBS301	C301	Engineering Mathematics – III															
BTCOC302	C302	Discrete Mathematics	1.98	1.98	1.98	1.98								1.98	1.98	1.98	1.98
BTCOC303	C303	Data Structures	3		3									3	3	3	3
BTCOC304	C304	Computer Architecture and Organization	2.13	1.98	2.13	1.98								1.98	1.98	1.98	1.98
BTCOC305	C305	Object - oriented Programming in C++	3	3	3	3								3	3	3	3
BTCOL306	L306A	Data Structures Lab	1.98	1.98	1.98	1.98								1.98	1.98	1.98	1.98
BTCOL306	L306B	Object Oriented Programming Lab															
BTCOS307	S307A	Seminar-I (Java Programming Lab)	1.98	1.98	1.98	1.98	1.98						1.98	1.98	1.98	1.98	1.98
BTCOS307	S307B	Seminar-I (Web Technology Lab)															
BTCOC501	C501	Database Systems	3	3	3		3							3	3	3	3
BTCOC502	C502	Theory of Computations	3	3	3	3								3	3	3	3
BTCOC503	C503	Machine Learning	1.98	1.98	1.98	1.98	1.98	1.98						1.98	1.98	1.98	1.98
BTCOE504	C504	Introduction to Research	3	3	3	3	3							3	3	3	3
BTCOE505	C505	Economics & Management	1.98	1.98	1.32		1.98							1.98		1.98	1.98
BTCOC506	C506	Competitive Programming-I	1	1	1	1								1	1	1	1
BTCOL507	C507	Distributed System Lab	3	3	3	3	3							3	3	3	3
BTCOL508	L508	Machine Learning Laboratory	1.98	1.98	1.98	1.98	1.98	1.98		1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98
BTCOC701	C701	Software Engineering	3	3	3	3	3	3		3		3	3	3	3	3	3
BTCOE702	C702A	Big Data Analytics	3	3	3	3	3	3					3	3	3	3	3
BTCOE702	C702B	Distributed System	3	3	3	3								3			
BTCOE703	C703A	Cloud Computing	3	3	3	3	3									3	3
BTCOE703	C703C	Natural Language Processing	3	3	3	3	3							3	3	3	3
BTCOE704	C704	Blockchain Technology	3	3			3							3	3	3	3
BTCOL705	C705	Full Stack Development	3	3	3		3							3	3	3	3
BTCOL706	L706	System Administration	3	3	3	3	3								3	3	3
BTCOL707	C707	Big Data Analytics Lab	3	3	3	3	3	3						3	3	3	3
BTCOL708	L708A	Cloud Computing Laboratory	3	3	3		3								3	3	3
BTCOL708	L708C	Natural Language Processing Laboratory	3	3	3	3	3							3	3	3	3
BTCOP709	P709	Project Phase-I	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.63	0.99	0.99	0.78	1	1	1
Average			**2.64**	**2.619**	**2.598**	**2.57**	**2.76**	**2.59**		**2.49**	**1.98**	**2.49**	**2.49**	**2.585**	**2.63091**	**2.619**	**2.62**

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Course Mapping Matrix A.Y. 2021-2022 (Even Semester)

				CO-PO Mapping												CO-PSO Mapping		
Subject Code	Subject Name	CO No	CO Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCOC401	Design & Analysis of Algorithms	C401.1	Examine the running time of an algorithm using asymptotic analysis and to check correctness of algorithm by solving recurrence relation.	2	3	2	1								1	2	1	
		C401.2	Describe the Divide-and-Conquer paradigm and use this technique to solve different algorithms.	2	3	2									1	2	1	
		C401.3	Describe the Backtracking, Branch and Bound paradigm and use this technique to solve different algorithms.	2	3	2									1	2	1	
		C401.4	Describe the Greedy paradigm and use this technique to solve different algorithms.	2	3	2									1	2	1	
		C401.5	Describe the Dynamic Programming paradigm and use this technique to solve different algorithms and examine the classes of algorithms based on P, NP, and NP-Complete	2	3	2	1								1	2	1	
BTCOC402	Operating System	C402.1	To Comprehend and Use basic concepts of Operating System with its structure	2											1	2		1
		C402.2	To Illustrate concepts of Process as well as Thread Management along with Implement concepts of CPU Scheduling algorithms.	2	2			1								2	2	
		C402.3	To Illustrate concepts of Process Synchronization as well as deadlock along with Implement concepts of Synchronization primitives and banker s algorithms	2	2			1								2	2	
		C402.4	To Comprehend concept of Memory Management along with Implement concepts of page replacement algorithms and memory allocation algorithms	2	2			1								2	2	
		C402.5	To Illustrate concepts of File System Manipulation as well as Disk Management along with Implement concepts of file allocation algorithms and disk secluding algorithms	2	2			1							1	2	2	
BTHM403	Basic Human Rights	C403.1	Discuss the importance, philosophical and historical perspectives of human rights						2		1	1	1					
		C403.2	Examine the challenges of the pluralistic society and the rising conflicts and tensions in the name of particular loyalties to caste, religion, region and culture						3		1	1	2					
		C403.3	Discuss prominent issues such as Economy, Poverty, Unemployment, Migrant workers and human rights violation and the responsibility of the government						2		1	1	1					
		C403.4	Discuss Fundamental Rights and Directive Principles of State Policy in the Constitution of India in context with the present situation						2		2	1	2					
		C403.5	Discuss Universal declaration of human rights and provisions of India						2		2	1	2					
BTBS404	Probability Theory and Random Processes	C404.1	Find probability of given events Using addition and multiplication theorem. Apply Bayes theorem. Translate real-world problems into probability models.	2	2											1	2	
		C404.2	Find expectation and variance of discrete and continuous random variable. Find probability using Binomial, Poisson and Normal distribution.	2	1	1										1	2	
		C404.3	Calculate and interpret the correlation coefficient between two variables	3	1	1										1	2	
		C404.4	Calculate the simple linear regression equation for a set of data.	2	2	1										1	2	
		C404.5	Apply the concept of sampling theory to the engineering problems	2	2											1	2	
BTES405	Digital Logic Design & Microprocessors	C405.1	Illustrate the fundamental concepts of digital signal, positive and negative logic. Boolean algebra, logic gates, logical variables, the truth table, number systems, codes, and their interconversion, code error detection and correction.	2	1	1										2	1	
		C405.2	Perceive, analyse and design various minimization techniques, combinational and sequential circuits, to develop skill to construct and troubleshoot digital circuits.	2	1	1	1									2	1	
		C405.3	Perceive, the fundamentals and internal design of Microprocessors along with the features and their programming to build systems for real time applications	2	2	1	1	1	1						1	2	1	1
BTCOL406A	Operating System Lab	L406A.1	To Comprehend and Use basic concepts of Operating System with its structure	2	2	2		1							1	2	1	1
		L406A.2	To Illustrate concepts of Process as well as Thread Management along with Implement concepts of CPU Scheduling algorithms.	2	2	2		1								2	1	1
		L406A.3	To Illustrate concepts of Process Synchronization as well as deadlock along with Implement concepts of Synchronization primitives and banker s algorithms	2	2	2		1								2	1	1
		L406A.4	To Comprehend concept of Memory Management along with Implement concepts of page replacement algorithms and memory allocation algorithms	2	2	2		1								2	1	1
		L406A.5	To Illustrate concepts of File System Manipulation as well as Disk Management along with Implement concepts of file allocation algorithms and disk secluding algorithms	2	2	2		1							1	2	1	1
BTCOL406B	Python Programming Lab	L406B.1	To Use the Python language syntax including control statements, loops and functions to write programs for a wide variety problem in mathematics, science, and games	2	2	2	2	2							2	3	2	1
		L406B.2	To Examine the core data structures like lists, dictionaries, tuples and sets in Python to store, process and sort the data	2	2	2	2	2							2	3	2	1
		L406B.3	To Determine the methods to handle the strings in python and to use string functions.	2	2	2	2	2							2	3	2	1
		L406B.4	To Interpret the concepts of Object-oriented programming as used in Python using encapsulation, polymorphism and inheritance.	2	2	2	2	2							2	3	2	1
		L406B.5	To Write a program to Read and write data from & to files in Python	2	2	2	2	2							2	3	2	1
BTCOS407A	Seminar – II : Design & Analysis of Algorithms Lab	L407.1	To Use divide-and-conquer strategy to implement searching and sorting algorithms	2	3	1	1	1							2	3	1	
		L407.2	To Use Greedy methods to implement maximization and minimization problems	2	3	1	1	1							2	3	1	
		L407.3	To Use a dynamic Programming to implement the overlapping sub problems.	2	3	1	1	1							2	3	1	1
		L407.4	To Use the distance matrix strategy to find the shortest path in connected graph.	2	3	1	1	1							2	3	1	

BTCOS407B	Seminar – II : Mobile Application Development Lab	C407.1	To appreciate and understand the step for installing of required software and preparing the working environment	1	1			1								1	1		
		C407.2	To apply the OObject-orientedapproach to design layouts and views for mobile app	2	2	1	1									1		1	1
		C407.3	To analyze and solve the user interactions using input tools	1	1		1									1		1	2
		C407.4	To use of different API's or data sharing or data storing operation and apply different design methodologies based on the problem specification and objectives.			1	1	2								1	1		2
		C407.5	To Analyze and solve different features of mobile app development using error handling and passing data with real world problem etc.		1	1		1								1		1	2
BTCOC601	Compiler Design	C601.1	To explain the concepts and different phases of compilation with compile time error handling.	2	3	2										1	2	3	
		C601.2	To Use regular expressions, context free grammar and finite automata to Represent language tokens and design lexical analyzer for a languag	3	3	2	2	1								1	2	3	
		C601.3	To compare top down with bottom up parsers, and use appropriate parser to produce parse tree representation of the input.	2	3	2	2	1								1	2	3	1
		C601.4	To Design syntax directed translation schemes for a given context free grammar.	3	3	2	2									1	2	3	
		C601.5	To Generate intermediate code for statements in high level language.	3	3	2	2									1	3	3	1
		C601.6	To Apply optimization techniques to intermediate code and generate machine code for high level language program.	3	3	2	2									1	2	3	2
BTCOC602	Computer Networks	C602.1:	To Understand the essential components of a network as well as network layered architecture.	3	1	2	2	2	1							1	3	2	
		C602.2:	To Analyze various LAN Technologies.	3	3	3	2	3	1							1			
		C602.3:	To Understand the data connection layer's design difficulties and Service provided to Network Layer.	3	3	3	2	2								1	3	3	3
		C602.4:	Understanding & Analyze the Congestion control and Quality of service is Data Traffic	3	2	3	2	3									3	3	2
		C602.5:	To Understand and Analyze Application Layer Protocols.	3	2	2	2	2	1								3	2	1
BTCOE603B	Artificial Intelligence	C603B.1	To discuss fundamental understanding of the history of artificial intelligence (AI) , its foundations and the design of intelligent agents.	3	1	1										1	2	2	1
		C603B.2	To use the most appropriate AI methods for problem solving.	1	3	2										1	3	3	1
		C603B.3	To discuss the core concepts CSP's and design good evaluation functions and strategies for game playing	3	3	3										1	2	3	1
		C603B.4	To examine the logical agents and use of first order logic in building logical agents.	2	3	3										1	2	3	1
		C603B.5	**To describe knowledge in uncertain domain and semantics of Bayesian Networks.**	3	1	1										1	2	2	1
BTCOE603C	Object-Oriented Analysis Design	C603C.1	**Describe** the concepts of object oriented approach and **explain** SDLC.	3	3	3	1									2	2	3	2
		C603C.2	Design and develop object oriented models **using** appropriate UML notations.	3	3	3	3	3								3	3	3	3
		C603C.3	**Analyze** different approaches of object oriented system	3	3	3	3	1								2	3	2	2
		C603C.4	Use the concept of design patterns for constructing software architectures.	2	1	2	1									1	3	2	3
		C603C.5	**Discuss** the applications of Object oriented concepts in programming, databases and other real world application.	2	2	1										2	1	1	1
BTCOE604C	Internet of Things	C604.1	To **Recognize different** IoT Network Architecture and core concepts in IoT	1	2	2										1	2	1	1
		C604.2	To Examine communication criteria in IoT access Technologies and identify different elements in smart objects.	2	2	2										1	2	1	1
		C604.3	To Discuss and compare different protocols in IoT.	1	2		2									1	1	1	
		C604.4	To Use of different tools and technologies for IoT.	1	1		1	2								1	2	1	
		C604.5	To Demonstrate IoT Based system using IoT Physical Devices and endpoints.	2	2	2	1	1								2	2	2	2
BTCOE605A	Development Engineering	C605A.1	To Demonstrate basics of Engineering and classify the concept of development engineering in detail	2	1		1		1		1	1	2			2	2	1	
		C605A.2	To Analyze and illustrate the concept of poverty, and define the role of engineers in culture, global competence	2	3		2		3		2	1	2			2	2	2	
		C605A.3	To Explain and Define social justice engineering in religious, secular perspective.	2	1	1	2		3		2	1	2			2	2	1	
		C605A.4	To Use and apply different development strategies for society, economics, health and educational perspectives.	2	1	1			3		1	1	2	2		2	2	2	
		C605A.5	To Define the engineering for sustainable community and humanitarian education.	2		1				3	2	1	1			2	1		
		C605A.6	To Select and apply modern engineering tools like ICT, AI, Blockchain for social development.	1				2	1		1	1				2	2	1	1
BTCOC606	Competitive Programming-II	L606.1	Discuss the concepts of online Judges, feedback and the standard input output to solve the programming challenges based on number theory	3	2	1	1										2	3	2
		L606.2	Design and Implement back tracking challenging problems on Hackerrank, Codechef websites.	2	3	2	2										3	3	2
		L606.3	Design and Implement graph based challenging problems.	2	3	2	2										3	3	2
		L606.4	Design and implement the Dynamic Programming based challenging problems on Hackerrank, Codechef websites and use the guidelines for designing the test cases for the various programs	2	3	2	2										3	3	2

BTCOL607A	Mobile Application Development	C607.1	To appreciate and understand the step for installing of required software and preparing the working environment	1	1			1							1	1		
		C607.2	To apply the OObject-orientedapproach to design layouts and views for mobile app	2	2	1	1								1		1	1
		C607.3	To analyze and solve the user interactions using input tools	1	1		1								1		1	2
		C607.4	To use of different API's or data sharing or data storing operation and apply different design methodologies based on the problem specific			1	1	2							1	1		2
		C607.5	To Analyze and solve different features of mobile app development using error handling and passing data with real world problem etc.		1	1		1							1		1	2
BTCOL607B	Internet of Things Laboratory	L607B.1	To Identify different microcontrollers used in IoT systems and discuss the setup required to execute applications.	1	1										1	1		
		L607B.2	To Write program to design applications in IoT using Raspberry Pi and IoT physical devices as sensors, actuators.	1	2	2	2	1							2	1	2	1
		L607B.3	To Assemble IoT Based system using IoT Physical Devices and endpoints.	1	1	1		1	1		1	1	1	1	1	2	2	2
BTCOL608	Computer Networks Laboratory	C608.1	Understand the IP Forwarding and Working of Spanning Tree	2	2	2	1	1			1		1			1		1
		C608.2	Study/Understand the working of "Connection Establishment" in TCP and Data Rate of a Wireless LAN (IEEE 802.11b) network	2	2	2	1	1			2		1			2	1	2
		C608.3	Study/Understand Routing Information Protocol (RIP), Open Shortest Path First (OSPF) and characteristic curve throughput versus offered traffic for a Slotted ALOHA system	2	2	2	1	1			1		1			1	1	2
		C608.4	Study/Understand the impact of bit error rate on packet error and the performance of networks based on Star, Bus and Ring topologies	2	3	2	1	1			2		1			2	1	2
		C608.5	To Understand Client Server Using TCP IP sockets and calculate the shortest Path using Link State Routing Algorithms	2	2	2	1	1			1		1			2	1	2
BTCOE801B	Social Networks	C801.1	Understand the basic concepts and principles of different theoretical models of the social networks analysis	3	2										2	2	1	
		C801.2	Understand the concepts of network models, network measures, graph representation, graph traversal algorithms, graph mining essentials.	3	2										2	2	1	
		C801.3	Be able to analyze, and evaluate social communities.	3	3	3	2								2	3	3	3
		C801.4	To demonstrate proficiency and understanding of public sector media and privacy	3	3	3	2								2	3	3	3
		C801.5	To demonstrate proficiency in understanding concepts in social networking and utilizing these concepts for solving real-world social network	3	3	3	2								2	3	3	3
BTCOE802A	Introduction to Industry 4.0 and Industrial Internet of Things	C802.1	To understand Industry 4.0 in sensing & actuation, Communication, networking and other global issues in industrial systems.	1		1									1	1		1
		C802.2	To understand and interpret the cybersecurity concepts in Industry 4.0.	1	1	2	1	1							1	1	2	2
		C802.3	To understand and analyze Industrial IoT and its layers with Industry 4.0	1		1									1	1		1
		C802.4	To relate the Industrial IoT to various computer science-related technologies	1	1	2		1							2	1	2	1
		C802.5	To test the Industrial IoT for different application domains	1	2		1	2							2	1	2	1
		C802.6	To examine Industrial IoT applications with different case studies	1	1	2	1								2	1	2	
BTCOP803	Project phase - II	C803.1	To Analyse current trends in computer-related domains in order to uncover real-world issues and domain requirements.	1	3		1			1	1	2	2		2	2	1	
		C803.2	To Apply software engineering principles in planning, formulating an innovative design approach and computing requirements which are appropriate to solve the problem within the context of legal, global and environment constraint.	2	2	2	2	1	1	1	1	2		2	2	1		1
		C803.3	To design and create projects using the proper methods, materials, and modern equipment while upholding integrity and moral conduct in engineering practices	2	3	2	2	3	1	1	1	2	2	2	2	2	2	1
		C803.4	Ability to schedule, monitor, and manage project's resources, finance and work assignments to assure timely completion and to validate and verify project's performance with respect to proposed solution	2			2	2	1	1	1	2	2	3	2	2	2	3
		C803.5	Ability to effectively communicate in both formal and informal environments with team members and mentors; professional performance as a team member; acceptance of responsibility, initiative, and leadership required to present and create technical documents for successful					1	2	2	2	3	3	1	2	2	2	1

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Program Mapping Matrix A.Y. 2021-2022 (Even Semester)

			CO-PO Mapping Average												CO-PSO Mapping Average		
Subject Code	CO Code	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCOC401	401	Design & Analysis of Algorithms	2	3	2	1								1	2	1	
BTCOC402	402	Opearting System	2	2			1							1	2	2	1
BTHM403	403	Basic Human Rights						2.2		1.4	1	1.6					
BTBS404	404	Probability Theory and Random Processes	2.2	1.6	1										1	2	
BTES405	405	Digital Logic Design & Microprocessors	2	1.33	1	1	1	1						1	2	1	1
BTCOC406A	406A	Opearting System Lab	2	2	2		1							1	2	1	1
BTCOL406B	406B	Python Programming Lab	2	2	2	2	2							2	3	2	1
BTCOS407A	407A	Seminar – II : Design & Analysis of Algorithms Lab	2	3	1	1	1							2	3	1	1
BTCOS407B	407B	Seminar – II : Mobile Application Development Lab	2	2	2	2	2							2	3	2	2
BTCOC601	601	Compiler Design	2.8	3	2	2	1							1	2.17	3	1.33
BTCOC602	602	Computer Networks	2	2	2	1	1								3	2	1
BTCOE603B	603B	Artificial Intelligence	2.4	2.2	2									1	2.2	2.6	1
BTCOE603C	603C	Object-Oriented Analysis Design	2.6	2.4	2.4	2	2							2	2.4	2.2	2.2
BTCOE604C	604	Internet of Things	1.4	1.8	2	1.33	1.5							1.2	1.8	1.25	1
BTCOE605A	605	Development Engineering	1.83	1.5	1	1.5	2	2.2	3	1.5	1	1.8	2	2	1.83	1.4	1
BTCOC606	606	Competitive Programming-II	2.25	2.75	1.75	1.75									2.75	3	2
BTCOL607A	607A	Mobile Application Development	2	2	2	2	2							2	3	2	2
BTCOL607B	607B	Internet of Things Laboratory	1	1.33	1.5	2	1	1		1	1	1	1	1.33	1.33	2	1.5
BTCOL608	608	Computer Networks Laboratory	2	2.25	1	2	1							1	2	1	1.5
BTCOE801B	801	Social Networks	3	2.6	3	2								2	2.6	2.2	3
BTCOE802A	802	Introduction to Industry 4.0 and Industrial Internet of Things	1	1.25	1.6	1.5	1.33							1.5	1	2	1
BTCOP803	803	Project Phase-II	1.75	2.66	2	1.75	1.75	1.2	1.2	1.2	2.2	2.25	2	2	2	1.6	1.2
Program Mapping Average			2.01	2.13	1.76	1.64	1.41	1.52	2.10	1.28	1.30	1.66	1.67	1.50	2.19	1.82	1.41

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Department of Computer Engineering
Program Articulation Matrix (Attainment) A.Y. 2021-2022 (Even Semester)

