

B.Tech. - Course Structure & Syllabus – RK24**INDUCTION PROGRAMME**

S.No.	Category	Course Name	L-T-P-C
1	MC	Physical Activities -- Sports, Yoga and Meditation, Plantation	0-0-6-0
2	MC	Career Counselling	2-0-2-0
3	MC	Orientation to all branches -- career options, tools, etc.	3-0-0-0
4	EC	Orientation on admitted Branch -- corresponding labs, tools and platforms	2-0-3-0
5	ES	Proficiency Modules & Productivity Tools	2-1-2-0
6	MC	Assessment on basic aptitude and mathematical skills	2-0-3-0
7	MC	Remedial Training in Foundation Courses	2-1-2-0
8	MC	Human Values & Professional Ethics	3-0-0-0
9	BS	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	2-1-2-0
10	ES	Concepts of Programming	2-0-2-0

Group-A Branches:

Computer Science and Engineering
Computer Science and Engineering (Data Science)

Group-B Branches:

Civil Engineering,
Electrical and Electronics Engineering,
Mechanical Engineering
Electronics and Communication Engineering,
Artificial Intelligence and Machine Learning

Course Code Format:

Regulation	Branch	Year	Semester	Course Serial Number
2 Digits	2 Digits	1 Digit	1 Digit	2 Digits
24	01/02/03/04/05/44/61	1/2/3/4	1/2	01/02/03/04/...../19/20

Branch Code:

Code	Branch
01	Civil Engineering
02	Electrical & Electronics Engineering
03	Mechanical Engineering
04	Electronics and Communication Engineering
05	Computer Science and Engineering
44	Computer Science and Engineering (Data Science)
61	Artificial Intelligence and Machine Learning

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B. Tech. – I Year I Semester (for Group-A Branches CSE and CSE-(DS))

S.No.	Course Code	Category	Title	L/D	T	P	Credits
1	24051101/ 24441101	BS & H	Engineering Chemistry	3	0	0	3
2	24051102/ 24441102	BS & H	Linear Algebra & Calculus	3	0	0	3
3	24051103/ 24441103	Engineering Science	Basic Civil & Mechanical Engineering	3	0	0	3
4	24051104/ 24441104	BS & H	Communicative English	2	0	0	2
5	24051105/ 24441105	Engineering Science	Introduction to Programming	3	0	0	3
6	24051106/ 24441106	BS & H	Engineering Chemistry Lab	0	0	2	1
7	24051107/ 24441107	Engineering Science	Engineering Workshop	0	0	3	1.5
8	24051108/ 24441108	BS & H	Communicative English Lab	0	0	2	1
9	24051109/ 24441109	Engineering Science	Computer Programming Lab	0	0	3	1.5
10	24051110/ 24441110	BS & H	Health and wellness, Yoga and Sports	-	-	1	0.5
Total				14	0	11	19.5

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B.Tech. – I Year I Semester (for Group-B Branches CE, EEE, ME, ECE, and AI & ML)

S.No.	Course Code	Category	Title	L/D	T	P	Credits
1	24011111/ 24021111/ 24031111/ 24041111/ 24611111	BS & H	Engineering Physics	3	0	0	3
2	24011112/ 24021112/ 24031112/ 24041112/ 24611112	BS & H	Linear Algebra & Calculus	3	0	0	3
3	24011113/ 24021113/ 24031113/ 24041113/ 24611113	Engineering Science	Basic Electrical & Electronics Engineering	3	0	0	3
4	24011114/ 24021114/ 24031114/ 24041114/ 24611114	Engineering Science	Engineering Drawing	1	0	4	3
5	24011115/ 24021115/ 24031115/ 24041115/ 24611115	Engineering Science	Introduction to Programming	3	0	0	3
6	24011116/ 24021116/ 24031116/ 24041116/ 24611116	BS & H	Engineering Physics Lab	0	0	2	1
7	24011117/ 24021117/ 24031117/ 24041117/ 24611117	Engineering Science	Electrical & Electronics Engineering Workshop	0	0	3	1.5
8	24011118/ 24021118/ 24031118/ 24041118/ 24611118	Engineering Science	IT Workshop	0	0	2	1
9	24011119/ 24021119/ 24031119/ 24041119/ 24611119	Engineering Science	Computer Programming Lab	0	0	3	1.5
10	24011120/ 24021120/ 24031120/ 24041120/ 24611120		NSS / NCC / Scouts & Guides / Community Service	-	-	1	0.5
Total				13	0	15	20.5

