

Dept. of Mathematics
MAHATMA GANDHI UNIVERSITY, NALGONDA



Mathematics Course Structure

(B.Sc. Common Core Syllabus for the Students Admitted from the Academic Year
2019-2020 Batch onwards)

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1 B.Sc. Course Structure Template

Telangana State Council of Higher Education

B.A/B.Sc. Mathematics Course Structure

(Common Core Syllabus for All Universities of Telangana State for the Students Admitted from the Academic Year 2019-20 Batch onwards)

Paper	Semester	Subject	Hours/ per week	Hours/per week		Max. Marks	Credits
				Theory	*Tutorials		
DSC - I	I	Differential & Integral Calculus	6	5	1	100	5
DSC - II	II	Differential Equations	6	5	1	100	5
DSC - III	III	Real Analysis	6	5	1	100	5
DSC - IV	IV	Algebra	6	5	1	100	5
DSC - V	V	Linear Algebra	6	5	1	100	5
DSE – VI(A)	VI	(A) Numerical Analysis	6	5	1	100	5
DSE – VI(B)	VI	(B) Integral Transforms	6	5	1	100	5
DSE – VI(C)	VI	(C) Analytical Solid Geometry	6	5	1	100	5
SEC-I	III	Theory of Equations	2	2	-	50	2
SEC-II	III	Logic & Sets	2	2	-	50	2
SEC-III	IV	Number Theory	2	2	-	50	2
SEC-IV	IV	Vector Calculus	2	2	-	50	2
Generic Elective	V-A*	1. Basic Mathematics or 2. Mathematics of Finance & Insurance	4	4	-	100	4
Project/Optional	VI*	Mathematical Modelling	4	4	-	100	4

*Tutorials: Problems solving session for each 20 student's one batch.

SEMESTER-I

1.1 Differential and Integral Calculus

(w.e.f. academic year 2019-20)

DSC-1A

BS:101

Theory: 5 credits and Tutorials: 0 credits
Theory: 5 hours /week and Tutorials: 1 hours /week

Objective: The course is aimed at exposing the students to some basic notions in differential calculus.

Outcome: By the time students complete the course they realize wide ranging applications of the subject.

Unit- I

Partial Differentiation: Introduction - Functions of two variables - Neighbourhood of a point (a, b) - Continuity of a Function of two variables, Continuity at a point - Limit of a Function of two variables - Partial Derivatives - Geometrical representation of a Function of two Variables - Homogeneous Functions.

Unit- II

Theorem on Total Differentials - Composite Functions - Differentiation of Composite Functions - Implicit Functions - Equality of $f_x(a, b)$ and $f_y(a, b)$ - Taylor's theorem for a function of two Variables - Maxima and Minima of functions of two variables – Lagrange's Method of undetermined multipliers.

Unit- III

Curvature and Evolutes: Introduction - Definition of Curvature - Radius of Curvature - Length of Arc as a Function, Derivative of arc - Radius of Curvature - Cartesian Equations - Newtonian Method - Centre of Curvature - Chord of Curvature.

Evolutes: Evolutes and Involutes - Properties of the evolute.

Envelopes: One Parameter Family of Curves - Consider the family of straight lines - Definition - Determination of Envelope.

Unit- IV

Lengths of Plane Curves: Introduction - Expression for the lengths of curves $y = f(x)$ - Expressions for the length of arcs $x = f(y)$; $x = f(t)$, $y = \phi(t)$; $r = f(\theta)$

Volumes and Surfaces of Revolution: Introduction - Expression for the volume obtained by revolving about either axis - Expression for the volume obtained by revolving about any line - Area of the surface of the frustum of a cone - Expression for the surface of revolution - Pappus Theorems - Surface of revolution.

Text:

- Shanti Narayan, P.K. Mittal *Differential Calculus*, S.CHAND, NEW DELHI
- Shanti Narayan *Integral Calculus*, S.CHAND, NEW DELHI

References:

- William Anthony Granville, Percy F Smith and William Raymond Longley; *Elements of the differential and integral calculus*
 - Joseph Edwards , *Differential calculus for beginners*
 - Smith and Minton, *Calculus*
 - Elis Pine, *How to Enjoy Calculus*
 - Hari Kishan, *Differential Calculus*
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SEMESTER-II

1.2 Differential Equations

(w.e.f. academic year 2019-20)

DSC-1B

BS:201

Theory: 5 credits and Tutorials: 0 credits
Theory: 5 hours /week and Tutorials: 1 hours /week

Objective: The main aim of this course is to introduce the students to the techniques of solving differential equations and to train to apply their skills in solving some of the problems of engineering and science.

Outcome: After learning the course the students will be equipped with the various tools to solve few types differential equations that arise in several branches of science.

Unit- I

Differential Equations of first order and first degree: Introduction - Equations in which Variables are Separable - Homogeneous Differential Equations - Differential Equations Reducible to Homogeneous Form - Linear Differential Equations - Differential Equations Reducible to Linear Form - Exact differential equations - Integrating Factors - Change in variables - Total Differential Equations - Simultaneous Total Differential Equations - Equations of the form $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$.

Unit- II

Differential Equations first order but not of first degree: Equations Solvable for p - Equations Solvable for y - Equations Solvable for x - Equations that do not contain x (or y) - Equations Homogeneous in x and y - Equations of the First Degree in x and y - Clairaut's equation.

Applications of First Order Differential Equations : Growth and Decay - Dynamics of Tumour Growth - Radioactivity and Carbon Dating - Compound Interest - Orthogonal Trajectories

Unit- III

Higher order Linear Differential Equations: Solution of homogeneous linear differential equations with constant coefficients - Solution of non-homogeneous differential equations $P(D)y = Q(x)$ with constant coefficients by means of polynomial operators when $Q(x) = be^{ax}, b \sin ax/b \cos ax, bx^k, Ve^{kax}$ - Method of undetermined coefficients.

Unit- IV

Method of variation of parameters - Linear differential equations with non constant coefficients - The Cauchy - Euler Equation - Legendre's Linear Equations - Miscellaneous Differential Equations.

Partial Differential Equations: Formation and solution- Equations easily integrable - Linear equations of first order.

Text:

- Zafar Ahsan, *Differential Equations and Their Applications*

References:

- Frank Ayres Jr, *Theory and Problems of Differential Equations*.
 - Ford, L.R ; *Differential Equations*.
 - Daniel Murray, *Differential Equations*.
 - S. Balachandra Rao, *Differential Equations with Applications and Programs*.
 - Stuart P Hastings, J Bryce McLead; *Classical Methods in Ordinary Differential Equations*.
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SEMESTER-III

1.3 Real Analysis

(w.e.f. academic year 2020-21)

DSC-1C

BS:301

Theory: 5 credits and Tutorials: 0 credits
Theory: 5 hours /week and Tutorials: 1 hours /week

Objective: The course is aimed at exposing the students to the foundations of analysis which will be useful in understanding various physical phenomena.

Outcome: After the completion of the course students will be in a position to appreciate beauty and applicability of the course.

Unit- I

Sequences: Limits of Sequences- A Discussion about Proofs-Limit Theorems for Sequences- Monotone Sequences and Cauchy Sequences -Subsequences-Lim sup's and Lim inf's-Series-Alternating Series and Integral Tests .

Unit- II

Continuity: Continuous Functions -Properties of Continuous Functions -Uniform Continuity - Limits of Functions

Unit- III

Differentiation: Basic Properties of the Derivative - The Mean Value Theorem - * L'Hospital Rule - Taylor's Theorem.

Unit- IV

Integration : The Riemann Integral - Properties of Riemann Integral-Fundamental Theorem of Calculus.

Text:

- Kenneth A Ross,*Elementary Analysis-The Theory of Calculus*

References:

- S.C. Malik and Savita Arora, *Mathematical Analysis, Second Edition, Wiley Eastern Limited, New Age International (P) Limited, New Delhi, 1994.*
- William F. Trench, *Introduction to Real Analysis*
- Lee Larson , *Introduction to Real Analysis I*
- Shanti Narayan and Mittal, *Mathematical Analysis*
- Brian S. Thomson, Judith B. Bruckner, Andrew M. Bruckner; *Elementary Real analysis*
- Sudhir R., Ghorpade, Balmohan V., Limaye; *A Course in Calculus and Real Analysis*

SEMESTER-IV

1.4 Algebra

(w.e.f. academic year 2020-21)

DSC-1D

BS:401

Theory: 5 credits and Tutorials: 0 credits
Theory: 5 hours /week and Tutorials: 1 hours /week

Objective: The course is aimed at exposing the students to learn some basic algebraic structures like groups, rings etc.

Outcome: On successful completion of the course students will be able to recognize algebraic structures that arise in matrix algebra, linear algebra and will be able to apply the skills learnt in understanding various such subjects.

Unit- I

Groups: Definition and Examples of Groups- Elementary Properties of Groups-Finite Groups - Subgroups -Terminology and Notation -Subgroup Tests - Examples of Subgroups.

Cyclic Groups: Properties of Cyclic Groups - Classification of Subgroups Cyclic Groups.

Unit- II

Permutation Groups: Definition and Notation -Cycle Notation-Properties of Permutations -A Check Digit Scheme Based on D_5 Isomorphisms ; Motivation- Definition and Examples -Cayley's Theorem Properties of Isomorphisms -Automorphisms-Cosets and Lagrange's Theorem Properties of Cosets 138 - Lagrange's Theorem and Consequences-An Application of Cosets to Permutation Groups -The Rotation Group of a Cube and a Soccer Ball.

Unit- III

Normal Subgroups and Factor Groups: Normal Subgroups-Factor Groups -Applications of Factor Groups -Group Homomorphisms - Definition and Examples -Properties of Homomorphisms -The First Isomorphism Theorem.

Introduction to Rings: Motivation and Definition -Examples of Rings -Properties of Rings - Subrings.

Integral Domains: Definition and Examples - Fields -Characteristics of a Ring.

Unit- IV

Ideals and Factor Rings: Ideals -Factor Rings -Prime Ideals and Maximal Ideals.

Ring Homomorphisms: Definition and Examples-Properties of Ring- Homomorphisms.

Text:

- Joseph A Gallian, *Contemporary Abstract algebra (9th edition)*

References:

- Bhattacharya, P.B Jain, S.K.; and Nagpaul, S.R,*Basic Abstract Algebra*
- Fraleigh, J.B, *A First Course in Abstract Algebra.*

- Herstein, I.N, *Topics in Algebra*
 - Robert B. Ash, *Basic Abstract Algebra*
 - I Martin Isaacs, *Finite Group Theory*
 - Joseph J Rotman, *Advanced Modern Algebra*
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SEMESTER-V

1.5 Linear Algebra

(w.e.f. academic year 2021-22)

DSC-E

BS:501

Theory: 5 credits and Tutorials: 0 credits
Theory: 5 hours /week and Tutorials: 1 hours /week

Objective: The students are exposed to various concepts like vector spaces , bases , dimension, Eigen values etc.

Outcome: After completion this course students appreciate its interdisciplinary nature.

Unit- I

Vector Spaces: Vector Spaces and Subspaces -Null Spaces, Column Spaces, and Linear Transformations -Linearly Independent Sets; Bases -Coordinate Systems -The Dimension of a Vector Space

Unit- II

Rank-Change of Basis - Eigenvalues and Eigenvectors - The Characteristic Equation

Unit- III

Diagonalization -Eigenvectors and Linear Transformations -Complex Eigenvalues - Applications to Differential Equations.

Unit- IV

Orthogonality and Least Squares : Inner Product, Length, and Orthogonality -Orthogonal Sets -Orthogonal Projections - The Gram-Schmidt Process.

Text:

- David C Lay,*Linear Algebra and its Applications 4e*

References:

- S Lang, *Introduction to Linear Algebra*
- Gilbert Strang , *Linear Algebra and its Applications*
- Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence; *Linear Algebra*
- Kuldeep Singh; *Linear Algebra*
- Sheldon Axler; *Linear Algebra Done Right*

SEMESTER-VI

1.6 Numerical Analysis

(w.e.f. academic year 2021-22)

DSE-1F/A

BS:601/A

Theory: 5 credits and Tutorials: 0 credits
Theory: 5 hours /week and Tutorials: 1 hours /week

Objective: Students will be made to understand some methods of numerical analysis.

Outcome: Students realize the importance of the subject in solving some problems of algebra and calculus.

Unit- I

Errors in Numerical Calculations - **Solutions of Equations in One Variable:** The Bisection Method - The Iteration Method - The Method of False Position-Newton's Method - Muller's Method - solution of Systems of Nonlinear Equations.

Unit- II

Interpolation and Polynomial Approximation: Interpolation - Finite Differences - Differences of Polynomials - Newton's formula for Interpolation - Gauss's central differences formulae - Stirling's and Bessel's formula - Lagrange's Interpolation Polynomial - Divided Differences - Newton's General Interpolation formula - Inverse Interpolation.

Unit- III

Curve Fitting: Least Square Curve Fitting: Fitting a Straight Line-Nonlinear Curve Fitting.
Numerical Differentiation and Integration: Numerical Differentiation - Numerical Integration: Trapezoidal Rule-Simpson's 1/3rd-Rule and Simpson's 3/8th-Rule - Boole's and Weddle's Rule - Newton's Cotes Integration Formulae.

Unit- IV

Numerical Solutions of Ordinary Differential Equations: Taylor's Series Method - Picard's Method - Euler's Methods - Runge Kutta Methods.

Text:

- S.S.Sastry,*Introductory Methods of Numerical Analysis, PHI*

References:

- Richard L. Burden and J. Douglas Faires,*Numerical Analysis (9e)*
- M K Jain, S R K Iyengar and R K Jain, *Numerical Methods for Scientific and Engineering computation*
- B.Bradie , *A Friendly introduction to Numerical Analysis*

SEMESTER-VI

1.7 Integral Transforms

(w.e.f. academic year 2021-22)

DSE - 1F/B

BS:601/B

Theory: 5 credits and Tutorials: 0 credits
Theory: 5 hours /week and Tutorials: 1 hours /week

Objective: Students will be exposed to Integral Transforms. The students also learning the Applications of Laplace Transforms to Differential Equations which arises in Physics and Engineering Problems.

Outcome: Students apply their knowledge to solve some problems on special functions and Differential Equations by using the Integral Transforms.

Unit- I

Laplace Transforms-Definition-Existence theorem-Laplace transforms of derivatives and integrals – Periodic functions and some special functions.

Unit- II

Inverse Transformations - Convolution theorem - Heaviside's expansion formula.

Unit- III

Applications to ordinary differential equations - solutions of simultaneous ordinary differential equations - Applications to Partial differential equations.