			CO-PO Direct Attainment											CO-PSO Direct Attainment		
Subject Code	CO Code	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCOC401	401	Design & Analysis of Algorithms	2.19	2.19	1.59	2.49								2.59	2.19	2.19	
BTCOC402	402	Opearting System	1.79	2			2							1	1.79	2	1
BTHM403	403	Basic Human Rights						3		3	3	3					
BTBS404	404	Probability Theory and Random Processes	3	3	3										3	3	
BTES405	405	Digital Logic Design & Microprocessors	3	3	3	3	3	3						3	3	3	3
BTCOC406A	406A	Opearting System Lab	3	3	3		3							3	3	3	3
BTCOL406B	406B	Python Programming Lab	3	3	3	3	3							3	3	3	3
BTCOS407A	407A	Seminar – II : Design & Analysis of Algorithms Lab	2	3	1	1	1							2	3	1	1
BTCOS407B	407B	Seminar – II : Mobile Application Development Lab	3	3	3	3	3							3	3	3	3
BTCOC601	601	Compiler Design	2.62	2.66	2.66	2.59	3							2.66	2.61	2.66	2.75
BTCOC602	602	Computer Networks	2.59	2.19	2.59	2.54	2.49					2.31	2.31	2.59	2.18	2.49	2.54
BTCOE603B	603B	Artificial Intelligence	3	3	3									3	3	3	3
BTCOE603C	603C	Object-Oriented Analysis Design	3	3	3	3	3							3	3	3	3
BTCOE604C	604	Internet of Things	3	3	3	3	3							3	3	3	3
BTCOE605A	605	Development Engineering	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
BTCOC606	606	Competitive Programming-II	3	3	3	3									3	3	3
BTCOL607A	607A	Mobile Application Development	3	3	3	3	3							3	3	3	3
BTCOL607B	607B	Internet of Things Laboratory	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
BTCOL608	608	Computer Networks Laboratory	3	3	3	3	3	3					3	3	3	3	3
BTCOE801B	801	Social Networks	3	3	3	3								3	3	3	3
BTCOE802A	802	Introduction to Industry 4.0 and Industrial Internet of Things	3	3	3	3	3							3	3	3	3
Average			2.81	2.85	2.78	2.79	2.77	3.00	3.00	3.00	3.00	2.83	2.83	2.77	2.84	2.77	2.74
			CO-PO Indirect Attainment												CO-PSO Indirect Attainment		
Subject Code	CO Code	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCOC401	401	Design & Analysis of Algorithms	3	3	3	3								3	3	3	
BTCOC402	402	Opearting System	3	3			3							3	3	3	3
BTHM403	403	Basic Human Rights						3		3	3	3					
BTBS404	404	Probability Theory and Random Processes	3	3	3										3	3	

BTES405	405	Digital Logic Design & Microprocessors	3	3	3	3	3	3						3	3	3	3
BTCOC406A	406A	Opearting System Lab	3	3	3		3							3	3	3	3
BTCOL406B	406B	Python Programming Lab	3	3	3	3	3							3	3	3	3
BTCOS407A	407A	Seminar – II : Design & Analysis of Algorithms Lab	3	3	3	3	3	3						3	3	3	3
BTCOS407B	407B	Seminar – II : Mobile Application Development Lab	3	3	3	3	3							3	3	3	3
BTCOC601	601	Compiler Design	3	3	3	3	3							3	3	3	3
BTCOC602	602	Computer Networks	3	3	3	3	3							3	3	3	3
BTCOE603B	603B	Artificial Intelligence	3	3	3									3	3	3	3
BTCOE603C	603C	Object-Oriented Analysis Design	3	3	3	3	3							3	3	3	3
BTCOE604C	604	Internet of Things	3	3	3	3	3							3	3	3	3
BTCOE605A	605	Development Engineering	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
BTCOC606	606	Competitive Programming-II	3	3	3	3									3	3	3
BTCOL607A	607A	Mobile Application Development	3	3	3	3	3							3	3	3	3
BTCOL607B	607B	Internet of Things Laboratory	3	3	3	3	3	3		3	3	3	3	3	3	3	3
BTCOL608	608	Computer Networks Laboratory	3	3	3	3	3					3	3	3	3	3	3
BTCOE801B	801	Social Networks	3	3	3	3								3	3	3	3
BTCOE802A	802	Introduction to Industry 4.0 and Industrial Internet of Things	3	3	3	3	3							3	3	3	3
BTCOP803	803	Project Phase-II	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Average Indirect Attainment			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Average attainment of Internal Assessment			2.81	2.85	2.78	2.79	2.77	3.00	3.00	3.00	3.00	2.83	2.83	2.77	2.84	2.77	2.74
Average attainment through University			2.1808	2.1992	2.1732	1.9973	2.15	2.184	2.37	2.235	2.235	2.184	1.92	2.158	2.290313	2.30063	2.010714
Average Direct attainment			2.4952	2.5256	2.4771	2.393	2.458	2.592	2.685	2.6175	2.6175	2.50575	2.37375	2.4634	2.564406	2.53381	2.374524
Program Direct attainment (80%)			*2.00*	*2.02*	*1.98*	*1.91*	*1.97*	*2.07*	*2.15*	*2.09*	*2.09*	*2.00*	*1.90*	*1.97*	*2.05*	*2.03*	*1.90*
Program Indirect attainment (20%)			*0.60*	*0.60*	*0.60*	*0.60*	*0.60*	*0.60*	*0.60*	*0.60*	*0.60*	*0.60*	*0.60*	*0.60*	*0.60*	*0.60*	*0.60*
Program Attainment			*2.60*	*2.62*	*2.58*	*2.51*	*2.57*	*2.67*	*2.75*	*2.69*	*2.69*	*2.60*	*2.50*	*2.57*	*2.65*	*2.63*	*2.50*

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Department of Computer Engineering
CO PSO Attainment Through University A.Y. 2021-2022 (Even Semester)

			CO-PO Attainment through University											CO-PSO Attainment through University		
Subject Code	CO Code	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTCOC401	401	Design & Analysis of Algorithms	3	3	3	3								3	3	3	
BTCOC402	402	Opearting System	1.98	1.98			1.98								1.98	1.98	1.98
BTHM403	403	Basic Human Rights						3		3	3	3					
BTBS404	404	Probability Theory and Random Processes	3	3	3										3	3	
BTES405	405	Digital Logic Design & Microprocessors	1.98	1.98	1.98	1.98	1.98	1.98						1.98	1.98	1.98	1.98
BTCOC406A	406A	Opearting System Lab	3	3	3		3							3	3	3	3
BTCOL406B	406B	Python Programming Lab	3	3	3	3	3							3	3	3	3
BTCOS407A	407A	Seminar – II : Design & Analysis of Algorithms Lab	3	3	3	3	3							3	3	3	3
BTCOS407B	407B	Seminar – II : Mobile Application Development Lab															
BTCOC601	601	Compiler Design	1.98	1.98	1.98	1.98	1.98							1.98	1.98	1.98	1.98
BTCOC602	602	Computer Networks	1.98	1.98	1.98	1.98	1.98					1.98	1.98	1.98			
BTCOE603B	603B	Artificial Intelligence	3	3	3									3	3	3	3
BTCOE603C	603C	Object-Oriented Analysis Design	1.98	1.98	1.98	1.98	1.98							1.98	1.98	1.98	1.98
BTCOE604C	604C	Internet of Things	1.98	1.98	1.98	1.98	1.98							1.98	1.98	1.98	1.98
BTCOE605A	605A	Development Engineering	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98
BTCOC606	606	Competitive Programming-II	1.485	1.815	1.155	1.155									1.815	1.98	1.32
BTCOL607B	607B	Internet of Things Laboratory	1.98	1.98	1.98	1.98	1.98	1.98		1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98
BTCOL608	608	Computer Networks Laboratory	1.98	1.98	1.98									1.98			
BTCOE801B	801B	Social Networks	0.99	0.99	0.99	0.99								0.99	0.99	0.99	0.99
BTCOE802A	802A	Introduction to Industry 4.0 and Industrial Internet of Things	1.98	1.98	1.98	1.98	1.98							1.98	1.98	1.98	1.98
BTCOP803	803	Project Phase-II	1.98	1.98	1.98	1.98	1.98	1.98	2.37	1.98	1.98	1.98	1.74	1.56	3	3	1
Average			2.22395	2.24132	2.21917	2.06893	2.21538	2.184	2.37	2.235	2.235	2.184	1.92	2.21063	2.33206	2.34176	2.076667

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The process of attainment of POs and PSOs of individual course in the four-year engineering degree program requires measuring tools. Respective faculty member prepares course outcomes using the concept of engineering subject. Then, a correlation is established between COs with POs/PSOs on the scale of 0 to 3 where 0 means no correlation and 3 means high correlation. Mapping matrix of COs-POs and COs-PSOs is prepared for all courses in the program.

Assessment tools are categorized into direct and indirect methods to assess whether the program specific outcomes (PSO) and program outcomes (PO) are attained. Direct methods include direct examinations of student, conducted throughout the semester. It is carried out in the form of continuous internal assessment tests, end semester examinations, assignments, unit tests and laboratory assignments etc. Indirect method is based on course exit survey, program exit survey, alumni survey etc. A target value is set for CO, PO and PSO and attainment is calculated with respect to that target value.

For CO attainment, it is calculated how many students have scored more than the target value which is already set by the course coordinator in the internal exam and university exams. Attainment levels are defined as per the following table:

% students scored more than the target value	Attainment level
0-50%	1
50-60%	2
>60%	3

For PO attainment, multiplier factors are defined based on CO attainment as per following table:

Percentage students scored more than the target value	Multiplier factor
0-50%	0.33
50-60%	0.66
>60%	1

This multiplier factor is multiplied with the value assigned in the CO-PO relevance table and final attainment of each PO is calculated as demonstrated in the following steps :

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Step no 1: CO-PO Relevance

Subject	Subject Code	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Electrical Drives	BTEEC 703	CO703.1	3	2	1									2
		CO703.2	3	2	1	1			1					1
		CO703.3	3	3	2	1			1					3
		CO703.4	1	1	3	3			1					1
		CO703.5	2	1					1					3
CO703 Average			2.4	1.8	1.75	1.67			1					2

Step no2: Calculation of multiplying factor for each CO and finally PO attainment

CO	Description	% of students receiving more than target value	Attainment Level	Multiplication Factor
CO703.1	Analyze the dynamics of Electrical Drives system	25	1	**0.33**
CO703.2	Use various control techniques for controlling the speed of AC and DC motors.	50	2	**0.66**
CO703.3	Analyze the AC and DC drives.	93.18	3	**1**
CO703.4	To Select/recommend the appropriate Drive according to the particular applications.	95.45	3	**1**
CO703.5	State the recent technology of AC and DC drive	70.45	3	**1**

Subject With Subject Code	CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Electrical Drives (BTEEE703)	CO703.1	0.99	0.66	0.33									0.66
	CO703.2	1.98	1.32	0.66	0.66			0.66					0.66
	CO703.3	3	3	2	1			1					3
	CO703.4	1	1	3	3			1					1
	CO703.5	2	1					1					3
Sum		8.97	6.98	5.99	4.66			3.66					8.32
Sum of values attained		12	9	7	5			4					10
% PO attainment for each element		**74.8**	**77.56**	**85.57**	**93.2**			**91.5**					**83.2**

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PO attainment (Direct) is calculated by for both the internal assessment test and university exams for each. In the case of indirect attainment, it is calculated only on the basis of the course exit survey which is taken by the course coordinator at the end of the course.

Finally, an articulation matrix is formed, in which all subjects (from Sem I to Sem VIII) are incorporated with their PO and PSO attainment values (Direct/ indirect). For calculating program indirect attainmentAverage value of indirect attainment for all subjects is calculated and program indirect This final average value is considered as the program indirect attainment value. Direct attainment of the program is calculated by taking the average of PO values attained through university exams and internal assessment tests.

Direct assessment Methods		
Sr. No.	Assessment tool	Method description
1.	Internal assessment test	The internal assessment(IA) marks in a theory paper is based on number of tests, conducted as scheduled in the departmental academic calendar. It is a metric to continuously assess the attainment of course outcomes with respect to course objectives. The total marks of all tests being asked for each CO is calculated for CO attainment purpose
2.	Lab Assignments	Lab Assignment is one of the measuring criteria to mainly assess student's practical knowledge with their experimental capabilities. In case of practical, the IA marks shall be based on the laboratory records, practical tests and viva-voce
3.	Theory Semester Examination & Practical Semester Examination	Semester examination (theory or practical) are the metric to assess whether all the course outcomes are attained or not, framed by the course owner. Semester Examination is more focused on attainment of course outcomes and uses a descriptive exam.
4.	Seminar	The IA marks in the case of seminar shall be based on continuous evaluation by a faculty coordinator assigned by the department
5.	Mini Project	The IA marks in the case of mini-project shall be based on continuous evaluation by a faculty coordinator (project guide if allotted) assigned by the department
6.	Project	The IA marks in projects in the final years shall be based on the continuous evaluation throughout the semester by an internal committee consisting of the three faculty members of the Department, one of whom shall be the project guide

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2023 passout

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Department of Electrical Engineering
CO-PO CO-PSO Relevance Matrix

Subject Code	Subject Name	CO Number	Course outcome Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTBS101	Engineering Mathematics – I	CO101.1	Apply the matrix technique (Linear algebra) to find solutions of system of linear equations arising in many engineering problem	2	2	1												
		CO101.2	Demonstrate the concept of partial derivatives and their applications to Maxima/ Minima, series expansion of multi valued functions & Compute Jacobian of functions of several variables	3	2	1												
		CO101.3	Identify and sketch of curves in various coordinate system & Evaluate multiple integrals and their applications to area and volume	3	2	1												
BTBS102	Engineering Chemistry	CO1202.1	Develop the importance of water in industrial and domestic usage.	2	1	2	1		1									
		CO1202.2	Interpret the knowledge of phases, components, degree of freedom and apply it in various phase diagrams.	2	1	1												
		CO1202.3	Describe various methods of metallurgy, types of fuels and lubricants, and also able to define various concepts of electrochemistry.	2	1	1												
BTES103	Engineering Mechanics	CO103.1	Know and apply fundamental Laws of Engineering Mechanics	2	2										1			
		CO103.2	Know and apply conditions of static equilibrium to analyze given force system	2	2										1			
		CO103.3	Compute Centre of gravity and Moment of Inertia of plane surfaces	3	3													
		CO103.4	Compute the motion characteristics of a body /particle for a Rectilinear and Curvilinear motion.	2	2													
		CO103.5	Know and discuss relation between force and motion characteristics	2	2													
BTES104	Computer Programming in C	CO103.1	To illustrates the Process of programming, Fundamental Basic and various operators in c	1	1	2	1								1			
		CO103.2	To illustrate and implement various decision statement ,loops and Function in c	2	2	2	2	1							1			
		CO103.3	To Explain and implement Derived Data type -Array, String and User defined Data type –Structure	2	2	3	2	1							1			
BTES105 L	Workshop Practices	COWS1205.1	Perform carpentry operations like planning, cutting, fitting of joints using hand and power tools	3	2	2	1	1	1	1	2	2	2	2	2			
		COWS1205.2	Perform fitting operations such as marking, cutting, filing, drilling and tapping using hand and power tools and also basic plumbing Operations.	3	2	2	1	1	1	1	2	2	2	2	2			
		COWS1205.3	Perform sheet metal operations such as marking, shearing, bending, punching, and soldering using hand and power tools and Welding operations like joint preparations, electrode selections.	3	2	2	1	1	1	1	2	2	2	2	2			
		COWS1205.4	Understand the simple machining skills on lathe machine operations and its use during their project work	3	2	2	1	1	1	1	2	2	2	2	2			
BTES106	Basic Electrical and Electronic Engineering	CO106.1	Apply basic ideas and principles of electrical engineering	3	2				1	1								
		CO106.2	Identify protection equipment and energy storage devices	3	2				1	1								
		CO106.3	Differentiate electrical and electronics domains and explain the operation of diodes and transistors.	3	2				1	1								
		CO106.4	Acquire knowledge of digital electronics	3	2				1									
		CO106.5	Design simple combinational and sequential logic circuits.	3	3	3			1	1		1						
BTBS108 L	Engineering Chemistry Lab	CO1202L.1	Test the quality of water sample by determination of hardness, acidity, alkalinity and dissolve oxygen present in it.	2					2	1	2	3						
		CO1202L.2	Examine chemical or physical property of given sample material.	2					1	1	2	3						
		CO1202L.2	Determine the concentration of specific ions present in the solution using titration methods.	2					1	1	2	3						
BTES109 L	Engineering Mechanics Lab	CO108L.1	Calculate beam reaction by Parallel Force apparatus and graphics static method and forces in truss.	1	1	1												
		CO108L.2	Evaluate co-efficient of friction and centroid of irregular shaped bodies.		1		1											
		CO108L.3	Evaluate mechanical advantage, Velocity ratio, efficiency and mass moment of inertia.	1			1											
		CO201.1	Discuss the need and use of complex variables to find roots, to separate complex quantities and to establish relation between circular and hyperbolic functions.	2	1	1												

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BTBS201	Engineering Mathematics – II	CO201.2	Solve first and higher order differential equations and apply them as a mathematical modeling in electric and mechanical systems.	3	2	1															
		CO201.3	Determine Fourier series representation of periodic functions over different intervals.	2	1																
		CO201.4	Demonstrate the concept of vector differentiation and interpret the physical and geometrical meaning of gradient, divergence &curl in various engineering streams. Apply the	2	1	1															
BTBS202	Engineering Physics	CO102.1	Apply the concept of types of oscillations in engineering.	3	2	1		1							1						
		CO102.2	Apply the fundamentals of interference, polarization in LASER, and optical fiber in engineering.	2	3	1		1							1						
		CO102.3	Determine the application of the trajectory of charge particles in the electromagnetic field, with basic principles of quantum physics.	3	2	1		1		1					1						
		CO102.4	Determine the different types of crystal structures using the X-ray diffraction technique, and study the fundamentals of material science and its application in Magnetic material, Superconductors, and semiconductors.	3	2	1		1							1						
BTES203	Engineering Graphics	CO103.1	Use of drawing instruments effectively for drawing and dimensioning	3								1	3								
		CO103.2	Explain conventions and methods of engineering drawing	3								1			1						
		CO103.3	Apply concepts of projections of points, lines, planes, solids and section of solids	3	2	3						1	3								
		CO103.4	Construct isometric and orthographic views of given objects	3	2	3						1	3								
BTHM204	Communicatio n Skills	CO104.1	Apply Verbal and Non-Verbal communication in professional and social situations								1	3	3		3						
		CO104.2	Apply communication skills for presentations, group discussion, interpersonal interactions, public speaking, report writing and business correspondence								1	3	3		3						
		CO104.3	Apply phonetics and grammar in communication to develop a neutral accent								1	3	3		3						
BTES205	Energy and Enviornmental Engineering	CO205.1	Identify conventional, non-conventional energy sources.	2	2			1	2	2	1				1						
		CO205.2	Know and discuss power consuming and power developing devices for effective utilization and power consumption	2	2			1	2	2	2				1						
		CO205.3	Identify various sources of air, water pollution and its effects.	2	1			1	2	2	1				1						
		CO205.4	Know and discuss noise, soil, thermal pollution and Identify solid, biomedical and hazardous waste.	2	1			1	2	2	1				1						
BTES206	Basic Civil and Mechanical Engineering	CO206.1	Identify various Civil Engineering materials and choose suitable material among various options.	1						1					1						
		CO206.2	Apply principles of surveying to solve engineering problem.	2	1																
		CO206.3	Identify various Civil Engineering structural components and select appropriate structural system among various options.	1	1	2									1						
		CO206.4	Explain and define various properties of basic thermodynamics, materials and manufacturing processes.	2	1																
		CO206.5	Know and discuss the working principle of various power consuming and power developing devices.	1	1					1					1						
BTBS207 L	Engineering Physics Lab	CO1202L.1	Determine the mechanical & electrical properties of matter.	3	2		1	1			1	1			1						
		CO1202L.2	Determine the wavelength of He-Ne Laser and numerical aperture of optical fibre.	3	2		1	1		1	1	1			1						
		CO1202L.3	Determine the various properties of semiconducting materials.	3	2		1	1		1	1	1			1						
BTES208 L	Engineering Graphics Lab	CO1203L.1	Use of drawing instruments effectively for drawing and dimensioning	3								1	3								
		CO1203L.2	Implement various fundamental geometrical constructions	3								1			1						
		CO1203L.3	Apply concepts of projections of points, lines, planes, solids and section of solids	3	2	3						1	3								
		CO1203L.4	Construct isometric and orthographic views of given objects	3	2	3						1	3								
BTHM209	Communicatio	CO209L.1	To illustrate the process of introduction with RP exercising Transcription, Stress and Intonations								1	3	3		3						

