INDUCTION PROGRAMME & BRIDGE COURSE

B. TECH/ B.DES/ B. ARCH

2020 - 21

HINDUSTAN
INSTITUTE OF TECHNOLOGY & SCIENCE
(DEEMED TO BE UNIVERSITY)

HINDUSTAN INSTITUTE OF TECHNOLOGY AND SCIENCE

Designed by
Dr. N. Vasudevan
DEAN - ET

HINDUSTAN
INSTITUTE OF TECHNOLOGY & SCIENCE
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WELCOME TO HITS

Vision

The motto of the Institute is "To make every man a success and no man a failure".

The Vision of the Institute is "To be an international institute of excellence, providing a conducive environment for education with a strong emphasis on innovation, quality, research and strategic partnership blended with values and commitment to society"

Mission of the institute is

- *To create an ecosystem that promotes learning and world class research.*
- *To nurture creativity and innovation.*
- *To instil highest ethical standards and values.*
- *To pursue activities for the development of the Society.*
- *To develop national and international collaborations with institutes and industries of eminence.*
- *To enable graduates to become future leaders and innovators.*

Value Statement

Integrity, Innovation, Internationalization

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INAUGURAL FUNCTION

21ST SEPTEMBER

09.00 am to 09.05 am	Prayer
09.05 am to 09.10 am	Welcome Address by Registrar HITS
09.10 am to 09.20 am	HITS intro video
09.20 am to 09.30 am	Address by the ProVice- Chancellor
09.30 am to 09.45 am	Address by the Chief Guest
09.45 am to 09.55 am	Felicitations by Director - HITS
09.55 am to 10.00 am	Vote of Thanks by Dean – E & T

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DAY 1 SCHEDULE
21ST SEPTEMBER 2020

10.15 am to 11.00 am	Address by Dean – E & T " Academic Regulations"
11.00 am to 12.00 pm	Address by Dean – Student Affairs " NSS, NCC, Student clubs, Cultural, Sports etc.,
12.00 pm to 12. 30 pm	Address by Placement & Training
12.30 pm to 01.00 pm	Address by Director – International Affairs
01.00 pm to 02.00 pm	Lunch Break
02.00 pm to 02.45 pm	Alumni Talk
02.45 pm to 03.30 pm	Guest Lecture – Digital Literacy
03.30 pm to 03.45 pm	Brief about the Bridge Course / online classes
03.45 pm to 04.00 pm	Closing Ceremonies

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DAY 2 SCHEDULE
22ND SEPTEMBER 2020

DAY 2 SCHEDULE	
9.00 am to 09.10 am	Welcome address
9.10 am to 10.00 am	Address by the HoD
11.00 am to 12.00 pm	Introduction to Department Faculty
12.00 am to 01.00 pm	Virtual walk through video of the department labs and projects
1.00 pm to 02.00 pm	Lunch Break
2.00 pm to 02.45 pm	Eminent Industry-Expert Lecture
2.45 pm to 03.45 pm	Guest Lecture on Sports / Yoga / Mediation Skills
3.45 pm to 04.00 pm	Closing Ceremonies

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B.TECH/ B.DES / B.ARCH

BRIDGE COURSE

(STARTS FROM 23RD SEPTEMBER 2020)

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ACADEMIC SCHEDULE

SL. NO	DESCRIPTION	DATE
1.	INAUGURAL FUNCTION & INDUCTION PROGRAMME (INSTITUTE)	21ST SEPTEMBER 2020
2.	INDUCTION PROGRAMME (DEPARTMENT)	22ND SEPTEMBER 2020
3.	BRIDGE COURSE	23RD SEPTEMBER 2020 TO 15TH OCTOBER 2020 (15 DAYS)
4.	APTITUDE TEST	16TH OCTOBER 2020
5.	REGULAR CLASSES	19TH OCTOBER 2020

TIME TABLE FOR BRIDGE COURSE

TIME	PERIOD
08.30 - 09.30 AM	1
10.00 - 11.00 AM	2
11.30 - 12.30 PM	3
01.30 - 02.30 PM	4
03.00 - 04.00 PM	5

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INTRODUCTION

The genesis of this module lies in the Induction Program conceived by HITS for the students from 2015. The conceptual understanding of the basic sciences is a very important factor for becoming a good engineer. The fact is that the students are overburdened and stressed out due to a hectic high school life. To refresh their creative mind, they were exposed to 2 week long diverse credit courses in basic science concepts interleaved with some activity classes and personality development courses.