Unit- IV

Fourier Transforms- Sine and cosine transforms-Inverse Fourier Transforms.

Text:

- Vasishtha and Gupta, *Integral Transforms*, Krishna Prakashan Media(P), Ltd, Meerut (2e)

SEMESTER-VI

1.8 Analytical Solid Geometry

(w.e.f. academic year 2021-22)

DSE - 1F/C

BS:601/C

Theory: 5 credits and Tutorials: 0 credits
Theory: 5 hours /week and Tutorials: 1 hours /week

Objective: Students learn to describe some of the surfaces by using analytical geometry.

Outcome: Students understand the beautiful interplay between algebra and geometry.

Unit- I

Sphere: Definition-The Sphere Through Four Given Points-Equations of a Circle- Intersection of a Sphere and a Line-Equation of a Tangent Plane-Angle of Intersection of Two Spheres-Radical Plane.

Unit- II

Cones and Cylinders: Definition-Condition that the General Equation of second degree Represents a Cone-Cone and a Plane through its Vertex -Intersection of a Line with a Cone.

Unit- III

The Right Circular Cone-The Cylinder- The Right Circular Cylinder.

Unit- IV

The Conicoid: The General Equation of the Second Degree-Intersection of Line with a Conicoid-Plane of contact-Enveloping Cone and Cylinder.

Text:

- Shanti Narayan and P K Mittal, *Analytical Solid Geometry* (17e)

References:

- Khaleel Ahmed, *Analytical Solid Geometry*
 - S L Loney , *Solid Geometry*
 - Smith and Minton, *Calculus*
-

SEMESTER-III

1.9 Theory of Equations

(w.e.f. academic year 2020-21)

SEC-I

Theory: 2 credits
Theory: 2 hours /week

Objective: Students learn the relation between roots and coefficients of a polynomial equation, Descartes's rule of signs in finding the number of positive and negative roots if any of a polynomial equation besides some other concepts.

Outcome: By using the concepts learnt the students are expected to solve some of the polynomial equations.

Unit- I

Graphic representation of a polynomial-Maxima and minima values of polynomials-Theorems relating to the real roots of equations-Existence of a root in the general equation -Imaginary roots-Theorem determining the number of roots of an equation-Equal roots-Imaginary roots enter equations in pairs-Descartes' rule of signs for positive roots- Descartes' rule of signs for negative roots.

Unit- II

Relations between the roots and coefficients-Theorem-Applications of the theorem-Depression of an equation when a relation exists between two of its roots-The cube roots of unity Symmetric functions of the roots-examples.

Text:

- W.S. Burnside and A.W. Panton, *The Theory of Equations*

References:

- C. C. Mac Duffee, *Theory of Equations*
 - Hall and Knight , *Higher Algebra*
-

SEMESTER-III

1.10 Logic and Sets

(w.e.f. academic year 2020-21)

SEC - II

Theory: 4 credits and Tutorials: 0 credits
Theory: 4 hours /week and Tutorials: 1 hours /week

Objective: Students learn some concepts in set theory and logic.

Outcome: After the completion of the course students appreciate its importance in the development of computer science.

Unit- I

Basic Connectives and truth tables - Logical equivalence : Laws of Logic - Logical Implication : Rules Inference : The Use of Quantifiers - Quantifiers, Definitions, and proofs of Theorems.

Unit- II

Sets and Subsets - Set Operations and the Laws of Set Theory - Counting and Venn Diagrams - A First Word on Probability - The axioms of Probability - Conditional Probability: Independence - Discrete Random variables .

Text:

- Ralph P Grimaldi, *Discrete and Combinatorial Mathematics* (5e)

References:

- P R Halmos, *Naïve Set Theory*
 - E Kamke , *Theory of Sets*
-

SEMESTER-IV

1.11 Number Theory

(w.e.f. academic year 2020-21)

SEC-III

Theory: 2 credits
Theory: 2 hours /week

Objective: Students will be exposed to some of the jewels like Fermat's theorem, Euler's theorem in the number theory.

Outcome: Student uses the knowledge acquired solving some divisor problems.

Unit- I

The Goldbach conjecture - Basic properties of congruences- Binary and Decimal Representation of Integers - Number Theoretic Functions; The Sum and Number of divisors- The Mobius Inversion Formula- The Greatest integer function.

Unit- II

Euler's generalization of Fermat's Theorem: Euler's Phi function- Euler's theorem Some Properties of the Euler's Phi function.

Text:

- David M Burton, *Elementary Number Theory* (7e)

References:

- Thomas Koshy, *Elementary Number Theory and its Applications*
- Kenneth H Rosen, *Elementary Number Theory*

SEMESTER-IV

1.12 Vector Calculus

(w.e.f. academic year 2020-21)

SEC-IV

Theory: 2 credits
Theory: 2 hours /week

Objective: Concepts like gradient, divergence, curl and their physical relevance will be taught.

Outcome: Students realize the way vector calculus is used to addresses some of the problems of physics.

Unit- I

Line Integrals: Introductory Example - Work done against a Force-Evaluation of Line Integrals
Conservative Vector Fields.

Surface Integrals: Introductory Example : Flow Through a Pipe Evaluation of Surface Integrals.

Unit- II

Volume Integrals: Evaluation of Volume integrals

Gradient, Divergence and Curl: Partial differentiation and Taylor series-Partial differentiation
Taylor series in more than one variable-Gradient of a scalar field-Gradients, conservative fields and
potentials-Physical applications of the gradient.

Text:

- P.C. Matthews, *Vector Calculus*

References:

- G.B. Thomas and R.L. Finney, *Calculus*
 - H. Anton, I. Bivens and S. Davis ; *Calculus*
 - Smith and Minton, *Calculus*
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DEPARTMENT OF PHYSICS
MAHATMA GANDHI UNIVERSITY-NALGONDA

B.Sc. SYLLABUS
PHYSICS & ELECTRONICS
(W.E.F. 2019-20)

**DEPARTMENT OF PHYSICS
MAHATMA GANDHI UNIVERSITY-NALGONDA**

Board of Studies in Physics Meeting Resolutions

The members of Board of Studies in Physics for UG met on 31.01.2022 from 2.30 pm to 3.00 pm (Virtual mode through google meet: <http://meet.google.com/etv-roes-wff>) and discussed various issues pertaining to approve the Physics and Electronics Syllabus of all semesters of B.Sc. Course w.e.f 2019 - 20 onwards.


Members Present:


1. Prof. D. Karuna Sagar
2. Prof. M. Srinivas
3. Prof.M. Prasad
4. Prof.M.Laxman Naik
5. Dr. Md. Shareefuddin
6. Dr.N. V. Prasad

Resolutions:

1. Resolved to adopt the B.Sc. Physics and B.Sc. Electronics syllabi of Osmania University as per the suggestion of Telangana State Council of Higher Education.
2. Resolved to approve the above said syllabi as it is without any modification and in force w.e.f.2019-20 onwards.
3. It is to be noted here that there is revision of B.Sc. I Sem Physics syllabus - Unit IV (Special Theory of Relativity) Syllabus is adjusted in Unit III and new chapter Oscillations is named as Unit IV. The theory paper title is changed from Mechanics to Mechanics and Oscillations and similarly the Practical paper title is changed from Mechanics to Mechanics & Oscillations Lab.



(Prof. D. Karuna Sagar)


(Prof.M. Prasad)


(Dr. Md. Shareefuddin)


(Prof. M. Srinivas)


(Prof.M.Laxman Naik)


(Dr.N. V. Prasad)

**B.Sc. (Physics) Syllabus, Mahatma Gandhi University
(w.e.f 2019-2020)**

**MAHATMA GANDHI UNIVERSITY
B.Sc. (Physics)
SCHEME FOR CHOICE BASED CREDIT SYSTEM
(YEAR & SEMESTER - WISE SCHEME OF HPW, CREDITS & MARKS)**

Y E A R	SEM	Course/Paper	Course Type*	Hrs / Week	No. of Credits	Marks		
						Internal	SEM End	Total
F I R S T	I	Mechanics & Oscillations	DSC-1	4	4	20	80	100
		Mechanics & Oscillations Lab (Practicals)	DSC-1(Pr)	3	1	-	25	25
	II	Thermal Physics	DSC-2	4	4	20	80	100
		Thermal Physics Lab (Practicals)	DSC-2(Pr)	3	1	-	25	25
S E C O N D	III	Electromagnetic Theory	DSC-3	4	4	20	80	100
		Electromagnetic Theory Lab (Practicals)	DSC-3(Pr)	3	1	-	25	25
		1) Experimental methods & Error analysis 2) Electrical circuits & Networking	SEC-1 SEC-2	2 2	2 2	10 10	40 40	50 50
	IV	Waves & Optics	DSC-4	4	4	20	80	100
		Waves & Optics Lab (Practicals)	DSC-4(Pr)	3	1	-	25	25
		1) Basic Instrumentation 2) Digital Electronics	SEC-3 SEC-4	2 2	2 2	10 10	40 40	50 50
T H I R D	V	(A) Modern Physics Or (B) Computational Physics	DSE-1	4	4	20	80	100
		(A) Modern Physics Lab (Practicals) Or (B) Computational Physics Lab (Practicals)	DSE-1 (Pr)	3	1	-	25	25
		Renewable energy & Energy harvesting	GE	4	4	20	80	100
	VI	(A) Electronics Or (B) Applied Optics	DSE-2	4	4	20	80	100
		(A) Electronics Lab (Practicals) Or (B) Applied Optics Lab (Practicals)	DSE-2 (Pr)	3	1	-	25	25
		Nanoscience	Project / Course in lieu of project	4	4	20	80	100
Total				30 + 16	120+80	630+320	750 + 400	

*DSC: Discipline Specific Course (Core);
DSE: Discipline Specific Elective (Elective);
Pr: Practical
SEC: Skill Enhancement Course;
GE: Generic Elective

B.Sc. (Physics)- I Year
Semester – I
Paper – I: Mechanics and Oscillations
(DSC-1: Compulsory)

Total: 56 hrs
(4 Hrs / week)

Unit – I

1. Vector Analysis (14)

Scalar and Vector fields, Gradient of a Scalar field and its physical significance. Divergence and Curl of a Vector field and related problems. Vector integration - line, surface and volume integrals. Stokes, Gauss's and Green's theorems - simple applications.

Unit – II

2. Mechanics of Particles (7)

Laws of motion, motion of variable mass system, motion of a rocket, multi-stage rocket, conservation of energy and momentum. Collisions in two and three dimensions, concept of impact parameter, scattering cross-section.

3. Mechanics of Rigid Bodies (7)

Definition of Rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum and inertial tensor. Euler's equations, precession of a top, Gyroscope.

Unit – III

4. Central Forces (8)

Central forces – definition and examples, conservative nature of central forces, conservative force as a negative gradient of potential energy, equation of motion under a central force, gravitational potential and gravitational field, motion under inverse square law, derivation of Kepler's laws.

5. Special theory of Relativity (8)

Galilean relativity, absolute frames, Michelson-Morley experiment, Postulates of special theory of relativity. Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation. Concept of four vector formalism.

Unit – IV

6. Oscillations (12)

Simple harmonic oscillator and solution of the differential equation – Physical characteristics of SHM, Torsion pendulum – Measurement of rigidity modulus, Compound pendulum - Measurement of 'g', combination of two mutually perpendicular simple harmonic vibrations of same frequency and different frequencies, Lissajous figures.


Damped harmonic oscillator, Solution of the differential equation of damped oscillator. Energy considerations, Logarithmic decrement, relaxation time, quality factor, differential equation of forced oscillator and its solution, amplitude resonance, velocity resonance.

Note: Problems should be solved at the end of every chapter of all units.

B.Sc. (Physics) Syllabus, Mahatma Gandhi University
(w.e.f 2019-2020)

Suggested Books

1. Berkeley Physics Course. Vol.1, **Mechanics** by C. Kittel, W. Knight, M.A. Ruderman - *Tata-McGraw hill Company Edition 2008.*
2. **Fundamentals of Physics.** Halliday/Resnick/Walker *Wiley India Edition 2007.*
3. **First Year Physics - Telugu Academy.**
4. **Introduction to Physics for Scientists and Engineers.** F.J. Ruche. *McGraw Hill.*
5. **Fundamentals of Physics** by Alan Giambattista et al *Tata-McGraw Hill Company Edition, 2008.*
6. **University Physics** by Young and Freeman, *Pearson Education, Edition 2005.*
7. **Sears and Zemansky's University Physics** by Hugh D. Young, Roger A. Freedman *Pearson Education Eleventh Edition.*
8. **An introduction to Mechanics** by Daniel Kleppner & Robert Kolenkow. *The McGraw Hill Companies.*
9. **Mechanics.** Hans & Puri. *TMH Publications.*
10. **Engineering Physics.** R.K. Gaur & S.L. Gupta. *Dhanpat Rai Publications.*
11. **The Feynman Lectures in Physics, Vol.-1,** R P Feynman, RB Lighton and M Sands, BI Publications,
12. **Mechanics-P.K. Srivastava - New Age International.**


CHAIRMAN,
Board of Studies in Physics,
Mahatma Gandhi University
NAGGONDA - 508 254. (T.P.M.)

B.Sc. (Physics) – I year
Semester - I
Paper – I: Mechanics and Oscillations Practicals
(DSC-1: Compulsory)

1. Measurement of errors – Simple Pendulum.
2. Calculation of slope and intercept of $Y = mX + C$ graph by theoretical method (simple pendulum experiment)
3. Study of a compound pendulum- determination of 'g' and 'k'.
4. Y by uniform Bending
5. Y by Non-uniform Bending.
6. Moment of Inertia of a fly wheel.
7. Rigidity modulus by Torsion Pendulum.
8. Determination of surface tension of a liquid through capillary rise method.
9. Determination of Surface Tension of a liquid by any other method.
10. Determination of Viscosity of a fluid.
11. Observation of Lissajous figures from CRO- Frequency ratio. Amplitude and phase difference of two waves.
12. Study of oscillations of a mass under different combination of springs- Series and parallel
13. Study of Oscillations under Bifilar suspension- Verification of axis theorems

Note: Minimum of eight experiments should be performed. Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

Suggested Books

1. D.P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani Publishing House, New Delhi).
2. S.P. Singh, "Advanced Practical Physics" (Pragati Prakashan, Meerut).
3. Worsnop and Flint- Advanced Practical physics for students.
4. "Practical Physics" R.K Shukla, Anchal Srivastava.


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Board of Studies in Physics,
Mahatma Gandhi University
KAL GONDA - 508 254 (T.P.M)

B.Sc. (Physics)- I Year
Semester – II
Paper – II: Thermal Physics
(DSC-2: Compulsory)

Total: 56 hrs
(4 Hrs / week)

Unit – I

1. Kinetic theory of gases: (6)

Introduction – Deduction of Maxwell's law of distribution of molecular speeds, Transport Phenomena – Viscosity of gases – thermal conductivity – diffusion of gases.