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L	n Skills Lab	CO209L.2	To apply Verbal and Non-Verbal communication through Extempore, GD, Debate, Presentation and Interviews.								1	3	3		3			
BTES210P	Mini Project	CO210P.1	State the title of the project and explain the motivation, objectives and scope of the project	2	2													
		CO210P.2	Review the literature, Design the outline, components of the system related to the selected topic of the project	2	2													
		CO210P.3	Demonstrate effective written and verbal communication	2	2	1	1	1	2	1	3							
BTBSC301	Engineering Mathematics-III	CO301.1	Find Laplace transform of functions using various formulas and properties. Evaluate particular types of integration.	2	2											1	1	
		CO301.2	Find Inverse Laplace transform of functions using various formulas and properties. Solve linear differential/simultaneous linear differential equation using Laplace and inverse Laplace transform.	2	1	1										1	1	
		CO301.3	Find Fourier and inverse Fourier transform, Fourier sine and inverse Fourier sine transform. Cosine transform and inverse Fourier cosine Transform of functions.	3	1	1										1	1	
		CO301.4	Form PDE by eliminating arbitrary constant, solve PDE and use PDE to solve one and two dimensional heat flow equation.	2	2	1										1	1	
		CO301.5	Determine Analytic functions//Bilinear transformation/ apply Cauchy's theorem/Cauchy's integral formula and Residue theorem to solve contour	2	2											1	1	
BTEEC302	Network Analysis and Synthesis	CO302.1	To review basic components of electric network.	2	2	1		1							1	2	1	
		CO302.2	To design and develop network equations and their solutions.	2	2	2		1							1	2	2	1
		CO302.3	To apply Laplace theorem for electric network analyses	3	2	1										2	1	
		CO302.4	To analyze AC circuit.	2	2	2		1							1	2	2	
BTEEC303	Fluid Mechanics	CO303.1	Calculate properties of fluid and hydraulic measurement.	2	3												2	
		CO303.2	Apply fluid dynamics principal to laminar and turbulent flow and illustrate working of centrifugal pump.	3	2	2											2	
		CO303.3	Plot the T-S diagram for I C Engine and explain various systems of I C Engine.	2	1					1							2	
		CO303.4	Classify air compressor and performance improvement techniques for air compressor.	2													2	
		CO303.5	Classify refrigeration air conditioning systems along with coefficient of performance and plot the various air conditioning processes.	2		2				1					1		2	
BTEEC304	Measurement and Instrumentation	CO304.1	To understand philosophy of measurement.	3	1				2		1	1			1	2	3	1
		CO304.2	To understand different methods of analog and digital measurement.	3	1	1			1		1				1	2	2	1
		CO304.3	To study principle of construction and operation of different transducer and display methods.	3	2	2									1	2	3	1
BTEEE305A	Electrical Engineering Material	CO305.1	To study about crystal structure	3											1		2	
		CO305.2	To understand magnetic material structure	2	2										1	2		
		CO305.3	To study about conductor,superconductor & semiconducting materials	2	1										1		2	3
		CO305.4	To study dielectric and nano materials	2	2										1	1		
BTHM3401	Basic Human Value	CO3401.1	To study concept of human values,human rights & human duties						3		2	2	1		1	3		1
		CO3401.2	To explain social structure and concept of Society, Religion, Culture with their Inter-Relationship						3		1	2		2	1	3		1
		CO3401.3	To study freedom,democracy and human Rights in Indian Constitution.						3		1				1	3		1
BTHM306	Engineering Economics	CO306.1	To study concept of economy and its type								1	1	1	1				1
		CO306.2	To study concept of time value of money								1	1	1	1	2			1
		CO306.3	To study about demand in detail								1	1	2		2			1
		CO306.4	To understand Meaning of Production and factors of production,								1	2	2	1				1
		CO306.5	To understand different Concept about market								1	2	2	1				1
BTEEL307	Network Analysis and Synthesis lab	CO307.1	Verifies Principles of Network	3	3							1					2	
		CO307.2	Analyze Behavior of circuit response in Time & Frequency domain	3	3							1			1		2	1
		CO307.3	Understand Two Port Network & Characteristics of Filters	3	3							1			1		2	1
BTEEL308	Measurement and Instrumentation lab	CO308.1	To illustrate the working of basic measuring Instruments	3	2	1									2	2	3	1
		CO308.2	To experiment the various methods of resistance,inductance,capacitance and power measurement	3	3	1									2	2	2	1
		CO308.3	To use transducers for measurement of various quantities	3	1	1	1								1	2	3	1
		CO308.4	To use Digital instruments for measurement of electrical qunatities	3	2	1									1	2	3	3
		CO308.5	To discuss range extension methods for measuring instruments	3	2	1									1	2	3	3
BTEEM309	Electrical Workshop	CO309.1	To recognize the various resources and components using data sheet in Electrical Engineering	1	1	1										1	2	
		CO309.2	To implement projects based on the circuit simulation software (Tina-TI)	2	1	1	1								1	2	1	
		CO309.3	TO desing, prepration and analysis of PCB along with report writing of project	2	1	1	1								1	1	1	
BTEEF310	Field training	CO310.1	To demonstrate the knowledge gained during internship with the help of survey report writing and presentation	1			1	2					3				1	1
		CO310.2	To discover engineering and management principles useful at specific work environment	1				2						3			1	1
		CO310.3	To implement the learning acquired during internship to solve environmental, societal issues and in their future endeavours	1			1	2	1	1					3	1	2	3
		CO401.1	To study diff. types, construction and operating principle of diff. types of electrical machines	3	2	2	2		2	2				2	1	2	3	1

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BTEEC401	Electrical Machines-I	CO401.2	To illustrate the principle of energy conversion in single, multilpe excited machines and the concept of co energy.	3	1	1	1		1	1				1		2	2	1
		CO401.3	To analyze the performance and Characteristics of electrical machines by conducting various test.	3	2	2	2		2	2				2	1	2	3	1
BTEEC402	Power System-I	CO402.1	To Understand basic operation of power system, power system components and their characteristics.	3	1		1			1				1	1	3	3	2
		CO402.2	To Analyze the Performance of Transmission Line	3	1	2				1	2			1	1	3	2	2
		CO402.3	To understand Mechanical Design of Transmission Line	3	3	2	1							1	1	3	2	1
BTEEC403	Electrical Installation and Estimation	CO403.1	To prepare estimates and costing of electrical installations of power system.	3	2				1	1			1	1	1	1	2	1
		CO403.2	To describe procedures of contracting and purchase.	3	2				1	1			1	1	1	1	2	1
		CO403.3	To demonstrate the different components of electrical systems, tools and	3	2				1	1					1	1	2	1
BTEEC404	Numerical Methods and Program	CO404.1	Apply numerical methods to obtain approximate solutions and errors in mathematical problems.	3	2	1	2								1	1	2	1
		CO404.2	Make appropriate use of MATLAB commands to implement numerical methods	3	2	1		2							2		2	2
		CO404.3	Derive numerical methods and solutions for linear, non-linear and differential equations.	3	1	1	2	1							1		2	1
BTID405	Product Design Engineering	CO405.1	Create simple mechanical or other designs	3				3							1			1
		CO405.2	Create design documents for knowledge sharing		2	1									2		2	1
		CO405.3	Manage own work to meet design requirements									3	3	1				1
		CO405.4	Work effectively with colleagues									3	2	1			2	1
BTEEE406B	Analog and Digital Electronics	CO406B.1	To illustrate working of transistor as an amplifier, types and characteristics of an amplifier.	2	2	2										2	2	
		CO406B.2	To comprehend constructional details, characteristics and applications of operatinal amplifier.	2	1	1										2	1	
		CO406B.3	To distinguish basic number system and fundamentals of Boolean algebra and various minimization techniques.	2	1	1										2	2	
		CO406B.4	To comprehend types, design and characteristics of logic gates.	2	1	1									1	1	1	
		CO406B.5	To implement digital systems using combinational and sequential circuits.	2	1	1	1								1	1	1	1
BTEEOE407 B	Introductoion to Non Conventional Energy Sources	CO407.1	To review energy scenario and different types of energy sources	2					2	3						2		
		CO407.2	To understand basic concepts , construction and operational features of different non-conventional sources	2		2				2					2		2	
BTEEL408	Electrical Machines-I lab	CO408.1	To Determine Polarity and Transformation ratio of Single phase Transformer	3	2	2	1		1	1				2	1	2	3	
		CO408.2	To study diff. parts, types of connections and operations of diff. types of electrical machines	3	1	1	1		1	1				1		2	2	1
		CO408.3	To analyze the performance and draw Characteristics of electrical machines by conducting various test.	3	2	2	2		2	2				2	1	2	3	1
BTEEL409	Power System-I lab	CO409.1	To Understand basic operation of power Plants	3	2	2										2	2	
		CO409.2	To discuss the major equipments used in power station.	2	1											2	1	
		CO409.3	To recognize Various components of Transmission Lines	2	1			2								2	2	
		CO409.4	To Analyze the Performance of different types of transmission Lines	2	1	1									1	1	1	
BTEEL410	Numerical Methods and Program lab	CO410.1	To Understand basics Matlab programming for numerical methods	3	3											2		
		CO410.2	To Obtain different errors using Matlab programming	3	3										1	2		1
		CO410.3	To obtain numerical solution of various engineering methods	3	3	2	2								1	3	1	1
BTEEEL411	Analog and Digital Electronics lab	CO411.1	To comprehend constructional details, characteristics and applications of operatinal amplifier.	2	1	1										2	1	
		CO411.2	To implement digital systems using combinational circuits.	2	1	1	1								1	1	1	
		CO411.3	To implement digital systems using sequential circuits.	2	1	1	1								1	1	1	
BTEEC501	Electrical Machines-II	CO501.1	To study different methods of speed control of AC Machine	2	2	1	1								1	2	2	1
		CO501.2	To study importance and procedure of different performance test on AC Machine	2	2	1	1								1	1	2	1
		CO501.3	Interpret the behavior of AC machines using phasors, equivalent circuits and its operating characteristics.	2	2	2	2								1	1	2	1
BTEEC502	Power System-II	CO502.1	To study different parameters of power system operation and control	3	1	1	1	1		1					1	1	3	1
		CO502.2	To study load flow and Diff. methods of reactive power control.	3	1	1	1	2							2	2	2	1
		CO502.3	To understand diff. methods of fault analysis and stability study	3	1	1	1	2		1				1	2	2	2	1
BTEEC503	Microprocessor and Microcontroller	CO503.1	To know the architecture of 8085 and 8051.	2	1	1	1								1	2	2	1
		CO503.2	To understand interfacing and interrupt features of 8085 and 8051.	2	2	2	1	1						1		1	2	1
		CO503.3	To develop program for basic applications.	2	2	2	2	2	1							1	1	1
BTHM504	Value education human rights and legislative procedure	CO504.1	To understand value of education and self-development						2		3	1			2	1		2
		CO504.2	To develop good values and character						1		3	1			1	1		2
		CO504.3	To know Human right and legislative procedure						1		3	2			1	1		2
BTEEE 505	Testing and Maintenance of Electrical equipment	CO505.1	Test the electrical equipment by various methods as per ISI standards.	2	3									1		1	2	1
		CO505.2	Test the electrical equipment by various methods as per ISI standards.	2	1	1										1	2	2
		CO505.3	Relate testing equipments for testing and fault finding	2	3		2	2								1	3	1
		CO505.4	Identify , rectify and analysis of faults in Power Transformer and Induction motors		3	3	3	2								1	3	2
BTEEOE 506	Power Plant Engineering	CO506B.1	Discuss power plant economics and interpret their performance based on load variations.	3	3		1										2	1
		CO506B.2	Discuss power generation using renewable and non-renewable energy resources.	2	1	2				2					2	1		2

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		CO506B.3	Explain the issues and benefits of power plants interconnection and interface to grid.	2	2	2				1					1	1	2	1
BTEEL507	Electrical Machine-II Lab	CO507.1	To conduct test on induction machine to determine the performance characteristics	3	2	2	1		1		1	1	1		2	2	2	1
		CO507.2	To conduct test on synchronous generator (alternator) to determine the performance characteristics	3	2	2	1		1		1	1	1		2	2	2	1
		CO507.3	To conduct test on synchronous motor to draw the performance curves	3	2	2	1		1		1	1	1		2	2	1	1
BTEEL508	Power System-II Lab	CO508.1	To study Characteristics of salient pole synchronous machine	3	2	2	1		1		1	1	1		2	2	1	1
		CO508.2	To study the power limit and various compensation techniques on Transmission line model.	3	3	3	1								1			
		CO508.3	To perform Different types of fault analysis in AC Network Analyzer.	3	3	3	1								1			
		CO508.4	To identify & formulate solutions to problems relevant to power system using software tools.	3	3	3	1								1			
BTEEL509	Microprocessor lab	CO509.1	To know the architecture 8085 microprocessor.	2	2											2	2	1
		CO509.2	Design and implement programs on 8085 microprocessor.	2		2		2	2							1	2	1
		CO509.3	To develop program for interface based applications for 8085 microprocessor.			1	2	1	1							1	1	1
BTEEF510	Industrial Training	CO510.1	To demonstrate the knowledge gained during internship with the help of survey report writing and presentation	1			1	2					3				1	1
		CO510.2	To discover engineering and management principles useful at specific work environment	1				2						3			1	1
		CO510.3	To implement the learning acquired during internship to solve environmental, societal issues and in their future endeavours	1			1	2	1	1					3	1	2	3
BTEEC601	Control System	CO601.1	To know different basic concepts and components of a control system	2	3			1							1	2		1
		CO601.2	To derive transfer functions of basic control system components.	3	2		1	2								2	2	1
		CO601.3	To perform stability analysis using time domain and frequency domain response on a given system.	3	2		2	2						1	1	3	2	
		CO601.4	To design and analyze PID controller.	3	2		2	1						1	1	3	2	1
		CO601.5	To understand and analyze state variable technique	2	2		2									2		
BTEEC602	Principle of Electrical Machine Design	CO 602.1	To understand principles of electric machine design	3	1				1	1						1	2	
		CO 602.2	To design different components of electric machine..	3	3	3			1	1					1	2	3	1
		CO 602.3	To design Transformer	3	3	3			1	1					1	2	3	1
		CO 602.4	To understand CAD and use it for transformer design	2		2		1								2	3	1
BTEEC603	Power Electronics	CO603.1	Know the characteristics of semiconductor switching devices and their driver circuits.	3	1	1											1	
		CO603.2	Analyze the performance of controlled and uncontrolled converters.	3	2	2	1	1							1		2	1
		CO603.3	Analyze the performance of DC-DC and DC-AC converters.	3	1	2	1	1							1	1	2	1
		CO603.4	Analyze the performance of AC voltage controllers.	3	1	2	2								1		2	1
BTEEE604	Industrial Automation and Control	CO604.1	To understand construction and working principle of different industrial measurement system.	2	3									1		1	3	
		CO604.2	To understand new trends in industrial process control.	2	1	1										1	3	
		CO604.3	To discuss various control techniques used in industrial automation.	2	3		2	2								1	3	
BTEEE605	Switchgear and Protection	CO605.1	To explain the principles of protective relaying	2	1				3							1	2	
		CO605.2	To understand principle of construction, operation and selection of different type of	2	2	3										2	1	
		CO605.3	To explain different protection schemes used in power system engineering.			3			2						2	2	1	
BTEEEOE606	Project Management	CO606.1	To understand concepts of project management.								1			3				
		CO606.2	To develop a project plan.									2	2	3	2			2
		CO606.3	To understand the project implementation strategy.									2	2	3	2			2
		CO606.4	To analyze post project affects.									2	1	3	1			1
BTEEL607	Control System Lab	CO607.1	To know basic concepts and components of control system	3	3	3	1								1		2	1
		CO607.2	To design and analyze Non-linear equations.	3	3	3	1								1	2	2	1
		CO607.3	Development of a program and Simulation for Control system using MATLAB	3	3	3	1								1		2	1
BTEEL608	Principle of Electrical Machine Design lab	CO608.1	To understand general electrical symbol	2												1		
		CO608.2	To understand electrical installation layout	2												1		
		CO608.3	To design different components of electric machine	3	2	3	2			1					1	1	3	1
		CO608.4	To design Transformer	3	2	3	2			1					1	1	3	1
BTEEL609	Power Electronics lab	CO 609.1	To demonstrate the characteristics of power semiconductor switches and driver circuits.	2			1										2	
		CO 609.2	To demonstrate controlled converters circuit.	2	1	1									1		2	1
		CO 609.3	To analyze performance of DC-DC, DC- AC and AC-DC converters.	3	1	2	2	3							1	1	3	1
BTEEC701	Power System Operation And Control	CO701.1	Explain the fundamental concept of power system.	3	1	1										1	1	
		CO701.2	Design the mathematical model of synchronous machine.	3	3	2		2							1		2	1
		CO701.3	Design the mathematical model Excitation system and speed governing system.	3	3	2		2							1		2	1
		CO701.4	Analyze the transient stability of power system using swing equation and equal area criteria.	3	3	1	3	2							1		2	1
		CO701.5	Analyze the economic operation of power system. .	3	3	1	2	2							1	2	2	1
		CO701.6	Explain the methods of Voltage control	3	2	2	2	1							1		1	1
		CO702.1	Illustrate the concept of electric field stresses, applications of insulating materials and methods for Non-destructive testing of equipment like	2	2	2									1		1	1

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BTEEC702	High Voltage Engineering	CO702.2	Explain the breakdown process in solid, liquid, and gaseous materials	3	3	1									1	1	3	1
		CO702.3	Explain the methods for generation and measurement of High Voltages and Currents (both ac and dc)	2	2	2		1									2	
		CO702.4	Describe the phenomenon of over-voltage and choose appropriate insulation coordination levels based on IS & IEC Standards.	2	2	1			1		1				1	1	2	1
BTEEC703	Electrical Drives	CO703.1	Analyze the dynamics of Electrical Drives system.	3	2	1									2	2	3	1
		CO703.2	Use various control techniques for controlling the speed of AC and DC motors.	3	2	1	1			1					1	2	2	1
		CO703.3	Analyze the AC and DC drives.	3	3	2	1			1					3	2	3	1
		CO703.4	To Select/recommend the appropriate Drive according to the particular applications.	1	1	3	3			1					1	2	3	1
		CO703.5	State the recent technology of AC and DC drive	2	1					1					3	2		
BTEEE704B	Electric Traction & Utilization	CO704.1	Identify types of Traction System.	3	2	2								2		3		
		CO704.2	Interprete Various Power supply in Electric Traction.	3	3	2	1							2	1	3	2	
		CO704.3	Analyze Various Traction Motors.	3	3	2	1							2	1	3	2	
		CO704.4	Define methods of Traction motor Control.	3	3	2								2	1	3	2	
		CO704.5	Elobrate Train movement & Breaking in Traction system.	3	3	2	1							2	1	3	2	1
		CO704.6	Classify the indoor and outdoor Illumination system	3	2	2								1		2		
BTEEE705D	HVDC Transmission And FACTS	CO705.1	To understand importance, configuration and types of HVDC transmission	3	2	2									1	2	1	
		CO705.2	To analyst the operation of HVDC converter, system control and protection.	3	2	2									1	2	2	
		CO705.3	To understand the concept of FACTS, their role, type and functionality.	3	2	2									1	2	1	
		CO705.4	To analyze the operation of static series and shunt compensator	3	2	2									1	2	2	
BTEEL706	Power System Operation And Control Lab	CO706.1	Development of a program to analyse transient stability.	3	3	1	3	3							1		2	1
		CO706.2	Development of a program to analyse economic load dispatch and load frequency control.	3	3	1	3	3							1	2	2	1
		CO706.3	Development of a mathematical model of generator excitation control and AVR.	3	3	1	2	3							1		2	1
BTEEL707	High Voltage Engineering Lab	CO707.1	Demonstrate the breakdown mechanism in solid, liquid, and gaseous dielectrics.	3	2		2				1				1		2	1
		CO707.2	Demonstrate the performance of high-voltage generation and protection devices.	2				1									2	
		CO707.3	Illustrate the effect of high voltage on biodiversity and protection by means of electrostatic shielding.	2					1						1	1	1	1
BTEEL708	Electrical Drives Lab	CO708.1	Efficiently use various DC drive.	3						1		2					2	
		CO708.2	Efficiently use various AC drive.	3						1		2					2	
		CO708.3	Simulate various drive system	3				3		1		2					2	1
BTEES709	Seminar	CO709.1	To discover recent trends in Electrical engineering	3								2			1	1		3
		CO709.2	To use different techniques in order to formulate seminar topic	2				2				2			2	1		3
		CO709.3	To demonstrate the knowledge gained during seminar report writing and seminar presentation	2							3	3	3		2	1		3
BTEEP710	PROJECT PHASE-I	CO710.1	To demonstrate the knowledge gained during project preparation with help of survey report writing and presentation	1			1	2				1	3					
		CO710.2	To use different research techniques in order to formulate problem statements	2	3		3	2		1		1		3		2	2	1
		CO710.3	To design the relevant solution in order to address the problem statement formulated	2		3	1	2	1			1			3		2	1
		CO710.4	To practice core values of ethical principles, professional ethics and responsibilities	1				2			3						2	
		CO710.5	To evaluate different solution based on fixed performance parameter in order to justify the applicability	2			1	2				1						
BTEEF711	INTERNSHIP EVALUATION-III	CO711.1	To demonstrate the knowledge gained during internship with the help of survey report writing and presentation	1			1	2					3				2	
		CO711.2	To discover engineering and management principles useful at specific work environment	1				2						3				
		CO711.3	To implement the learning acquired during internship to solve environmental, societal issues and in their future endeavours	1			1	2	2	2					3	1	2	3
		CO711.4	To practice core values of ethical principles professional ethics and responsibilities	1							3							
BTEEO801	Introduction To Industry 4.0 And Industrial Internet Of Things	CO801F.1	Know about IoT and Industry 4.0 principles and its scope.	1	1	1		1								1	2	1
		CO801F.2	Learn fundamentals of cyber security, Physical system and business models.	1	1	2		1	1								1	1
		CO801F.3	Know fundamentals of networking protocols and sensors of IIoT.	1	2										1	1	1	
		CO801F.4	Learn IIoT Analytics, data management and advanced technologies.	1		2		1							1	1	2	1
		CO801F.5	Development of application based on IIoT for Industry 4.0.	1	1				1							1	1	1
BTEEO802	Joy of computing python	CO802.1	Explain Python programming fundamentals.	3	1	2		1										
		CO802.2	Implement Conditional statements and Loops in Python Programs	3	1	2		1							1			1
		CO802.3	Use Python lists, tuples and dictionaries for representing compound data.	3	1	2		1							1			1
		CO802.4	Develop Python programs by defining functions and calling them.	3	1	2		1							1			1
BTEEP803	PROJECT PHASE-II	CO803.1	To demonstrate the knowledge gained during project preparation with help of survey report writing and presentation	1			1	2				1	3					
		CO803.2	To use different research techniques in order to formulate problem statements	2	3		3	2		1		1		3		2	2	1
		CO803.3	To design the relevant solution in order to address the problem statement formulated	2		3	1	2	1			1			3		2	1
		CO803.4	To practice core values of ethical principles, professional ethics and responsibilities	1				2			3						2	
		CO803.5	To evaluate different solution based on fixed performance parameter in order to justify the applicability	2			1	2				1						