The, purpose of this module is to bridge the gap between what the students need to know before they can start taking the advanced courses in the college level and what they are actually aware of from the intermediate level.

Bridge courses in basic Mathematics, Physics, Chemistry and Computer Programming is taught in this module to recap the theories and problems of applications of Science. The bridge courses will cover typical weakness areas of students in science at the 10+2 level. All I year students of B.Tech degree programme will undergo this bridge course. An aptitude test will be administered at the end of the course and a summative assessment grade card will be provided to the students on SWOC analysis.

Planting the seeds of Learning

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B.TECH PROGRAMME - BRIDGE COURSE STRUCTURE

SL. NO.	COURSE	NO. OF HOURS
1.	MATHS	28
2.	PHYSICS	18
3.	COMPUTER PROGRAMMING	15
4.	CHEMISTRY	15
5.	ENGLISH COMMUNICATION	05
6.	APTITUDE TEST	04
7.	SME LECTURES	03
8.	CREATIVE ARTS / DESIGN THINKING	02
	TOTAL HOURS	90

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INSTRUCTIONS TO ALL STUDENTS

Mandatory Requirements for all students of B.Tech/ B.Des/ B.Arch/ MBA/ MCA/ M.Tech Programmes:

a. Latest Laptop b. Broad Band connection

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1. Welcome to HITS. You have selected the right destination for your higher studies. Congrats for the same. You will find the next four years of your higher learning a real enjoyment coupled with professional growth experience.
2. The transition from school system to engineering education is little difficult for most of the students, the fact, learnt from our experience.
3. This bridge course is designed in such a way to make your journey towards engineering a comfortable and smooth process.
4. You will be provided with your official mail id from HITS
5. Your faculty will create class groups according to your branch of selection.
6. Microsoft Teams will be used for your classes.
7. Download the MS Teams App in your PC and Mobile
8. The scheduled classes for the respective groups will appear in MS teams. 5 hours are scheduled per day with sufficient intervals to adapt to the new norm…
9. You can click and join the classes in MS Teams
10. All students will have to be punctual in attending the online classes
11. The attendance for the bridge programme is compulsory. Attendance will be taken any random time during the class.
12. The bridge course is designed to introduce you the concepts and problem solving approach to Engineering
13. The classes will be interactive in nature and it is essential for you to have your notebook in hand for following your teacher.
14. Quizzes will be conducted in between the classes. Learner engagement is essential throughout the period of the class.
15. The aptitude test at the end of the Bridge Programme is designed for student profiling. A detailed profile of Strength, Weakness, Opportunities, Challenges for individual students will be given to each student. This helps the student in understanding where they stand and what next to be done.

All the best!!

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MATHS

MATHS		
SL. No.	Module	Lectures
1	Set Theory, Relations and Functions	3
2	Differential and Integral Calculus	5
3	Matrices and Determinants	3
4	Complex Numbers	2
5	Differential Equations	3
6	Analytical Geometry & Vector Algebra	4
7	Series & Sequences and Trigonometric Functions	6
8	Probability & Statistics	2
	Total	28

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MATH IS FUN LEARNING!!

Aim of the Bridge course in Engineering Mathematics

1. To understand "Mathematics as a discipline and not as a subject".
2. To Bridge "the School education and Engineering education".
3. To make "Learning of Mathematic as a pleasant Experience".

- The modules in Mathematics are prepared keeping in mind that an hour of discussion will bring all the students in the same stage such that they can cope up with the courses in their college level, that requires the concepts of different topics in Mathematics. The modules are made as interactive sessions between the students and the instructors. Furthermore, we have discussed those topics which harder to understand. At the end of the discussion teacher may also take a small test to understand how much the students followed the class.

- In brief the contents of the modules are presented as follows. In Mudule-1, basic concepts of sets, relations and function are discussed. Module -2 describes the definition of limit and discuss some of its properties. After that we introduce the notion of continuity of a function and the concept of the derivative of a function, and their properties.

- Module-3, presents the idea of the basics of matrices, types of matrices, operations on matrices, determinants and cofactors, computing inverse of a square matrix, rank and elementary operations with brief discussion on system of linear equations.

