ACE
Engineering College
An AUTONOMOUS Institution
Ghatkesar, Medchal (Dist), Hyderabad, Telangana State – 501 301
(NBA Accredited B.Tech Courses Accredited NAAC with A Grade 3.20 CGPA)
Phone: 9133308533, 468, website: www.aceec.ac.in

DEPARTMENT OF CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

COURSE STRUCTURE

IYear				I Semester			
S.No.	Course Type	Course Code	Course Title	Periods Per Week			Credits
				L	T	P	
1	BSC	MA101BS	Mathematics - I	3	1	0	4
2	BSC	PH102BS	Applied Physics	3	1	0	4
3	ESC	CS103ES	Programming for problem Solving	3	1	0	4
4	ESC	ME104ES	Engineering Graphics	1	0	4	3
5	BSC	PH105BS	Applied Physics Lab	0	0	3	1.5
6	ESC	CS106ES	Programming for problem Solving Lab	0	0	3	1.5
7	MC	MC107ES	Environmental Science	3	0	0	0
8	MC	MC108	Business English	2	0	0	0
			Induction Programme				
Total				**15**	**3**	**10**	**18**

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MA101BS: MATHEMATICS – I

(Linear Algebra and Calculus)

(Common to CE, EEE, ME, ECE, CSE, IT, IOT, AI&ML, DSE)

B.Tech. I Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
MA101BS	BSC	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

Prerequisite: Mathematical Knowledge of 12th / Intermediate level

Course Objectives: To learn

- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
- Concept of Sequence.
- Concept of nature of the series.
- Geometrical approach to the mean value theorems and their application to the mathematical problems
- Evaluation of surface areas and volumes of revolutions of curves.
- Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative
- Finding maxima and minima of function of two and three variables.

Course Outcomes: After learning the contents of this paper the student must be able to

- Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations
- Find the Eigen values and Eigen vectors
- Reduce the quadratic form to canonical form using orthogonal transformations.
- Analyse the nature of sequence and series.
- Solve the applications on the mean value theorems.
- Evaluate the improper integrals using Beta and Gamma functions
- Find the extreme values of functions of two variables with/ without constraints.

Unit: I Matrices

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and

Non-Homogeneous equations. Gauss elimination method; Gauss Seidel Iteration Method.

Unit: II	Eigen values and Eigen vectors

Eigen values and Eigen vectors:Linear Transformation and Orthogonal Transformation: Eigen values and 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	Sequences & Series

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences. Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test; Cauchy's Integral test; Cauchy's root test; logarithmic test. Alternating series:
Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

Unit: IV	Calculus

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series. Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

Unit: V	Multivariable calculus (Partial Differentiation and applications)

Definitions of Limit and continuity. Partial Differentiation; Euler's Theorem; Total derivative; Jacobian;
Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition,2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley &Sons,2006.

Reference Books:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint,2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint,2010.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition,Pearson, Reprint,2002.

Web References:

1) **SWAYAM Online Courses**https://storage.googleapis.com/uniquecourses/online.html
2) **Directory of Open Access Journals**https://doaj.org/
3) **Springer Open Journals**https://www.springeropen.com/journals
4) **UG/PG MOOCs**http://ugcmoocs.inflibnet.ac.in/ugcmoocs/moocs_courses.php

E-Text Books:

1) **National Digital Library:**https://ndl.iitkgp.ac.in/
2) **NCERT Text Books**http://ncert.nic.in/textbook/textbook.htm
3) **Directory of Open Access Books**https://www.doabooks.org/

PH102BS: APPLIED PHYSICS

(Common to EEE, ECE, CSE, IT, IOT, AI&ML, DSE)

B. TECH- I YEARI SEMESTER

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
PH102 BS	BSC	3	1	0	4	30	70	100
CONTACT CLASSES:45	TUTORIAL CLASSES:15	PRACTICAL CLASSES: NIL				TOTAL CLASSES :60		

PREREQUISITES: Intermediate level Physics and Mathematics

COURSE OBJECTIVES

To make the student

1. Understand the basic concepts of Quantum Physics
2. Learn the basics of semiconductors and operation of devices PN Diode, Zener Diode, BJT.
3. Understand basics of direct band gap semiconductors and operation of Opto-Electronic devices.
4. Gain knowledge on different ways of production of lasers and the basics of fiber optics
5. Get familiarized with the nature of different dielectric and magnetic materials and electromagnetic theory

COURSE OUTCOMES:

After completion of this course the student will be able to

1. Explain the wave-particle duality of both radiation and matter
2. Explain the different types of semi-conductors and the operation & characteristics of PN Diode, Zener diode and BJT
3. Describe the operation & characteristics of Opto- Electronic devices
4. Illustrate the features of a laser beam and its applications and explain fiber optic communication
5. Classify various dielectric and magnetic materials and explain the basics of electromagnetic theory

UNIT 1: QUANTUM MECHANICS

Introduction to quantum physics, de-Broglie's hypothesis, Wave-particle duality, Davisson-Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box, Bloch's Theorem-Electron motion in a periodic potential- Kronig-Penney Model-Effective Mass- Origin of Energy Bands in solids-Classification of materials into conductors, semiconductors and insulators.