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PO-PSO Mapping Matrix

			CO-PO Mapping Average												CO-PSO Mapping Avera		
Subject Code	CO Code	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTBS101	CO101	Mathematics-I	2.66	2	1												
BTBS102	CO102	Engineering Chemistry	2	1	1.33	1		2									
BTES103	CO103	Engineering Mechanics	1	1	1	1											
BTES104	CO104	Computer Programming	1.66	1.66	2.33	1.66	1										
BTES105L	CO105	Workshop Practice	3	2	2	1	1	1	1	2	2	2	2	2			
BTES106	CO106	Basic Electrical and Electronics Engineering	3	2.2	3			1	1		1						
BTBS108L	CO108	Engineering Chemistry lab	2					1.33	1	2	3						
BTBS109L	CO109	Engineering Mechanics	1	1	1	1											
BTBS201	CO201	Engineering Machematics-II	2.25	1.25	1												
BTBS202	CO202	Engineering Physics	2.75	2.25	1		1		1								
BTES203	CO203	Engineering Graphics	3	2	3						1	3		1			
BTHM204	CO204	Communication Skills								1	3	3		3			
BTES205	CO205	Energy and Environment Engineering	2	1.5			1	2	2	1.25				1			
BTES206	CO206	Basic Civil and Mechanical Engineering	1.4	1.33	2				1					1			
BTBS207L	CO207	Engineering Physics lab	3	2		1	1		1	1	1			1			
BTBS208L	CO208	Engineering Graphics lab	3	2	3						1	3		1			
BTHM209L	CO209	Communication Skills lab								1	3	3		3			
BTBSC301	CO301	Engineering Mathematics-III	2.20	1.60	1.00										1.00	1.00	
BTEEC302	CO302	Network Analysis and Synthesis	2.25	2.00	1.50		1.00							1.00	2.00	1.50	1.00
BTEEC303	CO303	Fluid Mechanics	2.60	2.00	2.00				1.00					1.00		2.00	
BTEEC304	CO304	Measurement and Instrumentation	3.00	1.33	1.50			1.50		1.00	1.00			1.00	2.00	2.67	1.00
BTEEE305A	CO305	Electrical Engineering Material	2.60	2.00										1.00	1.33	2.00	3.00
BTHM3401	CO304	Basic Human Value						3.00		1.33	2.00	1.00	2.00	1.00	3.00		1.00
BTHM306	CO306	Engineering Economics								1.00	1.40	1.60	1.00	2.00			1.00
BTEEL307	CO307	Network Analysis and Synthesis lab	3	3							1			1		2.00	1.00
BTEEL308	CO308	Measurement and Instrumentation lab	3.00	2.00	1.00	1.00								1.40	2.00	2.80	1.80
BTEEM309	CO309	Electrical Workshop	1.67	1.00	1.00	1.00								1.00	1.33	1.33	
BTEEF310	CO310	Field training	1.00			1.00	2.00	1.00	1.00			3.00	3.00	3.00	1.00	2.00	3.00
BTEEC401	CO401	Electrical Machines-I	3.00	1.67	1.70	1.67		1.67	1.70				1.67	1.00	2.00	2.67	1.00
BTEEC402	CO402	Power System-I	3.00	1.67	2.00	1.00			1.00	2.00			1.00	1.00	3.00	2.33	1.67
BTEEC403	CO403	Electrical Installation and Estimation	3.00	2.00				1.00	1.00			1.00	1.00	1.00	1.00	2.00	1.00
BTEEC404	CO404	Numerical Methods and Program	3.00	1.67	1.00	2.00	1.50							1.33	1.00	2.00	1.33
BTID405	CO405	Product Design Engineering	3.00	2.00	1.00		3.00				3.00		2.00			2.00	1.00
BTEEE406B	CO406	Analog and Digital Electronics	2.00	1.20	1.20	1.00								1.00	1.60	1.40	1.00
BTEEOE407B	CO407	Introductoion to Non Conventional Energy	2.19		3.00			1.98	2.39					3.00	0.66	3.00	
BTEEL408	CO408	Electrical Machines-I lab	3.00	1.67	1.70	1.33		1.33	1.30				1.67	1.00	2.00	2.67	1.00
BTEEL409	CO409	Power System-I lab															
BTEEL410	CO410	Numerical Methods and Program lab	3.00	3.00	3.00	3.00								3.00	3.00	3.00	3.00
BTEEEL411	CO411	Analog and Digital Electronics lab	2.00	1.00	1.00	1.00								1.00	1.33	1.00	
BTEEC501	C501	Electrical Machine-II	2.00	2.00	1.33	1.33								1.00	1.33	2.00	1.00
BTEEC502	C502	Power system-II	3.00	1.00	1.00	1.00	1.67		1.00				1.00	1.67	1.67	2.33	1.00
BTEEC503	C503	Microprocessor and Microcontroller	2.00	1.67	1.67	1.33	1.50	1.00					1.00	1.00	1.33	1.67	1.00
BTHM504	C504	rights and legislative procedure						2.67		3.00	2.67			2.67	1.00		2.00
BTEEE505	C505	Testing and Maintenance of Electrical Equipment	2.00	2.50	2.00	2.50	2.00						1.00		1.00	2.50	1.50

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BTEEOE506	C506	Power Plant Engineering	2.33	2.00	2.00	1.00			1.50					1.50	1.00	2.00	1.33
BTEEL507	C507	Electrical Machine-II Lab	3.00	2.00	2.00	1.00		1.00		1.00	1.00	1.00		2.00	2.00	2.00	1.00
BTEEL508	C508	Power system-II lab	3.00	3.00	3.00	1.00								1.00	2.00	2.00	1.00
BTEEL509	C509	Microprocessor & Microcontroller lab	2.00	2.00	1.50	2.00	1.50	1.50							1.33	1.67	1.00
BTEEF510	C510	Industrial Internship	1.00			1.00	2.00	1.00	1.00			3.00	3.00	3.00	1.00	2.00	3.00
BTEEC601	CO601	Control System	2.60	2.20		1.80	1.50						1.00	1.00	2.40	2.00	1.00
BTEEC602	CO602	Principle of Electrical Machine Design	2.75	2.33	2.67		1	1	1					1	1.67	2.67	1.00
BTEEC603	CO603	Power Electronics	3.00	1.25	1.75	1.33	1.00							1.00	1.00	1.75	1.00
BTEEE604	CO604	Industrial Automation and Control	3.00	1.33	1.67									1.00	1.00	3.00	
BTEEE605	CO605	Switchgear and Protection	2.00	1.50	3.00			2.50						2.00	1.67	1.33	
BTEEOE606	CO606	Project Management								1.00	2.00	1.67	3.00	1.67			1.67
BTEEL607	CO607	Control System lab	3.00	3.00	3.00	1.00								1.00	2.00	2.00	1.00
BTEEL608	CO608	Principle of Electrical Machine Design lab	2.50	2.00	3.00	2.00			1.00					1.00	1.00	3.00	1.00
BTEEL609	CO609	Power Electronics lab	2.33	1.00	1.50	1.50	3.00							1.00	1.00	2.33	1.00
BTEEC701	CO701	Operation And Control	3.00	2.50	1.50	2.33	1.80							1.00	1.50	1.67	1.00
BTEEC702	CO702	High Voltage Engineering Lab	2.25	2.25	1.50		1.00	1.00		1.00				1.00	1.00	1.50	1.00
BTEEC703	CO703	Electrical Drives Lab	2.40	2.00	2.00	1.70	3.00	1.00	1.00				2.00	2.00	2.00	2.67	1.00
BTEEE704B	CO704	Utilization	3.00	2.70	2.70	1.70		2.00	2.00				1.83	1.60	2.83	3.00	1.67
BTEEE705D	CO705	HVDC Transmission And FACTS	3.00	2.00	2.00									1.00	2.00	1.50	
BTEEL706	CO706	Power System Operation And Control	3	3	1	2.67	3							1	2.00	2.00	1.00
BTEEL707	CO707	High Voltage Engineering Lab	2.33	2.00	1.67	1.50	1.00	1.00		1.00				1.50	1.50	1.67	1.50
BTEEL708	CO708	Electrical Drives Lab	3.00				3.00		1.00		2.00					2.00	1.00
BTEES709	CO709	Seminar	2.60							3.00	2.33	3.00	2.67	1.00		3.00	
BTEEP710	CO710	Project Phase-I	1.60	3.00	3.00	1.50	2.00	1.00	1.00	3.00	1.00	3.00	3.00	3.00		2.00	1.00
BTEEF711	CO711	Internship Evaluation-III	1.00			1.00	2.00	1.00	1.00	3.00		3.00	3.00	3.00	1.00	2.00	2.00
BTEEO801	CO801	Introduction To Industry 4.0 And Industrial Internet Of	1.00	1.25	1.67		1.00	1.00						1.00	1.00	1.50	1.00
BTEEO802	CO802	Joy of computing python	3	1	2		1							1			1.00
BTEEP803	CO803	Project Phase-II	1.60	3.00	3.00	1.50	2.00	1.00	1.00	3.00	1.00	3.00	3.00	3.00		2.00	1.00

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Program Articulation Matrix (Attainment)

			CO-PO Direct Attainment											CO-PSO Direct Attainment		
Subject Code	CO Code	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTBS101	CO101	Engineering Mathematics-I	2.62	2.33	2.33												
BTBS102	CO102	Engineering Chemistry	3	3	3	3		3									
BTES103	CO103	Engineering Mechanics	2	2	1	3											
BTES104	CO104	Computer Programming	1.41	1.41	1.59	1.41	0.99										
BTES105L	CO105	Workshop Practice	3	3	3	3	3	3	3	3	3	3	3	3			
BTES106	CO106	Basic Electrical and Electronics Engineering	3.00	3.00	3			3	3		3						
BTBS108L	CO108	Engineering Chemistry lab	3					3	3	3	3						
BTBS109L	CO109	Engineering Mechanics	2	2	1	3											
BTBS201	CO201	Engineering Machematics-II	3	3	3												
BTBS202	CO202	Engineering Physics	3	3	3		3		3					3			
BTES203	CO203	Engineering Graphics	2	2	2						2	2		2			
BTHM204	CO204	Communication Skills								3	3	3		3			
BTES205	CO205	Energy and Environment Engineering															
BTES206	CO206	Basic Civil and Mechanical Engineering	1.28	1	1				0.83					0.87			
BTBS207L	CO207	Engineering Physics lab	3	3		3	3		3	3	3			3			
BTBS208L	CO208	Engineering Graphics lab	3	3	3						3	3		3			
BTHM209L	CO209	Communication Skills lab								3	3	3		3			
BTBSC301	CO301	Engineering Mathematics-III	3	3	3										2.79	2.79	
BTEEC302	CO302	Network Analysis and Synthesis	2.8	2.7	2.7		2.7							2.7	2.75	2.66	3
BTEEC303	CO303	Fluid Mechanics	3	3	3				3					3		3	
BTEEC304	CO304	Measurement and Instrumentation	2.33	2.87	2.83			2.83		2.75	3.00			2.83	2.83	2.81	2.833
BTEEE305A	CO305	Electrical Engineering Material	3	3										3	3	3	3
BTHM3401	CO3401	Basic Human Value						3		3	3	3	3	3	3		3
BTHM306	CO306	Engineering Economics								3	3	3	3	3			3
BTEEL307	CO307	Network Analysis and Synthesis lab	3	3	3	3							3		3	3	3
BTEEL308	CO308	Measurement and Instrumentation lab	2.33	3	3	3								3	1.79	1.85	
BTEEM309	CO309	Electrical Workshop	3	3	3	3								3			
BTEEF310	CO310	Field training	3			3	3	3	3			3	3	3	3	3	3
BTEEC401	CO401	Electrical Machines-I	3	3	3	3		3	3				3	3	3	3	3
BTEEC402	CO402	Power System-I	2.33	2.6	3	2			2	3			2.33	2.33	2.33	3	3
BTEEC403	CO403	Estimation	3	3				3	3			3	3	3	2.25	2.25	2.25
BTEEC404	CO404	Numerical Methods and Program	2.32	2.39	2.32	2.49	1.98							2.24	3.00	2.32	2.24
BTID405	CO405	Product Design Engineering	3	3	3	3								3	3	3	3
BTEEE406B	CO406B	Analog and Digital Electronics	3	3	3	3								3	3	3	3
BTEEOE407B	CO407	Introductoion to Non Conventional Energy Sources	3						3					3	3		3
BTEEL408	CO408	Electrical Machines-I lab	3	3	3	3	3							3	3	3	3
BTEEL409	CO409	Power System-I lab	2.6	2.6	2.3		3							0.99	1.56	1.66	
BTEEL410	CO410	Numerical Methods and Program lab	3	3	3	3							3	3	3	3	3
BTEEEL411	CO411	Analog and Digital Electronics lab	3	3	3	3								3	3	3	
BTEEC501	CO501	Electrical Machine-II	3	3	3	3		3		3	3	3		3	3	3	3
BTEEC502	CO502	Power system-II	1	1	1	1	1		1				0.99	0.99	0.99	0.99	0.99
BTEEC503	CO503	Microprocessor and Microcontroller	3	3	3	3	3	3					3	3	3	3	3
BTHM504	C504	Value education human rights and legislative procedure						3		3	3			3	3		3
BTEEE505	CO505	Testing and Maintenance of Electrical Equipment	3	2.4	1.5	1.8	2						3		2.5	2.1	2
BTEEOE506	CO506	Power Plant Engineering	2.27	2.15	2.49	1.98			2.66					2.66	2.49	1.98	2.49
BTEEL507	CO507	Electrical Machine-II Lab	3	3	3	3		3	3		3			3	3	3	3
BTEEL508	CO508	Power system-II lab															
BTEEL509	CO509	Microprocessor lab	3	3	3	3	3	3							3	3	3
BTEEF510	CO510	Industrial Internship															
BTEEC601	CO601	Control System	2.6	2.2		1.8	1.5						1	1	2.4	2	1
BTEEC602	CO602	Principle of Electrical Machine Design	2.45	2.14	2.25		3.00	2.33	2.33					2.00	2.43	2.45	2.33
BTEEC603	CO603	Power Electronics	2.49	2.59	2.56	2.49	3.00							2.66	3.00	2.56	2.66
BTEEE604	CO604	Industrial Automation and Control	2.33	2.5	2.2									2.33	2.33	3	
BTEEE605	CO605	Switchgear and Protection	3	3	3			3						3	3	3	
BTEEOE606	CO606	Project Management								1.5	1.5	1.34	1.794	1.34			1.34
BTEEL607	CO607	Control System lab	3	3	3	3								3	3	3	3
BTEEL608	CO608	Principle of Electrical Machine Design lab	3	3	3	3			3					3	3	3	3
BTEEL609	CO609	Power Electronics lab	3	3	3	3	3			3				3	3	3	3
BTEEC701	CO701	Power System Operation And Control	2.33	2.46	2.44	2.56	2.55							2.59	2.33	2.39	2.59
BTEEC702	CO702	High Voltage Engineering Lab	2.32	2.32	2.15		1.98	1.98		1.98				2.32	2.49	2.27	2.32
BTEEC703	CO703	Electrical Drives	1.57	1.54	1.99	2.20			1.74					1.69	1.79	1.81	1.74
BTEEE704B	CO704	Electric Traction & Utilization	2.66	2.75	2.67	3.00							2.64	3	2.65	3	3
BTEEE705D	CO705	HVDC Transmission And FACTS	3	3	3									3	3	3	
BTEEL706	CO706	Power System Operation And Control	3	3	3	3	3							3	3	3	3
BTEEL707	CO707	High Voltage Engineering Lab	3	3		3	3	3		3				3	3	3	3
BTEEL708	CO708	Electrical Drives Lab	3				3		3		3					3	3
BTEES709	CO709	Seminar	3				3			3	3	3	3	3	3		3
BTEEP710	CO710	Project Phase-I	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98

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BTEEO801F	CO801	Introduction To Industry 4.0 And Industrial Internet Of Things															
BTEEO802	CO802	Joy of computing python															
BTEEP803	CO803	Project Phase -II	1.98	1.98	1.98	1.98	1.98	1.98	1.98		1.98	1.98	1.98	1.98	1.98	1.98	1.98
		Internal Assessment Direct Attainment	*2.72*	*2.69*	*2.67*	*2.65*	*2.56*	*2.76*	*2.51*	*2.68*	*2.68*	*2.59*	*2.51*	*2.64*	*2.68*	*2.65*	*2.65*

University Attainment

			CO-PO Direct Attainment												CO-PSO Direct Attainment		
Subject Code	CO Code	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTEEC302	CO302	Network Analysis and Synthesis	3	3	3		3							3	3	3	3
BTEEC303	CO303	Fluid Mechanics	3	3	3				3					3		3	
BTEEC304	CO304	Measurement and Instrumentation	0.99	0.99	0.99			0.99		0.99	0.99			0.99	0.99	0.99	0.99
BTEEE305A	CO305	Electrical Engineering Material	3	3										3	3	3	3
BTHM306	CO306	Engineering Economics								3	3	3	3	3			3
BTEEL307	CO307	Network Analysis and Synthesis lab	0.99	0.99	0.99	0.99							0.99		0.99	0.99	0.99
BTEEL308	CO308	Measurement and Instrumentation lab	3	3	3	3								3	3	2.79	
BTEEM309	CO309	Electrical Workshop	1.2	1.32	1.32										1.5	1.41	
BTEEF310	CO310	Field training	3			3	3	3	3			3	3	3	3	3	3
BTEEC401	CO401	Electrical Machines-I	3	3	3	3		3	3				3	3	3	3	3
BTEEC402	CO402	Power System-I	0.99	0.99	0.99	0.99			0.99	0.9			0.99	0.99	0.99	0.99	0.99
BTEEC403	CO403	Electrical Installation and Estimation	3	3				3	3			3	3	3	3	3	3
BTEEC404	CO404	Numerical Methods and Program	3	3	3	3	3							3	3	3	3
BTEEE406B	CO406	Analog and Digital Electronics	3	3	3	3								3	3	3	3
BTEEOE407B	CO407	Introductoion to Non Conventional Energy Sources	1.98						1.98					3	2		2
BTEEL408	CO408	Electrical Machines-I lab	1.98	1.98	1.98	1.98		1.98	1.98				1.98	1.98	1.98	1.98	1.98
BTEEL409	CO409	Power System-I lab	0.99	0.99	0.99		0.99							0.99	0.99	0.99	
BTEEL410	CO410	Numerical Methods and Program lab	3	3	3	3							3	3	3	3	3
BTEEEL411	CO411	Analog and Digital Electronics lab	1.8	2.01	2.01									3	2.25	2.13	
BTEEC501	CO501	Electrical Machine-II	1.98	1.98	1.98	1.98								1.98	1.98	1.98	1.98
BTEEC502	CO502	Power system-II	3	3	3	3	3		3				3	3	3	3	3
BTEEC503	CO503	Microprocessor and Microcontroller	1.98	1.98	1.98	1.98									1.98	1.98	1.98
BTEEE505	CO505	Testing and Maintenance of Electrical Equipment	1.98	1.98	1.98	1.98	1.98						1.98		1.98	1.98	1.98
BTEEOE506	CO506	Power Plant Engineering	1.98	1.98	1.98	1.98			1.98					1.98	1.98	1.98	1.98
BTEEL507	CO507	Electrical Machine-II Lab	0.99	0.99	0.99	0.99		0.99	0.99		0.99			0.99	0.99	0.99	0.99
BTEEL508	CO508	Power system-II lab	3	3	3	3								3	3	3	3
BTEEL509	CO509	Microprocessor lab	1.98	1.98	1.98	1.98	1.98	1.98							1.98	1.98	1.98
BTEEF510	CO510	Industrial Internship															
BTEEC601	CO601	Control System	0.99	0.99		0.99	0.99						0.99	0.99	1	1	1
BTEEC602	CO602	Principle of Electrical Machine Design	0.99	0.99	0.99		0.99	0.99	0.99					0.99	0.99	0.99	0.99
BTEEC603	CO603	Power Electronics	1.98	1.98	1.98	1.98	1.98							1.98	1.98	1.98	1.98
BTEEE604	CO604	Industrial Automation and Control	3	3	3									3	3	3	
BTEEE605	CO605	Switchgear and Protection	3	3	2			3							3	2	
BTEEOE606	CO606	Project Management								0.99	0.99	0.99	0.99	0.99			0.99
BTEEL607	CO607	Control System lab	3	3	3	3								3	3	3	3
BTEEL608	CO608	Principle of Electrical Machine Design lab	1.98	1.98	1.98	1.98			1.98					1.98	1.98	1.98	1.98
BTEEL609	CO609	Power Electronics lab	1.98	1.98	1.98	1.98	1.98							1.98	1.98	1.98	1.98
BTEEC701	CO701	Power System Operation And Control	1.98	1.98	1.98	1.98	1.98							1.98	1.98	1.98	1.98
BTEEC702	CO702	High Voltage Engineering	1.98	1.98	1.98		1.98	1.98		1.98				1.98	1.98	1.98	1.98
BTEEC703	CO703	Electrical Drives	0.99	0.99	0.99	0.99			0.99					0.99	0.99	0.99	0.99
BTEEE704B	CO704	Electric Traction & Utilization	0.99	0.99	0.99	0.99							0.99	0.99	0.99	0.99	0.99
BTEEE705D	CO705	HVDC Transmission And FACTS	1.98	1.98	1.98									1.98	1.98	1.98	
BTEEL706	CO706	Power System Operation And Control	1.98	1.98	1.98	1.98	1.98							1.98	1.98	1.98	1.98
BTEEL707	CO707	High Voltage Engineering Lab	1.98	1.98		1.98	1.98	1.98		1.98				1.98	1.98	1.98	1.98
BTEEL708	CO708	Electrical Drives Lab	1.98				1.98		1.98		1.98					1.98	1.98
BTEES709	CO709	Seminar	3				3			3	3	3	3	3	3		3
BTEEP710	CO710	Project Phase-I															
BTEEF711	CO711	Internship Evaluation-III	1.98			1.98	1.98	1.98	1.98	1.98		1.98	1.98	1.98	1.98	1.98	1.98
BTEEO801F	CO801	Introduction To Industry 4.0 And Industrial Internet Of Things	1.98	1.98	1.98		1.98	1.98						1.98	1.98	1.98	1.98
BTEEO802	CO802	Joy of computing python															
BTEEP803	CO803	Project Phase -II															
		University Direct Attainment	***2.12***	***2.10***	***2.05***	***2.10***	***2.09***	***2.07***	***2.06***	***1.85***	***1.83***	***2.50***	***2.13***	***2.22***	***2.12***	***2.09***	***2.09***
		Average Direct Attainment	***2.42***	***2.40***	***2.36***	***2.37***	***2.32***	***2.41***	***2.28***	***2.27***	***2.25***	***2.54***	***2.32***	***2.43***	***2.40***	***2.37***	***2.37***
		Program Direct attainment(80%)	***1.94***	***1.92***	***1.89***	***1.90***	***1.86***	***1.93***	***1.83***	***1.81***	***1.80***	***2.03***	***1.86***	***1.94***	***1.92***	***1.90***	***1.90***
		Program Indirect Attainment(20%)	***0.58***	***0.58***	***0.59***	***0.58***	***0.57***	***0.55***	***0.54***	***0.57***	***0.58***	***0.55***	***0.57***	***0.58***	***0.58***	***0.57***	***0.57***
		Final Program Attainment	***2.52***	***2.50***	***2.47***	***2.48***	***2.43***	***2.48***	***2.37***	***2.38***	***2.38***	***2.59***	***2.42***	***2.52***	***2.50***	***2.47***	***2.47***