- Module-4 introduces the idea of the complex numbers and its basic properties. Further, the definition of the complex sets, neighborhood of a complex number, domain, complex functions, limit of a complex functions and continuity of complex functions are presented in detail with several examples.

- Module-5 is devoted to the differential equations and includes the topics as the formation of the differential equations, some special forms of the differential equations and then existence and uniqueness of the first order differential equations. Module-6 focuses on the double and triple integral and describes the method to solve such problems. It includes the other topics as polar equations of conics, directional derivatives, gradients, divergence and curl. Module-7, 8 presents the basic idea of the trigonometry, probability and statistics respectively.

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MODULE-1
Set Theory, Relations and Functions

In this module, we will discuss about the basic concepts of sets, relations and function. The model is divided into three sections with three subsections each given below:

1. Set Theory
   1.1 Definition and Representation
   1.2 Types of Sets
   1.3 Operation on Sets
2. Relations
   2.1 Definition
   2.2 Types of Relations
   2.3 Partial order and Equivalence Relations
3. Functions
   3.1 Definition and classification
   3.2 Types of functions
   3.3 Composition and Inverse of functions

MODULE-2
Differential and Integral Calculus

1.0 Single Variable Calculus
   1.1 Definition and Representations
   1.2 Limits and Continuity
   1.3 Intermediate Value Theorem
   1.4 Concept of Neighborhood
   1.5 Lagrange's Mean Value Theorem

Derivatives
   1.1 Derivatives of a function
   1.2 Differentiation rules
   1.3 Derivatives of Trigonometric functions
   1.4 Chain Rule – Techniques of differentiation – Total and Partial Derivatives
   1.5 Theory of Equations – Relation between roots and coefficients – Expressions – Equations and factors

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2.0 Integral Calculus

2.1 Applications of Integration
2.2 Definite and indefinite Integrals
2.3 Proper and improper integrals
2.4 Techniques of integration
2.5 Integration by Substitution
2.6 Integration by parts – Bernoulli's formula

MODULE 3
Matrices and Determinants

In this module, we discuss about the basics of matrices, types of matrices, operations on matrices, determinants and cofactors, computing inverse of a square matrix, rank and elementary operations with brief discussion on system of linear equations.

1. Matrices and Determinants

1.1 Types of Matrices
1.2 Operations on Matrices
1.3 Determinants and Cofactors
1.4 Inverse of a Square Matrix
1.5 Rank of Matrix
1.6 Elementary row / column operations
1.7 System of Linear Equations

MODULE 4
COMPLEX NUMBERS

3.0 Complex numbers and Complex functions:
3.1 Definition of complex numbers

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3.2 Concepts of modulus / absolute value
3.3 Disks and Neighborhoods
3.4 Domain, Regions, Bounded sets
3.5 Complex functions
3.6 Real and Imaginary Parts of a Complex Function
3.7 Limits of a complex function
3.8 Continuity of a complex function
3.9 Theorems and Example problems

MODULE 5
DIFFERENTIAL EQUATIONS

4.0 Differential Equations

4.1.1 Definitions, Order and Degree
4.1.2 Formation of differential equations of first order
4.1.3 Differential Equations reducible to linear form
4.1.4 Bernoulli's equation
4.1.5 Exact Differential Equation
4.1.6 Integrating factor
4.1.7 Differential equations of the first order but not of the first degree
4.1.8 Clairaut's equation
4.1.9 Initial value problem
4.1.10 Existence theorem
4.1.11 Uniqueness theorem
4.1.12 Mean value theorem

MODULE 6

5.0 Analytical geometry and Vector Algebra

5.1.1 Polar Equation of Conics
5.1.2 Cartesian coordinate system
5.1.3 Relating Polar and Cartesian coordinates
5.1.4 Conic Section in Polar Coordinates
5.1.5 Circles passing through origin
5.1.6 Conic Sections