UNIT 2: SEMICONDUCTOR PHYSICS

Intrinsic and Extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall effect, p-n junction diode, Zener diode and their V-I Characteristics, Bipolar Junction Transistor (BJT): Construction, Principle of operation.

UNIT 3: OPTOELECTRONICS

Radiative and non-radiative recombination mechanisms in semiconductors, LED and semiconductor lasers: Device structure, Materials, Characteristics and figures of merit,

Semiconductor photodetectors: Solar cell, PIN and Avalanche and their structure, Materials, working principle and Characteristics.

UNIT 4: LASERS AND FIBER OPTICS

Lasers: Introduction to interaction of radiation with matter, Coherence, Principle and working of Laser, Population inversion, Pumping, Types of Lasers: Ruby laser, Carbon dioxide (CO2) laser, He-Ne laser, Applications of laser. **Fiber Optics:** Introduction, Optical fiber as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibers, Losses associated with optical fibers, Applications of optical fibers

UNIT 5: ELECTROMAGNETISM & MAGNETIC PROPERTIES OF MATERIALS

Laws of electrostatics, Electric current and the continuity equation, Ampere's and Faraday's laws, Maxwell's equations, Polarization, Permittivity and Dielectric constant, Internal fields in a solid, Clausius-Mosotti equation, Ferroelectrics and Piezoelectric materials. Magnetization, permeability and susceptibility, Classification of magnetic materials, Ferromagnetism and ferromagnetic domains, Hysteresis, Applications of magnetic materials

Text Books:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learning
2. Integrated Electronics by J. Millman and C. Halkias, TMH

Reference Books:

1. Richard Robinett, "Quantum Mechanics" 2nd ed. -Oxford.
2. J. Singh, Semiconductor Optoelectronics: Physics and Technology, MGH (1995).
3. Halliday and Resnick, Physics - Wiley.
4. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand

Web References:

1. web.mit.edu/6.732
2. https://learn about-electronics.org/semiconductors
3. www. Aip.org/history/Heisenberg/p08.html
4. https://www.youtube.com/watch?v=wpAA3qeOYiI
5. https://www.youtube.com/watch?v=OyC02DWq3mI
6. https://www.youtube.com/watch?v=KFCgeI4j-Ig
7. http://www.infocobuild.com/education/audio-video-courses/materials-science/optoelectronic-materials-and-devices-iit-kanpur.html#:~:text=Instructors%3A%20Prof.-,Deepak%20Gupta%20and%20Prof.,in%20optoelectronics%20and%20semiconductor%20devices.
8. https://circuitglobe.com/light-emitting-diode-led.html
9. https://solarlove.org/how-solar-cells-work-components-operation-of-solar-cells/

E-Text Books:

1. https://www.e-booksdirectory.com/details.php?ebook=11931
2. https://www.e-booksdirectory.com/details.php?ebook=5855
3. https://www.e-booksdirectory.com/details.php?ebook=5302

CS203ES: PROGRAMMING FOR PROBLEM SOLVING

B. Tech I Year I Semester

Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
CS103ES	ESC	3	1	0	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

Prerequisite: Basic knowledge of Computer

Course Objectives:

- To understand the various steps in programdevelopment.
- To learn the syntax and semantics of C programminglanguage.
- To learn the usage of structured programming approach in solvingproblems.
- To learn modular programming approach inprogramming
- To understand and learn the concept of derived datatypes.

Course Outcomes:

- To write algorithms and to draw flowcharts for solvingproblems.
- To convert the algorithms/flowcharts to Cprograms.
- To code and test a given logic in C programminglanguage.
- To decompose a problem into module (functions) and to develop modular reusablecode.
- To use derived data type to write advances Cprograms.

Unit - 1	COMPUTER FUNDAMENTALS AND INTRODUCTION TO C LANGUAGE

Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems

Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming **Introduction to C Programming Language**: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code , Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion,

The main method and command line arguments

Bitwise operations: Bitwise AND, OR, XOR and NOT operators

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, dowhile loops

I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.

Unit - 2	Derived Data Types

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays **Strings**: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings

Structures: Defining structures, initializing structures, unions, Array of structures

Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self referential structures in linked list(no implementation) **Enumeration data type**

Unit -3	**Files**

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef**Files**: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

Unit -4	**Functions**

Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

Unit -5	**Applications of Arrays & Analysis of algorithms**

Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc.