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			CO-PO Indirect Attainment											CO-PSO Indirect Attainment		
Subject Code	CO Code	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTBSC301	CO301	Engineering Mathematics-III	3	3	3										3	3	
BTEEC302	CO302	Network Analysis and Synthesis	3	3	3		3							3	3	3	3
BTEEC303	CO303	Fluid Mechanics	3	3	3				3					3		3	
BTEEC304	CO304	Measurement and Instrumentation	3	3	3			3		3	3			3	3	3	3
BTEEE305A	CO305	Electrical Engineering Material	3	3										3	3	3	3
BTHM3401	CO306 1	Basic Human Value						3		3	3	3	3	3	3		3
BTHM306	CO306	Engineering Economics								3	3	3	3	3			3
BTEEL307	CO308	Network Analysis and Synthesis lab	3	3	3	3							3		3	3	3
BTEEL308	CO309	Measurement and Instrumentation lab	2.33	3	3	3								3	3	3	
BTEEM309	CO310	Electrical Workshop	3	3	3	3								3	3	3	
BTEEF310	CO311	Field training	3			3	3	3	3			3	3	3	3	3	3
BTEEC401	CO401	Electrical Machines-I	3	3	3	3		3	3				3	3	3	3	3
BTEEC402	CO402	Power System-I	3	3	3	3			3	3			3	3	3	3	3
BTEEC403	CO403	Electrical Instrumentation and Estimation	3	3				3	3			3	3	3	3	3	3
BTEEC404	CO404	Numerical Methods and Program	3	3	3	3	3							3	3	3	3
BTID405	CO405	Product Design Engineering	3	3	3	3	3				3		3	3		3	3
BTEEE406B	CO406	Analog and Digital Electronics	3	3	3	3								3	3	3	3
B	CO407	Introduction to Non Conventional Energy Sources	3						3					3	3		3
BTEEL408	CO408	Electrical Machines-I lab	3	3	3	3	3							3	3	3	3
BTEEL409	CO409	Power System-I lab	3	3	3		3							3	3	3	
BTEEL410	CO410	Numerical Methods and Program lab	3	3	3	3								3	3	3	3
BTEEEL411	CO411	Analog and Digital Electronics lab	3	3	3	3								3	3	3	
BTEEC501	CO501	Electrical Machine-II	3	3	3	3	3							3	3	3	3
BTEEC502	CO502	Power system-II	3	3	3	3	3		3				3	3	3	3	3
BTEEC503	CO503	Microcontroller	3	3	3	3	3	3					3	3	3	3	3
BTHM504	C504	Value education human rights and legislative procedure						3		3	3			3	3		3
BTEEE505	CO505	Testing and Maintenance of Electrical Equipment	3	3	3	3	3						3		3	3	3
BTEEOE506	CO506	Power Plant Engineering	3	3	3	3			3					3	3	3	3
BTEEL507	C505	Electrical Machine-II Lab	3	3	3	3		3	3		3			3	3	3	3
BTEEL508	C506	Power system-II lab	3	3	3	3								3	3	3	3
BTEEL509	C507	Microprocessor lab	3	3	3	3	3	3							3	3	3
BTEEC601	CO601	Control System	3	3		3	3						3	3	1	1	1
BTEEC602	CO602	Principle of Electrical Machine Design	2.5	2.1	2.3	2.4	3	2.3	2.3					2	2.43	2.45	2.33
BTEEC603	CO603	Power Electronics	3	3	3	3	3							3	3	3	3
BTEEE604	CO604	Industrial Automation and Control	3	3	3									3	3	3	
BTEEE605	CO605	Switchgear and Protection	3	3	3			3						3	3	3	
BTEEOE606	CO606	Project Management								3	3	3	3	3			3
BTEEL607	CO607	Control System lab	3	3	3	3								3	3	3	3
BTEEL608	CO608	Principle of Electrical Machine Design lab	3	3	3	3			3					3	3	3	3
BTEEL609	CO609	Power Electronics lab	3	3	3	3	3							3	3	3	3
BTEEC701	CO701	Power System Operation and Control	3	3	3	3	3							3	3	3	3
BTEEC702	CO702	High Voltage Engineering Lab	3	3	3		3	3		3				3	3	3	3
BTEEC703	CO703	Electrical Drives Lab	1.6	1.5	2	2.2	1.5	1.8	1.8				1.89	1.69	1.79	1.81	1.74
BTEEE704B	CO704	Electric Traction & Utilization	3	3	3	3							3	3	3	3	3
BTEEE705D	CO705	HVDC Transmission And FACTS	3	3	3									3	3	3	
BTEEL706	CO706	Power System Operation and Control	3	3	3	3	3							3	3	3	3
BTEEL707	CO707	High Voltage Engineering Lab	3	3		3	3	3		3				3	3	3	3
BTEEL708	CO708	Electrical Drives Lab	3				3		3		3					3	3
BTEES709	CO709	Seminar	3				3			3	3	3	3	3	3		3
BTEEP710	CO710	PROJECT PHASE-I	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98
BTEEF711	CO711	INTERNSHIP EVALUATION-III	1.98			1.98	1.98	1.98	1.98	1.98		1.98	1.98	1.98	1.98	1.98	1.98
BTEEO801F	CO801	Introduction To Industry 4.0 And Industrial Internet Of Things															
BTEEO802	CO802	Joy of computing python															
		Average	*2.90*	*2.92*	*2.93*	*2.90*	*2.85*	*2.75*	*2.74*	*2.81*	*2.90*	*2.75*	*2.85*	*2.91*	*2.87*	*2.87*	*2.86*

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The process of attainment of POs and PSOs of individual course in the four-year engineering degree program requires measuring tools. Respective faculty member prepare course outcomes using the concept of engineering subject. Then, a correlation is established between COs with POs and COs with PSOs on the scale of 0 to 3 where 0 means no correlation and 3 means high correlation. Mapping matrix of COs-POs and COs-PSOs is prepared in this regard for all the courses in the program. Besides, mapping is the process of representing, preferably in matrix form, the correlation among the parameters.

Assessment tools are categorized into direct and indirect methods to assess the program specific outcomes (PSO) and program outcomes (PO). Direct method is based on assessment of PO and PSO. Indirect method is based on course end survey, program exit survey, alumni survey etc. Direct methods are computed through direct examinations of student conducted throughout the semester. It is carried out in the form of continuous internal assessment tests, end semester examinations, assignments, unit tests and laboratory assignments etc. The internal assessment marks in a theory paper are based on five assessment tools viz, continuous assessment I&II, mid semester exam, unit test and assignments. Total marks obtained from all tests is considered for calculating the attainment value. A target value is set for CO, PO and PSO.

For CO attainment, it is calculated how many students have scored more than the target value which is already set by the course coordinator in the internal exam and university exams. Attainment levels are defined as per the following table:

Percentage students scored more than the target value	**Attainment level**
0-50%	1
50-60%	2
>60%	3

For PO attainment, multiplier factors are defined based on CO attainment as per following table:

Percentage students scored more than the target value	**Multiplier factor**
0-50%	0.33
50-60%	0.66
>60%	1

This multiplier factor is multiplied with the value assigned in the CO-PO relevance table and final attainment of each PO is calculated as demonstrated below:

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Step 1: CO-PO Relevance

Sub code / Subject	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO11	PO1 2
BTITOE605C SPM	CO605C.1	2	2	2	2	2	-	-	--	2	-	2	2
	CO605C.2	2	2	2	2	--	-	-	-	1	-	2	2
	CO605C.3	1	2	1	2	2	-	-	-	2	2	1	2
	CO605C.4	2	2	1	2	1	-	-	-	2	1	1	1
	CO605C.5	1	1	1	2	2	-	-	-	1	2	1	2
AVG		1.60	1.80	1.40	2.00	1.75				1.60	1.67	1.40	1.80

Step 2: Calculation of multiplying factor for each of CO and finally PO attainment

CO	Description	% of students receiving more than target value	Attainment Level	Multiplication Factor
CO605C.1	To decompose the given project in planning and various phases of a software lifecycle	44.42	1	**0.33**
CO605C.2	To know various project evaluation techniques	55.88	2	**0.66**
CO605C.3	To understand various phases of monitoring and control of the software product	95.59	3	**1**
CO605C.4	To apply software configuration managements and contract management.	97.06	3	**1**
CO605C.5	To understand quality and people management along with project management tools	92.65	3	**1**

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Sub code / Subject	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
BTITOE605 C SPM	CO605C.1	2*0.33 =0.67	2*0.33=0.67	2*0.33=0.67	2*0.33=0.67	2*0.33=0.67	-	-	--	2*0.33=0.67	-	2*0.33 =0.67	2*0.33=0.67
	CO605C.2	2*0.66 =1.32	2*0.66=1.32	2*0.66=1.32	2*0.66=1.32	--	-	-	-	1*0.66=0.66	-	2*0.66 =1.32	2*0.66=1.32
	CO605C.3	1	2	1	2	2	-	-	-	2	2	1	2
	CO605C.4	2	2	1	2	1	-	-	-	2	1	1	1
	CO605C.5	1	1	1	2	2	-	-	-	1	2	1	2
SUM		5.99	6.99	4.99	7.99	5.67	-	-	-	6.33	5	4.99	6.99
Sum of values attained		8	9	7	10	7	-	-	-	8	5	7	9
% PO attainment for each element		75	77.77	71.42	80	81	-	-	-	79.12	100	71.42	77.77
Average Approximation (Direct Attainment)		2.25	2.33	2.14	2.4	2.43	-	-	-	2.37	3	2.14	2.33
University Attainment		1.98	1.98	1.98	1.98	1.98	-	-	-	1.98	1.98	1.98	1.98
Final Attainment (Average of Direct and University Attainment		2.12	2.16	2.06	2.19	2.21	-	-	-	2.18	2.49	2.06	2.16

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POs and PSOs are evaluated separately for internal assessment tests and university exams. Program PO attainment (Direct) is calculated by taking the average of PO and PSO attainment values obtained in both the internal assessment test and university exams. In the case of indirect attainment, it is calculated only on the basis of the course exit survey which is taken by the course coordinator at the end of the course.

Finally, an articulation matrix is formed, in which all subjects (from Sem I to Sem VIII) are incorporated with their PO and PSO attainment values (Direct/ indirect). Averaging of all attainment values of all subjects for each PO is done for both direct and indirect attainment. This final average value is considered as the program indirect attainment value. Direct attainment of the program is calculated by taking the average of PO values attained through university exams and internal assessment tests.

Direct assessment Methods		
Sr. No.	**Assessment tool**	**Method description**
1	Internal assessment test	The internal assessment marks in a theory paper is based on a number of tests already mentioned which are conducted as scheduled in the departmental academic calendar. It is a metric to continuously assess the attainment of course outcomes with respect to course objectives. The total marks of all tests being asked for each CO is calculated for CO attainment purpose
2	Lab Assignments	Lab Assignment can be one of the measuring criteria to mainly assess student's practical knowledge with their designing capabilities. In case of Practical, the IA marks shall be based on the laboratory records and practical tests.
3	Theory Semester Examination & Practical Semester Examination	Semester examination (theory or practical) are the metric to assess whether all the course outcomes are attained or not framed by the course owner. Semester Examination is more focused on attainment of course outcomes and uses a descriptive exam.
4	Seminar	The internal assessment marks in the case of seminar shall be based on continuous evaluation by a faculty coordinator assigned by the department
5	Mini Project	The internal assessment marks in the case of seminar shall be based on continuous evaluation by a faculty coordinator (project guide if allotted) assigned by the department
6	Project	The internal Assessment marks in the case of projects in the in the final years shall be based on the continuous evaluation throughout the semester by an internal committee consisting of the three faculty members of the Department, one of whom shall be the project / seminar guide

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Shree Vile Parle Kelavani Mandal's
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Department of Information Technology
Course Outcome Statements (2022-23 Passout Batch) CO-PO PSO MAPPING

Subject Code	Subject Name	CO No	CO Statement	CO-PO Mapping												CO-PSO Mapping		
				PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTBS301	Engineering Mathematics - III	C301.1	Find Laplace transform of functions using various formulas and properties Evaluate particular types of integration	2	2											2	1	
		C301.2	Find Inverse Laplace transform of functions using various formulas and properties Solve linear differential/simultaneous linear differential equation using Laplace and inverse Laplace transform	2	1	1										2	1	
		C301.3	Find Fourier and inverse Fourier transform, Fourier sine and inverse Fourier sine transform Cosine transform and inverse Fourier cosine Transform of functions	3	1	1										2	1	
		C301.4	Form PDE by eliminating arbitrary constant, solve PDE and use PDE to solve one and two dimensional heat flow equation	2	2	1										2	1	
		C301.5	Determine Analytic functions/ Bilinear transformation/ apply Cauchy's theorem/Cauchy's integral formula and Residue theorem to solve contour integration	2	2											2	1	
BTITC302	Switching Theory and Logic Design	CO302.1	Apply classical problem solving methods to solve Binary, Octal, hexadecimal calculations and conversions along with its implementation using gates	2	2										1			
		CO302.2	Illustrate theory of Boolean algebra and the underlying features of various numbering systems	3	2	1		1					1			1		
		CO302.3	Demonstrate the classification of logic families and the characteristics of digital IC's	1	1	1												
		CO302.4	know the most simplified circuit using various mapping and mathematical methods	3	3	1	1	2					1			1		
		CO302.5	Demonstrate the working of various flip-flop and their interconversion	3	2	1	1	2					2			1		
		CO302.6	Describe various programmable logic device	2	1	1	1	2					2			1		
BTCOC304	Computer Architecture and Organization	C304.1	To identify components of a computer system instruction types, its execution and interrupt mechanism	1	1	1		1										
		C304.2	To Illustrate numerical representation in interger and floating point and understand memory org	3	3	1	2									2	3	
		C304.3	To understand control unit operations and differentiate input / output organizations I/O modules	3	2	1	2									1	1	
BTITC303	Object Oriented Paradigm with C++	CO303.1	To draw the control flow of a program and understand basic of object oriented programming	2	2	1		1					1		1	1	1	
		CO303.2	Demonstrate inheritance and exception handling feature in C++	2	2	2	1	1					1		1	2	1	
		CO303.3	Demonstration of polymorphism and file handling in C++	2	2	2	1	1					1		1	2	1	
BTHM3401	Basic Human Rights	C3401.1	Appreciate the importance of the values of human rights						1	1	1	1						1
		C3401.2	Strengthen respect for human rights and fundamental freedoms and respect others caste, religion, region and culture						1	1	1	1						1
		C3401.3	Know about regional, national, state, and local law that reinforces international human rights law						1	1	1	1						1
BTITE305B	Programming in Java	E305B.1	Know the structure and model of the Java programming language	2	2	2	2	2								1	1	1
		E305B.2	Use the Java programming language for various programming technologies	2	2	2	2	2								1	1	1
		E305B.3	Develop software in the Java programming language (application)	2	2	2	2	2								1	1	1
BTITL307	Object - oriented Programming in C++ Lab	CO307.1	Programs to demonstrate the implementation using function and structure.	2	2	2	1	1					1			1	1	
		CO307.2	Programs to demonstrate the implementation class & object and compile time polymorphism.	2	2	2	1	1					1			1	1	
		CO307.3	Programs to demonstrate the implementation of inheritance and file handling	2	2	2	1	1					1			1	1	
BTITL306	Switching Theory and Logic Design Lab	CO306.1	Study and implement the basic and Universal gates and perform code conversions	1	1										1	1	1	
		CO306.2	Implement of half adder, full adder, half subtractor and full subtractor.	1	1	1									1	1	1	
		CO306.3	Demonstrate and Implement K-map and Quine- McClusky method	1	1	1										1	1	
		CO306.4	Demonstrate and Implement Multiplexer and Demultiplexer with BCD	1	1											1	1	
		CO306.5	Study and implement various flip-flops along with their inter conversion	1	1	1										1	1	
		CO306.6	Study various programmable logic device	2	2	1									1	1	1	
BTITL308	Programming Lab (Python)	L308.1	Student should be able to understand the basic concepts of scripting and the contributions of scripting language	2	2	2	2	2								2	2	
		L308.2	Ability to explore python data structures like Lists, Tuples, Sets and dictionaries	2	2	2	2	2								2	2	
		L308.3	Ability to create practical and contemporary applications using Functions, Modules and Regular Expressions	2	2	2	2	2								2	2	
BTITEL309B	Programming in Java Lab	EL309B.1	Able to write programs for solving real world problems using java collection frame work	2	2	2	2	2								2	2	
		EL309B.2	Able to write programs using abstract classes	2	2	2	2	2								2	2	
		EL309B.3	Able to write multithreaded programs	2	2	2	2	2								2	2	
BTITC401	Microprocessors and Microcontrollers	CO401.1	Explain about the architecture of microprocessor and microcontroller	1	1	11									1			
		CO401.2	Understand the architecture, features and basic instructions of 8086	2	1	1									1	1		
		CO401.3	Illustrate 8086 Interrupt System and its application	2	1	1									1	1		
		CO401.4	Illustrate the design aspects of I/O and memory interfacing circuits	2	1	1									1	1		
		CO401.5	Understand the concepts related to I/O and memory interfacing	2	1	1										1		
		CO401.6	Understand the concepts related PIC18 Microcontroller	1	1	1												
BTITC402	Data Structures and Applications	C402.1	To write neat code by selecting appropriate data structure and demonstrate a working solution for a given problem	3	2	2			1							2		
		C402.2	To think of all possible inputs to an application and handle all possible errors properly	3	2	2	2	1	1						1	2	1	
		C402.3	To analyze clearly different possible solutions to a program and select the most efficient one	3	3	3	2	1	1						1	2	2	
		C402.4	To write an application to demonstrate a good working solution	2	2	3	1								1	3	2	