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5.1.7 Directional Derivative
5.1.8 Gradient
5.1.9 Properties of Directional Derivative
5.1.10 Gradient and directional derivative for function of three variables
5.1.11 Change of order of integration in triple integral
5.1.12 Triple integral in cylindrical & spherical coordinate system
5.1.13 Volume/ Triple integrals w.r.t three coordinate system
5.1.14 Gradient, Divergence and Curl
5.1.15 scaler point function
5.1.16 Vector point function
5.1.17 Gradient of a Scaler function:
5.1.18 Properties of gradient
5.1.19 Geometrical meaning of the Gradient
5.1.20 Definition of level surface
5.1.21 Engineers usage of the gradient vector in many physical laws
5.1.22 Divergence of a Vector function
5.1.23 Geometrical Interpretation of Divergence
5.1.24 CURL of a Vector
5.1.25 Physical Meaning of the CURL
5.1.26 Surface Area of a closed and bounded region on the surface
5.1.27 Surface integrals

MODULE 7

6.0 TRIGNOMETRY

6.1 Generation of Angles
6.1.1 Useful Terminology
6.1.2 Quadrant
6.1.3 Quadrantile and Co-terminal angles
6.2 Measurement of angles: different systems
6.2.1 Sexagesimal or English Systems or Degree System Circular System or Radian Measure (or system):
6.3 Definition of π
6.4 Relation between three systems

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6.5 TRIGNOMETRICAL RATIO and FUNCTION
6.6 Some Basic Identities
- 6.6.1 Definition of Trigonometrical Function unit Circle
- 6.6.2 Values of Circular functions for some standard angles
- 6.6.3 Conversion of circular functions of -Θ(negative angle) in terms of circular functions of Θ
- 6.6.4 Cosine Formula
- 6.6.5 Sine Formula
- 6.6.6 To transform sum or difference into product
- 6.6.7 Graph of trigonometry ratio

6.7 Formulae on submultiple angles
6.8 Inverse Trigonometric Functions
6.9 Importance of Series and Sequences
- 6.9.1 Link between series and sequences
- 6.9.2 Validity of series
- 6.9.3 Conditions of convergence and divergence
- 6.9.4 Binomial series
- 6.9.5 Exponential Series
- 6.9.6 Logarithmic series

MODULE 8

7.0 PROBABILITY AND STATISTICS

- 7.1.1 Statistical (or Empirical or Frequency) definition of probability
- 7.1.2 Additive Law of probability (Theorem of total probability)
- 7.1.3 Conditional probability
- 7.1.4 Random Variables and Probability Distributions
- 7.1.5 Random Variable
- 7.1.6 Discrete Probability Distribution
- 7.1.7 Distribution function:
- 7.1.8 Binomial Probability Distribution
- 7.1.9 Statistics Measures of Central Tendency
- 7.1.10 Central Tendency:

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7.1.11 Arithmetic Mean:
7.1.12 The Weighted Arithmetic Mean
7.1.13 Median
7.1.14 Median for continuous frequency distribution
7.1.15 Mode
7.1.16 Mode for continuous frequency distribution:
7.1.17 DISPERSION
7.1.18 Measures of Dispersion:
7.1.19 Mean deviation:
7.1.20 Standard deviation and Root mean square deviation
7.1.21 Variance of the combined series
7.1.22 Variance and consequently standard deviation is independent of change of origin

REFERENCE BOOKS:

1. P.B. Bhattacharya, S,.K.Jain, S.R. Nagpaul, First Course in Linear Algebra, Wiley, 1983.
2. G. Hadley, Linear Algebra, Narosa Publishing, 1992.
3. J.P. Singh, Discrete Mathematics for Under graduates, Ane Books, 2014.
4. G.B. Thomas, M.D. Weir, J.R. Hass, Thomas' Calculus, Pearson Publication.
5. R.G. Bartle, D.R. Sherbert, Introduction to Real Analysis, Wiley Publication.
6. Dennis G. Zill and Patrick D. Shanahan. A First Course in Complex Analysis with
7. Applications, Jones and Bartlett publishers Sudbury, Massachusetts
8. S. Ponnusamy. Foundations of Complex Analysis, Norasa publishers.
9. Apostol, T., Mathematical Analysis, Addison-Wesley, 2nd Edition, 1974
10. Thomas, George Brinton, Maurice D. Weir, Joel Hass, and Frank R. Giordano. calculus. Addison-Wesley, 2005.
11. Kreyszig, Erwin, Advanced engineering mathematics, 12th Edition, Wiley.
12. Mathematical Statistics, J. N. Kapur & H. C. Saxena.
13. Probability and Statistics for Engineers, Irwin Miller & John E. Freund.
14. Elements of Probability and Statistics, A. P. Baisnab & M. Jas.
15. Statistics, Schaum's Outlines, M. R. Spiegel & L. J. Stephens.
16. Probability and Statistics, Schaum's Outlines, M. R. Spiegel, J. J. Schiller, R. A. Srinivasan.

