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 -- correspondinglabs, tools and platforms	2-0-3-0
5	ES	Proficiency Modules & Productivity Tools	2-1-2-0
6	MC	Assessment on basic aptitude and mathematicalskills	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)
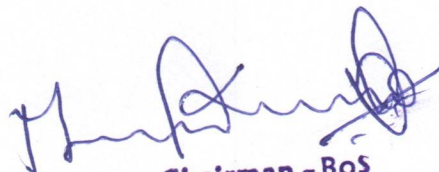
Group-B Branches:

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

Course Code Format:

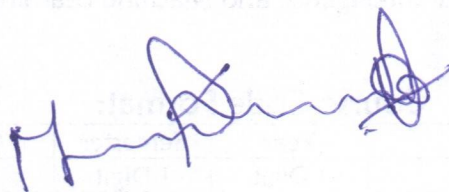| Regulation	Branch	Year	Semester	Course Serial Number
2 Digits	2 Digits	1 Digit	1 Digit	2 Digits
24	01/02/03/04/05/44/61	1/2/3/4	1/2	01/02/03/04/........../19/20

Branch Code:

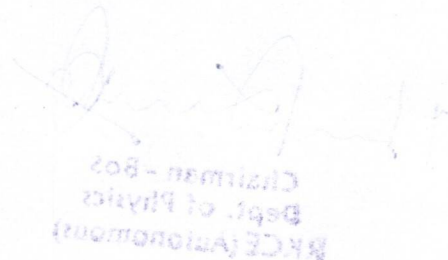| Code	Branch
01	Civil Engineering
02	Electrical & Electronics Engineering
03	Mechanical Engineering
04	Electronics and Communication Engineering
05	Computer Science and Engineering
44	Computer Science and Engineering (Data Science)
61	Artificial Intelligence and Machine Learning

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1

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
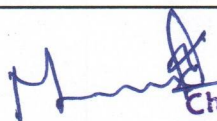
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2

PHY.

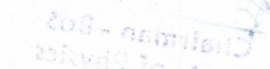## B.Tech. – I Year I Semester (for Group-B Branches CE, EEE, ME, ECE, and AI & ML)

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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3

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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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 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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3

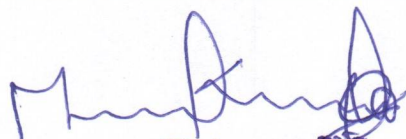## B.Tech. – I Year II Semester (for Group-A Branches CSE and CSE-(DS))

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 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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L/D	T	P	C
3	0	0	3

ENGINEERING PHYSICS
(Common to all Branches of Engineering)

Course Objectives:
To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

Course Outcomes:

CO1	Analyze the intensity variation of light due to polarization, interference and diffraction
CO2	Familiarize with the basics of crystals and their structures
CO3	Summarize various types of polarization of dielectrics and classify the magnetic materials. Explain fundamentals of quantum mechanics and apply it to one dimensional motion of particles, Explain the basic concepts of Quantum Mechanics and the band theory of solids
CO4	Identify the type of semiconductor using Hall effect

UNIT I

Wave Optics: Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.
Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).
Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

UNIT II

Crystallography and X-ray diffraction: Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.
X - ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

UNIT III

Dielectric , Magnetic Materials and Quantum Mechanics: Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations-Electronic (Quantitative), Ionic (Quantitative) and Orientation. polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss.
Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.
Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle –

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5/8/24

6

Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

UNIT IV

Free electron Theory and Semiconductors: Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation – Hall effect and its applications.
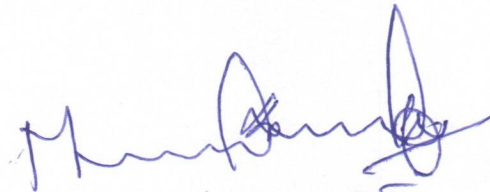
Textbooks:
1. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition 2019.
2. Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

Reference Books:
1. Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning 2021.
2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press. 2010
4. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

Web Resources:
https://www.loc.gov/rr/scitech/selected-internet/physics.html

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L/D	T	P	C
0	0	2	1

ENGINEERING PHYSICS LAB
(Common to all Branches of Engineering)

Course Objectives: To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

Course Outcomes: The students will be able to

CO1	Operate optical instruments like travelling microscope and spectrometer
CO2	Estimate the wavelengths of different colours using diffraction grating
CO3	Plot the intensity of the magnetic field of circular coil carrying current with distance
CO4	Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively
CO5	Calculate the band gap of a given semiconductor. CO6: Identify the type of semiconductor using Hall effect

List of Experiments:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

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References:
- A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

Web Resources
- www.vlab.co.in
- https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

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