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B.Tech. – I Year II Semester (for Group-A Branches CSE and CSE-(DS))

S.No.	Course Code	Category	Title	L/D	T	P	Credits
1	24051201/ 24441201	BS & H	Engineering Physics	3	0	0	3
2	24051202/ 24441202	BS & H	Differential Equations & Vector Calculus	3	0	0	3
3	24051203/ 24441203	Engineering Science	Basic Electrical & Electronics Engineering	3	0	0	3
4	24051204/ 24441204	Engineering Science	Engineering Drawing	1	0	3	4
5	24051205/ 24441205	Professional Core	Data structures	3	0	0	3
6	24051206/ 24441206	BS & H	Engineering Physics Lab	0	0	2	1
7	24051207/ 24441207	Engineering Science	Electrical & Electronics Engineering Workshop	0	0	3	1.5
8	24051208/ 24441208	Engineering Science	IT Workshop	0	0	2	1
9	24051209/ 24441209	Professional Core	Data structures Lab	0	0	3	1.5
10	24051210/ 24441210		NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5
Total				13	0	15	20.5

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S.No.	Course Code	Category	Title	L/D	T	P	Credits
1	24011111/ 24021111/ 24031111/ 24041111/ 24611111	BS & H	Engineering Physics	3	0	0	3
2	24011112/ 24021112/ 24031112/ 24041112/ 24611112	BS & H	Linear Algebra & Calculus	3	0	0	3
3	24011113/ 24021113/ 24031113/ 24041113/ 24611113	Engineering Science	Basic Electrical & Electronics Engineering	3	0	0	3
4	24011114/ 24021114/ 24031114/ 24041114/ 24611114	Engineering Science	Engineering Graphics	1	0	4	3
5	24011115/ 24021115/ 24031115/ 24041115/ 24611115	Engineering Science	Introduction to Programming	3	0	0	3
6	24011116/ 24021116/ 24031116/ 24041116/ 24611116	BS & H	Engineering Physics Lab	0	0	2	1
7	24011117/ 24021117/ 24031117/ 24041117/ 24611117	Engineering Science	Electrical & Electronics Engineering Workshop	0	0	3	1.5
8	24011118/ 24021118/ 24031118/ 24041118/ 24611118	Engineering Science	IT Workshop	0	0	2	1
9	24011119/ 24021119/ 24031119/ 24041119/ 24611119	Engineering Science	Computer Programming Lab	0	0	3	1.5
10	24011120/ 24021120/ 24031120/ 24041120/ 24611120		NSS / NCC / Scouts & Guides / Community Service	-	-	1	0.5
Total				13	0	15	20.5

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S.No.	Course Code	Category	Title	L/D	T	P	Credits
1	24051201/ 24441201	BS & H	Engineering Physics	3	0	0	3
2	24051202/ 24441202	BS & H	Differential Equations & Vector Calculus	3	0	0	3
3	24051203/ 24441203	Engineering Science	Basic Electrical & Electronics Engineering	3	0	0	3
4	24051204/ 24441204	Engineering Science	Engineering Graphics	1	0	3	4
5	24051205/ 24441205	Professional Core	Data structures	3	0	0	3
6	24051206/ 24441206	BS & H	Engineering Physics Lab	0	0	2	1
7	24051207/ 24441207	Engineering Science	Electrical & Electronics Engineering Workshop	0	0	3	1.5
8	24051208/ 24441208	Engineering Science	IT Workshop	0	0	2	1
9	24051209/ 24441209	Professional Core	Data structures Lab	0	0	3	1.5
10	24051210/ 24441210		NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5
Total				13	0	15	20.5

