Jabalpur Engineering College, Jabalpur

(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)

(AICTE Model Curriculum Based Scheme)

Bachelor of Technology (B.Tech.) I Semester (EE/EC/IP/IT/AI&DS Group B)

w.e.f. July 2023

S.No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours Per Week			Total Credits
				Theory			Practical						
				End. Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Lab Work		L	T	P	
1	BT21	BSC	Engineering Physics	70	20	10	30	20	150	3	-	2	4
2	BT12	BSC	Mathematics-I	70	20	10	-	-	100	3	1	-	4
3	BT23	ESC	Computer Programming and Problem Solving	70	20	10	30	20	150	3	-	2	4
4	BT24	ESC	Basic Mechanical Engineering	70	20	10	30	20	150	3	-	2	4
5	BT25	ESC	Basic Civil Engineering	70	20	10	30	20	150	3	-	2	4
6	BT26	HSMC	Language Lab	-	-	-	30	20	50	-	-	2	1
			Total	**350**	**100**	**50**	**150**	**100**	**750**	**15**	1	**10**	**21**
7	BT18	MC	Induction Program of first three weeks	Physical activity, creative arts, universal human values, Literary proficiency Modules, Lectures by Eminent People, visits to local areas, Familiarization to department/ branch & innovation.									
8	BT19	MC	NSS/NCC/Swatchhata Abhiyan/Rural Outreach	Qualifier									

1 hour lecture (L) = 1 credit	1 hour Tutorial (T) = 1 credit	2 hour Practical (P) = 1 credit

BSC: Basic Science Course, ESC: Engineering Science Course, HSMC: Humanities & Social Sciences including Management Course, MC: Mandatory Course,

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Jabalpur Engineering College, Jabalpur

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(AICTE Model Curriculum Based Scheme)

Bachelor of Technology (B.Tech.) I / II Semester (All Branches)

COURSE CONTENTS

w.e.f. July 2024

SUBJECT CODE	CATEGORY CODE	SUBJECT NAME	MAXIMUM MARKS ALLOTTED					HOURS/ WEEK			CREDITS
			THEORY			PRACTICAL		L	T	P	
BT 21	BSC	ENGINEERING PHYSICS	END. SEM	MID. SEM	QUIZ/ ASSIGNMENT	END SEM	LAB WORK	3	-	2	4
			70	20	10	30	20				

DETAILED SYLLABUS

MODULE I:

Electrodynamics & Semiconductors: Gradient, Divergence and Curl, Gauss Divergence Theorem, Stokes theorem. Introduction to Dielectrics, Electric Polarization P, Displacement vector D, Relation between D, E and P.

Semiconductors: Free electron theory of metals, Fermi level of Intrinsic and extrinsic semiconductors, density of states, Bloch's theorem for particles in a periodic potential, Kronig- Penney model (no derivation) and origin of energy bands, V-I characteristics of PN Junction, Zener diode, solar cell, Hall effect.

MODULE II:

Quantum Mechanics: Basic Ideas of quantum mechanics. de Broglie's hypothesis. Davisson and Germer experiment. Group & Phase velocity, Heisenberg's Uncertainty principle, Compton Effect: Wave function (ψ) and its physical significance. Schrödinger Time Dependent & Time Independent wave equation. Application of Schrödinger wave equation: Particle in one dimension box.

MODULE III:

Optics: Interference on the basis of Division of wavefront (Fresnel Biprism) and Division of amplitude (Interference in Thin films & Newton's Rings). Michelson Interferometer. Diffraction of light, Diffraction at Single-Slit. Plane Transmission grating (PTG). Concept of Polarized light, Brewster's law, Nicol Prism.

MODULE IV:

Nuclear Physics: Static properties of Nucleus. Liquid Drop Model and Semi-empirical mass formula. Particle Accelerators: Linear Accelerator (LINAC), Cyclotron, Betatron. Geiger Muller counter and Bainbridge mass spectrograph.

Nano Technology: Elementary ideas about Nano science & Nano Technology and its applications in science and engineering.

MODULE V:

Laser: Einstein's coefficients, Principle and properties of Laser. Construction, working, energy level diagram and applications of Ruby Laser, He-Ne Laser, CO_2 and Semiconductor Laser. Laser Speckle phenomenon.

