Semester-wise Course Structure
(w.e.f. 2022-23)

(Program: B.Tech. in Mathematics & Computing)

Semester 1 (I Year: Odd Sem)

Course/Subject	L	T	P	Cr
Classical Physics (IS) (PY111)	3	1	0	11
Inorganic and Physical Chemistry (IS) (CY111)	3	1	0	11
Real Analysis and Calculus (IS) (MA 111)	3	1	0	11
Computer Programming (IE) (CS101)	3	1	2	13
Biology (IS) (BY101)	2	1	0	8
Chemistry Lab (IS) (CY111L)	0	0	2/2	1
Physics Lab (IS) (PY111L)	0	0	2/2	1
Engineering Graphics (EP) (ME121)	0	0	3	3
Total Credits				**59**
Basic English (HU)* (LM101)	1	2	0	7
Universal Human Values (HU) (HU101)	1	1	0	5

*For students with less proficiency in English

Semester 2 (I Year: Even Sem)

Course/Subject	L	T	P	Cr
Modern Physics (IS) (PY112)	2	1	0	8
Differential Equations (IS) (MA121)	3	1	0	11
Engineering Thermodynamics (IE) (CH161)	3	1	0	11
Fundamentals of Electronics Engineering (IE) (EC111)	3	1	2	13
Engineering Practices in Mathematics and Computing (EP) (MA122)	1	0	2	5
Chemistry Lab (IS) (CY121L)	0	0	2/2	1
Physics Lab (IS) (PY121L)	0	0	2/2	1
Workshop Practices (EP) (ME131)	0	0	3	3
Total Credits				**53**
Community Internship (HU)	0	0	5	5

Semester 3 (II Year: Odd Sem)

Course/Subject	L	T	P	Cr
Linear Algebra & Complex Analysis (IS) (MA 211)	2	1	0	8
Discrete Mathematics (DC/CSE) (CS201)	3	0	0	9
Data Structure & Algorithms (DC/CSE) (CS211)	3	0	2	11
Graphics & Visual Computing (DC/CSE) (CS231)	2	0	2	8
Elementary Number Theory & Algebra (DC) (MA 212)	3	1	0	11
Professional Communications (L)	2	1	0	**8**
Total Credits				**55**

Semester 4 (II Year: Even Sem)

Course/Subject	L	T	P	Cr
Database Management Systems (DC/CSE) (CS212)	3	0	2	11
Computer Organization and Architecture (DC/CSE) (CS211)	3	0	0	9
Numerical Methods (IS) (MA 221)	2	1	0	8
Statistical Methods and Data Analysis (IS) (MA 231)	2	1	0	8
Web Technology (IE/CSE) (CS 222)	3	0	2	11
Financial Engineering-I (DC) (MA 241)	3	0	0	9
Group Discussion (EP)	0	0	2	**2**
Total Credits				**58**

Semester 5 (III Year: Odd Sem)

Course/Subject	L	T	P	Cr
Operating Systems (DC/CSE) (CS311)	3	0	2	11
Computational PDE (DC) (MA 321)	3	0	0	9
Design and Analysis of Algorithms (DC/CSE) (CS341)	3	0	2	11
DE-1 (DE)	3	0	0	9
Theory of Computation (DC/CSE) (CS321)	3	0	0	9
B.Tech. Project-I (DP)	0	0	5	5
Seminar (EP)	0	0	2	**2**
Total Credits				**56**

Semester 6 (III Year: Even Sem)

Course/Subject	L	T	P	Cr
Metric Space and Topology (DC) (MA 312)	3	0	0	9
Computer Networks (DC/CSE) (CS351)	3	0	2	11
Data Mining (DC/CSE) (CS458)	2	0	2	8
Stochastic Processes (DC) (MA 331)	3	0	0	9
DE-2 (DE)	3	0	0	9
B.Tech. Project-II (DP)	0	0	5	5
Total Credits				**51**

Summer Internship	**10**

Semester 7 (IV Year: Odd Sem)

Course/Subject	L	T	P	Cr
Graph Theory (DC) (MA 411)	3	0	0	9
Advanced Analysis (DC) (MA 412)	2	0	0	6
DE-3 (DE)	3	0	0	9
OE-1 (OE)	3	0	0	9
Foundations of Management (MT5405)	3	0	0	9
Organizational Psychology (HU331)	2	0	0	6
Total Credits				**48**

Semester 8 (IV Year: Even Sem)

Course/Subject	L	T	P	Cr
Soft Computing (DC/CSE) (CS468)	2	0	2	8
Optimization Methods & Applications (DC) (MA422)	3	0	0	9
DE-4 (DE)	3	0	0	9
OE-2 (OE)	3	0	0	9

Semester 6 (III Year: Even Sem)

Principles of Economics (MT5100)	3	0	0	9
Sociology of Industry and Work Culture (HU313)	2	0	0	**6**
Total Credits				**50**

Streams in Mathematics and Computing:

	Mathematical Modeling & Simulation	**Artificial Intelligence (CSE)**	**Financial Mathematics**
DE-1	Mathematical Modeling of Dynamical System (MA 322)	Artificial Intelligence (CS360)	Mathematical Finance (MA 341)
DE-2	Computational Fluid Dynamics (MA 324)	Deep Learning (CS365) Or Genetic Algorithm (CS361)	Financial Engineering-II (MA 342)
DE-3	Data Analytics (CS457)	Data Analytics (CS457)	Computational Finance (MA 441)
DE-4	Reservoir Simulation (MA 421)	Computer Vision & Pattern Recognition (CS454)	Financial Management (MA 454)

Open Electives:

A tentative list of Open Electives (OE) is given below. More elective courses will be included/updated in future.