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PHYSICS

	Module	Lecture Required
1.	Mechanics	02
2.	Mechanical Properties of Solids and Fluids	03
3.	Waves and Oscillations, Electricity and Magnetism	05
4.	Optics, Semiconductor Electronics	04
5.	Modern Physics, Atomic and Nuclear Physics	04
	TOTAL	18

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Syllabus

1. Classical Mechanics: Centre of Mass, Motion of Centre of mass, Pure Translational and Rotational motion, Torque and angular momentum, Principle of moments (Moment of Inertia), Radius of Gyration, Generalized Motion, Kinematics of rotational motion about a fixed axis.

2. Mechanical Properties of Solids and Fluids: Elastic behaviors of solids, Hooke's Law, Young's Modulus, Shear Modulus, Bulk Modulus, Applications of Elastic behaviors of materials, Compressibility, Viscosity, Relative density, Pascal's Law, Streamline Flow, Bernoulli's Principle, Surface Tension, Drops and Bubbles

3. Waves and Oscillations: Rectilinear motion, Oscillations or Vibrations, Simple Harmonic Motion, Damped Harmonic motion: Real oscillatory system, Forced or Driven oscillation, TYPES OF WAVES, Superposition of Waves, Reflection and Refraction, Standing Waves and Normal Modes, Beats, Resonance, Doppler's Effect

4. Electricity and Magnetism: Physical concepts of gradient, divergence, and curl; Laplacian operator, Concept of electricity and magnetism, Coulomb's law, Electrostatics, Magneto statics, The Lorentz force, Maxwell's equations

5. Electromagnetic Signal: Introduction to Maxwell's equations, The dynamical magnetic field, The dynamical electric field, Electromagnetic Waves

6. Wave Optics: Interference of light, Photons, Young's Double Slit Experiment, Huygens's Principle, Diffraction, Diffraction Grating, Polarization

7. Semiconductor Electronics: Classification of metals, conductors and semiconductors, Fermi Level, Intrinsic Semiconductor, Extrinsic Semiconductor, p-n junction, Semiconductor Diode, Half-Wave Rectifier, Full -Wave Rectifier, Zener diode, Photodiode, Light emitting diode, Junction Transistor

8. Modern Physics: Wave nature of light, Particle nature of light: the photon, De Broglie Hypothesis, Experimental confirmation of de Broglie hypothesis (Davisson and Germer's Experiment)

9. Atomic and Nuclear Physics: Matters, Atoms, Atomic Theory: Atomic Theory by John Dolton, Atomic Theory by J. J Thompson, Atomic Theory by Ernest Rutherford, Atomic Theory by James Chadwick, Discovery of the Neutron, Bohr's Postulates, Proton, Neutron, Electron, Limitations of Bohr's Theory

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COMPUTER PROGRAMMING

Sl. No.	Module	Lecture Required
1.	Programming Language Concepts	02
2.	Principles of Operating Systems	02
3.	Programming, Data Structures, and Algorithms	04
4.	Foundations of Computer Science	02
5.	Computational Problem Solving (using Python and C)	05
	TOTAL	15

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SYLLABUS

Programming Language Concepts

Conceptual study of programming language syntax, semantics and implementation. Course covers language definition structure, data types and structures, control structures and data flow, run-time consideration, and interpretative languages.

Principles of Operating Systems

Organization of operating systems covering structure, process management and scheduling; interaction of concurrent processes; interrupts; I/O, device handling; memory and virtual memory management and file management.

Programming, Data Structures, and Algorithms

Intensive introduction to computer science principles: a programming language such as Java; programming design techniques; introductory data structures (linked lists, stacks, sets, trees, graphs); and algorithms (sorting, searching, etc.) and their analysis. Programming assignments are included.

Foundations of Computer Science

Introduction to the concepts of iteration, asymptotic performance analysis of algorithms, recursion, recurrence relations, graphs, automata and logic, and also surveys the main data models used in computer science including trees, lists, sets, and relations. Programming assignments are given.

