

Bridge Course Guideline

1. Bridge Course [For students admitted in B. Tech. I Year 2021-22 and onwards but lacking Physics or Mathematics in their 10+2 level]

It will be an audit course for all UG Engineering & Technology students admitted to B. Tech. I Year session 2021-22 and onwards who do not have Physics or Mathematics in their 10+2 level. There will be no marks awarded, but students must complete these courses in order to bridge subjects such as Mathematics and Physics for students from a variety of backgrounds and meet the program's desired learning aims.

2. Guidelines for Evaluation of Bridge Course

According to the APH AIY 2021-22 and General Instructions for REAP-2021, B. Tech. I Year students (who do not have Physics or Mathematics in their 10+2 level) must pass a Bridge Course to be admitted to Engineering and Technology (UG Courses):

S. No.	Course Code	Course Title	Applicable for the students admitted in B. Tech. I Year and not opted the following subject in 10+2 Level
1	FYBC-01	Basic Physics	Physics
2	FYBC-02	Basic Mathematics	Mathematics

- a. The Bridge Course shall be an audit course with internal assessment only, the award of which shall not be counted for the overall B. Tech. Course credit and percentage. However, the grades will be reflected in the mark sheet of the student.
- b. The above courses may be completed through classroom teaching/ equivalent Massive Open Online Courses (MOOCs) or Certification Course (to be decided by the Institute), as per RTU guideline.
- c. Institutes/Colleges have to arrange classes as per RTU syllabus at their own level.
- d. This Bridge Course will be implemented from the I Semester. The students have to clear the Bridge Course preferably during the first year.
- e. The Bridge Course will be evaluated on the basis of Internal Assessment to be conducted by the Host Institute before the End term Examination of that semester.
- f. For passing the Bridge Course, candidate must obtain at least Grade D as per RTU norms.
- g. The above bridge courses are mandatory for all the students who have not opted Physics or Mathematics in 10+2 Level.

3. Question Paper pattern for Bridge Course Exam (For the courses opted as classroom teaching)

Maximum Marks =100

Bridge Course Subjects	Exam (Hours)	Mid Term Exam (30%)	Final Theory Exam (70%)	Total Maximum Marks
	3 hours	30	70	100

Exam Duration	Final Theory Exam Max. Marks (70)		
	3 Hours	Part A	10/10
Part B		5/7	5x4=20
Part C		3/5	3x10=30

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- a. Part-A will contain 10 questions, covering full syllabus of 2 marks each. Word limit for answer is 25 words.
- b. Part-B will contain 5 out of 7 questions of 4 marks each. Word limit is 100 words.
- c. Part-C will contain 3 out of 5 questions of 10 marks each. Questions will be based on Problem Solving skills.

B. Tech. I Year-BRIDGE COURSE

For all students admitted in B. Tech. I Year 2021-22 and onwards but lacking Physics or Mathematics in their 10+2 level

S.No.	Course Code	Course Title	Hours			Marks		
			L	T	P	MT	FTE	Total
1	FYBC-01	Basic Physics	2	1	-	30	70	100
2	FYBC-02	Basic Mathematics	2	1	-	30	70	100

Bridge Course

L= Lecture, P = Practical, MT=Mid Term, FTE = Final Theory Exam

4. Syllabus for Bridge Course:

FYBC-01: Basic Physics

S.No.	Contents	Hours
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	03
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	04
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	04
4.	Electricity and Magnetism: Physical concepts of gradient, divergence, and curl; Laplacian operator, Concept of electricity and magnetism, Coulomb's law, Electrostatics, Magnetostatics, The Lorentz force, Maxwell's equations	03
5.	Electromagnetic Signal: Introduction to Maxwell's equations, The dynamical magnetic field, The dynamical electric field, Electromagnetic Waves	03
6.	Wave Optics: Interference of light, Photons, Young's Double Slit Experiment, Huygens's Principle, Diffraction, Diffraction Grating, Polarization	03
7.	Semiconductor Electronics: Classification of metals, conductors and semiconductors, Fermi Level, Intrinsic Semiconductor, Extrinsic Semiconductor, $p-n$ junction,	03