Fiber Optics: Fundamental ideas and applications of optical fiber, Types of Optical Fiber on the basis of mode, material and refractive index. Propagation of signal into optical fiber, Numerical aperture & V-number of an optical fiber, Dispersion in optical fibers. Losses in optical fibers.

16/8/24

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HOD Physics

REFERENCE BOOKS:

1. *Concepts of Modern Physics by Arthur Beiser*
2. *Fundamentals of Physics by Resnick, Halliday & Walker*
3. *A Text Book of Engineering Physics by Navneet Gupta. & S.K.Tiwary*
4. *Introduction to Astrophysics by Baidyanath Basu (PHI)*
5. *Introduction to Nanoscience and Nanotechnology by K.K.K Chattopadhyay & A.N. Banerjee (PHI)*
6. *Engineering Physics by R K Gaur & S L Gupta (Dhanpat Rai Publication).*

LIST OF EXPERIMENTS:

1. To determine refractive index (μ) of the material of given prism.
2. To determine the dispersive power (ω) of a prism.
3. To determine the grating element (e) of a plane transmission grating (PTG).
4. To determine the wavelength of green light using PTG and spectrometer.
5. To determine the wavelength of red light using diode laser through PTG.
6. To determine radius of curvature of a Plano convex lens using Newton's ring method.
7. To draw graph between RI and wavelength for light of different wavelengths using Hg vapor lamp and spectrometer and verify the Cauchy's formula.
8. To determine the resolving power of a PTG.
9. To determine the energy band gap (Eg) of a semiconductor using a junction diode.
10. To determine the resolving power of telescope.
11. To plot the V-I characteristics of P-N junction diode.
12. To plot the V-I characteristics of Zener diode.
13. To plot the V-I characteristics of NPN transistor.
14. To plot the V-I characteristics of LED.
15. To study of preparation of nano materials.
16.

Course Outcomes (CO):

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

1. Solve the problems of electrodynamics & semiconductors used in various related applications.
2. Apply principles of quantum mechanics at microscopic level.
3. Analyze principles of optics towards the optical applications.
4. Apply concept of nanotechnology in various fields and the problems related to nuclear physics.
5. Analyze features of laser system and optical communication system.

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Mapping of Course Outcomes (COs) with Program Outcomes (POs)
Engineering Physics (BT 21)

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	02	01	01	-	01	01	01	-
CO2	01	02	01	01	-	-	-	-
CO3	02	01	-	-	-	-	-	-
CO4	02	01	1	-	-	-	01	-
CO5	01	-	-	-	-	-	01	-

The **above-mentioned** scheme and syllabus is approved here with:

Programme Educational Objectives (PEOs) of the Engineering Physics

1. To identify, formulate, create, analyze, design, develop and optimize various problems related to various fields of physics through basic knowledge.
2. To the industry by applying the skills and knowledge acquired during the course period.
3. To be prepared for the successful pursuit of graduate studies and shall have abilities to engage in lifelong learning in various field and will understand the challenges of a dynamically and globalised changing world adapting their skills through continuous I earning and self improvement.
4. To demonstrate the ability of gauging the impact of science on society, and possess knowledge of the ethical, social and professional implications/responsibilities of their work.
5. To inculcate a sense of ethics, professionalism and effective communication skills amongst Engineering graduates.

Program Outcomes (POs) of the Engineering Physics course

Program Outcomes (POs) of the Engineering Physics course in B.Tech. are as follows: Engineering Physics course in B. Tech. has been design to generate the following skills and abilities amongst the students as stated under (i) through (v)

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below in conformity with PEOs. After the completion of the course, students will be able to:

1. *Apply the concepts of fundamental Physics in their respective fields*
2. *Design and conduct experiments in the relevant areas of physics and as well as to analyze and interpret the results*
3. *Identify, formulate and solved physical problems related to engineering*
4. *Communicate effectively*
5. *Understand the impact of engineering physics in a global, economic, environment and social context*
6. *Use* fundamental techniques and skills of physics in modern engineering

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(AICTE Model Curriculum Based Scheme and Syllabus)

Bachelor of Technology (B.Tech.) I Semester (Common to all Disciplines)

COURSE CONTENT **w.e.f. July 2023**

Subject Code	Subject Name	Maximum marks Allotted			Total marks	Hours/Week			Total Credit
BT12	MATHEMATICS-I	Theory				L	T	P	
		End Sem	Mid-Sem Exam	Quiz/ Assignment	100	3	1	0	4
		70	20	10					

Module 1: Calculus-I (08 hours)

Rolle's theorem, Mean value theorem, Expansion of functions by Maclaurin's and Taylor's theorem, Partial differentiation, Homogeneous functions, Euler's theorem, Maxima and Minima of two variables, Method of Lagrange's multipliers.