Computational Problem Solving using C and Python

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CHEMISTRY

CHEMISTRY		
	Module	**Lectures**
1	Coordination Chemistry / Chemical Kinetics	3
2	Material Chemistry	2
3	Thermodynamics and Equilibrium	3
4	Basics of Electrochemistry	2
5	Polymer Chemistry	3
6.	Inorganic Chemistry	2
	Total	15

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COMMUNICATION SKILLS

Sl. No.	Module	Lecture Required
1.	Spoken Communication	01
2.	Non-Verbal Communication	01
3.	Listening Skills	01
4.	Personal Appearance and Presentation	02
	TOTAL	05

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B.DES – INTERIOR DESIGN

SL. NO.	COURSE	NO. OF HOURS
1.	FREEHAND DRAWING AND SKETCHING:	15
2.	COLOR THEORY AND PAINTING:	15
3.	BASIC MATH:	06
4.	SCALE AND MEASUREMENT:	10
5.	DESIGN THINKING:	15
6.	VALUE AND ETHICS:	02
7.	QUIZ AND TALENT SHOWCASE:	05
8.	MOTIVATIONAL LECTURES	03
9.	CREATIVE ARTS / DESIGN THINKING	15
10.	APTITUDE TEST	04
	TOTAL HOURS	90

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SYLLABUS

Freehand Drawing and Sketching:
Tools : Types of pencils , Types of drawing papers and sizes , Drawing boards , Stands,
Objects : Human figures, Trees , Landscape , Fruits , Still life , Water , Perspective and 3 dimension
Exercise 1 – Drawing of Human figure
Exercise 2 - Drawing of Trees
Exercise 3 – Drawing of Still life

COLOR Theory and Painting:
Color in nature, color wheel, Primary colors, Secondary Colors, Complimentary colors, Hue, Saturation, Color formation in pigments
Canvas, Watercolor, Acrylic Color, Oil paint, Brushes sizes and material. Palette mixing and layering of colors.
Exercise 1 – Color Wheel
Exercise 2 - Painting of Fruits
Exercise 3 – Painting of Landscape

Basic Math:
Differential Equation , Integration , Equation solution ,Trigonometry

Scale and Measurement:
Drawing Units, Types of scales for drawing, Units of measurement, Conversion of units, Measured drawing, Anthropometrics, Ergonomics
Exercise – 1 – Drawing of Geometric figures to scale
Exercise -2 - Measured Drawing of a Table

Design Thinking:
Representation of Objects , Harmony ,Contrast , Scale , Direction ,pattern , Texture , Product Form development , Composition , Typography , Digital tools , software

Value and Ethics:
Value system , Culture , Behaviour

Quiz and Talent Showcase:
Architects, Designers, Buildings, Paintings, Artwork, Sculpture, Icons of the society ,General Knowledge
Showcase of extra-curricular activities
Motivational Lecture:
Lectures by Artists , Architects Designers

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B.DES FASHIION DESIGN BRIDGE COURSE

S.NO	NAME OF THE COURSE	HOURS
1	FASHION INDUSTRY -INTRODUCTION	6
2	FREE HAND DRAWING	15
3	PENCIL SHADING /STROKES	10
4	SKETCHING/ CONCEPTUAL SKETCHING	12
5	IMAGINATION & VISUALIZATION	10
6	PROJECT PREPARATION & PRESENTATION	6
7	COLOR PSYCHOLOGY	5
8	HAND CRAFT	6
9	PROPORTION & SCALING	6
10	LIFE STUDY DRAWING	8
11	COMMUNICATION SKILLS	4
12	GUEST LECTURES /MOTIVATIONAL TALKS	2
	TOTAL	90

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B. ARCH BRIDGE COURSE

S.NO	NAME OF THE COURSE	HOURS
1	FREEHAND DRAWING AND SKETCHING	15
2	COLOR THEORY AND PAINTING	15
3	BASIC MATHS	6
4	SCALE AND MEASUREMENT	10
5	DESIGN THINKING GRAPHIC /PRODUCT / FORM / COMPOSITION	15
6	VALUE AND ETHICS	4
7	QUIZ AND TALENT SHOWCASE	10
8	MOTIVATIONAL LECTURE	2
9	COMMUNICATION SKILLS	6
10	YOGA AND MEDITATION	2
11.	GUEST LECTURE BY ARCHITECTS	5
	TOTAL	90

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