2. Thermodynamics: (8)

Basics of Thermodynamics - Carnot's engine (qualitative) - Carnot's theorem - Kelvin's and Clausius statements – Thermodynamic scale of temperature – Entropy, physical significance – Change in entropy in reversible and irreversible processes – Entropy and disorder – Entropy of universe – Temperature- Entropy (T-S) diagram – Change of entropy of a perfect gas-change of entropy when ice changes into steam.

Unit – II

3. Thermodynamic potentials and Maxwell's equations: (7)

Thermodynamic potentials – Derivation of Maxwell's thermodynamic relations – Clausius-Clayperon's equation – Derivation for ratio of specific heats – Derivation for difference of two specific heats for perfect gas. Joule Kelvin effect – expression for Joule Kelvin coefficient for perfect and Vanderwaal's gas.

4. Low temperature Physics: (7)

Joule Kelvin effect – liquefaction of gas using porous plug experiment. Joule expansion – Distinction between adiabatic and Joule Thomson expansion – Expression for Joule Thomson cooling – Liquefaction of helium, Kapitza's method – Adiabatic demagnetization – Production of low temperatures – Principle of refrigeration, vapour compression type.

Unit – III

5. Quantum theory of radiation: (14)

Black body-Ferry's black body – distribution of energy in the spectrum of Black body – Wein's displacement law, Wein's law, Rayleigh-Jean's law – Quantum theory of radiation - Planck's law – deduction of Wein's law, Rayleigh-Jeans law, Stefan's law from Planck's law. Measurement of radiation using pyrometers – Disappearing filament optical pyrometer – experimental determination – Angstrom pyroheliometer - determination of solar constant, effective temperature of sun.

Unit – IV

6. Statistical Mechanics: (14)

Introduction, postulates of statistical mechanics. Phase space, concept of ensembles and some known ensembles, classical and quantum statistics and their differences, concept of probability, Maxwell-Boltzmann's distribution law -Molecular energies in an ideal gas- Maxwell-Boltzmann's velocity distribution law, Bose-Einstein Distribution law, Fermi-Dirac Distribution law, comparison of three distribution laws.


NOTE: Problems should be solved at the end of every chapter of all units.


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Suggested books

1. **Fundamentals of Physics.** Halliday/Resnick/Walker.C. *Wiley India Edition 2007.*
2. **Second Year Physics – Telugu Academy.**
3. **Modern Physics** by R. Murugesan and Kiruthiga Siva Prasath (for statistical Mechanics) *S. Chand & Co.*
4. **Modern Physics** by G. Aruldas and P. Rajagopal, *Eastern Economy Education.*
5. Berkeley Physics Course. Volume-5. **Statistical Physics** by F. Reif. *The McGraw-Hill Companies.*
6. **An Introduction to Thermal Physics** by Daniel V. Schroeder. *Pearson Education Low Price Edition.*
7. **Thermodynamics** by R.C. Srivastava, Subit K. Saha & Abhay K. Jain *Eastern Economy Edition.*
8. **Modern Engineering Physics** by A.S. Vasudeva. *S.Chand & Co. Publications.*
9. **Feynman's Lectures on Physics** Vol. 1,2,3 & 4. *Narosa Publications.*
10. **Introduction to Statistical Mechanics.** , B.B. Laud, Macmillan, 1981
11. **Statistical Physics,** K.Haung, Wiley Eastern 1988


CHAIRMAN,
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NAI GONDA - 508 254 (T.S.N)

B.Sc. (Physics) – I year
Semester - II
Paper – II: Thermal Physics Practicals
(DSC-2: Compulsory)

1. Co-efficient of thermal conductivity of a bad conductor by Lee's method.
2. Measurement of Stefan's constant.
3. Specific heat of a liquid by applying Newton's law of cooling correction.
4. Heating efficiency of electrical kettle with varying voltages.
5. Calibration of thermo couple
6. Cooling Curve of a metallic body
7. Resistance thermometer
8. Thermal expansion of solids
9. Study of conversion of mechanical energy to heat.
10. Determine the Specific of a solid (graphite rod)

Note: Minimum of eight experiments should be performed. Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

Suggested Books

1. D.P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani Publishing House, New Delhi).
2. S.P. Singh, "Advanced Practical Physics" (Pragati Prakashan, Meerut).
3. Worsnop and Flint- Advanced Practical Physics for students.
4. "Practical Physics" R.K Shukla, Anchal Srivastava


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NAI GONDA-508 254. (T.P.M)

B.Sc. (Physics)- II Year
Semester – III
Paper – III: Electromagnetic Theory
(DSC-3: Compulsory)

Total: 56 hrs
(4 Hrs / week)

Unit I : Electrostatics (14 Hrs)

Electric Field:- Concept of electric field lines and electric flux, Gauss's law (Integral and differential forms), application to linear, plane and spherical charge distributions. Conservative nature of electric field 'E', Irrotational field. Electric potential:- Concept of electric potential, relation between electric potential and electric field, potential energy of a system of charges. Energy density in an electric field. Calculation of potential from electric field for a spherical charge distribution.

Unit II : Magnetostatics (14 Hrs)

Concept of magnetic field 'B' and magnetic flux, Biot-Savart's law, B due to a straight current carrying conductor. Force on a point charge in a magnetic field. Properties of B, curl and divergence of B, solenoidal field. Integral form of Ampere's law, Applications of Ampere's law: field due to straight, circular and solenoidal currents. Energy stored in magnetic field. Magnetic energy in terms of current and inductance. Magnetic force between two current carrying conductors. Magnetic field intensity. Ballistic Galvanometer:- Torque on a current loop in a uniform magnetic field, working principle of B.G., current and charge sensitivity, electromagnetic damping, critical damping resistance.

Unit III: Electromagnetic Induction and Electromagnetic waves (14)

Faraday's laws of induction (differential and integral form), Lenz's law, self and mutual Induction. Continuity equation, modification of Ampere's law, displacement current, Maxwell equations. Maxwell's equations in vacuum and dielectric medium, boundary conditions, plane wave equation: transverse nature of EM waves, velocity of light in vacuum and in medium. Poynting's theorem.

UNIT IV:

Varying and alternating currents (7 Hrs)

Growth and decay of currents in LR, CR and LCR circuits-Critical damping. Alternating current, relation between current and voltage in pure R, C and L-vector diagrams - Power in ac circuits. LCR series and parallel resonant circuit-Q-factor. AC & DC motors-single phase, three phase (basics only).

Network Theorems (7 Hrs)

Passive elements, Power sources, Active elements, Network models: T and π Transformations, Superposition theorem, Thevenin's theorem, Norton's theorem. Reciprocity theorem and Maximum power transfer theorem (Simple problems).


Note: Problems should be solved at the end of every chapter of all units.


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B.Sc. (Physics) Syllabus, Mahatma Gandhi University
(w.e.f 2019-2020)

Suggested Books:

1. Fundamentals of electricity and magnetism By Arthur F. Kip (McGraw-Hill, 1968)
2. Electricity and magnetism by J.H.Fewkes & John Yarwood. Vol.I (Oxford Univ. Press, 1991).
3. Introduction to Electrodynamics, 3rd edition, by David J. Griffiths, (Benjamin Cummings, 1998).
4. Electricity and magnetism By Edward M. Purcell (McGraw-Hill Education, 1986)
5. Electricity and magnetism. By D C Tayal (Himalaya Publishing House, 1988)
6. Electromagnetics by Joseph A. Edminister 2nd ed. (New Delhi: Tata McGraw Hill, 2006).


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B.Sc. (Physics) Syllabus, Mahatma Gandhi University
(w.e.f 2019-2020)


B.Sc. (Physics) – II year
Semester - III
Paper – III: Electromagnetic Theory Practicals
(DSC-3: Compulsory)

1. To verify the Thevenin Theorem
2. To verify Norton Theorem
3. To verify Superposition Theorem
4. To verify maximum power transfer theorem.
5. To determine a small resistance by Carey Foster's bridge.
6. To determine the (a) current sensitivity, (b) charge sensitivity, and (c) CDR of a B.G.
7. To determine high resistance by leakage method.
8. To determine the ratio of two capacitances by De Sauty's bridge.
9. To determine self-inductance of a coil by Anderson's bridge using AC.
10. To determine self-inductance of a coil by Rayleigh's method.
11. To determine coefficient of Mutual inductance by absolute method.
12. LR circuit
13. RC circuit
14. LCR series circuit
15. LCR parallel circuit

Note: Minimum of eight experiments should be performed.
Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

Suggested Books:

1. B. L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House, New Delhi.
2. Indu Prakash and Ramakrishna, A Text Book of Practical Physics, Kitab Mahal


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B.Sc. (Physics) Syllabus, Mahatma Gandhi University
(w.e.f 2019-2020)

B.Sc. (Physics) - II Year
Semester – IV
Paper – IV: Waves and Optics
(DSC-4: Compulsory)

Total: 56 Hrs
(4 Hrs / week)

Unit-I: Waves (14 Hrs)

Fundamentals of Waves -Transverse wave propagation along a stretched string, general solution of wave equation and its significance, modes of vibration of stretched string clamped at ends, overtones, energy transport, transverse impedance.

Longitudinal vibrations in bars- wave equation and its general solution. Special cases (i) bar fixed at both ends ii) bar fixed at the midpoint iii) bar free at both ends iv) bar fixed at one end. Transverse vibrations in a bar- wave equation and its general solution. Boundary conditions, clamped free bar, free-free bar, bar supported at both ends, Tuning fork.

Unit II: Interference: (14 Hrs)

Principle of superposition – coherence – temporal coherence and spatial coherence – conditions for Interference of light.

Interference by division of wave front: Fresnel's biprism – determination of wave length of light. Determination of thickness of a transparent material using Biprism – change of phase on reflection – Lloyd's mirror experiment.

Interference by division of amplitude: Oblique incidence of a plane wave on a thin film due to reflected and transmitted light (Cosine law) – Colours of thin films – Non-reflecting films – interference by a plane parallel film illuminated by a point source – Interference by a film with two non-parallel reflecting surfaces (Wedge shaped film) – Determination of diameter of wire-Newton's rings in reflected light with and without contact between lens and glass plate, Newton's rings in transmitted light (Haidinger Fringes) – Determination of wave length of monochromatic light – Michelson Interferometer – types of fringes – Determination of wavelength of monochromatic light, Difference in wavelength of sodium D_1, D_2 lines and thickness of a thin transparent plate.

Unit III: Diffraction: (14 Hrs)

Introduction – Distinction between Fresnel and Fraunhofer diffraction, Fraunhofer diffraction:- Diffraction due to single slit and circular aperture – Limit of resolution – Fraunhofer diffraction due to double slit – Fraunhofer diffraction pattern with N slits (diffraction grating).

Resolving Power of grating – Determination of wave length of light in normal and oblique incidence methods using diffraction grating.

Fresnel diffraction-Fresnel's half period zones – area of the half period zones –zone plate – Comparison of zone plate with convex lens – Phase reversal zone plate – diffraction at a straight edge – difference between interference and diffraction.

Unit IV: Polarization (14 Hrs)

Polarized light : Methods of Polarization, Polarization by reflection, refraction, Double refraction, selective absorption , scattering of light – Brewster's law – Malus law – Nicol prism polarizer and analyzer – Refraction of plane wave incident on negative and positive crystals (Huygen's explanation) – Quarter wave plate, Half wave plate – Babinet's compensator – Optical activity, analysis of light by Laurent's half shade polarimeter.

NOTE: Problems should be solved at the end of every chapter of all units.


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B.Sc. (Physics) Syllabus, Mahatma Gandhi University
(w.e.f 2019-2020)

Suggested books

1. **Optics** by Ajoy Ghatak. *The McGraw-Hill companies.*
2. **Optics** by Subramaniam and Brijlal. *S. Chand & Co.*
3. **Fundamentals of Physics.** Halliday/Resnick/Walker.C. *Wiley India Edition 2007.*
4. **Optics and Spectroscopy.** R. Murugesan and Kiruthiga Siva Prasath. *S. Chand & Co.*
5. **Second Year Physics – Telugu Academy.**
6. **Modern Engineering Physics** by A.S. Vasudeva. *S.Chand & Co. Publications.*
7. **Feynman's Lectures on Physics** Vol. 1,2,3 & 4. *Narosa Publications.*
8. **Fundamentals of Optics** by Jenkins A. Francis and White E. Harvey, *McGraw Hill Inc.*
9. **Physical Optics,** K. Ghatak
10. **Optical and Atomic Physics,** D.P. Khandelwal, Himalaya Publishing House, Bombay, 1988
11. **Fundamental of Optics,** Jenkins and White, McGraw-Hill
12. **Optics,** Smith and Thomson, John Wiley and sons



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B.Sc. (Physics) Syllabus, Mahatma Gandhi University
(w.e.f 2019-2020)


B.Sc. (Physics) – II year
Semester - IV
Paper – IV: Waves and Optics Practicals
(DSC-4: Compulsory)

1. Thickness of a wire using wedge method.
2. Determination of wavelength of light using Biprism.
3. Determination of Radius of curvature of a given convex lens by forming Newton's rings.
4. Resolving power of grating.
5. Study of optical rotation-polarimeter.
6. Dispersive power of a prism
7. Determination of wavelength of light using diffraction grating minimum deviation method.
8. Wavelength of light using diffraction grating – normal incidence method.
9. Resolving power of a telescope.
10. Refractive index of a liquid and glass (Boys Method).
11. Pulfrich refractometer – determination of refractive index of liquid.
12. Wavelength of Laser light using diffraction grating.
13. Verification of Laws of a stretched string (Three Laws).
14. Velocity of Transverse wave along a stretched string
15. Determination of frequency of a bar- Melde's experiment

Note: Minimum of eight experiments should be performed Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

Suggested Books

1. D.P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani Publishing House, New Delhi).
2. S.P. Singh, "Advanced Practical Physics" (Pragati Prakashan, Meerut).
3. Worsnop and Flint- Advanced Practical physics for students.
4. "Practical Physics" R.K Shukla, Anchal Srivastav.


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NALGONDA-508 254. (T.S.M)

B.Sc. (Physics)- III Year
Semester – V
Paper – V (A): Modern Physics
(DSE-1: Elective)

Total: 56 Hrs
(4 Hrs / week)

UNIT - 1 : SPECTROSCOPY (14 Hrs)

Atomic Spectra: Introduction - Drawbacks of Bohr's atomic model - Sommerfeld's elliptical orbits - relativistic correction (no derivation). Stern & Gerlach experiment, Vector atom model and quantum numbers associated with it. L-S and j-j coupling schemes. Spectral terms, selection rules, intensity rules-spectra of alkali atoms, doublet fine structure, Zeeman Effect, Paschen-Back Effect and Stark Effect (basic idea).