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	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)	02
9.	Atomic and Nuclear Physics: Matters, Atoms, Atomic Theory: Atomic Theory by John Dalton, 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	03
	Total	28

Suggested Readings:

1. NCERT Physics Text book Part I for Class XI <https://ncert.nic.in/textbook.php?keph1=0-8>
2. NCERT Physics Text book Part II for Class XI <https://ncert.nic.in/textbook.php?keph2=0-7>
3. NCERT Physics Text book Part I for Class XII <https://ncert.nic.in/textbook.php?leph1=0-8>
4. NCERT Physics Text book Part II for Class XII <https://ncert.nic.in/textbook.php?leph2=0-6>
5. AICTE Module for Bridge Course in Physics
<https://www.aicte-india.org/sites/default/files/final%20physics.pdf>

FYBC-02: Basic Mathematics

S. No.	Contents	Hours
1.	Set Theory, Relations and Functions: Set Theory: Definition and Representation, Types of Sets, Operation on Sets. Relations: Definition, Types of Relations, Partial order and Equivalence Relations. Functions: Definition and classification, Types of functions, Composition and Inverse of functions	03
2.	Differential and Integral Calculus: Limits, Continuity, Differentiability, Rolle's Theorem, Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem, Riemann Integrals, Partitions, Darboux Upper Sum and Lower Sum, Upper and Lower Riemann Integral, Condition for integrability.	03
3.	Matrices and Determinants: Types of Matrices, Operations on Matrices, Determinants and Cofactors, Inverse of a Square Matrix, Rank of Matrix, Elementary row / column operations, System of Linear Equations.	04
4.	Complex Number: Definition of complex numbers, Concepts of modulus / absolute value, Disks and Neighbourhoods, Open Sets, Annulus, Domain, Regions, Bounded sets, Complex functions, Limit of Complex Functions, Continuity of Complex Functions and properties.	03
5.	Differential Equations : Definition, Order and Degree of a differential Equation, formation of differential equations of first order, differential equations reducible to linear form, exact differential equation, integrating factor, inspection method, differential equations of the first order but not of the first degree, equations solvable for dy/dx , Equations solvable for x , equations solvable for x , Clairaut's equation, initial value problem	05
6.	Analytical Geometry & Vector Algebra: Polar equation of Conics, definition of polar coordinates, relating polar and cartesian coordinates, Conic section, Conic section in polar coordinates, Change of order of integration in triple integral, triple integral in cylindrical & spherical coordinate system, Volume/ Triple integrals. Vector Algebra: Scaler point function, Vector point function, Definition of level surface, Directional Derivative, Gradient, Divergence and Curl, gradient of a scaler function, divergence of a vector function, curl of a vector function. Surface area of a closed and	04

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	bounded region on the surface of $f(x,y,z)=c$, surface integrals and properties.	
7.	Trigonometry: Generation of Angles, Vertex, Quadrants, Quadrantal and Co-terminal angles, Measurement of angles, different systems, Trigonometrical ratio and function, Basic Identities, Inverse Trigonometric Functions.	02
8.	Probability: Random experiment, Sample space, Events, Classical definition of probability, Statistical (or empirical or frequency) definition of probability, additive law of probability (Theorem of total probability), conditional probability, independent event, Bayes' theorem, random variables, Distribution function, discrete probability distributions, Binomial Probability Distribution.	02
9.	Statistics: Central Tendency, Measures of Central Tendency Dispersion, Measures of Dispersion, Standard deviation and Root mean square deviation.	02
	Total	28

Suggested Readings:

1. Mathematics Text Book for Class XI, NCERT
2. Mathematics Text Book for Class XII, Part-I & II, NCERT
3. AICTE Module for Bridge Course in Mathematics
<https://www.aicte-india.org/sites/default/files/final%20maths.pdf>

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