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		C402.5	To demonstrate the ability to write reusable code and abstract data types with object based approach	3	2	2			1						1	2	1	
BTITC403	Discrete Structures and Applications	C403.1	To perform operations on various discrete structures such as sets functions, relations, and sequences	2	2	1	2									1	2	
		C403.2	To solve problems using counting techniques, permutation and combination, recursion and generating functions	2	2	1	2									1	2	
		C403.3	To use graphs as tools to visualize and simplify Problems	2	2	1	2									1	2	
BTITC404	Internetworking Protocols	CO404.1	Understand networking models with network addressing methods	1	1												1	1
		CO404.2	Understanding packet delivery and message control mechanism	1	1												1	1
		CO404.3	Understanding of transport layer and UDP & TCP protocols.	1	1												1	1
BTID405	Product Design Engineering	D405.1	Create simple mechanical or other designs	2	2	2	2	2								1	1	
		D405.2	Create design documents for knowledge sharing	2	2	2	2	2								1	1	
		D405.3	Manage own work to meet design requirements	2	2	2	2	2								1	1	
		D405.4	Work effectively with colleagues	2	2	2	2	2								1	1	
BTITE406C	Development Engineering	E406C.1	To understand the core disciplines issues in development.	1	1	1	1									1		1
		E406C.2	To understand certifications	1	1	1	1									1		1
		E406C.3	To understand the planning of developing of rural areas	1	1	1	1									1		1
BTITL407	Microprocessors and Microcontrollers	C407.1	To program microprocessor and microcontroller for arithmetic operations	2	2	2	2	2								2	2	
		C407.2	To interface microprocessor and microcontroller with I/O devices	2	2	2	2	2								2	2	
BTITL408	Data Structures and Applications Lab	L408.1	Able to write well-structured procedure-oriented programs	3	2	2										3	2	
		L408.2	To implement the Stack ADT using both array based and linked-list based data structures	2	3	3			2						2	2	2	
		L408.3	To implement the Queue ADT using both array based circular queue and linked-list based implementations	2	3	3			2						2	2	2	
		L408.4	Analyze run-time execution of previous learned searching and sorting methods including binary search, selection, merge sort, heap sort and Quick sort.	2	3	3									2	2	3	
BTITL409	Internetworking Protocols Lab	L409.1	Understand the practical approach to network communication protocols.	1	1	1	1	1								1	1	1
		L409.2	Understand network layers, structure/format and role of each network layer.	1	1	1	1	1								1	1	1
		L409.3	Understand the various Routing Protocols/Algorithms and Internetworking	1	1	1	1	1								1	1	1
BTITC501	Database Management Systems	C501.1	Describe the fundamental elements of relational database management systems and data models.	3	3	1	3	3	2			3	2	3		2	2	
		C501.2	Demonstrate basic concepts of the relational database design and Relational algebra.	3	2	2	2	3	3			2	2	3		2	3	
		C501.3	Populate relational database, formulate SQL queries on database designed and calculate query cost.	3	2	1	3	3	1			3	3	3		3	3	
		C501.4	Convert the ER-model to relational tables and apply various normalization techniques.	3	3	1	2	3	3			2	3	3		3	3	
		C501.5	Explain Transaction Processing & Locking using concept of Concurrency control.	2	3	2	2	2	3			3	3	2		3	3	
BTITC502	Design and Analysis of Algorithms	C502.1	Calculate computational complexity using asymptotic notations for various algorithms	2	2	1	2	2								1	1	
		C502.2	Apply Divide & Conquer as well as Greedy approach to design algorithms	2	2	2	2	2								2	2	
		C502.3	Analyze optimization problems using dynamic programming	2	2	1	2	2								2	2	1
		C502.4	Illustrate problems using backtracking and branch & bound.	1	2	2	2	2								2	2	
		C502.5	Understand problems of graph theory	2	1	2	2	1								2	1	2
		C502.6	Compare string matching algorithms, P, NP, NP-complete, NP-Hard problems	1	1	1	2	2								1	1	
BTITC503	Software Engineering	C503.1	Understand the software development process and models.	2	2	2	2	1	1					1	1	2		
		C503.2	Understand the requirement engineering and apply the requirement gathering process	2	2	2	2	2	1				1	1	1	2		1
		C503.3	Design a system, component, or process to meet desired needs within realistic constraints	3	2	3	3	2				1		1	1	2		1
		C503.4	Understand the Quality aspect in software development	2	2	2	2	2	1			1	1	2	1	1		
		C503.5	Understand the web engineering and project management in software development.	2	2	2	2	2	1					2		1		1
BTITC504	Probability and Queuing Theory	C504.1	Find probability,conditional probability,expectation,variance,,define pmf & pdf	1												1	1	
		C504.2	Find probability using Binomial , Poisson, Normal, Uniform and Geometric distributions	1	2		2									1	1	
		C504.3	Test null and alternate hypotheses for small and large samples	1	2		2										1	
		C504.4	Define Stochastic processes, Markov chain , apply Chapman Kolmogorov theorem	1	2		2										1	
		C504.5	Find transition probability matrix, classify states of Markov chain,define finite and infinite queuing models	1	2		2										1	
BTITOE505A	Graph Theory	C505A.1	Able to define the basic concepts of graphs, directed graphs, and weighted graphs	1	2	2	1									1	1	1
		C505A.2	Is able to understand the concept of colorings and theory.	2	2	2	1									2	1	
		C505A.3	Is able to understand Eulerian and Hamiltonian graphs	1	2	1	2										1	
		C505A.4	Is able to understand the concept of plane graph and theory.	2	2	2	2									1	2	
BTITPE506E	Data Visualisation	C506E.1	Describe the seven stages of Data Visualization and its implementation using processing	1	2		1							1			2	
		C506E.2	Illustrate theory of Time Series and visualize using the processing tool	1	1		1							1			1	1
		C506E.3	Apply and analyze connections and correlations of data using analytical methods for real life problems	1	1		1							2			2	
		C506E.4	Apply Scatterplot to analyze the data using suitable example, visualize using the processing tool	1	2		2	2						2	1	1	1	
		C506E.5	Demonstrate the working of trees, hierarchies, recursion, networks and graphs	1	2	1	2	1						2	1	1	1	1
		C506E.6	Describe the data acquisition, apply data preprocessing methods on open access data for visualization	1	2	2	2	2						2	1	1	1	
BTHM501	Constitution of India	A501.1	know salient features of the Indian Constitution							2					1			
		A501.2	understand directive principles of state policy, its nature and importance							2					1			
		A501.3	understand structure, function and powers of Election Commission of India							2					1			
		A501.4	Be aware of structure of Indian Judiciary, types of court, characteristics of Indian Judiciary							2					1			1
BTITL507	Programming Lab (R Programming)	L507.1	Install and use R for simple programming tasks	1	1			2			1						1	
		L507.2	Extend the functionality of R by using add-on packages	1	1			1			1						1	
		L507.3	Execute program to test and demonstrate objects ,classes and vector ,matrix & factor	2	1	1					1					1	1	
		L507.4	Use and Display various graph and charts in R	2	1	1					1				1	1	1	

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BTITL508	Database Management Systems Lab	L508.1	Execute DDL, DML SQL queries	2	2	3	1	1						2				
		L508.2	Write and Execute PL SQL programs using stored procedures, triggers and cursors	3	2	3	1	1						2				
		L508.3	Write and execute SQL Join queries and functions	2	2	2	1	1						1				
BTITL509	Design and Analysis of Algorithms Lab	L509.1	To implement divide and conquer, greedy algorithms concepts	3	3	1	1									1	2	
		L509.2	To implement dynamic programming algorithms	3	3	1	2									2	2	
		L509.3	To implement backtracking algorithms	3	2	1	2									2	2	
BTITS510	Seminar	CO510.1	Identifying and define problem statement for seminar	1							1	1		1			1	1
		CO510.2	Comprehend the problem statement and present the seminar	2	2		1				1	1		1			1	1
		CO510.3	Prepare the technical report for seminar	1	1		1				1	1		1				
BTITC601	Operating Systems	C601.1	To understand the objectives and functions of Operating System, types and related concepts	3												3		
		C601.2	Comprehend basic concepts of Process Management and Process Synchronization	3	1	2										3	1	
		C601.3	To understand and solve OS related memory management problems	3	2	2										3	1	
		C601.4	To understand and solve process deadlock handling problems	3	2	2										3	1	
		C601.5	To understand file system management and storage devices	2												2		
BTITC602	Compiler Construction	C602.1	To understand the major concept areas of language translation and compiler design	2	2	1	2	1								1		1
		C602.2	To Understand compiling and lexical Analysis for compiler design	2	2	1	1	1								1		
		C602.3	To Explain the concept of syntactical analysis for compiling process	2	2	1	1									1		
		C602.4	To use of syntax analysis for optimized code generation	2	2	1	1									1	1	1
BTITC603	Object Oriented Software and Web Engineering	C603.1	Understand Object Oriented Software Development Process	2	2					1				1	2	1	1	
		C603.2	Gain exposure to Object Oriented Methodologies & UML Diagrams	2	2	2		2	1	1				1	2	1		
		C603.3	Apply Object Oriented Analysis Processes for projects	2	2	2			1	1	1			1	2	2	2	
		C603.4	Design the system using Systematic methods & attributes	2	2	2			1		1			2			2	
		C603.5	Model the web applications with characteristics	2	2	-					1			2			1	
		C603.6	Test & Design web applications	2	2	2		2	1	1	1			1			1	
BTITC604	Digital Image Processing	C604.1	Explain the fundamentals of digital image processing and its processing	1	2	2												
		C604.2	Illustrate various image transforms in frequency domain	1	2	1		1	1		1			1				
		C604.3	Perform image enhancement techniques in spatial domain	1	2	1		2	1		1			2	1			
		C604.4	Apply the concept of image segmentation	1	2	1		2	1		1			2	1			
		C604.5	Elucidate the mathematical modelling of image restoration and degradation	1	2	1		2	1		1			2	1			
		C604.6	Demonstrate the video formation, perception and representation			1		1	1						1			
BTITOE605C	Software Project Management	C605C.1	To decompose the given project in planning and various phases of a software lifecycle	2	2	2	2	2			2		2	2	2	1		
		C605C.2	To know various project evaluation techniques	2	2	2	2	-			1		2	2	2	1		
		C605C.3	To understand various phases of monitoring and control of the software product	1	2	1	2	2			2	2	1	2	2	1		
		C605C.4	To apply software configuration managements and contract types	2	2	1	2	1			2	1	1	1	2	1		
		C605C.5	To understand quality and people management along with project management tools	1	1	1	2	2			1	2	1	2	2	1		
BTITPE606A	Software Testing	C606A.1	Understand Principles of Testing Software development life cycle model.	3	2	2								1	3	2		
		C606A.2	To identify various software testing problems.	2	3	2	2								3	2		
		C606A.3	To solve software testing problems by designing and selecting software test models, criteria, strategies and methods	2	3	3	2	2						2	2	2		
		C606A.4	To apply the techniques learned to improve the quality of software development.	3	2	2		2	1					2	3	3		
		C606A.5	Examine real-world entities while testing Object Oriented Software.	2	3	3		2						2	3		2	
BTITL607	Operating Systems Lab	C607.1	To implement CPU Scheduling algorithms.	2	2	2	1	1				1		1	2	2		
		C607.2	To implement Bankers algorithm for deadlock avoidance and algorithm for deadlock detection	2	2	1	1					1		1	2	2		
		C607.3	To implement page replacement algorithms.	2	2	1	1	1							2	2		
		C607.4	To implement file organization algorithms and semaphores.	1	2	2	1	1				1		1	1	1		
BTITL608	Digital Image Processing Lab	C608.1	To Illustrate the concept of basics of Image Processing.	1		1		1	1					1				
		C608.2	To write a MATLAB program for image shrinking and zooming and Discrete Cosine Transform	1		1		2	1					2	1			
		C608.3	To write a MATLAB program to perform following gray level Transformation	1		1		2	1					2	1			
		C608.4	To write a MATLAB program for image enhancement and smoothing and sharpening of an image	1		1		2	1					2	1			
BTITPEL609A	Software Testing Lab	C609A.1	To understand requirements and discuss test cases for the given problem	2	1	3										2		
		C609A.2	To design and implement the solution for given problem in any programming language		2	3	2							2	3			
		C609A.3	To apply the appropriate technique for the design of flow graph		2	3		2					1	2	2			
BTITP610	Mini Project	C610.1	Identify, understand and define problem statement for mini project.		3	3	3	3	3	3	3	3	3	3	3	3	3	3
		C610.2	Implementation of mini project	3		3	3	3					3		3			3
		C610.3	Documenting the development of mini project					3										
BTITF611	Field Training/Internship / Industrial Training III (Minimum four weeks which can be completed partially	C611.1	Skill development: Learning and improving skills such as writing, verbal communication technology, teamwork, and leadership	2	1	2					1	1	1	2	1	2		
		C611.2	To integrate or synthesize knowledge from diverse disciplines, courses and areas of interest	2	1	2		1			1	2	1	2	2	1		
		C611.3	To apply knowledge and skills related to the concepts, principles, and methodologies	2	1	1		1			1		2	2	2			
BTITC701	Cloud Computing and Storage Management	C701.1	Interpret the various cloud computing models and services	2	2	1	1	1		1					2			
		C701.2	Identify the significance of implementing virtualization techniques	2	2	2	2	2							2			
		C701.3	To understand the cloud systems and build the cloud for service deployment.	2	2	1		1			1		1	1	2			
		C701.4	To understand the significance of Storage virtualization and challenges.	2	2	1	2		1		1	1		1	1	2	2	
		C701.5	To understand the features of storage availability and information recovery.	2	2		1	1									2	
		C701.6	Understand the key terminology of storage security and management.	2	2	1			2								2	
BTCOE702	Artificial Intelligence#	C702.1	To discuss fundamental understanding of the history of artificial intelligence (AI) , its foundations and understanding the design of intelligent agents	3	1	1								1	2			
		C702.2	To use the most appropriate AI methods for problem solving	1	3	2	1							1	2	2		
		C702.3	Apply Heuristic search strategies to develop Artificial Intelligence solution	3	3	3	1							1	2	3		
		C702.4	To examine the knowledge of real world Knowledge representation	2	3	3	1							1	2	2		
		C702.5	Apply probabilistic models to solve real-world problems and Natural Language Processing	3	1	1	1							1	2	2		
BTITE703	SOFT	CO703B.1	Learn about soft computing techniques and their applications	2	2	3	-								1	1		
		CO703B.2	Analyze various neural network architectures	2	2	3	2								2	2		

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B	COMPUTING	CO703B 3	To apply fuzzy logic concepts to real world applications	3	2	3	2									2	2						
		CO703B 4	Identify and select a suitable Soft Computing technology to solve the problem	3	3	3	3									2	2						
BTITOE704B	B) Machine Learning	C704B 1	Understand and apply basic concepts of machine learning and explain relative strengths and weaknesses of different machine learning methods	1	2	1								1		1	1						
		C704B 2	Illustrate the decision tree learning algorithm, hypothesis space search in decision tree, hypothesis testing and comparing learning algorithms	1	1	2								1		2	3						
		C704B 3	Demonstrate Bayesian learning and Compare different types of classification models and their relevant application	1	1	2	2							2		2	3						
		C704B 4	Illustrate the various regression techniques and Compare various kernel methods of Bayesian and Gaussian model	1	2	2	2	2						2	1	2	2						
		C704B 5	Explain linear regression and logistic regression and compare them	1	2	3	2	1						2	1	2	2						
		C704B 6	Demonstrate the reinforcement learning using various examples	1	2	2	2	2						1	2	2	2						
BTITPE705B	B) Information Security	C705B 1	Explain security concepts, challenges & scope of information security	2	2	2	2	2								2	2	2					
		C705B 2	Use and explain Cryptographic algorithms & tools for secure-based security of information	2	2	2	2	2								2	2	2					
		C705B 3	Acquire & apply the knowledge of advanced security issues, policy standards and laws (such as ISO27001, IPR, CMM) of things After successful completion of course	2	2	2	2	2								2	2	2					
		C705B 4	describe the access control mechanism used for user authentication and authorization	2	2	2	2	2								2	2	2					
		C705B 5	explain malicious software issues introduced by software-based viruses and worms	2	2	2	2	2								2	2	2					
		C705B 6	To describe the process of risk assessment in the context of IT security management	2	2	2	2	2								2	2	2					
BTITL706	Cloud Computing and Storage Management Lab	L706 1	Understand Cloud computing Architecture and Infrastructure of cloud	2		1																	
		L706 2	Implement the Infrastructure as Service in cloud	2	2	1																	
		L706 3	Implement the private cloud	2	2	1								1			1	2					
BTITEL707B	B) Soft Computing Lab	LO707B 1	To Illustrate the basics of Artificial Neural Network	2	2	3	-									1	1						
		LO707B 2	To Demonstrate multilayer perceptron model	2	2	3	2									2	2						
		LO707B 3	To demonstrate CNN and Implement various various fuzzy membership functions	3	2	3	2									2	2						
		LO707B 4	To demonstrate and Implement Fuzzification and de-fuzzification along with FIS	3	3	3	3									2	2						
BTITPEL708B	B) Information Security Lab	LO708B 1	Implement substitution, transposition techniques and security algorithms	2	2	2	2									1	1	3					
		LO708B 2	Implement digital signature standard	2	2	2	2									1	1	3					
		LO708B 3	Implement network security tools such as kf sensors, Net stumbler, rootkits	2	2	2	2									1	1	3					
BTITP709	Project Phase I*	CO709.1	Analyze the problem, formulation and solution of the selected project using various techniques and tools in Information Technology	3	3	1	1					1	1			3	1	1					
		CO709.2	Develop solutions for contemporary real life problems using modern tools for sustainable development	3	3	3	2	3	1	2		3	3	2	3	3	2	1					
		CO709.3	Create the documentation of the project development while working in a team and communicate it effectively for the benefit of the society by following the ethical and professional sustainability	3	3	3	1		1	1	3	2	3	1	3								
		CO709.4	Analyze the IT engineering, finance and management principles for understanding the problems of various domains	3	2	3	2	1						1	2	3	2	2					
BTITC801	Internet of Things#	C801.1	To interpret the vision of IoT from a global context	1	1	1																	
		C801.2	To determine the market perspective of IoT	1	1	1												1					
		C801.3	To compare and contrast the use of devices, gateways and data management in IoT	2	2	1	1											1					
		C801.4	To implement state of the art architecture in IoT	2	1	1	1											1					
		C801.5	To illustrate the application of IoT in industrial automation and identify real world design constraints	2	2	1	1											1					
BTITC802	Mobile Computing#	C802.1	To understand the Fundamentals of Wireless and Wireless Networks.	2					2						1		2	2					
		C802.2	To understand Mobile Communications and Mobile Computing	2				1	2						1		2	2					
		C802.3	To understand GSM architectures and evolutions of networks	2					2						1		2	2					
		C802.4	To understand DHCP and implement different routing algorithms in MANET	2					2						1		2	2					
BTITP803	Project Phase II/ Project with Internship**	P803.1	Analyze the problem, formulation and solution of the selected project using various techniques and tools in Information Technology	3	3	1	1					1	1			3	1	1					
		P803.2	Develop solutions for contemporary real life problems using modern tools for sustainable development	3	3	3	2	3	1	2		3	3	2	3	3	2	1					
		P803.3	Create the documentation of the project development while working in a team and communicate it effectively for the benefit of the society by following the ethical and professional sustainability	3	3	3	1		1	1	3	2	3	1	3								
		P803.4	Analyze the IT engineering, finance and management principles for understanding the problems of various domains	3	2	3	2	1						1	2	3	2	2					

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Shree Vile Parle Kelavani Mandal's
Institute of Technology, Dhule
Department of Information Technology
Program Mapping Matrix (2022-23 Passout Batch)

			CO-PO Mapping Average												CO-PSO Mapping Average		
Subject Code	CO Code	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTBS301	C301	Engineering Mathematics - III	3	3	3										2	1	
BTITC302	C302	Switching Theory and Logic Design	2.67	2	1	1	2					1.67			1		
BTCOC304	C304	Computer Architecture and Organization	3	2.67	1	1.67									1.33	2	
BTITC303	C303	Object Oriented Paradigm with C++	2	2	1.6	1	1					1		1	1.66	1	
BTHM3401	C3401	Basic Human Rights						1	1	1	1				1	1	1
BTITE305B	C305B	Programming in Java	2	2	2	2									2	2	
BTITL307	L307	Object - oriented Programming in C++ Lab	2	2	2	1	1					1			1	1	
BTITL306	L306	Switching Theory and Logic Design Lab	1.17	1.17	1									1	1	1	
BTITL308	L308	Programming Lab (Python)	2	2	2	2	2								2	2	
BTITEL309B	L309B	Programming in Java Lab	2	2	2	2	2								2	2	
BTITC401	C401	Microprocessors and Microcontrollers	1.6	1	1									1	1		
BTITC402	C402	Data Structures and Applications	2.8	2.2	2.4	1.67	1	1						1	2.2	1.5	
BTITC403	C403	Discrete Structures and Applications	2	2	1	2									1	2	
BTITC404	C404	Internetworking Protocols	1	1												1	1
BTID405	D405	Product Design Engineering	2	2	2	2	2								1	1	
BTITE406C	C406C	Development Engineering	1	1	1	1									1		1
BTITL407	L407	Microprocessors and Microcontrollers Lab	2	2	2	2	2								2	2	
BTITL408	L408	Data Structures and Applications Lab	2.25	2.75	2.75			2						2	2.25	2.25	
BTITL409	L409	Internetworking Protocols Lab	1	1	1	1	1	1							1	1	1
BTITC501	**C501**	**Database Management Systems**	2.79	2.65	1.5	2.49	2.65	2.49			2.49	1.98	2.65		2.65	2.79	
BTITC502	**C502**	**Design and Analysis of Algorithms**	1.67	1.67	1.6	2	1.83								1.67	1.5	1.5
BTITC503	**C503**	**Software Engineering**	2.2	2	2	2.2	1.8	0.8			0.4	0.4	0.4	1.4	2.6		0.6
BTITC504	**C504**	**Probability and Queuing Theory**	2.39	2.49		2.49									2	3	
BTITOE505A	**C505A**	**Graph Theory**	1.5	2	1.75	1.5									1.33	1.25	1
BTITPE506E	**C506E**	**Data Visualisation**	3	3	3	3	3	-	-	-	-	-	3	3	3	3	3
BTHM501	**L501**	**Constitution of India**	-	-	-	-	-	-	-	2	-	-	-	1	-	-	-
BTITL507	**L507**	**Programming Lab (R Programming)**	3	3	3	-	3	-	-	-	3	-	-	-	3	3	-
BTITL508	**L508**	**Database Management Systems Lab**	3	3	2	3	3	3			3	3	3		3	2	
BTITL509	**L509**	**Design and Analysis of Algorithms Lab**	3	2.67	1	1.67									1.67	2	
BTITS510	**S510**	**Seminar**	1.33	1.5		1					1	1		1		1	1
BTITC601	C601	Operating Systems	2.79	2.67	2.58								3		2.8	1	
BTITC602	C602	Compiler Construction	2	2	1	1.25	0.5								1	0.25	0.5
BTITC603	C603	Object Oriented Software and Web Engineering	2	2	2		2	1	1	1				1.33	2	1.33	1.4
BTITC604	C604	Digital Image Processing	3	3	3		3	3					3	3	3		
BTITOE605C	C605C	Software Project Management	1.6	1.8	1.4	2	1.75	-	-	-	1.6	1.67	1.4	1.8	2	1	-
BTITPE606A	C606A	Software Testing	3	3	3	3	3	3						3	3	3	3
BTITL607	L607	Operating Systems Lab	1.75	2	1.5	1	1				1				1.75	1.75	

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BTITL608	L608	Digital Image Processing Lab	3		3		3	3						3	3		
BTITPEL609A	L609A	Software Testing Lab	2	1.67	3	2	2						1	2	2.5	2	
BTITP610	P610	Mini Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
BTITF611	F611	Field Training/Internship/ Industrial Training III (Minimum four weeks	2	1	1.66		1			1	1.5	1.33		2	1.66	1.5	
BTITC701	C701	Cloud Computing and Storage Management	2	2	1.2	1.5	1.2	1.5	1		1	1	1	1	1.8	2	2
BTCOE702	C702	Artificial Intelligence#	2.4	2.2	2	1								1	2	2.25	
BTITE703B	C703B	SOFT COMPUTING	2.5	2.25	3	2.33									1.75	1.75	
BTITOE704B	C704B	B) Machine Learning	1	1.6	2	2	1.6						1.5	1.3	1.83	2.16	
BTITPE705B	C705B	B) Information Security	2	2	2	2	2								2	2	2
BTITL706	L706	Cloud Computing and Storage Management Lab	2	2	1	1							1			1	2
BTITEL707B	L707B	B) Soft Computing Lab	2.5	2.25	3	2.33									1.75	1.75	
BTITPEL708B	L708B	B) Information Security Lab	2	2	2	2									1	1	3
BTITP709	P709	Project Phase I*	3	2.8	2.5	1.5	2	1	1.5	3	2	2.3	1.3	2.7	3	1.6	1.3
BTITC801	C801	Internet of Things#	1.6	1.4	1	1											1
BTITC802	C802	Mobile Computing#	2				1	2						1		2	2
BTITP803	P803	Project Phase II/ Project with Internship**	3	2.8	2.5	1.5	2	1	1.5	3	2	2.3	1.3	2.7	3	1.6	1.3
Program Mapping Average			2.17	2.09	1.95	1.83	1.94	1.90	1.50	1.60	1.73	1.55	2.00	1.78	1.93	1.73	1.56