Molecular Spectroscopy: Types of molecular spectra, pure rotational energies and spectrum of diatomic molecule. Determination of inter nuclear distance. Vibrational energies and spectrum of diatomic molecule. Raman effect, classical theory of Raman effect. Experimental arrangement for Raman effect and its applications.

UNIT – II: Quantum Mechanics (14 Hrs)

Inadequacy of classical Physics: Spectral radiation - Planck's law (only discussion). Photoelectric effect - Einstein's photoelectric equation. Compton's effect - experimental verification.

Matter waves & Uncertainty principle: de Broglie's hypothesis - wavelength of matter waves, properties of matter waves. Phase and group velocities. Davisson and Germer experiment. Double slit experiment. Standing de Broglie waves of electron in Bohr orbits. Heisenberg's uncertainty principle for position and momentum (x and p_x), Energy and time (E and t). Gamma ray microscope. Diffraction by a single slit. Position of electron in a Bohr orbit. Complementary principle of Bohr.

Schrodinger Wave Equation

Schrodinger time independent and time dependent wave equations. Wave function properties - Significance. Basic postulates of quantum mechanics. Operators, eigen functions and eigen values, expectation values.

Unit - III: Nuclear Physics (14 Hrs)

Nuclear Structure: Basic properties of nucleus - size, charge, mass, spin, magnetic dipole moment and electric quadrupole moment. Binding energy of nucleus, deuteron binding energy, p-p, n-n, and n-p scattering (concepts), nuclear forces. Nuclear models - liquid drop model, shell model.

Alpha and Beta Decays: Range of alpha particles, Geiger – Nuttall law. Gammow's theory of alpha decay. Geiger – Nuttall law from Gammow's theory. Beta spectrum - neutrino hypothesis,

Particle Detectors: GMcounter, proportionalcounter, scintillationcounter.

UNIT: IV: Solid State Physics & Crystallography (14 Hrs)

Crystal Structure: Crystalline nature of matter, Crystal lattice, Unit Cell, Elements of symmetry. Crystal systems, Bravais lattices. Miller indices. Simple crystal structures (S.C., BCC, FCC, CsCl, NaCl, diamond and ZincBlende)

X-ray Diffraction: Diffraction of X -rays by crystals, Bragg's law, Experimental techniques - Laue's method and powder method.

Bonding in Crystals: Types of bonding in crystals - characteristics of crystals with different bondings. Lattice energy of ionic crystals- determination of Madelung constant for NaCl crystal, Calculation of Born Coefficient and repulsive exponent. Born-Haber cycle.

NOTE: Problems should be solved at the end of every chapter of all units.

B.Sc. (Physics) Syllabus, Mahatma Gandhi University
(w.e.f 2019-2020)

Suggested books:

1. Modern Physics by G. Aruldhas & P.Rajagopal. Eastern Economy Edition.
2. Concepts of Modern Physics by Arthur Beiser. Tata McGraw-Hill Edition.
3. Modern Physics by R. Murugesan and Kiruthiga SivaPrasath.S. Chand & Co.
4. Nuclear Physics by D.C. Tayal, Himalaya PublishingHouse.
5. Molecular Structure and Spectroscopy by G.Aruldhas. Prentice Hall of India, New Delhi.
6. Spectroscopy -Atomic and Molecular by Gurdeep R Chatwal and Shyam Anand -Himalaya Publishing House.
7. Third Year Physics – Telugu Academy.
8. Elements of Solid State Physics by J.P. Srivastava. (for chapter on nanomaterials)-Prentice-hall of India Pvt. Ltd.



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B.Sc. (Physics) Syllabus, Mahatma Gandhi University
(w.e.f 2019-2020)


B.Sc. (Physics) – III year
Semester – V
Paper- V (A): Modern Physics Practicals
(DSE-1: Elective)

1. Measurement of Planck's constant using black body radiation and photo-detector
2. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light
3. To determine the Planck's constant using LEDs of at least 4 different colors.
4. To determine the ionization potential of mercury.
5. To determine the absorption lines in the rotational spectrum of Iodine vapour.
6. To determine the value of e/m by (a) Magnetic focusing or (b) Bar magnet.
7. To setup the Millikan oil drop apparatus and determine the charge of an electron.
8. To show the tunneling effect in tunnel diode using I-V characteristics.
9. To determine the wavelength of laser source using diffraction of single slit.
10. To determine the wavelength of laser source using diffraction of double slits.
11. To determine (1) wavelength and (2) angular spread of He-Ne laser using plane diffraction grating
12. To determine the value of e/m for electron by long solenoid method.
13. Photo Cell – Determination of Planck's constant.
14. To verify the inverse square law of radiation using a photo-electric cell.
15. To find the value of photo electric work function of a material of the cathode using a photo-electric cell.
16. Measurement of magnetic field – Hall probe method.
17. To determine the dead time of a given G.M. tube using double source.
18. Hydrogen spectrum – Determination of Rydberg's constant
19. Energy gap of intrinsic semi-conductor
20. G. M. Counter – Absorption coefficients of a material.
21. To draw the plateau curve for a Geiger Muller counter.
22. To find the half-life period of a given radioactive substance using a G.M. Counter.

Reference Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I. Prakash & Ramakrishna, 11th Edn, 2011, Kitab Mahal

Note: Minimum of eight experiments should be performed.


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B.Sc. (Physics) Syllabus, Mahatma Gandhi University
(w.e.f 2019-2020)

B.Sc. (Physics) - III Year
Semester – V
Paper – V (B) : Computational
Physics (DSE-1: Elective)

Total: 56 hrs
(4 Hrs / week)

UNIT I: Programming in C (14 Hrs)

Flow charts, algorithms, Integer and floating-point arithmetic, precision, variable types, arithmetic statements, input and output statements, control statements, executable and non-executable statements, arrays, Repetitive and logical structures, Subroutines and functions, operation with files, operating systems, Creation of executable programs.

UNIT II: Numerical methods of Analysis (14 Hrs)

Solution of algebraic and transcendental equation, Newton Raphson method, Solution of simultaneous linear equations. Matrix inversion method, Interpolation, Newton and Lagrange formulas, Numerical differentiation. Numerical integration, Trapezoidal, Simpson and gaussian quadrature methods, Least square curve fitting, Straight line and Polynomial fits.

UNIT III: Numerical solution of ordinary differential equations (14 Hrs)

Eulers and Runge kutta methods, simulation. Generation of uniformly distributed random integers, statistical tests of randomness. Monte-Carlo evaluation of integrals and error analysis, Non-uniform probability distributions, Importance sampling, Rejection method.


UNIT IV: Computational methods (14 Hrs)

Metropolis algorithm, Molecular diffusion and Brownian motions, Random walk problems and their Montecarlo simulation. Finite element and Finite difference methods. Boundary value and initial value problems, density functional methods.

Note: Problems should be solved at the end of every chapter of all units

Suggested Books:

1. Computational methods in Physics and Engineering: Wong
2. Computer Oriented Numerical methods: Rajaraman
3. Computer Programming in Fortran 77: Rajaraman
4. Applied Numerical Analysis: Gerald
5. A Guide to Manto - Carlo simulations Statistical Physics: Land


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B.Sc. (Physics) – III year
Semester – V
Paper – V (B): Computational Physics Practicals
(DSE-1: Elective)

1. Jacobi Method of Matrix diagonalization
2. Solution of Transcendental or Polynomial equations by the Newton Raphson method
3. Linear curve fitting and calculation of linear correlation coefficients
4. Matrix Simulation: Subtraction and Multiplication.
5. Matrix Inversion and solution of simultaneous equations
6. Lagrange interpolation based on given input data
7. Numerical integration using the Simpsons method.
8. Numerical integration using the Gaussian quadrature method.
9. Solution of first order Differential Equation using Runge-kutta method.
10. Numerical first order differentiation of a given function.
11. Fast Fourier transform
12. Monte Carlo Integration
13. Use of a package for data generation and graph plotting.
14. Test of Randomness for random numbers generators.

Note: Minimum of eight experiments should be performed. Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.



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B.Sc. (Physics) Syllabus, Mahatma Gandhi University
(w.e.f 2019-2020)

B.Sc. (Physics) - III Year
Semester – VI
Paper – VI (A): Electronics
(DSE-2: Elective)

Total: 56 hrs
(4 Hrs / week)

Unit - I: (14 Hrs)

- 1. Band theory of P-N junction:** Energy band in solids (band theory), valence band, conduction band and forbidden energy gap in solids, insulators, semi conductors and pure or intrinsic semiconductors and impure or extrinsic semi-conductors. N-type semi-conductors, P-type semi-conductors, Fermi level, continuity equation.
- 2. Diodes:** P-N junction diode, Half-wave, full-wave and bridge rectifier. Zener diode & its characteristics. Zener diode as voltage regulator.

Unit-II: (14 Hrs)

- 1. Bipolar Junction Transistor (BJT)** – p-n-p and n-p-n transistors, current components in transistors, CB, CE and CC configurations – transistor as an amplifier -RC coupled amplifier – Frequency response (Qualitative analysis).
- 2. Feedback concept & Oscillators:** Feedback, General theory of feedback–Concepts of oscillators, Barkhausen’s criteria, Phase shift oscillator – Expression for frequency of oscillation.

Unit-III: (14 Hrs)

Special devices- Construction and Characteristics: Photo diode - Shockley diode -Solar cell, Opto-couplers - Field Effect Transistor (FET) - FET as an Amplifier - Uni Junction Transistor (UJT), UJT as a relaxation oscillator - Silicon controlled rectifier (SCR) - SCR as a switch.

Unit-IV: (14 Hrs)

1. Digital Electronics

Binary number system, conversion of binary to decimal and vice-versa. Binary addition and subtraction (1’s and 2’s complement methods).Hexadecimal number system. Conversion from binary to hexadecimal and vice-versa, Decimal to hexadecimal and vice-versa.

2. Logic gates:

OR, AND, NOT gates, truth tables, realization of these gates using discrete components. NAND, NOR as universal gates, Exclusive – OR gate (EX-OR). De Morgan’s Laws – Verification.

NOTE: Problems should be solved from every chapter of all units.

Suggested Books:

1. Electronic devices and circuits – Millman and Halkias. *Mc.Graw-Hill Education.*
2. Principles of Electronics by V.K. Mehta – *S. Chand & Co.*
3. Basic Electronics (Solid state) – B. L. Theraja, S. Chand & Co.
4. A First Course in Electronics- Anwar A. Khan & Kanchan K. Dey, PHI.
5. Physics of Semiconductor Devices- S. M. Sze
6. Physics of Semiconductors- Streetman.
7. Basic Electronics – Bernod Grob.
8. Basic Electronics for B.Sc (Physics) III Year, 2019, Telugu Academy
9. Digital Principles & Applications – A.P. Malvino and D.P. Leach

B.Sc. (Physics) Syllabus, Mahatma Gandhi University
(w.e.f 2019-2020)


B.Sc. (Physics) – III year
Semester – VI
Paper-VI (A): Electronics Practicals
(DSE-2: Elective)

1. Construction of logic gates (AND, OR, NOT, gates) with discrete components– Truth table Verification
2. AND, OR, NOT – gates constructions using universal gates – Verification of truth tables.
3. Construction of NAND and NOR gates with discrete components and truth table verification
4. Characteristics of a Transistor in CE configuration
5. R.C. coupled amplifier – frequency response.
6. Verification of De Morgan's Theorem.
7. Zener diode V-I characteristics.
8. P-n junction diode V- I characteristics.
9. Zener diode as a voltage regulator
10. Construction of a model D.C. power supply
11. R C phase shift Oscillator –determination of output frequency

Note: Minimum of eight experiments should be performed.

Suggested Books:

1. B.Sc. Practical Physics – C. L. Arora – S. Chand & Co.
2. Viva-voce in Physics – R.C. Gupta, Pragathi Prakashan, Meerut.
3. Laboratory manual for Physics Course by B.P. Khandelwal.
4. Practical Physics by M. Arul Thakpathi by Comptex Publishers.
5. B.Sc. practical physics – Subbi Reddy.


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B.Sc. (Physics)- III Year
Semester – VI
Paper – VI (B): APPLIED OPTICS
(DSE-2: Elective)

Total: 56 Hrs
(4 Hrs / week)

Unit I: Principles of LASER (14 Hrs)

Emission and absorption of Radiation, -Einstein Relations- Pumping Mechanism- optical feedback- Laser rate equation for two, three and Four level Lasers, pumping threshold condition- Principle of Laser beams. Classification of LASER Systems- Gas, Liquid and Solid Lasers He-Ne and Argon Lasers, their energy level schemes- Ruby Laser and YAG laser, GA-As Laser and their applications in various fields.

Unit II: Holography (14 Hrs)

Basic principle of Holography- Recording of amplitude and phase. The recording medium- reconstruction of original wave front- Image formation by wave front reconstruction- Gabor Hologram- limitations of Gabor Hologram- Fourier Transform Hologram- Volume Hologram- Applications of holograms.

Unit III: (14 Hrs)

Fourier and Non-Linear Optics: Thin lens as phase transformation-thickness function-various types of lenses- Fourier transforming properties of lenses-Object placed Infront of the lens- Object placed behind the lens.

Non-Linear Optics: harmonic generation- second harmonic generation-phase matching condition- Optical mixing- parametric generation of Light- Self focusing of light.

Unit IV: Optical Fibers (14 Hrs)

Fiber types and their structures. Ray optic representation, Acceptance angle and numerical aperture. Step index and graded index fibers. Single mode and multi-mode fibers. Fiber materials for glass fibers and plastic fibers. Signal attenuation in optical fibers. Absorption, Scattering and bending losses in fibers, core and cladding losses. Material dispersion, wave guide dispersion, intermodal distortion and pulse broadening.