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B.Tech. – I Year II Semester (for Group-B Branches CE, EEE, ME, ECE, and AI & ML)

S.No.	Course Code	Category	Title	L/D	T	P	Credits
1	24011211/ 24021211/ 24031211/ 24041211/ 24611211	BS & H	Engineering Chemistry	3	0	0	3
2	24011212/ 24021212/ 24031212/ 24041212/ 24611212	BS & H	Differential Equations & Vector Calculus	3	0	0	3
3	24011213/ 24021213/ 24031213/ 24041213/ 24611213	Engineering Science	Basic Civil & Mechanical Engineering	3	0	0	3
4	24011214/ 24021214/ 24031214/ 24041214/ 24611214	BS & H	Communicative English	2	0	0	2
5	24011215/ 24031215 24021215 24041215 24611215	Professional Core	Engineering Mechanics Electrical Circuit Analysis – I Network Analysis Data structures	3	0	0	3
6	24011216/ 24021216/ 24031216/ 24041216/ 24611216	BS & H	Engineering Chemistry Lab	0	0	2	1
7	24011217/ 24021217/ 24031217/ 24041217/ 24611217	Engineering Science	Engineering Workshop	0	0	3	1.5
8	24011218/ 24021218/ 24031218/ 24041218/ 24611218	BS & H	Communicative English Lab	0	0	2	1
9	24011219/ 24031219 24021219 24041219 24611219	Professional Core	Engineering Mechanics Lab Electrical Circuits Lab Network Analysis Lab Data structures Lab	0	0	3	1.5
10	24011220/ 24021220/ 24031220/ 24041220/ 24611220	BS & H	Health and wellness, Yoga and Sports	-	-	1	0.5
Total				14	0	11	19.5

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B. Tech. – II Year I Semester

S.No.	Course Code	Category	Title	L	T	P	Credits
1	24012101/ 24022101/ 24032101/ 24042101/ 24052101/ 24442101/ 24612101	BS&H	Engineering Mathematics (Branch specific)	3	0	0	3
2		BS&H	Universal Human Values – Understanding Harmony	2	1	0	3
3		Engineering Science		2	0	0	2
4		Professional Core		3	0	0	3
5		Professional Core		3	0	0	3
6		Engineering Science		0	0	2	1
7		Professional Core		0	0	3	1.5
8		Professional Core		0	0	3	1.5
9		Skill Enhancement course		0	1	2	2
10		Audit Course	Environmental Science	2	0	0	-
Total				15	2	10	20

B. Tech. – II Year II Semester

S.No.	Course Code	Category	Title	L	T	P	Credits
1		Management Course - I		2	0	0	2
2		Engineering Science		3	0	0	3
3		Professional Core		3	0	0	3
4		Professional Core		3	0	0	3
5		Professional Core		3	0	0	3
6		Professional Core		0	0	2	1
7		Professional Core		0	0	3	1.5
8		Professional Core		0	0	3	1.5
9		Skill Enhancement course		0	1	2	2
10		BS&H	Design Thinking & Innovation	1	0	2	2
Total				15	1	12	22
Mandatory Community Service Project Internship of 08 weeks duration during summer vacation							

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B.Tech. – III Year I Semester