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Shree Vile Parle Kelavani Mandal's
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Department of Information Technology
Program Articulation Matrix (Attainment) (2022-23 Passout Batch)

			CO-PO Direct Attainment												CO-PSO Direct Attainment		
Subject Code	CO Code	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTBS301	C301	Engineering Mathematics - III	3	3	3										3	3	
BTITC302	C302	Switching Theory and Logic Design	3	3	3	3	3							3		3	
BTCOC304	C304	Computer Architecture and Organization	2	2	2	2									2	2	
BTITC303	C303	Object Oriented Paradigm with C++	2.59	2.59	2.59	2.49	2.59					2.59		2.59	2.59	2.66	
BTHM3401	C3401	Basic Human Rights								3	3						3
BTITE305B	C305B	Programming in Java	3	3	3	3	3	3	3		3		3				
BTITL307	L307	Object - oriented Programming in C++ Lab	3	3	3	3	3					3			3	3	
BTITL306	L306	Switching Theory and Logic Design Lab	3	3	3									3		3	
BTITL308	L308	Programming Lab (Python)	3	3	3	3									3	3	
BTITEL309B	L309B	Programming in Java Lab	3	3	3		3			3	3		3	3			
BTITC401	C401	Microprocessors and Microcontrollers	3	3	3									3		3	
BTITC402	C402	Data Structures and Applications	3	3	3	3	3	3						3	3	3	
BTITC403	C403	Discrete Structures and Applications	3	3	3	3									3	3	
BTITC404	C404	Internetworking Protocols	3	3												3	3
BTID405	D405	Product Design Engineering	3	3	3										3		
BTITE406C	C406C	Development Engineering	3	3	3	3									3		3
BTITL407	L407	Microprocessors and Microcontrollers Lab	3	3	3	3	3	3							3	3	
BTITL408	L408	Data Structures and Applications Lab	3	3	3			3						3	3	3	
BTITL409	L409	Internetworking Protocols Lab	3	3	3	3	3								3	3	3
BTITC501	C501	Database Management Systems	3	3	3	3	3	3			3	3			3	3	
BTITC502	C502	Design and Analysis of Algorithms	3	3	3	3	3								3	3	3
BTITC503	C503	Software Engineering	3	3	3	3	3	3			3	3	3	3	3		3
BTITC504	C504	Probability and Queuing Theory	2.39	2.49		2.49											
BTITOE505A	C505A	Graph Theory	3	3	3	3									3	3	
BTITPE506E	C506E	Data Visualisation	2.83	2.8	3	2.77	3						2.8	3	3	3	3
BTHM501	L501	Constitution of India								3			3				
BTITL507	L507	Programming Lab (R Programming)	3	3	3	-	3	-	-	-	3	-	-	-	3	3	
BTITL508	L508	Database Management Systems Lab	3	3	2	3	3	3			3	3	3		3	2	
BTITL509	L509	Design and Analysis of Algorithms Lab	3	3	3	3									3	3	
BTITS510	S510	Seminar	3	3		3					3	3		3		3	3
BTITC601	C601	Operating Systems	3	3	3								3		3	3	3
BTITC602	C602	Compiler Construction	3	3	3	3	3								3	3	3
BTITC603	C603	Object Oriented Software and Web Engineering	3	3	3	3	3				3	3	3	3	3	3	
BTITC604	C604	Digital Image Processing	3	3	3		3	3					3	3	3		
BTITOE605C	C605C	Software Project Management	3	3	3	3	3				3	3	3	3	3	3	
BTITPE606A	C606A	Software Testing	3	3	3	3	3	3						3	3	3	3
BTITL607	L607	Operating Systems Lab	3	3	3	3	3				3		3		3	3	3
BTITL608	L608	Digital Image Processing Lab	3		3		3	3						3	3		

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BTITPEL609A	L609A	Software Testing Lab	3	3	3	3	3						3	3	3	3	
BTITP610	P610	Mini Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
BTITF611	F611	Field Training/Internship/ Industrial Training III (Minimum four weeks which can be completed partially	3	3	3		3				3	3		3	3	3	
BTITC701	C701	Cloud Computing and Storage Management	3	3	3	3	3	3		3	3	3	3	3	3	3	3
BTCOE702	C702	Artificial Intelligence#	3	3	3	3								3	3	3	
BTITE703B	C703B	SOFT COMPUTING	3	3	3	3									3	3	
BTITOE704B	C704B	B) Machine Learning	3	3	3	3	3						3	3	3	3	
BTITPE705B	C705B	B) Information Security	3	3	3	3	3								3	3	3
BTITL706	L706	Cloud Computing and Storage Management Lab	3	3	3		3									3	3
BTITEL707B	L707B	B) Soft Computing Lab	3	3	3	3									3	3	
BTITPEL708B	L708B	B) Information Security Lab	3	3	3	3									3	3	3
BTITP709	P709	Project Phase I*	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
BTITC801	C801	Internet of Things#	3	3	3	3											3
BTITC802	C802	Mobile Computing#	2.79				3	2.79						2.79		2.79	2.79
BTITP803	P803	Project Phase II/ Project with Internship**	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Average			2.95	2.96	2.95	2.94	2.99	2.99	3.00	3.00	3.00	2.97	2.99	2.97	2.96	2.94	2.99

University Direct Attainment																
			CO-PO direct Attainment											CO-PSO direct Attainment		
Subject Code	CO Code	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTBS301	C301	Engineering Mathematics - III	3	3	3										3	3	
BTITC302	C302	Switching Theory and Logic Design	2.49	2.49	2.49	2.49	2.49					2.49			2.49		
BTCOC304	C304	Computer Architecture and Organization	2	2	2	2									2	2	
BTITC303	C303	Object Oriented Paradigm with C++	3	3	3	3	3					3		3	3	3	
BTHM3401	C3401	Basic Human Rights								3	3						3
BTITE305B	C305B	Programming in Java	3	3	3	3	3	3	3		3		3				
BTITL307	L307	Object - oriented Programming in C++ Lab	3	3	3	3	3					3			3	3	
BTITL306	L306	Switching Theory and Logic Design Lab	3	3	3									3		3	
BTITL308	L308	Programming Lab (Python)	3	3	3	3									3	3	
BTITEL309B	L309B	Programming in Java Lab	3	3	3		3			3	3		3	3			
BTITC401	C401	Microprocessors and Microcontrollers	3	3	3	3	3							3	3		
BTITC402	C402	Data Structures and Applications	3	3	3	3	3	3						3	3	3	
BTITC403	C403	Discrete Structures and Applications	3	3	3	3									3	3	
BTITC404	C404	Internetworking Protocols	1.98	1.98												1.98	1.98

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BTID405	D405	Product Design Engineering	3	3	3										3					
BTITE406C	C406C	Development Engineering	3	3	3	3									3					3
BTITL407	L407	Microprocessors and Microcontrollers Lab	1.98	1.98	1.98									1.98		1.98				
BTITL408	L408	Data Structures and Applications Lab	3	3	3			3						3	3	3				
BTITL409	L409	Internetworking Protocols Lab	3	3	3	3	3								3	3	3			
BTITC501	C501	Database Management Systems	3	3	2	3	3	3			3	3	3		3	3	3			
BTITC502	C502	Design and Analysis of Algorithms	2.66	2.71	2.6	2.8	2.43								3	3	3			
BTITC503	C503	Software Engineering	3	3	3	3	3	3			3	3	3	3	3		3			
BTITC504	C504	Probability and Queuing Theory	3	3		3									3	3				
BTITOE505A	C505A	Graph Theory	3	3	3	3									3	3	3			
BTITPE506E	C506E	Data Visualisation	1.98	1.98	1.98	1.98	1.98						1.98	1.98	1.98	1.98	1.98			
BTHM501	L501	Constitution of India	-	-	-	-	-	-	-	3	-	-	-	3	-	-	-			
BTITL507	L507	Programming Lab (R Programming)	3	3	3	-	3	-	-	-	3	-	-	-	3	3				
BTITL508	L508	Database Management Systems Lab	3	3	2	3	3	3			3	3	3		3	3				
BTITL509	L509	Design and Analysis of Algorithms Lab	3	3	3	3									3	3				
BTITS510	S510	Seminar	3	3		3					3	3		3		3	3			
BTITC601	C601	Operating Systems	3	3	3	3	3						3		3	3	3			
BTITC602	C602	Compiler Construction	3	3	3	3	3								3	3	3			
BTITC603	C603	Object Oriented Software and Web Engineering	3	3	3	-	3	3	3	3	-	-	-	3	3	3	3			
BTITC604	C604	Digital Image Processing	1.98	1.98	1.98		1.98	1.98					1.98	1.98	1.98					
BTITOE605C	C605C	Software Project Management	2.12	2.16	2.06	2.19	2.21				2.18	2.49	2.06	2.16	2.19	2.19				
BTITPE606A	C606A	Software Testing	3	3	3	3	3	3						3	3	3	3			
BTITL607	L607	Operating Systems Lab	3	3	3	3	3				3		3		3	3	3			
BTITL608	L608	Digital Image Processing Lab	3		3		3	3						3	3					
BTITPEL609A	L609A	Software Testing Lab	3	3	3	3	3						3	3	3	3				
BTITP610	P610	Mini Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3			
BTITF611	F611	Field Training/Internship/ Industrial Training in (Minimum four weeks which can be completed partially	3	3	3		3				3	3		3	3	3				
BTITC701	C701	Cloud Computing and Storage Management	2	2	2	2	2	2		2	2	2	2	2	2	2	2			

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BTCOE702	C702	Artificial Intelligence#	3	3	3	3								3	3	3	
BTITE703B	C703B	SOFT COMPUTING	1	1	1	1									1	1	
BTITOE704B	C704B	B) Machine Learning	2	2	2	2	2								2	2	
BTITPE705B	C705B	B) Information Security	2.5	2.5	2.5	2.5	2.5								2.5	2.5	2.5
BTITL706	L706	Cloud Computing and Storage Management Lab	2	2	2		2									2	2
BTITEL707B	L707B	B) Soft Computing Lab	3	3	3	3									3	3	
BTITPEL708B	L708B	B) Information Security Lab	3	3	3	3									3	3	3
BTITP709	P709	Project Phase I*	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
BTITC801	C801	Internet of Things#	2.85	2.85	2.85	2.85											2.85
BTITC802	C802	Mobile Computing#	2.28				2.28	2.28						2.28		2.28	2.28
BTITP803	P803	Project Phase II/ Project with Internship**	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Average			2.76	2.77	2.73	2.80	2.77	2.84	3.00	2.91	2.90	2.87	2.78	2.79	2.80	2.75	2.80
Average (Program Direct Attainment+University Direct Attainment) (80%)			2.86	2.86	2.84	2.87	2.88	2.91	3.00	2.95	2.95	2.92	2.88	2.88	2.88	2.84	2.89
Program Direct attainment (80%)			2.29	2.29	2.27	2.30	2.30	2.33	2.40	2.36	2.36	2.34	2.31	2.31	2.31	2.27	2.32
Program Indirect attainment (20%)			0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Program Attainment			2.89	2.89	2.87	2.90	2.90	2.93	3.00	2.96	2.96	2.94	2.91	2.91	2.91	2.87	2.92

CO-PO Indirect Attainment

			CO-PO Indirect Attainment												CO-PSO Indirect Attainment		
Subject Code	CO Code	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTBS301	C301	Engineering Mathematics - III	3	3	3										3	3	
BTITC302	C302	Switching Theory and Logic Design	3	3	3	3	3							3	3		
BTCOC304	C304	Computer Architecture and Organization	3	3	3	3									3	3	
BTITC303	C303	Object Oriented Paradigm with C++	3	3	3	3	3					3		3	3	3	
BTHM3401	C3401	Basic Human Rights								3	3						3
BTITE305B	C305B	Programming in Java	3	3	3	3	3								3	3	
BTITL307	L307	Object - oriented Programming in C++ Lab	3	3	3	3	3					3			3	3	
BTITL306	L306	Switching Theory and Logic Design Lab	3	3	3									3		3	
BTITL308	L308	Programming Lab (Python)	3	3	3	3	3								3	3	
BTITEL309B	L309B	Programming in Java Lab	3	3	3	3	3								3	3	
BTITC401	C401	Microprocessors and Microcontrollers	3	3	3	3	3							3		3	
BTITC402	C402	Data Structures and Applications	3	3	3	3	3	3						3	3	3	
BTITC403	C403	Discrete Structures and Applications	3	3	3	3									3	3	
BTITC404	C404	Internetworking Protocols	3	3												3	3

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BTID405	D405	Product Design Engineering	3	3	3	3	3			3	3	3			3	3	
BTITE406C	C406C	Development Engineering			3	3	3	3							3	3	
BTITL407	L407	Microprocessors and Microcontrollers Lab	3	3	3	3	3								3	3	
BTITL408	L408	Data Structures and Applications Lab	3	3	3			3						3	3	3	
BTITL409	L409	Internetworking Protocols Lab	3	3	3	3	3								3	3	
BTITC501	C501	Database Management Systems	3	3	3	3	3						3		3	3	
BTITC502	C502	Design and Analysis of Algorithms	3	3	3	3	3								3	3	
BTITC503	C503	Software Engineering	3	3	3	3	3	3			3	3	3	3	3		3
BTITC504	C504	Probability and Queuing Theory	3	3		3									3	3	
BTITOE505A	C505A	Graph Theory	3	3	3	3									3	3	3
BTITPE506E	C506E	Data Visualisation	3	3	3	3	3	-	-	-	-	-	3	3	3	3	3
BTHM501	L501	Constitution of India	-	-	-	-	-	-	-	3	-	-	-	3	-		
BTITL507	L507	Programming Lab (R Programming)	3	3	3	-	3	-	-	-	3	-	-	-	3	3	
BTITL508	L508	Database Management Systems Lab	3	3	3	3	3						3		3	3	
BTITL509	L509	Design and Analysis of Algorithms Lab	3	3	3	3									3	3	3
BTITS510	S510	Seminar	3	3		3					3	3		3		3	3
BTITC601	C601	Operating Systems	3	3	3								3		3	3	3
BTITC602	C602	Compiler Construction	3	3	3	3	3								3	3	3
BTITC603	C603	Object Oriented Software and Web Engineering	3	3	3		3	3	3	3				3	3	3	3
BTITC604	C604	Digital Image Processing	3	3	3		3	3					3	3	3		
BTITOE605C	C605C	Software Project Management	3	3	3	3	3				3	3	3	3	3	3	
BTITPE606A	C606A	Software Testing	3	3	3	3	3	3						3	3	3	3
BTITL607	L607	Operating Systems Lab	3	3	3	3	3				3		3		3	3	3
BTITL608	L608	Digital Image Processing Lab	3		3		3	3						3	3		
BTITPEL609A	L609A	Software Testing Lab	3	3	3	3	3						3	3	3	3	
BTITP610	P610	Mini Project	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
BTITF611	F611	Field Training/Internship/ Industrial Training III (Minimum four weeks which can be completed partially	3	3	3		3				3	3		3	3	3	
BTITC701	C701	Cloud Computing and Storage Management	3	3	3	3	3	3		3	3	3	3	3	3	3	3
BTCOE702	C702	Artificial Intelligence#	3	3	3	3	3							3	3	3	
BTITE703B	C703B	SOFT COMPUTING	3	3	3	3									3	3	
BTITOE704B	C704B	B) Machine Learning	3	3	3	3	3						3	3	3	3	
BTITPE705B	C705B	B) Information Security	3	3	3	3	3								3	3	
BTITL706	L706	Cloud Computing and Storage Management Lab	3	3	3	3							3			3	3
BTITEL707B	L707B	B) Soft Computing Lab	3	3	3	3									3	3	
BTITPEL708B	L708B	B) Information Security Lab	3	3	3	3									3	3	3
BTITP709	P709	Project Phase I*	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
BTITC801	C801	Internet of Things#	3	3	3	3											3

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BTITC802	C802	Mobile Computing#	3				3	3						3		3	3
BTITP803	P803	Project Phase II/ Project with Internship**	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Average			**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
20% Indirect attainment			0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6

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The process of attainment of POs and PSOs of individual course in the four-year engineering degree program requires measuring tools. Respective faculty member prepare course outcomes using the concept of engineering subject. Then, a correlation is established between COs with POs and COs with PSOs on the scale of 0 to 3 where 0 means no correlation and 3 means high correlation. Mapping matrix of COs-POs and COs-PSOs is prepared in this regard for all the courses in the program. Besides, mapping is the process of representing, preferably in matrix form, the correlation among the parameters.

Assessment tools are categorized into direct and indirect methods to assess the program specific outcomes (PSO) and program outcomes (PO). Direct method is based on assessment of PO and PSO. Indirect method is based on course end survey, program exit survey, alumni survey etc. Direct methods are computed through direct examinations of student conducted throughout the semester. It is carried out in the form of continuous internal assessment tests, end semester examinations, assignments, unit tests and laboratory assignments etc. The internal assessment marks in a theory paper are based on five assessment tools viz, continuous assessment I&II, mid semester exam, unit test and assignments. Total marks obtained from all tests is considered for calculating the attainment value. A target value is set for CO, PO and PSO.

For CO attainment, it is calculated how many students have scored more than the target value, which is already, set by the course coordinator in the internal exam and university exams. Attainment levels are defined as per the following table:

Percentage students scored more than the target value	Attainment level
0-50%	1
50-60%	2
>60%	3

For PO attainment, multiplier factors are defined based on CO attainment as per following table:

Percentage students scored more than the target value	Multiplier factor
0-50%	0.33
50-60%	0.66
>60%	1

This multiplier factor is multiplied with the value assigned in the CO-PO relevance table and final attainment of each PO is calculated as demonstrated below:

Subject	Subject Code	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Heat Transfer	BTMEC501	CO501.1	3	3	2	3						1		
		CO501.2	3	3	2	3						1		
		CO501.3	3	3	2	3						1		
		CO501.4	3	3	2	3						1		
		CO501.5	3	3	2	3						1		
		CO501.6	3	3	2	3						1		
CO501 Average			3	3	2	3						1		

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CO	Description	% of students receiving more than target value	Attainment Level	Multiplication Factor
CO501.1	Explain the laws of heat transfer and deduce the general heat conduction equation and to explain it for 1-D steady state heat transfer in regular shape bodies.	11.11	1	0.33
CO501.2	Describe the critical radius of insulation, overall heat transfer coefficient, thermal conductivity and lumped heat transfer.	5.56	1	0.33
CO501.3	Interpret the extended surfaces.	20.37	1	0.33
CO501.4	Illustrate the boundary layer concept, dimensional analysis, forced and free convection under different conditions.	81.48	3	1
CO501.5	Describe the Boiling heat transfer, mass transfer and Evaluate the heat exchanger and examine the LMTD and NTU methods applied to engineering problems.	83.33	3	1
CO501.6	Explain the thermal radiation black body, emissivity, reflectivity, and evaluation of view factor and radiation shields.	100	3	1

Subject With Subject Code	CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Heat Transfer BTMEC501	CO501.1	3*0.33	3*0.33	2*0.33	3*0.33						1*0.33		
	CO501.2	3*0.33	3*0.33	2*0.33	3*0.33						1*0.33		
	CO501.3	3*0.33	3*0.33	2*0.33	3*0.33						1*0.33		
	CO501.4	3*1	3*1	2*1	3*1						1*1		
	CO501.5	3*1	3*1	2*1	3*1						1*1		
	CO501.6	3*1	3*1	2*1	3*1						1*1		
Sum		11.97	11.97	7.98	11.97						3.99		
Sum of values attained		18	18	12	18						6		
% PO attainment for each element		66.5%	66.5%	66.5%	66.5%						66.5%		
Average Approximation		1.995	1.995	1.995	1.995						1.995		

POs and PSOs are evaluated separately for internal assessment tests and university exams. Program PO attainment (Direct) is calculated by taking the average of PO and PSO attainment values obtained in both the internal assessment test and university exams. In the case of indirect attainment, it is calculated only on the basis of the course exit survey which is taken by the course coordinator at the end of the course.

Finally, an articulation matrix is formed, in which all subjects (from Sem I to Sem VIII) are incorporated with their PO and PSO attainment values (Direct/ indirect). Averaging of all attainment values of all subjects for each PO is done for both direct and indirect attainment. This final average value is considered as the program indirect attainment value. Direct attainment of the program is calculated by taking the average of PO values attained through university exams and internal assessment tests.