Module 2: Calculus-II (08 hours)

Definite integral as limit of a sum, Application in summation of series, Double integrals, Change of order of integrals, Triple integrals, Length of curves, Area and Volume of surfaces using double and triple integrals, Beta and Gamma functions and their properties.

Module 3: Sequences, Series and Laplace Transform (10 hours)

Convergence of sequence and series, Tests for convergence; Power series, Taylor's series, series for exponential, Trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem. Laplace Transform, Inverse Laplace transform.

Module 4: Matrices (06 hours)

Rank of Matrix, Solution of simultaneous equations by elementary transformation and consistency of equations, Eigen values and Eigen vectors, Cayley-Hamilton theorem and its application to find the inverse of matrix, Diagonalisation of matrices.

Module 5: Vector Space (08 hours)

Vector Space, Linear dependence of vectors, Basis, Dimension; Linear transformations (maps) range and kernel of a linear map, Rank and Nullity, Inverse of a linear transformation, Rank-Nullity theorem, composition of linear maps, Matrix associated with a linear map.

Books References:

1. G.B. Thomas and R.I. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006
3. Veerarajan T, Engineering Mathematics for first year. Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V. Higher Engineering Mathematics, Tata McGraw-Hill, New Delhi. 11th Reprint. 2010.
5. D. Poole, Linear Algebra: A modern Introduction, 2nd Edition, Books/Cole, 2005.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publisher, 36th Edition. 2010.

Course Outcomes:

At the end of the course the students will able to:

1. Apply differential and integral calculus to notions of curvature and to improper integrals.
2. Understand basic knowledge of Beta and Gamma functions , functions of several variables.
3. Apply the fallouts of Rolle's Theorem of analysis to Engineering problems.
4. Determine the tool of power series and Fourier series, Laplace transform for learning advanced Engineering Mathematics.
5. Solve various problems using matrices and linear algebra in a comprehensive manner.

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B. Tech. I/II Sem. (Computer Science & Engineering)

Subject code	Subject Name	Maximum Marks Allotted						Hours/Week			Total Credits
		Theory			Practical			L	T	P	
		End Sem	Mid Sem Exam	Quiz, Assignment	End Sem	Lab Work	Total Marks				
BT23	**Computer Programming and Problem Solving**	70	20	10	30	20	150	3	0	2	4

Course Contents:

Module I: Computer Hardware - Block diagram of computer Hardware, Software , Firmware. Type of software, General function of CPU, ALU, Control unit and memory, Type of memory, Motherboard and BIOS, Understanding the Boot Process.

Module II: Introduction to algorithm and Flowchart, Generations of Programming Languages, Introduction to Programming. History of C , Characteristics of C, C Program Structure , Constants, Data types, Variables, Keywords ,Console Input/Output Statements, Compiling, linking and executing C programs.

Module III: Operators and expressions: arithmetic, Unary, Assignment, Relational, Logical & Conditional, Type Casting. Branching Statements - if Statement, switch Statement. Looping Statements - for, while, do-while loop Jump statement- goto, continue and break. Arrays- Array Concepts, Rules & Restrictions, Single & Multi-Dimensional arrays.

Module IV: Functions- Types of Functions, Built-in Functions, Function definition, Function Prototypes, Function calls. Storage classes & Scope of Variables. Strings- String manipulation functions. Structures-Defining New Data types, Unions, Enumerated Data types, Static Variables.

Module V: Pointers-Pointer Concepts, Pointers and Functions, Pointers and Arrays, Array of Pointers Static Initialization, Pointers and Structures, Dynamic Memory Allocation and Data Structures- sizeof(), malloc(), calloc(), realloc() and free()

Suggested Books:

1. C Programming Language by Karnighan & Ritchie, TMH publications.
2. Let us 'C' by Yashwantkanetkar, BPB publications
3. Fundamentals of Computers by E Balagurusamy, TMH publications

Computer Programming and Problem Solving (BT23)
Course Outcomes:

CO1: Explain hardware, software, booting process, types of statements in C language such as 1/0, branching and looping etc.