S.No.	Course Code	Category	Title	L	T	P	Credits
1		Professional Core		3	0	0	3
2		Professional Core		3	0	0	3
3		Professional Elective - I		2	0	0	2
4		Open Elective - I		3	0	0	3
5		Open Elective - II		3	0	0	3
6		Professional Core		0	0	3	1.5
7		Professional Core		0	0	3	1.5
8		Skill Enhancement course		0	1	2	2
9		BS&H	Tinkering Lab	0	0	2	1
10		Evaluation of Community Service Internship		-	-	-	2
Total				14	1	10	22

B.Tech. – III Year II Semester

S.No.	Course Code	Category	Title	L	T	P	Credits
1		Professional Core		3	0	0	3
2		Professional Core		3	0	0	3
3		Professional Core		3	0	0	3
4		Professional Elective - II		3	0	0	3
5		Professional Elective - III		2	0	0	2
6		Open Elective - III		3	0	0	3
7		Professional Core		0	0	2	1
8		Professional Core		0	0	2	1
9		Skill Enhancement course		0	1	2	2
10		Audit Course	Technical Paper Writing & IPR	2	0	0	-
Total				19	1	06	21
Mandatory Industry Internship of 08 weeks duration during summer vacation							

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B.Tech. – IV Year I Semester

S.No.	Course Code	Category	Title	L	T	P	Credits
1		Professional Core		3	0	0	3
2		Professional Core		3	0	0	3
3		Management Course - II		2	0	0	2
4		Professional Elective - IV		3	0	0	3
5		Professional Elective - V		3	0	0	3
6		Open Elective - IV		3	0	0	3
7		Professional Core		0	0	2	1
8		Professional Core		0	0	2	1
9		Skill Enhancement Course		0	1	2	2
10		Audit Course	Constitution of India	2	0	0	-
11		Internship	Evaluation of Industry Internship	-	-	-	2
Total				19	1	06	23

B.Tech. – IV Year II Semester

S.No.	Course Code	Category	Title	L	T	P	Credits
1		Project Work	Full semester Project Work	0	0	12	6
2		Internship	Full semester Internship	0	0	12	6
Total				0	0	24	12

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L/D	T	P	C
3	0	0	3

LINEAR ALGEBRA & CALCULUS (Common to all Branches of Engineering)

Course Objectives:

- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

Course Outcomes: At the end of the course, the student will be able to

CO1	Develop and use of matrix algebra techniques that are needed by engineers for practical applications.
CO2	Utilize mean value theorems to real life problems.
CO3	Familiarize with functions of several variables which is useful in optimization. Learn important tools of calculus in higher dimensions.
CO4	Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.

UNIT I

Matrices: Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

UNIT II

Eigenvalues, Eigenvectors and Orthogonal Transformation: Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley - Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley - Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT III

Mean Value Theorems and Partial Differentiation: Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorem with remainders (without proof), Problems and applications on the above theorems.

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

UNIT IV

Multiple Integrals (Multi variable Calculus): Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

Textbooks:

- Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
- Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

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Reference Books:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, Micheael Greenberg, Pearson publishers, 9th edition
5. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications, 2014, Third Edition (Reprint 2021)

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L/D	T	P	C
3	0	0	3

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS (Common to all Branches of Engineering)

Course Objectives:

- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real-world applications.

Course Outcomes: At the end of the course, the student will be able to

CO1	Solve the differential equations related to various engineering fields
CO2	Identify solution methods for partial differential equations that model physical processes
CO3	Interpret the physical meaning of different operators such as gradient, curl and divergence
CO4	Estimate the work done against a field, circulation and flux using vector calculus

UNIT I

Differential equations of first order and first degree: Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay - Electrical circuits.

UNIT II

Linear differential equations of higher order (Constant Coefficients): Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.

UNIT III

Partial Differential Equations: Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.

UNIT IV

Vector differentiation and Vector integration: Scalar and vector point functions, vector operator Del, Del applies to scalar point functions - Gradient, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities. Without integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

Textbooks:

- Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
- Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

Reference Books:

- Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
- Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.

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3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. Higher Engineering Mathematics, B. V. Ramana, McGraw Hill Education, 2017

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