1. Software Engineering. (CSE, Sem-V)
2. Compiler Design. (CSE, Sem-VI)
3. Mobile Computing (CSE, Sem-VII)
4. Digital Image Processing. (CSE, Sem-VIII)
5. Management Accounting. (MBA, Sem-I)
6. Managerial Economics. (MBA, Sem-I)
7. Business Analytics. (MBA, Sem-II)
8. Financial Derivatives. (MBA, DE)
9. Security Analysis & Portfolio Management. (MBA, DE)
10. Project Finance. (MBA, DE)
11. International Finance. (MBA, DE)
12. Management of Financial Services. (MBA, DE)
13. Financial Risk Management. (MBA, DE)
14. Corporate Finance. (MBA, DE)
15. Modern Coding Theory (EC, DE)
16. Modeling, Simulation and Optimization (CEBE, Sem-VIII)

Component Distribution of Credits (B.Tech. Program)

Category	Program components	Min	Max	Recommended
HU	Humanities and social science	22	25	22
IS	Sciences	70	90	88
IE	Institute Engineering	40	70	48
EP	Engineering drawing, workshop	18	24	15
LM	Language & Management	18	24	26
DC	Departmental core	145	180	177
DE	Departmental elective	30	75	36
OE	Open elective	15	20	18
DP	Project/Industrial visit	20	50	20
	Total (Range min to max)	440	490	**450**

Institute Science Courses (IS):

Course/Subject	L	T	P	Cr
Classical Physics (IS)	3	1	0	11
Real Analysis & Calculus (IS)	3	1	0	11
Biology (IS)	2	1	0	8
Chemistry Lab (IS)	0	0	2	2
Physics Lab (IS)	0	0	2	2
Modern Physics (IS)	2	1	0	8
Inorganic & Physical Chemistry (IS)	3	1	0	11
Differential Equations (IS)	3	1	0	11
Linear Algebra & Complex Analysis (IS)	2	1	0	8
Statistical Methods & Data Analysis (IS)	2	1	0	8
Numerical Methods (IS)	2	1	0	8
Total Credits				**88**

Institute Engineering Courses (IE):

Course/Subject	L	T	P	Cr
Engineering Thermodynamics (IE)	3	1	0	11
Computer Programming (IE)	3	1	2	13
Fundamentals of Electronics Engineering (IE)	3	1	2	13
Web Technology (IE)	3	0	2	11
Total Credits				**48**

EP, LM & HU Courses:

	Course/Subject	L	T	P	Cr
EP	Engineering Graphics (EP)	0	0	3	3
	Engineering Practices in Mathematics & Computing (EP)	1	0	2	5
	Group discussion (EP)	0	0	2	2
	Seminar (EP)	0	0	2	2
	Workshop Practices (EP)	0	0	3	3
	Total Credits				**15**
LM	Professional communication (L)	2	1	0	**8**
	Foundations of Management (MT5405)	3	0	0	9
	Principles of Economics (MT5100)	3	0	0	9
	Total Credits				**26**
HU	Universal Human Values (HU)	1	1	0	5
	Community Internship (HU)	0	0	5	5
	Organizational Psychology (HU331)	2	0	0	6
	Sociology of Industry and Work Culture (HU313)	2	0	0	6
	Total Credits				**22**

Project/Industry Visit (DP):

Project/industry Visit (DP)				**20**

Department Core (DC):

Course/Subject	L	T	P	Cr
Elementary Number Theory & Algebra (DC) (MA 211)	3	1	0	11
Financial Engineering-I (DC) (MA 241)	3	0	0	9
Functional Analysis & Topology (DC) (MA 311)	3	0	0	9
Computational PDE (DC) (MA 321)	3	0	0	9
Optimization Methods & Applications (DC) (MA 422)	3	0	0	9

Stochastic Processes (DC) (MA 331)	3	0	0	9
Graph Theory (DC) (MA 411)	3	0	0	9
Advanced Analysis	2	0	0	6

Multicore Subjects offered by MA and/or CSE				
Discrete Mathematics (DC/CSE)	3	0	0	9
Data Structure & Algorithms (DC/CSE)	3	0	2	11
Graphics & Visual Computing (DC/CSE)	2	0	2	8
Database Management Systems (DC/CSE)	3	0	2	11
Computer Organization and Architecture (DC/CSE)	3	0	0	9
Operating Systems (DC/CSE)	3	0	2	11
Theory of Computation (DC/CSE)	3	0	0	9
Design and Analysis of Algorithms (DC/CSE)	3	0	2	11
Computer Networks (DC/CSE)	3	0	2	11
Soft Computing (DC/CSE)	2	0	2	8
Data Mining (DC/CSE)	2	0	2	8
Total Credits				**177**

Departmental Electives (DE):

Course/Subject	**L**	**T**	**P**	**Cr**
DE-1	3	0	0	9
DE-2	3	0	0	9
DE-3	3	0	0	9
DE-4	3	0	0	9
Total Credits				**36**

Open Electives (OE):

Course/Subject	**L**	**T**	**P**	**Cr**
OE-1	3	0	0	9
OE-2	3	0	0	9
Total Credits				**18**

References:

IIT Delhi, IIT Guwahati, IIT Kanpur, IIT Ropar, IIT BHU and Delhi Technological University.