CO2: Describe various ingredients of C program such as constants, variables, keywords. data types, header files, functions. pointers and dynamic memory allocation functions.

CO3: Compose C program to solve simple arithmetic and logical problems.

CO4: Compose C program using arrays, pointers, functions and structures ete.

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Bachelor of Technology (B.Tech.) I/II Semester (All Branches)

COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab Work		L	T	P	
BT24	Basic Mechanical Engineering	70	20	10	30	20	150	3	-	2	4

Course objective:

1. To familiarize with the basics concepts of mechanical engineering.
2. To familiarize with the scope of mechanical engineering.
3. To familiarize with the job prospects of mechanical engineering.

Course contents:

Module-I

Materials: Classification of engineering material, composition of cast iron and carbon steels, Alloy steels their applications. Mechanical properties of materials (strength, hardness, toughness, ductility, brittleness, malleability etc), tensile test stress-strain diagram of ductile and brittle materials, Hooks law and modulus of elasticity, Hardness and impact testing of materials, BHN etc.

Module-II

Measurement: concept of measurements, error in measurement, temperature, pressure, velocity, flow, strain, force and torque measurement, Vernier calliper, micrometer, dial gauge, slip gauge, sine-bar and combination set.

Module-III

Fluids: fluid properties pressure, density and viscosity etc. types of fluids, Newton's law of viscosity Pascal's law, Bernoulli's equation for incompressible fluid, working principle of Hydraulic machines.

Module-IV

Thermodynamics: thermodynamic system, properties, state, process, Zeroth, First and Second law of thermodynamics, thermodynamic processes at constant pressure, constant volume, enthalpy & entropy.

Steam engineering: classification and working of boilers, mounting and accessories of boilers, efficiency and performance analysis, natural and artificial draught, introduction to steam properties.

Module-V

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Reciprocating Machines: - Working principal of steam engine, Carnot, Otto, diesel and dual cycles, P-V & T-S diagram and its efficiency, working of two stroke & four stroke petrol & diesel engines, working principle of compressor.

Evaluation:

Evaluation will be continuous and integral part of the class as well as through external assessment.

Reference Books:

1. Kothandaraman & Rudramoorthy, Fluid Mechanics & Machinery, New Age.
2. Nakra & Chaudhary, Instrumentation and Measurements, TMH.
3. Nag, P.K Engineering thermodynamics, TMH.
4. Ganesan, internal Combustion Engines, TMH.
5. Agrawal C.M Basic Mechanical Engineering, Wiley Publication,
6. Achuthan M, Engineering Thermodynamics, PHI.

Course outcomes:

At the completion of this course, students will be able to

CO1	Classify the Engineering materials and their mechanical properties.
CO2	Outline the basics of thermodynamics and boilers.
CO3	Illustrate the working of internal combustion engines.
CO4	Illustrate various machine tools and production processes.

Mapping of the course outcomes (COs) with program outcomes (Pos):

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1											
CO2	2	1										
CO3	2	1										
CO4	2	1										

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Basic Mechanical Engineering Lab

List of suggestive core Experiments:

Theory related eight to ten experiments including core experiments as follows:

1. Study of UTM and perform tensile test on it.
2. Verification of Bernoulli's Theorem
3. Linear and angular measurement using, micrometer, slip gauge, dial gauge and sine bar.
4. Study of different types of boilers and mounting.
5. To find COP of a Refrigeration unit.
6. Study of different IC Engines.
7. Study of lathe & drill machines.

Evaluation:

Evaluation will be continuous and integral part of the class followed by the final practical examination as well as through external assessment.

Course outcomes: Laboratory

At the completion of this course, students will be able to

CO1	Demonstrate working of petrol and diesel engine.
CO2	Explain testing of mechanical properties of materials.
CO3	Classify various types of boilers.

Mapping of the course outcomes (COs) with program outcomes (Pos):

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2								1			
CO2	2	1							1			
CO3	1								1			

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Bachelor of Technology (B.Tech.) I/II Semester (Civil Engineering)

COURSE CONTENTS **w.e.f. July 2023**

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/ Week			Total Credits
		Theory			Practical						
		End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
BT25	Basic Civil Engineering	70	20	10	30	20	150	3	-	2	4

PART A-BUILDING MATERIALS & CONSTRUCTION

MODULE-I

Types, properties, test & uses of: Stones, bricks, cement, lime, timber. Laboratory tests of concrete and mortar materials, workability, strength properties of concrete, nominal proportion of concrete, preparation of concrete, compaction, curing.