Basic searching in an array of elements (linear and binary search techniques),

Basic algorithms to sort array of elements (Bubble, Insertion, Selection, Quick and Merge sort algorithms)

Stack using Arrays and Queue using Arrays

Basic concept of order of complexity through the example programs

Text Books:

3. Byron Gottfried, Schaum's Outline of Programming with C,McGraw-Hill
4. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures,Cengage Learning, (3rdEdition)

Reference Books:

1. 'C Programming: A Modern Approach (2nd Edition)' by K. N.King
2. Let us c by Yawanth Kanetkar
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language,Prentice Hall ofIndia
5. R.G. Dromey, How to solve it by Computer, Pearson (16thImpression)
6. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
7. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4thEdition

Web References:

1. https://github.com/EbookFoundation/free-programming-books/blob/master/free-programming-books.md#c
2. https://publications.gbdirect.co.uk//c_book/

E-Text Books:

1. https://books.goalkicker.com/CBook/
2.http://www2.cs.uregina.ca/~hilder/cs833/Other%20Reference%20Materials/The%20C%20Programming%20Language.pdf
3. https://www.stormingrobots.com/prod/tutorial/pdf/kingBook-ch1to10.pdf

ME104ES : ENGINEERING GRAPHICS

B.Tech. I Year I Semester								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
ME104ES	**ESC**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		1	0	4	3	30	70	100
Contact Classes: 15	**Tutorial Classes: 0**	**Practical Classes: 60**				**Total Classes: 75**		

Prerequisite: NIL

Course Objectives:

- To provide basic concepts in engineeringdrawing.
- To impart knowledge about standard principles of orthographic projection ofobjects.
- To draw sectional views and pictorial views ofsolids.

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

- Preparing working drawings to communicate the ideas andinformation.
- Read, understand and interpret engineeringdrawings.

Unit: I

Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales – Plain & Diagonal.

Unit: II

Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.—Auxiliary Planes.

Unit: III

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere.

Unit: IV

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Intersection of Solids: Intersection of – Prism vs Prism- Cylinder Vs Cylinder.

Unit: V

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views –Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions

Introduction to CAD: (For Internal Evaluation Weightage only)

Introduction to CAD Software Package Commands.- Free Hand Sketches of 2D- Creation of 2D Sketches by CAD Package.

Text Books

1. Engineering Drawing N.D.Bhatt/Charotar.
2. Engineering Drawing / N. S. Parthasarathy and VelaMurali/Oxford.

Reference Books

1. Engineering Drawing / Basant Agrawal and McAgrawal/McGrawHill.
2. Engineering Drawing/ M. B. Shah, B.C. Rane/Pearson.
3. Computer Aided Engineering Drawing – K Balaveera Reddy et al –CBSPublishers.

Web References:

1.http://www.ndl.iitkgp.ac.in/

E-Text Books:

1. http://www.pdfdrive.com/engineering-drawing-books.html
2. http://www.examupdates.in/engineering-drawing-text-book/

PH105BS : APPLIED PHYSICS LAB

(Common to EEE, ECE, CSE, IT, IOT, AI&ML, DSE)

B. TECH- I YEARI SEMESTER

Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
PH 105BS	BS	-	-	3	1.5	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 39				Total Classes:39		

Prerequisites: none

COURSE OBJECTIVES:

To make the student

1. To gain knowledge by applying the experimental methods to correlate with the theoretical concepts.
2. To learn the usage of electric, electronic, magnetic and optical systems for various measurements.
3. To Apply the analytical techniques to the experimental data
4. To develop communication skills while working in a group

COURSE OUTCOMES:

After completion of this course the student will be able to

1. Operate different sets of measuring tools like RC circuit, LCR circuit, Laser diode and LED characteristics, Energy gap, Stewart-Gee's apparatus, Hall effect, Photoelectric effect and solar cell circuits
2. Compute relevant physical quantities from the observed measurements and interpret through graphical methods
3. Compare the experimental results with their theoretical counterparts
4. Demonstrate basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results

List of Experiments:

1) Charging, discharging and time constant of an R-C circuit
2) L-C-R circuit – Resonance & Q-factor
3) Magnetic field along the axis of current carrying coil – Stewart and Gees method
4) Study the characteristics of a LED
5) Study the characteristics of a LASER diode
6) Bending losses of fibres & Evaluation of numerical aperture of a given fibre
7) Energy gap of a material of p-n junction
8) Hall Effect- Determination of Hall Coefficient
9) Solar Cell-I-V Characteristics and Fill Factor
10) Photoelectric Effect- Determination of Planck's Constant

(Any eight experiments to be mandatorily performed by the student)

List of Equipment Required:

Function Generators
Battery Eliminators
Ammeters
Rheostats
LCR Circuit Boards
R-C Circuit Boards
Laser Characteristics-Circuit Boards

LED characteristics Boards
Energy Gap Kits
Optical Fiber Kits
Hall Effect circuit Boards
Photoelectric effect circuit Boards