Note:-Problems should be solved at the end of every chapter of all units

Suggested Books:

1. Opto electronics an Introduction-Wilson & JFB Hawkes 2nd edition
2. Introduction to Fourier optics-JW Goodman
3. Lasers and Non linear Optics--BB Laud
4. Optical electronics – Ghatak and Thyagarajan
5. Principles of Lasers- O.Svelto
6. Optical fiber communication -By Geradkeiser
7. Optical fiber communication-by John M Senior (PHI)


Board of Studies in Physics,
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B.Sc. (Physics) Syllabus, Mahatma Gandhi University
(w.e.f 2019-2020)


B.Sc. (Physics) – III year
Semester – VI
Paper – VI (B): Applied Optics Practicals
(DSE-2: Elective)

1. Study of the Profile of a laser beam
2. Determination of the diameter of a thin wire using laser
3. Determination of wavelength of He-Ne laser by transmission grating
4. Construction and recording of a Hologram
5. Study of Fourier transforming properties of lenses
6. Study of second harmonic generation by KDP crystal
7. Measurement of numerical aperture of an optical fiber
8. Measurement of coupling losses in optical fiber
9. Measurement of bending losses in optical fiber
10. Study of audio signal transmission through optical fiber
11. To study the interference of light using optical fiber

Note: Minimum of eight experiments should be performed.

Suggested Books:

1. Introduction to Fourier Optics- J Goodman
2. Optical Fiber Communication- John M senior
3. Principles of Lasers-by O.Svelto
4. Modern Optics by Grant Fowles
5. Principles of Optics by Born & Wolf
6. Fundamentals of Optics by Jenkins & White


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Mahatma Gandhi University
N. 11 GONDA - 508 254 (T.P. 11)

B.Sc. (Physics) - II Year
Semester – III
Experimental methods & Error analysis
(SEC - I)

Total: 28 Hrs
(2 Hrs / week)

Unit I: Experimental Methods (14 Hrs)

Least count of an instruments, Instruments for measuring mass, length, time, angle, current, voltage. Fundamental Units. Precision and accuracy of measurements, source of error in measurements, necessity of estimating errors, types of errors, reading error of instrument, Calibration error, random error, system error, Significant digits, order of magnitude and rounding of numbers, rounding error, absolute and relative error. Errors of computation- addition, subtraction, multiplication, division error in power and roots, propagation errors, analysis of data, standard deviation, calculation of mean value.

Unit II: I Statistical analysis of errors (14 Hrs)

Mean mode and standard deviation, Standard deviation of mean, Least squares fitting, Normal distribution, covariance and correlation, Binomial distribution, poisson distribution, chi-square test.

Note:-Problems should be solved at the end of every chapter of all units

Suggested Book:

1. The theory of errors in Physical Measurements JC Pal New central book agency -2010


CHAIRMAN,

Board of Studies in Physics,
Mahatma Gandhi University
NALGONDA-508 254 (T.P.N.)

B.Sc. (Physics) - II Year
Semester – III
Electrical circuit Networking
(SEC - II)

Total: 28 Hrs
(2 Hrs / week)

Unit I: (16 Hrs)

Basic electricity principles: Voltage, current, resistance and power – Ohm's law – Series, parallel and series-parallel combinations of resistances – AC electricity and DC electricity – Familiarization with multimeter, voltmeter and ammeter

Electrical circuits: Main electric circuit elements and their combination – Rules to analyze DC sourced electrical circuits – current and voltage drop across the DC circuit elements – single-phase and three-phase alternating current sources – Rules to analyze AC sourced electrical circuits – Real, imaginary and complex power components of AC source – Power factor – saving energy and money

Electrical drawing and symbols: Drawing symbols – Blueprints – Reading schematics – Ladder diagrams

Electrical schematics: Power circuits – Control circuits – Reading of circuit schematics – Tracking the connections of elements and identification of current flow and voltage drop

Generators and Transformers: DC power sources, AC/DC generators – Inductance, capacitance and impedance – Operation of transformers.

Electric motors: Single-phase, three phase & DC motors-Basic design – Interfacing DC or AC sources to control heaters and motors – Speed & power of AC motor

Solid state devices: Resistors, inductors and capacitors – Diode and rectifiers – Components in series or parallel – Response inductors and capacitors with DC or AC sources

Unit-II: (12 Hrs)

Electrical protection: Relays, fuses and disconnect switches – Circuit breakers – Overload devices – Ground-fault protection – Grounding and isolating – Phase reversal – Surge protection – Interfacing DC or AC sources to control elements (Relay protection device)

Electrical wiring: Different types of conductors and cables – Basics of wiring – Star and Delta connection – voltage drop and losses across cables and conductors – Instruments to measure current, voltage and power in DC and AC circuits – Insulation – Solid and stranded cable, conduit, cable trays – Splices: wire nuts, crimps, terminal blocks, split bolts and solder – Preparation of extension board.

Note: Problems should be solved at the end of every chapter of all units

Suggested Books:

1. A text book in electrical technology – B. L. Thereja – S. Chand & Co.
2. A text book of electrical technology – A. K. Thereja
3. Performance and design of AC machines – M. G. Say – ELBS Edn

B.Sc. (Physics)- II Year
Semester – IV
Basic Instrumentation
(SEC - III)

Total: 28 Hrs
(2 Hrs / week)

Unit I: (14 Hrs)

Basics of measurement: Instruments accuracy, precision, sensitivity, resolution, range, etc – Errors in measurements and loading effects – Multimeter: Principles of measurement of dc voltage and dc current, ac voltage and ac current, resistance – Specifications of a multimeter and their significance

Electronic voltmeter: Advantage over conventional multimeter for voltages measurement with respect to input impedance and sensitivity – Principles of voltage measurement (Block diagram only) – Specifications of an Electric voltmeter, multimeter and their significance - AC mill voltmeter: Types of AC mill voltmeters – Block diagram of AC mill voltmeter Amplifier-rectifier and Rectifier-amplifier – Specifications and their significance

Cathode Ray Oscilloscope (CRO): Block diagram of CRO – construction of CRT – electron gun – electrostatic focusing and acceleration (Qualitative only) – Brief description of screen phosphor, visual persistence and chemical composition – Time-base operation – synchronization – front panel controls – specifications of CRO and their significance – Use of CRO for the measurement of voltage dc and ac frequency, time period – Special features of dual trace – Introduction to digital oscilloscope – Probes – Digital storage oscilloscope: Block diagram and principle of working

Unit II: (14 Hrs)

Signal generators and Analysis instruments: Block diagram, explanation and specifications of low frequency signal generator, pulse generator and function generator – Concept of testing – Specifications – Distortion factor meter – wave analysis.

Impedance Bridges & Q-meters: Block diagram of bridge – working principles of basic (balancing type) RLC bridge – Specifications of RLC bridge – Block diagram & working principles of a Q-meter – Digital LCR bridges

Digital Instruments: Principle and working of digital meters – Comparison of analog & digital instruments – characteristics of digital meter – working principles of digital voltmeter.

Digital multimeter: Block diagram and working of digital multimeter – working principle - time interval, frequency and period measurement using universal counter/frequency counter – time-base stability, accuracy and resolution.

Note: Problems should be solved at the end of every chapter of all units.

Suggested Books:

1. A text book in electrical technology – B. L. Thereja – S. Chand & Co.
2. Performance and design of AC machines – M. G. Say – ELBS Edn
3. Digital circuits and systems – Venugopal, Tata McGraw Hill, 2011
4. Logic circuit design – Shimon P. Vingron, Springer, 2012
5. Digital electronics – Subrata Ghoshal, Cengage Learning, 2012
6. Electronic devices and circuits – S. Salivahanan & N. S. Kumar, 3rd Edn, 2012, Tata McGraw Hill
7. Electronic circuits: Hand Book of design and applications – U. Tietze & Ch. Schenk, Springer, 2012
8. Electronic devices – Thomas L. Floyd, 7th Edn., Pearson India, 2008

**B.Sc. (Physics) - II Year
Semester – IV
Digital Electronics
(SEC - IV)**

Total: 28 Hrs
(2 Hrs / week)

Unit I (14 Hrs)

Number Systems: Decimal, Binary, Octal and Hexadecimal.

Conversion: Binary to Decimal, Octal to Decimal, Hexadecimal to Decimal, Decimal to Binary, Decimal to Octal and Decimal to Hexadecimal.

Binary coded decimal, Excess-3 code, grey code, ASCII code.

Logic gates: OR, AND, NOT, EX-OR, NAND, NOR, Universal gates.

Half adder and Full adder.

Unit II: (14 Hrs)

Boolean algebra: Boolean laws, De-Morgan's theorems, Sum of products, Product of sums and Karnaugh maps. Multiplexers and Demultiplexers.

Flip-Flops: RS flip-flop, D flip-flop, JK flip-flop and MS flip-flop.

Registers: Types of Registers.

Counters: Synchronous and Asynchronous counters and their differences.

NOTE: Problems should be solved at the end of every chapter of all units.

References:

1. Digital Electronics by Gothman
2. Digital principles and applications by Malvino and Leach

Suggested Books:

1. Electronic Devices and circuits - Jacob Milliman, Christos C. Haikais and satyabrata Jit, Mc Graw Hill (India) Pvt. Ltd, 2010
2. Op-Amps and Linear Integrated circuits – P. Ramakanth and Gaykward, 4th edition PHI, 2000
3. Electronic measurements and instrumentation Technology - William D cooper and Ad Helfrick, PHI, 2002
4. Electronic devices and circuits – S. Shalivahan and N. Sureshkumar 2nd Edn, Mc Graw Hill, Pvt. Ltd., 2007.
5. Basic Electronics for B.Sc (Physics) III Year, 2019, Telugu Academy

B.Sc. (Physics) Syllabus, Mahatma Gandhi University
(w.e.f 2019-2020)

B.Sc. (Physics) - III
Year Semester – V
Renewal energy & Energy harvesting
(GE)

Total: 56 Hrs
(4 Hrs / week)

Unit I: Principles of Solar Radiation and Collection (Qualitative only) (14Hrs)

Non-renewable energy resources – Principles of power generation and transmission. A model of conventional thermal power plant. Advantages and disadvantages of conventional power plants. Role and potential of new and renewable sources, the solar energy option, environmental impact of solar power, physics of the sun, the solar constant, solar radiation on tilted surface, instruments for measuring solar radiation and sun shine, solar radiation data.

Unit II: Solar Energy Storage and Applications (14Hrs)

Solar energy collectors - Flat plate and concentration collectors, classification of concentration collectors and orientation, advanced collectors. Different sensible, latent heat and stratified storage, solar ponds. Solar Applications – solar heating/ cooling technique, solar distillation and drying, photovoltaic energy conversion.

Unit III: Wind and Bio-Mass Energy (14Hrs)


Resources and potentials, horizontal and vertical axis windmills, performance characteristics. Principles of Bio-Conversion, Energy from waste, types of bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, LPG and CNG.

Unit IV: Geothermal and Ocean Energy (14Hrs)

Resources, types of wells, methods of harnessing the energy, potential in India. OTEC, principles of utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy, Potential and conversion techniques, mini-hydel power plants, land and their economics.

Suggested Books:

1. Non-Conventional Energy Sources - G.D Rai, Khanna Publishers
2. Renewable Energy Resources - Twidell & Wier, CRC Press (Taylor & Francis)
3. Renewable energy resources - Tiwari and Ghosal, Narosa.
4. Renewable Energy Technologies - Ramesh & Kumar, Narosa
5. Non-Conventional Energy Systems - K Mittal, Wheeler
6. Renewable energy sources and emerging technologies - D.P. Kothari, K.C. Singhal.


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B.Sc. (Physics) Syllabus, Mahatma Gandhi University
(w.e.f 2019-2020)

B.Sc. (Physics)- III Year
Semester – VI
Nano Science
(Paper in lieu of project)

Total: 56 Hrs
(4 Hrs / week)

Unit I: (12 Hrs)

Length scales in physics and Nano structures: 1D, 2D and 3D nano structures (nanodots, thin films, nanowires, nanorods), Band structure and density of states of materials at nano scale – Size effects in nano systems – Quantum confinement in 3D, 2D and 1D nano structures and its consequences

Unit II: (16 Hrs)

Synthesis of Nano structure materials: Top-down and Bottom-up approach – Photolithography – Ball milling – Gas phase condensation – Vacuum deposition – Physical vapor deposition (PVD) – Thermal evaporation – E-beam evaporation – Pulsed Laser deposition – Chemical vapor deposition (CVD) – Sol-Gel – Electro deposition – Spray pyrolysis – Hydrothermal synthesis – Preparation through colloidal methods – MBE growth of quantum dots

Characterization: X-Ray diffraction – Optical microscopy – Scanning Electron Microscope (SEM) – Transmission Electron Microscope (TEM) – Atomic Force Microscope (AFM) – Scanning Tunneling Microscope

Unit III: (14 Hrs)

Optical properties: Coulomb interaction in nano structures – concept of dielectric constant for nano structures and charging of nano structure – Quasi-particles and excitons – Excitons in direct and indirect band gap semiconductor nanocrystals – Quantitative treatment of quasi-particles and excitons – Charging effects – Radioactive processes: general formalization – absorption, emission and luminescence

– Optical properties of hetero structures and nano structures

Electron Transport: Carrier transport in nano structures – Coulomb blockade effect – thermionic emission – tunneling and hopping conductivity – Defects and impurities: Deep level and surface defects

Unit IV: (14 Hrs)

Applications: Applications of nano particles, quantum dots, nanowires and thin films for photonic devices (LED, solar cells) – Single electron devices (Qualitative only) – CNT based transistors – Nano material devices: Quantum dots – hetero structure Lasers

Optical switching and optical data storage – Magnetic quantum well – magnetic dots – magnetic data storage – Micro Electromechanical Systems (MEMS), Nano Electromechanical Systems (NEMS)

Suggested Books:

1. Introduction to Nanotechnology – C.P. Poole, Jr. Frank, J. Owens – Wiley India Pvt, Ltd.
2. Nanotechnology: Principles & Practices – S.K. Kulkarni – Capital Publishing Co.)
3. Introduction to Nanoscience and Technology – K.K. Chatopadhyay, A.N. Benerjee – PHI Learning Pvt. Ltd.
4. Nanotechnology – Richard Booker, Earl Boysen – John Wiley and Sons
5. Nanoparticle Technology Handbook – M. Hosokawa, K. Nogi, M. Naita, T. Yokoyama, Elsevier, 2007.
6. Springer Handbook of Nanotechnology – Bharath Bhushan, Springer-Verlag, Berlin, 2004.