PART B-SURVEYING

MODULE-II

Introduction to surveying, Various Instruments used in Surveying, Measurement of distances-conventional and EDM methods, Types of Chain, Tape, Correction, Measurement of Horizontal angles, Prismatic and Surveyor's Compass, Bearing, Traversing, Included angle, Magnetic declination, Local Attraction

MODULE-III

Measurements of Elevation, Types of leveling, Rise and Fall method, Height of Instrument method, Reciprocal leveling, Contours, Properties of Contour, Measurement of Area and Volume, Simpson's rule, Trapezoidal rule

PART C-ENGINEERING MECHANICS

MODULE -IV

Forces and Equilibrium: Graphical and Analytical treatment of concurrent and non concurrent co-planar forces, free body diagram, Force diagram and Bow's notations, Application of Equilibrium Concepts. Analysis of plane trusses: Method of Joints, Method of sections, Friction force in equilibrium problems.

MODULE-V

Moment of Inertia of area and mass, centre of gravity, centroid, Radius of Gyration, Introduction to product of Inertia and Principle Axes. Support Reactions in beams. Shear force and bending

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moment Diagram for Cantilever & simply supported beam with concentrated load, distributed load and couple.

Reference Books

1. S. Ramamrutam & R Narayanan Dhanpat Rai Pub. By "Basic Civil Engineering"
2. Prasad I.B. by Applied Mechanics Khanna Pub.
3. Punmia B.C. Surveying Standard book Depot.
4. S.P. Timoshenko, Mechanics of Structure, East West Press Pvt. Ltd.
5. Surveying by Duggal- Tata McGraw Hill New Delhi
6. Building Construction by S.C. Rangwala Charotar Pub. House Anand
7. R.K. Rajput, Engineering Mechanics S. Chand & Co.

COURSE OUTCOMES (COs)

After completion of this course the students will be able to

CO1. Summarize properties and uses of building materials, contours, Remote sensing & its applications.

CO2. Calculate resultant forces, axial forces in simple truss, shear force, bending moment, centre of gravity, moment of inertia, horizontal & vertical distances and angles using different survey instruments, area & volume

CO3. Draw SFD & BMD for simply supported and cantilever beam.

List of Experiments-

1. Determine the magnitude of resultant force using law of polygon of forces and compare the result with analytical and graphical method.
2. Determine the coefficient of friction between the two given surfaces and find the weight of box.
3. Find the coefficient of friction between drum and cord.
4. Determine the modulus of Elasticity of mild steel and timber using simply supported beam.
5. Determine the modulus of inertia of a closed coiled helical spring.
6. Find the forces in the members of a simple jib crane and compare them with analytical and graphical method.
7. Draw the location of given points on a medium size field using chain survey.
8. Complete closed traverse and surrounding offsets by prismatic compass.
9. Determine reduced level of 10 stations by Auto level/Dumpty level.

Course Outcomes

After completion of this course the students will be able to

1. Measure horizontal & vertical distances and angles using different survey instruments.
2. Verify law of polygon of forces
3. Determine material properties of different building material, coefficient of friction, modulus of elasticity, moment of inertia.

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Bachelor of Technology (B.Tech.) I& II Semester

Common for all disciplines

Course Content

Subject Code	Subject Category	Subject Name	Maximum Marks Alloted					Total marks	Hours per week	Total Credits
			Theory			Practical				
			End Sem	Mid-Sem	Quiz/ Assignment	End Sem	Lab Work			
BT26	HSMC	Language Lab	-	-	-	30	20	50	2	1

(1). Introduction to sounds of English, Phonetics symbols: Vowels and Consonant sounds (2) Self-introduction (3). Interview Skills(4). Group Discussion(5) Story Telling (6) elocution.(7) Extempore. Students will be trained in the four basic skills viz. speaking, listening, reading, and writing.
The final assessment will be based on assignments, group discussions, storytelling, elocution/extempore given by each student

Course Outcomes:
Upon completing this course, students will have improved pronunciation, confident self-introduction skills, effective interview techniques, and the ability to actively participate in group discussions. They will enhance their storytelling and elocution abilities, develop confidence in impromptu speaking, and achieve balanced proficiency in speaking, listening, reading, and writing, ensuring readiness for various assessments.

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