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Direct assessment Methods		
Sr. No.	**Assessment tool**	**Method description**
1.	Internal assessment test	The internal assessment marks in a theory paper is based on a number of tests already mentioned which are conducted as scheduled in the departmental academic calendar. It is a metric to continuously assess the attainment of course outcomes with respect to course objectives. The total marks of all tests being asked for each CO is calculated for CO attainment purpose
2.	Lab Assignments	Lab Assignment can be one of the measuring criteria to mainly assess student's practical knowledge with their designing capabilities. In case of Practical, the internal assessment marks shall be based on the laboratory records and practical tests.
3.	Theory Semester Examination & Practical Semester Examination	Semester examination (theory or practical) are the metric to assess whether all the course outcomes are attained or not framed by the course owner. Semester Examination is more focused on attainment of course outcomes and uses a descriptive exam.
4.	Seminar	The internal assessment marks in the case of seminar shall be based on continuous evaluation by a faculty coordinator assigned by the department
5.	Mini Project	The internal assessment marks in the case of mini project shall be based on continuous evaluation by a faculty coordinator (project guide if allotted) assigned by the department
6.	Project	The internal Assessment marks in the case of projects in the in the final years shall be based on the continuous evaluation throughout the semester by an internal committee consisting of the three faculty members of the Department, one of whom shall be the project / seminar guide

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M.O.D. Restricted Paper
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Program Articulation Matrix (Attainment)

			CO-PO Direct Attainment												CO-PSO Attainment		
Subject Code	Subject	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTBSC 301	CO301	Engineering Mathematics III	3.00	3.00	3.00												
BTMEC 302	CO302	Material Science and Metallurgy	3.00	3.00	3.00	3.00	3.00								3.00		3.00
BTMEC 303	CO303	Fluid Mechanics	2.80	2.67	2.00	2.75					2.00			1.00	1.00		1.50
BTMEC 304	CO304	Machine Design and CAD	2.75	2.00	2.75	2.75	3.00			2.00	3.00	3.00		2.00	3.00		3.00
BTMEC 305	CO305	Thermodynamics	2.84	2.84	2.84	2.81			2.50						2.84	2.50	2.84
BTHM 3401	CO3401	Basic Human Rights						3.00		3.00	3.00						1.50
BTMEL 307	CO307	Material Science and Metallurgy Lab	3.00	3.00	3.00	3.00											3.00
BTMEL 308	CO308	Fluid Mechanics Lab	3.00	3.00	3.00	3.00	3.00			3.00	3.00	3.00			3.00		3.00
BTMEL 309	CO309	Machine Design and CAD Lab	2.75	2.00	2.75	2.75	3.00			2.00	3.00	3.00		2.00	3.00		3.00
BTMEF 310	CO310	Internship	3.00	3.00				3.00		3.00	3.00	3.00	3.00	3.00	3.00		3.00
BTMEC 401	CO401	Manufacturing Process I	3.00	3.00	3.00			3.00	3.00			3.00		3.00	3.00		3.00
BTMEC 402	CO402	Theory of Machines I	3.00	3.00	3.00	3.00	3.00	3.00						3.00	3.00		3.00
BTMEC 403	CO403	Strength of Materials	2.50	2.33	2.37	3.00						2.00			2.10		1.66
BTMEC 404	CO404	Numerical Methods in Engineering	2.70	2.70	2.70	2.70	2.70	2.70	2.76	2.76	2.76	2.76	2.76	2.76	2.49		2.49
BTID 405	CO405	Product Design Engineering I	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00		3.00
BTHM3402	CO3402	Elective II Interpersonal Comm Skills & Soft Skills Devp								3.00	3.00	3.00		3.00	3.00	3.00	
BTMEL 407	CO407	Manufacturing Process Lab I	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	3.00	3.00		3.00
BTMEL 408	CO408	Theory of Machines Lab I	3.00	3.00	3.00	2.75	3.00			1.00	3.00	3.00	3.00	1.00	1.50		1.50
BTMEL 409	CO409	Strength of Materials Lab	3.00	3.00	3.00	3.00				3.00	3.00	3.00		3.00	3.00		3.00
BTMEL 410	CO410	Numerical Methods Lab	3.00	3.00	2.00	2.00	3.00	2.00	1.00	2.00	2.00	2.00	2.00	2.00	3.00		3.00
BTMEC 501	CO501	Heat Transfer	2.50	2.50	2.50	2.50						2.50				2.50	2.50
BTMEC 502	CO502	Applied Thermodynamics I	3.00	3.00	3.00	3.00										3.00	3.00
BTMEC 503	CO503	Machine Design I	2.50	2.56	2.00	2.64	3.00					2.50			2.53		2.25
BTMEC 504	CO504	Theory of Machines II	2.66	2.65	2.66	2.83			2.00			2.66			2.62		2.67
BTMEC 505	CO505	Metrology and Quality Control	2.00	1.75	1.50	2.50	1.50	2.50			2.00		2.50	2.50	2.00		2.00
BTID 506	CO506	Product Design Engineering II	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00		3.00
BTMEC 506	CO506	Elective II (Automobile Engg)	1.99	1.99	1.99	1.99	1.99	1.99	1.99							2.00	1.16
BTMEL 507	CO507	Heat Transfer Lab	2.49	2.49	2.49	2.49				2.49	2.49	2.49		2.49		2.49	2.49
BTMEL 508	CO508	Applied Thermodynamics Lab	3.00	3.00	3.00	3.00										3.00	3.00
BTMEL 509	CO509	Machine Design Pratice I	3.00	3.00	3.00	3.00	3.00					3.00			3.00		3.00
BTMEL 510	CO510	Theory of Machines II Lab	3.00	3.00	3.00	2.75	3.00			1.00	3.00	3.00	3.00	1.00	1.50		1.50
BTMEF511	CO511	Internship	3.00	3.00				3.00		3.00	3.00	3.00	3.00	3.00	3.00		3.00
BTMEC 601	CO601	Manufacturing Processes II	1.91	1.85	1.54	1.58	1.74		1.87	1.24				1.10	1.28		1.17
BTMEC 602	CO602	Machine Design II	2.47	2.47	2.47	2.14		2.40							2.53		2.50
BTMEC 603	CO603	Applied Thermodynamics II	2.32	2.22	2.19	2.11			2.49			1.99		1.99		2.50	
BTMEC 604	CO604	Elective (IC Engine)	1.92	1.92					1.92					1.92	1.75		1.58
BTMEC 605	CO605	Elective(RES)	2.74	2.78	2.74	2.82			2.49					3.00		1.91	
BTMEC 606	CO606	OEC4/Solar Energy (Audit)	2.31	2.41	2.39	2.50		2.50	2.31				2.50	2.31	2.50	2.32	2.42
BTMEL 607	CO607	Metrology and Quality Control Lab	2.50	2.50	2.50	2.50	2.50				2.50			2.50	2.50		2.50
BTMEL 608	CO608	Machine Design Pratice II	2.00	2.00	2.00	2.00	2.00	2.00			2.00	2.00		2.00	2.00		2.00
BTMEL 609	CO609	I C Engine Lab	1.92	1.92					1.92					1.92	1.75		1.58
BTMEL 610	CO610	Refrigeration and Air Conditioning Lab	3.00	3.00	3.00	3.00										3.00	3.00
BTMEM 611	CO611	TPCS	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
BTMEC 701	CO701	Mechatronics	1.69	1.69	2.00		1.71							1.00	1.67		1.67

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BTMEC 702	CO702	CAD/CAM	2.87	2.69	2.90	2.79	3.00	3.00			3.00	3.00	3.00	3.00	2.75		2.76
BTMEC 703	CO703	Manufacturing Processes III	1.92	1.85	1.50	1.50	1.74								1.85		
BTMEC 704B	CO704	Industrial engineering and Management	2.50	2.50	2.50	2.50			2.50		2.50		2.50		3.00		
BTMEC 705A	CO705	Engineering Economics	2.00	2.00	2.00	2.00	2.00					2.00	1.87	1.33	1.50		2.00
BTMEL 706	CO706	Manufacturing Processes Lab III	3.00	3.00	3.00	3.00	3.00	3.00	3.00					3.00	3.00		
BTMEL 707	CO707	Mechatronics Lab	2.00	2.00	2.00	2.00				2.00	2.00	2.00		2.00	2.00		2.00
BTMEL 708	CO708	CAD/CAM Lab	3.00	3.00	3.00	3.00	3.00	3.00		3.00	3.00	3.00		3.00	3.00		3.00
BTMES 709	CO709	Seminar	2.00	2.00	-	2.00	2.00			2.00	2.00	2.00	2.00	2.00			2.00
BTMEF 710	CO710	Internship	3.00	3.00				3.00		3.00	3.00	3.00	3.00	3.00	3.00		3.00
BTMEP 711	CO711	Project Stage I	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00		3.00
BTMEC 801A	CO801A	Fundamentals of Automotive Systems	1.68	1.44					1.98					1.98		1.65	1.65
BTMEC 801F	CO801F	Non-Conventional Energy Sources	2.00	2.00	2.00	2.00			2.00					2.00		2.00	
BTMEP 803	CO803	Project Stage II	3.00	3.00	3.00	3.00				3.00	3.00	3.00	3.00	3.00	3.00		3.00

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PO-PSO Mapping Matrix

Subject Code	Subject	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTBSC 301	CO301	Engineering Mathematics III	3.00	3.00	3.00												
BTMEC 302	CO302	Material Science and Metallurgy	3.00	3.00	3.00	3.00	3.00								3.00		3.00
BTMEC 303	CO303	Fluid Mechanics	2.80	2.67	2.00	2.75					2.00			1.00	1.00		1.50
BTMEC 304	CO304	Machine Design and CAD	2.75	2.00	2.75	2.75	3.00			2.00	3.00	3.00		2.00	3.00		3.00
BTMEC 305	CO305	Thermodynamics	2.84	2.84	2.84	2.81			2.50						2.84	2.50	2.84
BTHM 3401	CO3401	Basic Human Rights						3.00		3.00	3.00						1.50
BTMEL 307	CO307	Material Science and Metallurgy Lab	3.00	3.00	3.00	3.00											3.00
BTMEL 308	CO308	Fluid Mechanics Lab	3.00	3.00	3.00	3.00	3.00			3.00	3.00	3.00			3.00		3.00
BTMEL 309	CO309	Machine Design and CAD Lab	2.75	2.00	2.75	2.75	3.00			2.00	3.00	3.00		2.00	3.00		3.00
BTMEF 310	CO310	Internship	3.00	3.00				3.00		3.00	3.00	3.00	3.00	3.00	3.00		3.00
BTMEC 401	CO401	Manufacturing Process I	3.00	3.00	3.00			3.00	3.00			3.00		3.00	3.00		3.00
BTMEC 402	CO402	Theory of Machines I	3.00	3.00	3.00	3.00	3.00	3.00						3.00	3.00		3.00
BTMEC 403	CO403	Strength of Materials	2.50	2.33	2.37	3.00						2.00			2.10		1.66
BTMEC 404	CO404	Numerical Methods in Engineering	2.70	2.70	2.70	2.70	2.70	2.70	2.76	2.76	2.76	2.76	2.76	2.76	2.49		2.49
BTID 405	CO405	Product Design Engineering I	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00		3.00
BTHM3402	CO3402	Elective II Interpersonal Comm Skills & Soft Skills Devp								3.00	3.00	3.00		3.00	3.00	3.00	
BTMEL 407	CO407	Manufacturing Process Lab I	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	3.00	3.00		3.00
BTMEL 408	CO408	Theory of Machines Lab I	3.00	3.00	3.00	2.75	3.00			1.00	3.00	3.00	3.00	1.00	1.50		1.50
BTMEL 409	CO409	Strength of Materials Lab	3.00	3.00	3.00	3.00				3.00	3.00	3.00		3.00	3.00		3.00
BTMEL 410	CO410	Numerical Methods Lab	3.00	3.00	2.00	2.00	3.00	2.00	1.00	2.00	2.00	2.00	2.00	2.00	3.00		3.00
BTMEC 501	CO501	Heat Transfer	2.50	2.50	2.50	2.50						2.50				2.50	2.50
BTMEC 502	CO502	Applied Thermodynamics I	3.00	3.00	3.00	3.00										3.00	3.00
BTMEC 503	CO503	Machine Design I	2.50	2.56	2.00	2.64	3.00					2.50			2.53		2.25
BTMEC 504	CO504	Theory of Machines II	2.66	2.65	2.66	2.83			2.00			2.66			2.62		2.67
BTMEC 505	CO505	Metrology and Quality Control	2.00	1.75	1.50	2.50	1.50	2.50			2.00		2.50	2.50	2.00		2.00
BTID 506	CO506	Product Design Engineering II	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00		3.00
BTMEC 506	CO506	Elective II (Automobile Engg)	1.99	1.99	1.99	1.99	1.99	1.99	1.99							2.00	1.16
BTMEL 507	CO507	Heat Transfer Lab	2.49	2.49	2.49	2.49				2.49	2.49	2.49		2.49		2.49	2.49
BTMEL 508	CO508	Applied Thermodynamics Lab	3.00	3.00	3.00	3.00										3.00	3.00
BTMEL 509	CO509	Machine Design Pratice I	3.00	3.00	3.00	3.00	3.00					3.00			3.00		3.00
BTMEL 510	CO510	Theory of Machines II Lab	3.00	3.00	3.00	2.75	3.00			1.00	3.00	3.00	3.00	1.00	1.50		1.50
BTMEF511	CO511	Internship	3.00	3.00				3.00		3.00	3.00	3.00	3.00	3.00	3.00		3.00
BTMEC 601	CO601	Manufacturing Processes II	1.91	1.85	1.54	1.58	1.74		1.87	1.24				1.10	1.28		1.17
BTMEC 602	CO602	Machine Design II	2.47	2.47	2.47	2.14		2.40							2.53		2.50
BTMEC 603	CO603	Applied Thermodynamics II	2.32	2.22	2.19	2.11			2.49			1.99		1.99		2.50	
BTMEC 604	CO604	Elective (IC Engine)	1.92	1.92					1.92					1.92	1.75		1.58
BTMEC 605	CO605	Elective(RES)	2.74	2.78	2.74	2.82			2.49					3.00		1.91	
BTMEC 606	CO606	OEC4/Solar Energy (Audit)	2.31	2.41	2.39	2.50		2.50	2.31				2.50	2.31	2.50	2.32	2.42
BTMEL 607	CO607	Metrology and Quality Control Lab	2.50	2.50	2.50	2.50	2.50				2.50			2.50	2.50		2.50
BTMEL 608	CO608	Machine Design Pratice II	2.00	2.00	2.00	2.00	2.00	2.00			2.00	2.00		2.00	2.00		2.00
BTMEL 609	CO609	I C Engine Lab	1.92	1.92					1.92					1.92	1.75		1.58
BTMEL 610	CO610	Refrigeration and Air Conditioning Lab	3.00	3.00	3.00	3.00										3.00	3.00
BTMEM 611	CO611	TPCS	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
BTMEC 701	CO701	Mechatronics	1.69	1.69	2.00		1.71							1.00	1.67		1.67
BTMEC 702	CO702	CAD/CAM	2.87	2.69	2.90	2.79	3.00	3.00			3.00	3.00	3.00	3.00	2.75		2.76

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BTMEC 703	CO703	Manufacturing Processes III	1.92	1.85	1.50	1.50	1.74							1.85		
BTMEC 704B	CO704	Industrial engineering and Management	2.50	2.50	2.50	2.50			2.50		2.50		2.50		3.00		
BTMEC 705A	CO705	Engineering Economics	2.00	2.00	2.00	2.00	2.00					2.00	1.87	1.33	1.50		2.00
BTMEL 706	CO706	Manufacturing Processes Lab III	3.00	3.00	3.00	3.00	3.00	3.00	3.00					3.00	3.00		
BTMEL 707	CO707	Mechatronics Lab	2.00	2.00	2.00	2.00				2.00	2.00	2.00		2.00	2.00		2.00
BTMEL 708	CO708	CAD/CAM Lab	3.00	3.00	3.00	3.00	3.00	3.00		3.00	3.00	3.00		3.00	3.00		3.00
BTMES 709	CO709	Seminar	2.00	2.00		2.00	2.00			2.00	2.00	2.00	2.00	2.00			2.00
BTMEF 710	CO710	Internship	3.00	3.00				3.00		3.00	3.00	3.00	3.00	3.00	3.00		3.00
BTMEP 711	CO711	Project Stage I	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00		3.00
BTMEC 801A	CO801A	Fundamentals of Automotive Systems	1.68	1.44					1.98					1.98		1.65	1.65
BTMEC 801F	CO801F	Non-Conventional Energy Sources	2.00	2.00	2.00	2.00			2.00					2.00		2.00	
BTMEP 803	CO803	Project Stage II	3.00	3.00	3.00	3.00				3.00	3.00	3.00	3.00	3.00	3.00		3.00

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for **H.O.D. Mechanical Dept.**

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Institute of Technology, Dhule
Department of Mechanical Engineering

PO-PSO Mapping Matrix

			PO avg												PSO avg		
Subject Code	Subject	Subject Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BTBSC 301	C117	Engineering Mathematics III	2.2	1.6	1												
BTMEC 302	C118	Material Science and Metallurgy	2	1.5	1.333333	1.4	1.333333								1		1
BTMEC 303	C119	Fluid Mechanics	2.85	2.66	2	2					2			1	1		1.5
BTMEC 304	C120	Machine Drawing and CAD	3	2.7	2.7	2	2				2	2.5		2.9	2.5	-	2.7
BTMEC 305	C121	Thermodynamics	3	2	1	1			1						3	1	1
BTHM 3401	C122	Basic Human Rights						1		1	1						1
BTMEL 307	C123	Material Science and Metallurgy Lab	2	1.75	1.5	1.75											2
BTMEL 308	C124	Fluid Mechanics Lab	3	3	3	3				2	3	1			1.5		1.5
BTMEL 309	C125	Machine Design and CAD Lab	3	3	3	3	3			3	3	3		3			
BTMEF 310	C126	Internship	1	2				1		1	1	2	1	1	2		1.5
BTMEC 401	C127	Manufacturing Process I	1.5	1	1			1	1			1		1	1.5		1
BTMEC 402	C128	Theory of Machines I	2	1.29	1.57	1.57	1	1						1	2.71	-	2.57
BTMEC 403	C129	Strength of Materials	2.4	2.4	2	1						1			1.8		1.5
BTMEC404	C130	Numerical Methods in Engineering	3	3	3	3	3	3		1	1	1	1	2	3		3
BTID 405	C131	Product Design Engineering -I	3	3	3	3	3	1	1	1	1	1	1	1	3		1
BTHM3402	C132	Elective II Interpersonal Comm Skills & Soft Skills Devp								1	3	3		3	3	2	
BTMEL 407	C133	Manufacturing Process Lab I	3	3	3	3	1	1	1	1	2	2	1	1	3		1
BTMEL 408	C134	Theory of Machines Lab I	2	2	2	2	1	3		3	3	3		1.5	1.5	1	2
BTMEL 410		Numerical Methods Lab	3	3	2	2	3	2	1	2	2	2	2	2	3		3
BTMEL 409	C135	Strength of Materials Lab	2	2	2	2				2	2	2		2	2		2
BTMEC 501	C136	Heat Transfer	3	3	2	3	-	-	-	-	-	1	-	-	-	2	1
BTMEC 502	C137	Applied Thermodynamics I	1.5	1.25	1	1										2	1
BTMEC 503	C138	Machine Design I	1	2.67	2	2.8	2					1			2.83		2
BTMEC 504	C139	Theory of Machines II	2	2.66	1	2			1			1			2.66		2.33
BTMEC 505	C140	Metrology and Quality Control	1	1.333333	2	2	1.5	1			1		2	1.333333	1		1
BTID 506	C141	Product Design Engineering II	3	3	3	3	3	1	1	1	1	1	1	1	3		1
BTMEC 506	C142	Elective II (Automobile Engg)	1.4	1.5	1	2	1	1.33	2							3	2
BTMEL 507	C143	Heat Transfer Lab	2	2	2	2	-	-	-	2	2	2	-	2	-	2	2
BTMEL 508	C144	Applied Thermodynamics Lab	1.6	1.2	1	1.4										1.8	1.8
BTMEL 509	C145	Machine Design Practice I	1	1.5	2	1	3					3	1	1	2.14		1.75
BTMEL 510	C146	Theory of Machines II Lab	3	3	3	2.75	3			1	3	3	3	1	1.5		1.5
BTMEF511	C147	Internship	1	2				1		1	1	2	1	1	2		1.5
BTMEC 601	C148	Manufacturing Processes II	3	2.67	1.6	2.25	3		2	2				1	1.8		1.5
BTMEC 602	C149	Machine Design II	2.83	2.83	2.83	1	-	2	-	-	-	-	-	-	2	-	2
BTMEC 603	C150	Applied Thermodynamics II	3	2.5	1	1			1			1		2		2	
BTMEC 604	C151	Elective (IC Engine)	2.33	1.8					1.2					1	2	1.33	1.5
BTMEC 605	C152	Elective(RES)	3	1.75	1	1			1					1		2	
BTMEC 606B	C153	OEC4/Solar Energy (Audit)	3	2.16	2.5	3		3	3				3	3	2	3	2.33
BTMEL 607	C154	Metrology and Quality Control Lab	1	1	1.33	2	1				1			1	2		1
BTMEL 608	C155	Machine Design Practice II	3	3	3	2	2	3			3	3		3	2	-	3
BTMEL 609	C156	I C Engine Lab	2.33	1.8					1.2					1	2	1.33	1.5
BTMEL 610	C157	Refrigeration and Air Conditioning Lab	2.25	1.5	1.25	1.5										1.75	1.75
BTMEM 611	C158	TPCS	1	1.33	2	2	1	1.33	1	1.5	1	1.75	1	1	3	3	3

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BTMEC 701	C159	Mechatronics	2.17	2.17	2		1.4							1.5	2		1
BTMEC 702	C160	CAD/CAM	2	2	1.57	2.5	2.33	1			1.33	1	2	1	2		2.17
BTMEC 703	C161	Manufacturing Processes III	2	1.16	2	1	1								1.16		
BTMEC 704B	C162	Industrial engineering and Management	1.5	1.16	1	1			1		1		2		1		
BTMEC 705A	C163	Engineering Economics	2	2	2	2	2					2	1.87	1.33	1.5		2
BTMEL 706	C164	Manufacturing Processes Lab III	2	2	2	2	2	2	2					1.33	1.5		
BTMEL 707	C165	Mechatronics Lab	2	2	2		2				2	1			2		2
BTMEL 708	C166	CAD/CAM Lab	2	2	2	2	2	2		2	2	2		2	3		2
BTMES 709	C167	Seminar	1	2		1	1.5			2	2	1.66	1	1			1.8
BTMEF 710	C168	Internship	1	2				1		1	1	2	1	1	2		1.5
BTMEP 711	C169	Project Stage I	2	2	2	2	2	1	1	1	3	1	1.2	1	2.5		1.6
BTMEC 801A	C170	Fundamentals of Automotive Systems	2.16	2					1					1		2	1
BTMEC 801F	C171	Non-Conventional Energy Sources	2.66	2.16	1.66	1.5			1					1		2	
BTMEP 803	C172	Project Stage II	2	2	2	2				1	3	1	1	1	2.5		1.6

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