Mahatma Gandhi University
Faculty of Science
B.Sc. (Computer Science)
CBCS Pattern With effect from the Academic Year 2019-2020

Code	Course Title	Course Type	HpW	Credits
Semester -I				
BS106	Programming in C	DSC-3A	4T + 3P = 7	4 + 1 = 5
Semester -II				
BS206	Programming in C++	DSC-3B	4T + 3P = 7	4 + 1 = 5
AECC				
BS107	Fundamentals of Computers	AECC	2T	2
Semester -III				
BS301	Python –1	SEC-1	2T	2
BS302	Operating System –1	SEC-2	2T	2
BS306	Data Structure using C++	DSC-3C	4T + 3P = 7	4 + 1 = 5
Semester -IV				
BS401	Python –2	SEC-3	2T	2
BS402	Operating System–2	SEC-4	2T	2
BS406	Data Base Management Systems (DBMS)	DSC-3D	4T + 3P = 7	4 + 1 = 5
Semester -V				
BS501	Information Technologies	GE	4T	4
BS502	Programming in Java	DSE-3E	4T + 3P = 7	4 + 1 = 5
Semester -VI				
BS605	Web Technologies	DSE-3F	4T + 3P = 7	4 + 1 = 5
Project/Optional				
BS606	PHP with MySQL	P/O	3T + 3P = 3	3 + 1 = 4
Total Number of Credits				48

Theory	4 Hours/Week	4credits
Practical	3 Hours/Week	1credit

Unit – I

Computer Fundamentals: Introduction of Computers, Classification of Computers, Anatomy of a Computer, Memory Hierarchy, Introduction to OS, Operational Overview of a CPU.

Program Fundamentals: Generation and Classification of Programming Languages, Compiling, Interpreting, Loading, Linking of a Program, Developing Program, Software Development.

Algorithms: Definitions, Different Ways of Stating Algorithms (Step-form, Pseudo-code, Flowchart), Strategy for Designing Algorithms, Structured Programming Concept.

Basics of C: Overview of C, Developing Programs in C, Parts of Simple C Program, Structure of a C Program, Comments, Program Statements, C Tokens, Keywords, Identifiers, Data Types, Variables, Constants, Operators and Expressions, Expression Evaluation–precedence and associativity, Type Conversions.

Unit – II

Input-Output: Non-formatted and Formatted Input and Output Functions, Escape Sequences,

Control Statements: Selection Statements – if, if-else, nested if, nested if-else, comma operator, conditional operator, switch; Iterative Statements–while, for, do-while; Special Control Statement–goto, break, continue, return, exit.

Arrays and Strings: One-dimensional Arrays, Character Arrays, Functions from ctype.h, string.h, Multidimensional Arrays.

Unit – III

Functions: Concept of Function, Using Functions, Call-by-Value Vs Call-by-reference, Passing Arrays to Functions, Scope of Variables, Storage Classes, Inline Functions, and Recursion.

Pointers: Introduction, Address of Operator (&), Pointer, Uses of Pointers, Arrays and Pointers, Pointers and Strings, Pointers to Pointers, Array of Pointers, Pointer to Array, Dynamic Memory Allocation.

Unit – IV

User-defined Data Types: Declaring a Structure (Union) and its members, Initialization Structure (Union), Accessing members of a Structure (Union), Array of Structures (Union), Structures verses Unions, Enumeration Types.

Files: Introduction, Using Files in C, Working with Text Files, Working with Binary Files, Files of Records, Random Access to Files of Records, Other File Management Functions.

Text Book PradipDey, ManasGhosh, *Computer Fundamentals and Programming in C(2e)*

Reference s Ivor Horton, *Beginning C*

Ashok Kamthane, *Programming in C*

Herbert Schildt, *The Complete Reference C*

Paul Deitel, Harvey Deitel, *C How To Program*

Byron S. Gottfried, *Theory and Problems of Programming*

with C Brian W. Kernighan, Dennis M. Ritchie, *The C*

Programming Language

B. A. Forouzan, R. F. Gilberg, *A Structured Programming Approach Using C*

B.Sc. (Computer Science)

Semester -I**Programming in C Lab****BS106****Practical****3 Hours/Week****1 credit**

- 1 Write a program to find the largest two (three) numbers using if and conditional operator.
- 2 Write a program to print the reverse of a given number.
- 3 Write a program to print the prime number from 2 to n where n is given by user.
- 4 Write a program to find the roots of a quadratic equation using switch statement.
- 5 Write a program to print a triangle of stars as follows (take number of lines from user):

```

*
* * *
*****
*****
*****
*****

```

- 6 Write a program to find largest and smallest elements in a given list of numbers.
- 7 Write a program to find the product of two matrices..
- 8 Write a program to find the GCD of two numbers using iteration and recursion.
- 9 Write a program to illustrate use of storage classes.
- 10 Write a program to demonstrate the call by value and the call by reference concepts.
- 11 Write a program that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
- 12 Write a program to illustrate use of data type enum.
- 13 Write a program to demonstrate use of string functions string.h headerfile.
- 14 Write a program that opens a file and counts the number of characters in a file.
- 15 Write a program to create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
- 16 Write a program that opens an existing text file and copies it to a new text file with all lowercase letters changed to capital letters and all other characters unchanged.

Note : Write the Pseudo Code and draw Flow Chart for the above programs.

Recommended to use Open Source Software : GCC on Linux; Dev C++ (or) CodeBlocks on Windows 10.

B.Sc. (Computer Science)

Semester -II

DSC-3B

Programming in C++

BS206

Theory	4 Hours/Week	4credits
Practical	3 Hours/Week	1credit

Unit – I

Introduction to C++: Applications, Example Programs, Tokens, Data Types, Operators, Expressions, Control Structures, Arrays, Strings, Pointers, Searching and Sorting Arrays.

Functions: Introduction, Prototype, Passing Data by Value, Reference Variables, Using Reference Variables as Parameters, Inline Functions, Default Arguments, Overloading Functions, Passing Arrays to Functions. Object Oriented Programming: Procedural and Object-Oriented Programming, Terminology, Benefits, OOP Languages, and OOP Applications.

Unit – II

Classes: Introduction, Defining an Instance of a Class, Why Have Private Members? Separating Class Specification from Implementation, Inline Member Functions, Constructors, Passing Arguments to Constructors, Destructors, Overloading Constructors, Private Member Functions, Arrays of Objects, Instance and Static Members, Friends of Classes, Member-wise Assignment, Copy Constructors, Operator Overloading, Object Conversion, Aggregation.

Unit – III

Inheritance: Introduction, Protected Members and Class Access, Base Class Access Specification, Constructors and Destructors in Base and Derived Classes, Redefining Base Class Functions, Class Hierarchies, Polymorphism and Virtual Member Functions, Abstract Base Classes and Pure Virtual Functions, Multiple Inheritance.

C++ Streams: Stream Classes, Unformatted I/O Operations, Formatted I/O Operations.

Unit – IV

Exceptions: Introduction, Throwing an Exception, Handling an Exception, Object-Oriented Exception Handling with Classes, Multiple Exceptions, Extracting Data from the Exception Class, Re-throwing an Exception, Handling the `bad_alloc` Exception.

Templates: Function Templates–Introduction, Function Templates with Multiple Type, Overloading with Function Templates, Class Templates – Introduction, Defining Objects of the Class Template, Class Templates and Inheritance, Introduction to the STL.

Text Tony Gaddis, *Starting out with C++: from control structures through objects*(7e)

Refere B. Lippman, *C++ Primer*

nce s Bruce Eckel, *Thinking in C++*

K.R. Venugopal, *Mastering C++*

Herbert Schildt, *C++: The Complete Reference*

Bjarne Stroustrup, *The C++ Programming Language*

Sourav Sahay, *Object Oriented Programming with C++*

- 1 Write a program to.
 - a. Print the sum of digits of a given number.
 - b. Check whether the given number is Armstrong or not
 - c. Print the prime number from 2 to n where n is natural number given
- 2 Write a program to find largest and smallest elements in a given list of numbers and sort the given list.
- 3 Write a program to read the student name, roll no, marks and display the same using class and object.
- 4 Write a program to implement the dynamic memory allocation and de-allocation using new and delete operators using class and object.
- 5 Write a program to find area of a rectangle, circle, and square using constructors.
- 6 Write a program to implement copy constructor.
- 7 Write a program using friend functions and friend class.
- 8 Write a program to implement constructors
 - * Default Constructor, Parameterized Constructor, Copy Constructor
 - * Define the constructor inside/outside of the class
 - * Implement all three constructors within a single class as well as use multiple classes (individual classes)
- 9 Write a program to implement the following concepts using class and object *
 - Function overloading
 - * Operator overloading (unary/binary(+ and-))
- 10 Write a program to demonstrate single inheritance, multilevel inheritance and multiple inheritances.
- 11 Write a program to implement the overloaded constructors in inheritance.
- 12 Write a program to implement the polymorphism and the following concepts using class and object. *
 - Virtual functions
 - * Pure virtual functions
- 13 Write a program to implement the virtual concepts for following concepts *
 - Constructor (not applied)
 - * Destructor (applied)
- 14 Write a program to demonstrate static polymorphism using method overloading.
- 15 Write a program to demonstrate dynamic polymorphism using method overriding and dynamic method dispatch.
- 16 Write a program to implement the template (generic) concepts
 - * Without template class and object
 - * With template class and object
- 17 Write the Pseudo Code and draw Flow Chart for the above programs.

Note:

Recommended to use Open Source Software: GCC on Linux; DevC++ (or) CodeBlocks on Windows.

B.Sc. (Computer Science)

Semester -II

AECC

Fundamentals of Computers

BS107

Theory

2Hours/Week

2 credits

Unit-I

Introduction to Computers: what is a computer, characteristics of Computers, Generations of Computers, Classifications of Computers, Basic Computer organization, Applications of Computers. Input and Output Devices: Input devices, Output devices, Softcopy devices, Hard copy devices. Computer Memory and Processors: Introduction, Memory Hierarchy, Processor, Registers, Cache memory, primary memory, secondary storage devices, magnetic tapes, floppy disks, hard disks, optical drives, USB flash drivers, Memory cards, Mass storage devices, Basic processors architecture.

Unit – II

Number System and Computer Codes: Binary number system, working with binary numbers, octal number system, hexadecimal number system, working with fractions, signed number representation in binary form, BCD code, other codes. Boolean algebra and logic gates: Boolean algebra, Venn diagrams, representation of Boolean functions, logic gates, logic diagrams and Boolean expressions using karnaugh-map. Computer Software: Introduction to computer software, classification of computer software, system software, application software, firmware, middleware, acquiring computer software, design and implementation of correct, efficient and maintainable programs.

Text Book:

ReemaThareja, Fundamentals of Computers.

References:

1. V. Rajaraman, 6th Edition Fundamentals of Computers, Neeharika Adabala.
2. Anita Goel, Computer Fundamentals.

B.Sc. (Computer Science)

Semester -III

Sec-1

Python-1

BS301

Theory

2Hours/Week

2 credits

Unit – I

Introduction to Python Programming: How a Program Works, Using Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations (Operators. Type conversions, Expressions), More about Data Output.

Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables.

Repetition Structures: Introduction, while loop, for loop, Calculating a Running Total, Input Validation Loops, Nested Loops.

Unit – II

Functions: Introduction, Defining and Calling a Void Function, Designing a Program to Use Functions, Local Variables, Passing Arguments to Functions, Global Variables and Global Constants, Value-Returning Functions- Generating Random Numbers, Writing Our Own Value-Returning Functions, The math Module, Storing Functions in Modules.

File and Exceptions: Introduction to File Input and Output, Using Loops to Process Files, Processing Records, Exceptions.

Text Books Tony Gaddis, *Starting Out With Python(3e)*

References

1. Kenneth A. Lambert, *Fundamentals of Python*
2. Clinton W. Brownley, *Foundations for Analytics with Python*
3. JamesPayne, *BeginningPythonusingPython2.6andPython3*
4. Charles Dierach, *Introduction to Computer Science using Python*
5. PaulGries, *PracticalProgramming:AnIntroductiontoComputerScienceusingPython3*

B.Sc. (Computer Science)

Semester -III

SEC-2[B]

OperatingSystems-1

BS302

Theory

2Hours/Week

2 credits

Unit – I

Introduction: Computer-System Architecture, Computing Environments. Operating-System Structures: Operating-System Services, User Interface for Operating-System, System Calls, Types of System Calls, Operating System Structure.

Process Management: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication, Examples–Producer-Consumer Problem.

Process Synchronization: Critical-Section Problem, Peterson’s Solution, Synchronization, Semaphores, Monitors.

Unit – II

CPU Scheduling: Concepts, Scheduling Criteria, Scheduling Algorithms.

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

Text AbrahamSilberschatz,PeterBaerGalvin,GregGagne, *OperatingSystemConcepts(9e)*

Reference s NareshChauhan, *Principles of Operating Systems* Thomas W. Doepner, *Operating Systems in Depth* Andrew S. Tanenbaum, *Modern Operating Systems*
William Stallings, *Operating Systems – Internals and Design Principles* Dhananjay M. Dhandhere, *Operating Systems – A Concept Based Approach*

B.Sc. (Computer Science)

Semester -III**DSC-3C****Data Structures Using C++****BS306****Theory**

4 Hours/Week

4credits

Practical

3 Hours/Week

1credit

Unit – I

Fundamental Concepts: Introduction to Data Structures, Types of Data Structures, Introduction to Algorithm, Pseudo-code, Flow Chart, Analysis of Algorithms.

Linear Data Structure Using Arrays: 1-D Arrays, 2-D Arrays, N-D Arrays, Memory Representation and Address Calculation of 1-D, 2-D, N-D Arrays, Concept of Ordered List, String Manipulation, Pros and Cons of Arrays.

Stacks: Concept, Primitive Operations, Abstract Data Type, Representation Stacks Using Arrays, Prefix, Infix, Postfix Notations for Arithmetic Expression, Applications of Stacks– Converting Infix Expression to Postfix Expression, Evaluating the Postfix Expression, Checking Well-formed (Nested) Parenthesis, Processing of Function Calls, Reversing a String.

Unit – II

Recursion: Introduction, Recurrence, Use of Stack in Recursion, Variants of Recursion, Execution of Recursive Calls, Recursive Functions, Iteration versus Recursion.

Queues: Concept, Primitive Operations, Abstract Data Type, Representation Queues Using Arrays, Circular Queue, Double-Ended Queue, Applications of Queues.

Linked Lists: Introduction, Concept, Terminology, Primitive Operations-creating, inserting, deleting, traversing, Representation of Linked Lists, Linked List Abstract Data Type, Linked List Variants - Singly Linked List, Doubly Linked List, Linear and Circular Linked List, Representation Stacks and Queues Using Linked Singly Lists, Application of Linked List–Garbage Collection.

Unit – III

Trees: Introduction, Representation of a General Tree, Binary Tree Introduction, Binary Tree Abstract Data Type, Implementation of Binary Trees, Binary Tree Traversals – Preorder, Inorder, Postorder Traversals, Applications of Binary Trees Briefly.

Graphs: Introduction, Graph Abstract Data Type, Representation of Graphs, Graph Traversal – Depth-First Search, Breadth-First Search, Spanning Tree – Prim’s Algorithm, Kruskal’s Algorithm.

Hashing: Introduction, Hash Functions, Collision Resolution Strategies.

Unit – IV

Searching and Sorting: Sequential (Linear) Search, Binary Search, Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge Sort, and Comparison of Sorting Techniques. Heaps: Concept, Implementation, Abstract Data Type, Heap Sort.

Text Book Varsha H. Patil, *Data Structures Using C++*

References Nell Dale, *C++ Plus Data Structures*
 Seymour Lipschutz, *Data Structures (Revised 1e)*
 Adam Drozdek, *Data Structures and Algorithms in C++*
 Mark Allen Weiss, *Data structures and Algorithm Analysis in C++ (4e)*
 D.S. Malik, *C++ Programming: Program Design Including Data Structures (6e)* Michael
 Main, Walter Savitch, *Data Structures and Other Objects Using C++ (4e)* Michael T.
 Goodrich, R. Tamassia, David M. Mount, *Data Structures and Algorithms in C++*
 Yonghui Wu, Jiande Wang, *Data Structure Practice for Collegiate Programming Contests
 and Education*

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Semester -III

Data Structures Lab

BS306

Practical

3 Hours/Week

1 credit

- 1 Write programs to implement the following using an array: a) Stack ADT b) Queue ADT.
- 2 Write a program to convert the given infix expression to postfix expression using stack.
- 3 Write a program to evaluate a postfix expression using stack.
- 4 Write a program to ensure the parentheses are nested correctly in an arithmetic expression.
- 5 Write a program to find following using Recursion
 - a) Factorial of +ve Integer b) n^{th} term of the Fibonacci Sequence c) GCD of two +ve integers
- 6 Write a program to create a single linked list and write functions to implement the following operations.
 - a) Insert an element at a specified position
 - b) Delete a specified element in the list
 - c) Search for an element and find its position in the list
 - d) Sort the elements in the list ascending order
- 7 Write a program to create a double linked list and write functions to implement the following operations.
 - a) Insert an element at a specified position
 - b) Delete a specified element in the list
 - c) Search for an element and find its position in the list
 - d) Sort the elements in the list ascending order
- 8 Write a program to create singular circular linked lists and function to implement the following operations.
 - a) Insert an element at a specified position
 - b) Delete a specified element in the list
 - c) Search for an element and find its position in the list
- 9 Write programs to implement the following using a single linked list:
 - a) Stack ADT b) Queue ADT.
- 10 Write a program to implement Binary search technique using Iterative method and Recursive methods.
- 11 Write a program for sorting the given list numbers in ascending order using the following technique: Bubble sort and Selection sort
- 12 Write a program for sorting the given list numbers in ascending order using the following technique: Insertion sort and Quicksort
- 13 Write a program for sorting the given list numbers in ascending order using the following technique: Merge sort and Heapsort
- 14 Write a program to traverse a binary tree in following way.
 - a) Pre-order b) In-order c) Post-order
- 15 Write a program to the implementation graph traversals – BFS and DFS.
- 16 Write a program to find the minimum spanning tree for a weighted graph using
 - a) Prim's Algorithm b) Kruskal's Algorithm.
- 17 Write the Pseudo Code for the above programs.

Note: Recommended to use Open Source Software: GCC on Linux; DevC++ (or) CodeBlocks on Windows.

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Semester -IV**SEC-3****Python-2****BS401**

Theory

2Hours/Week

2 credits

Unit – I

Lists and Tuples: Sequences, Introduction to Lists, List slicing, Finding Items in Lists with the in Operator, List Methods and Useful Built-in Functions, Copying Lists, Processing Lists, Two-Dimensional Lists, Tuples. Strings: Basic String Operations, String Slicing, Testing, Searching, and Manipulating Strings.

Dictionaries and Sets: Dictionaries, Sets, Serializing Objects.

Recursion: Introduction, Problem Solving with Recursion, Examples of Recursive Algorithms.

Unit – II

Object-Oriented Programming: Procedural and Object-Oriented Programming, Classes, Working with Instances, Techniques for Designing Classes, Inheritance, Polymorphism.

GUI Programming: Graphical User Interfaces, Using the tkinter Module, Display text with Label Widgets, Organizing Widgets with Frames, Button Widgets and Info Dialog Boxes, Getting Input with Entry Widget, Using Labels as Output Fields, Radio Buttons, Check Buttons.

Text Book Tony Gaddis, *Starting Out With Python(3e)*

References

1. Kenneth A. Lambert, *Fundamentals of Python*
2. Clinton W. Brownley, *Foundations for Analytics with Python*
3. JamesPayne, *BeginningPythonusingPython2.6andPython3*
4. Charles Dierach, *Introduction to Computer Science using Python*
5. PaulGries, *PracticalProgramming:AnIntroductiontoComputerScienceusingPython3*

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Semester -IV

SEC-4

Operating Systems-2

BS402

Theory**2Hours/Week****2credits****Unit – I**

Main Memory: Introduction, Swapping, Contiguous Memory Allocation, Segmentation, Paging.
 Virtual Memory: Introduction, Demand Paging, Page Replacement, Allocation of Frames, Thrashing.
 Mass-Storage Structure: Overview, Disk Scheduling, RAID Structure.
 File Systems: File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, Protection.

Unit – II

File System Implementation, Directory Implementation, Allocation Methods, Free-Space Management.
 Recovery, Network File System.
 Protection and Security: Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Access Control, Revocation of Access Rights, The Security Problem, Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication, Implementing Security Defenses, Firewalling to Protect Systems and Networks, Computer-Security Classifications. Case Study: Windows 7 and Linux System.

Text

AbrahamSilberschatz,PeterBaerGalvin,GregGagne,*OperatingSystemConcepts(9e)*

Reference s

Naresh Chauhan, *Principles of Operating Systems*
 Thomas W. Doepfner, *Operating Systems in Depth*
 Andrew S. Tanenbaum, *Modern Operating Systems*
 William Stallings, *Operating Systems – Internals and Design Principles*
 Dhananjay M. Dhandhere, *Operating Systems – A Concept Based Approach*

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Semester -IV**DSC–3D****Database Management Systems****BS406****Theory**
Practical4 Hours/Week
3 Hours/Week4 credits
1 credit**Unit – I**

Introduction to Databases: Introduction, Traditional File-Based Systems, Database Approach, Roles in the Database Environment, Advantages and Disadvantages of DBMSs, The Three-Level ANSI-SPARC Architecture, Database Languages, Data Models, Functions of a DBMS, Components of a DBMS. Relational Model: Introduction, Terminology, Integrity Constraints, Views.

The Relational Algebra: Unary Operations, Set Operations, Join Operations, Division Operation, Aggregation and Grouping Operations.

Unit – II

SQL: Introduction, Data Manipulation–Simple Queries, Sorting Results, Using the SQL Aggregate Functions, Grouping Results, Sub-queries, ANY and ALL, Multi-table Queries, EXISTS and NOT EXIST, Combining Result Tables, Database Updates.

SQL: The ISO SQL Data Types, Integrity Enhancement Feature–Domain Constraints, Entity Integrity, Referential Integrity, General Constraints, Data Definition–Creating a Database, Creating a Table, Changing a Table Definition, Removing a Table, Creating an Index, Removing an Index, Views–Creating a View, Removing a View, View Resolution, Restrictions on Views, View Updatability, WITH CHECK OPTION, Advantages and Disadvantages of Views, View Materialization, Transactions, Discretionary Access Control–Granting Privileges to Other Users, Revoking Privileges from Users.

Advanced SQL: The SQL Programming Language–Declarations, Assignments, Control Statements, Exceptions, Cursors, Subprograms, Stored Procedures, Functions, and Packages, Triggers, Recursion.

Unit – III

Entity–Relationship Modeling: Entity Types, Relationship Types, Attributes, Keys, Strong and Weak Entity Types, Attributes on Relationships, Structural Constraints, Problems with ER Models–Fan Traps, Chasm Traps.

Enhanced Entity–Relationship Modeling: Specialization/Generalization, Aggregation, Composition. Functional–Dependencies: Anomalies, Partial Functional Dependency, Transitive Functional Dependency, Multi Valued Dependency, Join Dependency.

Normalization: The Purpose of Normalization, How Normalization Supports Database Design, Data Redundancy and Update Anomalies, Functional Dependencies in brief, The Process of Normalization, 1NF, 2NF, 3NF, BCNF. The Database Design Methodology for Relational Databases(Appendix–D).

Unit – IV

Transaction Management: Transaction Support–Properties of Transactions, Database Architecture, Concurrency Control–The Need for Concurrency Control, Serializability and Recoverability, Locking Methods, Deadlock, Time Stamping Methods, Multi-version Timestamp Ordering, Optimistic Techniques, Granularity of Data Items, Database Recovery–The Need for Recovery, Transactions and Recovery, Recovery Facilities, Recovery Techniques, Nested Transaction Model.

Security: Database Security–Threats, Computer-Based Controls–Authorization, Access Controls, Views, Backup and Recovery, Integrity, Encryption, RAID.

Text Book Thomas M. Connolly, Carolyn E. Begg, *Database Systems–A Practical Approach to Design, Implementation, and Management (6e)*

Reference s Sharon Allen, Evan Terry, *Beginning Relational Data Modeling*
Jeffrey A. Hoffer, V. Ramesh, HeikkiTopi, *Modern Database Management*
Raghu Ramakrishnan, Johannes Gehrke, *Database Management Systems*
RamezElmasri, Shamkant B. Navathe, *Fundamentals of Database Systems*
Abraham Silberschatz, Henry F. Korth, S. Sudarshan, *Database System Concepts*
C Coronel, S Morris, Peter Rob, *Database Systems: Design, Implementation, and Management*

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Semester -IV

Database Management Systems Lab

BS406

Practical

3 Hours/Week

1 credit

Consider the relational schema for part of the **Dream Home** case study is:

Branch (branchNo, street, city, postcode)

Staff (staffNo, fName, IName, position, sex, DOB, salary, branchNo)

Property For Rent (propertyNo, street, city, postcode, type, rooms, rent, ownerNo, staffNo, branchNo)

Client (clientNo, fName, IName, telNo, prefType, maxRent, eMail)

Private Owner (ownerNo, fName, IName, address, telNo, eMail, password)

Viewing (clientNo, propertyNo, viewDate, comment)

Registration (clientNo, branchNo, staffNo, dateJoined)

1. Create a database with name "DreamHome" and now create all the tables listed above with constraints.
2. Insert a new row into the table supplying data for all columns.
3. Modify data in the database using UPDATE
4. Delete data from the database using DELETE
5. Changing a table definition using ALTER
6. Removing a table using DROP
7. Removing rows in table using TRUNCATE
8. Create an index and removing an index
9. Practice other standard SQL commands for creating, modifying, displaying data of tables.
10. List full details of all staff.
11. List all staff with a salary greater than £10000.
12. List the property numbers of all properties that have been viewed.
13. Produce a list of salaries for all staff, showing only the staffNo, fName, IName, and salary details.
14. List all cities where there is either a branch office or a property for rent.
15. List all cities where there is a branch office but no properties for rent.
16. List all cities where there is both a branch office and at least one property for rent.
17. List the names and comments of all clients who have viewed a property for rent.
18. Produce a status report on property viewings.
19. List complete details of all staff who work at the branch in Glasgow.
20. List the addresses of all branch offices in London or Glasgow
21. List all staff with a salary between £20,000 and £30,000.
22. Identify all clients who have viewed all properties with three rooms.
23. How many properties cost more than £350 per month to rent?
24. How many different properties were viewed in May 2013?
25. Find the total number of Managers and the sum of their salaries.
26. Find the minimum, maximum, and average staff salary.
27. Find the number of staff working in each branch and the sum of their salaries.
28. List all managers and supervisors.
29. Find all owners with the string 'Glasgow' in their address.
30. List the details of all viewings on property PG4 where a comment has not been supplied.
31. Produce a list of salaries for all staff, arranged in descending order of salary.
32. Produce an abbreviated list of properties arranged in order of property type.
33. Find the number of staff working in each branch and the sum of their salaries.
34. For each branch office with more than one member of staff, find the number of staff working in each branch and the sum of their salaries.
35. List the staff who work in the branch at '163 MainSt'.
36. List all staff whose salary is greater than the average salary, and show by how much their salary is greater than the average.
37. List the properties that are handled by staff who work in the branch at '163 MainSt'.
38. Find all staff whose salary is larger than the salary of at least one member of staff at branch B003.
39. Find all staff whose salary is larger than the salary of every member of staff at branch B003
40. List the names of all clients who have viewed a property, along with any comments supplied.
41. For each branch office, list the staff numbers and names of staff who manage properties and the properties that they manage.
42. For each branch, list the staff numbers and names of staff who manage properties, including the city in which the branch is located and the properties that the staff manage.

43. Find the number of properties handled by each staff member, along with the branch number of the member of staff.
44. List all branch offices and any properties that are in the same city.
45. List all properties and any branch offices that are in the same city.
46. List the branch offices and properties that are in the same city along with any unmatched branches or properties.
47. Find all staff who work in a London branch office.
48. Construct a list of all cities where there is either a branch office or a property.
49. Construct a list of all cities where there is both a branch office and a property.
50. Create a view so that the manager at branch B003 can see the details only for staff who work in his or her branch office.
51. Create a view of the staff details at branch B003 that excludes salary information, so that only managers can access the salary details for staff who work at their branch.
52. Create a view of staff who manage properties for rent, which includes the branch number they work at, their staff number, and the number of properties they manage.
53. Removing a view using DROPVIEW
54. Give the user with authorization identifier Manager all privileges on the Staff table.
55. Give users Personnel and Director the privileges SELECT and UPDATE on column salary of the Staff table.
56. Revoke the privilege SELECT on the Branch table from all users.
57. Revoke all privileges you have given to Director on the Staff table.
58. Demonstrate exceptions in PL/SQL
59. Demonstrate cursors in PL/SQL
60. Write PL/SQL queries to create procedures.
61. Write PL/SQL queries to create functions.
62. Write PL/SQL queries to create package.
63. Write PL/SQL queries to create triggers.
64. Write PL/SQL queries using recursion.
65. Create a database with name "Hotel" and now create all the tables listed above with constraints.
66. Insert a new row into the table supplying data for all columns.
67. Modify data in the database using UPDATE
68. Delete data from the database using DELETE
69. Changing a table definition using ALTER
70. Removing a table using DROP
71. Removing rows in table using TRUNCATE
72. Practice other standard SQL commands for creating, modifying, displaying data of tables.
73. List full details of all hotels.
74. List full details of all hotels in London.
75. List the names and addresses of all guests living in London, alphabetically ordered by name.
76. List all double or family rooms with a price below £40.00 per night, in ascending order of price.
77. List the bookings for which no dateTo has been specified.
78. How many hotels are there?
79. What is the average price of a room?
80. What is the total revenue per night from all double rooms?
81. How many different guests have made bookings for August?
82. List the price and type of all rooms at the Grosvenor Hotel.
83. List all guests currently staying at the Grosvenor Hotel.
84. List the details of all rooms at the Grosvenor Hotel, including the name of the guest staying in the room.
85. What is the total income from bookings for the Grosvenor Hotel today?
86. List the rooms that are currently unoccupied at the Grosvenor Hotel.
87. What is the lost income from unoccupied rooms at the Grosvenor Hotel?
88. List the number of rooms in each hotel.
89. List the number of rooms in each hotel in London.
90. What is the average number of bookings for each hotel in August?
91. What is the most commonly booked room type for each hotel in London?
92. What is the lost income from unoccupied rooms at each hotel today?
93. Insert rows into each of these tables.

94. Update the price of all rooms by 5%.
95. Demonstrate that queries written using the UNION operator and same can be rewritten using the OR.
96. Apply the syntax for inserting data into a table.
97. Create a view containing the cheapest hotels in the world.
98. Create the Hotel table using the integrity enhancement features of SQL.
99. Create a database trigger for the following situations:
 - (a) The price of all double rooms must be greater than £100.
 - (b) The price of double rooms must be greater than the price of the highest single room.
 - (c) A booking cannot be for a hotel room that is already booked for any of the specified dates.
 - (d) A guest cannot make two bookings with overlapping dates.
 - (e) Maintain an audit table with the names and addresses of all guests who make bookings for hotels in London (do not store duplicate guest details).
100. Find the names and ages of all sailors.
101. Find all sailors with a rating above 7.
102. Find the names of sailors who have reserved boat 103.
103. Find the sids of sailors who have reserved a red boat.
104. Find the names of sailors who have reserved a red boat.
105. Find the colors of boats reserved by Lubber.
106. Find the names of sailors who have reserved at least one boat.
107. Find the names of sailors who have reserved at least two boats.
108. Compute increments for the ratings of persons who have sailed two different boats on the same day.
109. Find the ages of sailors whose name begins and ends with B and has at least three characters.
110. Find the names of sailors who have reserved a red or a green boat.
111. Find the names of sailors who have reserved a red and a green boat.
112. Find the sids of all sailors who have reserved red boats but not green boats.
113. Find all sids of sailors who have a rating of 10 or have reserved boat 104.
114. Find the names of sailors who have not reserved a red boat.
115. Find sailors whose rating is better than some sailor called Horatio.
116. Find sailors whose rating is better than every sailor called Horatio.
117. Find the names of sailors who have reserved all boats.
118. Find the names of sailors who have reserved at least two boats.
119. Find the names of sailors who have reserved all boats called Interlake.
120. Find sailors who have reserved all red boats.
121. Find the sailor name, boat id, and reservation date for each reservation.
122. Find the sids of sailors with age over 20 who have not reserved a red boat.
123. Find the average age of all sailors.
124. Find the average age of sailors with a rating of 10.
125. Find the name and age of the oldest sailor.
126. Count the number of different sailor names.
127. Find the names of sailors who are older than the oldest sailor with a rating of 10.
128. Find the sailors with the highest rating.
129. Find the age of the youngest sailor for each rating level.
130. Find age of the youngest sailor who is eligible to vote for each rating level with at least 2 such sailors.
131. Find the average age of sailors for each rating level that has at least two sailors.
132. For each red boat, find the number of reservations for this boat.
133. Find the average age of sailors who are of voting age (i.e., at least 18 years old) for each rating level that has at least two sailors.
134. Delete the records of sailors who have rating 8 (deleting some rows in a table).
135. Loading data which is present in the text into the table.

Note Recommended to use open source database software like MySQL, MongoDB, PostgreSQL, etc...

: In practical examination, students have to

- Create database
- Create tables with their integrity constraints.
- Insert the data into tables and then execute the queries.
- Answer any **six** queries from **ten** queries given by the examiner.

B.Sc. (Computer Science)

Semester -V**GE****Information Technologies****BS501****Theory****4Hours/Week****4 credits****Unit – I**

Information Technology Basics – introduction, Need for Information Storage and Processing, Information Technology Components , Role of information Technology, Information Technology and the Internet .
Emerging Trends in IT - Introduction , Electronic Commerce (E-Commerce), Electronic Data Interchange(EDI),
Smart Cards , Mobile Communication, Internet Protocol TV.

Unit – II

Computer Software: Introduction, Classification of Computer Software, System Software, Applications Software, Firmware, Middleware, Acquiring Computer Software.

Operating Systems: Introduction, Evolution of OS, Process Management, Memory Management, File Management, Device Management, Security Management, Command Interpreter, Windows, Linux.

Unit – III

Introduction to Algorithms and Programming Languages: Algorithm, Control Structures, Flowcharts, Pseudo code, Programming Languages, Generations of Programming Languages.

Database Systems: File Oriented Approach, Database Oriented Approach, Database Views, Three-Schema Architecture, Database Models, Components of DBMS, Introduction of SQL Queries.

Unit – IV

Computer Networks: Introduction, Connection Media, Data Transmission Mode, Data Multiplexing, Data Switching, Network Topologies, Types of Networks, Networking Devices, OSI Model. The Internet: Internet Services, Types of Internet Connections, Internet Security.

Emerging Computer Technologies: Distributed Networking, Peer-to-peer Computing, Grid Computing, Cloud Computing, Utility Computing, OnDemand Computing, Wireless Network, Bluetooth, Artificial Intelligence.

Text Wiley India Editorial Team, Fundamentals of Information Technology

Reema Thareja, *Fundamentals of Computers*

Reference s P. K. sinha, *Computer Fundamentals*

Anita Goel, *Computer Fundamentals*

V. Rajaraman, *Fundamentals of Computers*

E. Balagurusamy, *Fundamentals of Computers*

J. Glenn Brookshear, Dennis Brylow, *Computer Science An Overview*

B.Sc. (Computer Science)

Semester -V**DSC–3E****Programming in Java****BS505****Theory
Practical****4Hours/Week
3 Hours/Week****4credits
1credit****Unit – I**

Introduction: Java Essentials, JVM, Java Features, Creation and Execution of Programs, Data Types, Type Conversion, Casting, Conditional Statements, Loops, Branching Mechanism, Classes, Objects, Class Declaration, Creating Objects, Method Declaration and Invocation, Method Overloading, Constructors– Parameterized Constructors, Constructor Overloading, Cleaning-up unused Objects, Class Variables & Methods-static Keyword, this Keyword.

Unit – II

One-Dimensional Arrays, Two-Dimensional Arrays, Command-Line Arguments, Inner Class.

Inheritance: Introduction, Types of Inheritance, extends Keyword, Examples, Method Overriding, super, final Keywords, Abstract classes, Interfaces, Abstract Classes Verses Interfaces. Packages– Creating and Using Packages, Access Protection, Wrapper Classes, String Class, StringBuffer Class. Exception: Introduction, Types, Exception Handling Techniques, User-Defined Exception.

Unit – III

Multithreading: Introduction, Main Thread, Creation of New Threads – By Inheriting the Thread Class or Implementing the Runnable Interface, Thread Lifecycle, Thread Priority, Synchronization. Input/Output: Introduction, java.io Package, File Class, FileInputStream Class, FileOutputStream Class, Scanner Class, BufferedInputStream Class, BufferedOutputStream Class, RandomAccessFile Class.

Unit – IV

Event Handling: Introduction, Types of Events, Example. AWT: Introduction, Components, Containers, Button, Label, Checkbox, Radio Buttons, Container Class, Layouts. Swing: Introduction, Differences between Swing and AWT, JFrame, JApplet, JPanel, Components in Swings, Layout Managers, Jtable, DialogBox.

Database Handling Using JDBC: Introduction, Types of JDBC Drivers, Load the Driver, Establish Connection, Create Statement, Execute Query, Iterate Resultset, Scrollable Resultset, Developing a JDBS Application.

**Text Book
Reference s**

Sachin Malhotra, Saurabh Choudhary, *Programming in Java(2e)*

Bruce Eckel, *Thinking in Java (4e)*

Herbert Schildt, *Java: The Complete Reference (9e)*

Y. Daniel Liang, *Introduction to Java Programming (10e)*

Paul Deitel, Harvey Deitel, *Java: How To Program (10e)*

Cay S. Horstmann, *Core Java Volume I – Fundamentals (10e)*

1 Thomas Wu, *An introduction to object-oriented programming with Java*

(5e) Tony Gaddis, *Starting Out with Java From Control Structures*

Through Objects (6e)

Jeanne Boyarsky, Scott Selikoff, *OCA: Oracle Certified Associate Java SE 8 Programmer–I Study Guide*

Practical

3 Hours/Week

1credit

Write java programs to find the following

- a) largest of given three numbers
- 1 b) reverses the digits of a number
- c) given number is prime or not d) GCD of given two integers

Write java programs that implement the following

- 2 a) default constructor b) parameterized constructor c) constructor overloading
- a) Write a java program to find the smallest of given list integers using array and scannerclass.
- 3 b) Write a java program for multiplication of two matrices.

a) Write a java program for demonstrating an inner classes or nested classes.

- 4 b) Write a java program to implement method overloading, method overriding, dynamic method dispatch

5 Write a java program to implement single, multilevel, hierarchal, multiple, hybrid inheritances.

6 Write java programs that demonstrate the use of abstract, this, super, static, final key words

7 a) Write a java program for creating a package and using a package.

b) Write a java program to demonstrate the use of wrapper classes.

8 a) Write a java program using all five keywords of exception handling mechanism.

b) Write a java program for creating customized (user) exception

9 a) Write a java program that checks whether a given string is a palindrome or not.

b) Write a java program for sorting a given list of names in ascending order.

10 a) Write a java program to create a file, write the data and display the data.

b) Write a java program that reads a file name from user and displays its information.

11 a) Write a java program for controlling main thread.

b) Write a java program for creating new thread by extending Thread class.

12 a) Write a java program for creating new thread by implementing Runnable interface.

b) Write a java program for thread synchronization.

13 a) Write a java program to create following AWT components: Button, Checkbox, Choice, and List.

b) Write java programs to create AWT application using containers and layouts.

14 a) Write java programs to create a simple Applet and create swing based Applet.

b) Write a java program to handle different types of events in a swing application.

15 Write java programs to create a swing application using swing components and layouts.

16 Write a java program to store and retrieve data from database using JDBC.

17 Write the program using simple text editors (not IDE), compile and run from command prompt.

Note : Encourage students to develop small java applications using IDE, like giving as assignment. Write a small java application using some features of java.

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Semester -VI**DSE-3F****Web Technologies****BS605****Theory**

4Hours/Week

4credits

Practical

3 Hours/Week

1credit

Unit – I

Structuring Documents for the Web: Introducing HTML and XHTML, Basic Text Formatting, Presentational Elements, Phrase Elements, Lists, Editing Text, Core Elements and Attributes, Attribute Groups Links and Navigation: Basic Links, Creating Links with the <a> Element, Advanced E- mail Links.

Images, Audio, and Video: Adding Images Using the Element, Using Images as Links Image Maps, Choosing the Right Image Format, Adding Flash, Video and Audio to your web pages. Tables: Introducing Tables, Grouping Section of a Table, Nested Tables, Accessing Tables

Forms: Introducing Forms, Form Controls, Sending Form Data to the Server

Frames: Introducing Frameset, <frame> Element, Creating Links Between Frames, Setting a Default Target Frame Using <base> Element, Nested Framesets, Inline or Floating Frames with <iframe>.

Unit – II

Cascading Style Sheets: Introducing CSS, Where you can Add CSS Rules.

CSS Properties: Controlling Text, Text Formatting, Text Pseudo Classes, Selectors, Lengths, Introducing the Box Model.

More Cascading Style Sheets: Links, Lists, Tables, Outlines, The :focus and :activate Pseudo classes Generated Content, Miscellaneous Properties, Additional Rules, Positioning and Layout with CSS

Page Layout: Understating the Site's Audience, Page Size, Designing Pages, Coding your Design, Developing for Mobile Devices.

Design Issues: Typography, Navigation, Tables, Forms.

Unit – III

Learning JavaScript: How to Add Script to Your Pages, the Document Object Model, Variables, Operators, Functions, Control Statements, Looping, Events, Built- In Objects,

Working with JavaScript: Practical Tips for Writing Scripts, Form Validation, Form Enhancements, JavaScript Libraries.

Putting Your site on the web: Meta tags, Testing your site, Talking the Leap to Live, Telling the World about your site, Understanding your visitors.

Unit – IV

XML - Introduction, XML Basics, Structuring Data, XML Namespaces, Document Type Definitions (DTDs), W3C XML Schema Documents, XML Vocabularies, Extensible Style sheet Language and XSL Transformations, Document Object Model (DOM).

Ajax-Enabled Rich Internet Applications: introduction, history of Ajax, traditional web applications Vs Ajax Applications, RIAs with Ajax, Ajax example using XML Http Request object, XML and DOM, creating full scale Ajax-enabled application, Dojo Toolkit.

**Text Book
Reference s**

Jon Duckett, *Beginning HTML, XHTML, CSS and JavaScript*

Chris Bates, *Web Programming*

M. Srinivasan, *Web Technology: Theory and Practice*

Achyut S. Godbole, AtulKahate, *Web Technologies*

Kogent Learning Solutions Inc, *Web Technologies Black*

Book Ralph Moseley and M. T. Savaliya, *Developing Web*

Applications

P.J. Deitel& H.M. Deitel, *Internet and World Wide Web How to program*

B.Sc. (Computer Science)

Semester -VI**Web Technologies Lab****BS605****Practical****2 Hours/Week****1credit**

- a. Write a HTML program using basic text formatting tags, <hn>, <p>,
, <pre>.
- 1 b. Write a HTML page for Example Cafe using above text formatting tags.
 - a. Write a HTML program using presentational element tags , <i>, <strike>, <sup>, <sub>, <big>, <small>, <hr>
- 2 b. Write a HTML program using phrase element tags <blockquote>, <cite>, <abbr>, <acronym>, <kbd>, <address>
 - a. Write a HTML program using different list types.
- 3 b. Write a HTML page that displays ingredients and instructions to prepare a recipe.
- 4 a. Write a HTML program using grouping elements <div> and .
- b. Write a HTML Menu page for Example cafe site.
 - a. Write a HTML program using images, audios, videos.
- 5 b. Write a HTML program to create your time table.
- 6 Write a HTML program to create a form using text inputs, password inputs, multiple line text input, buttons, check boxes, radio buttons, select boxes, file select boxes.
- 7 Write a HTML program to create a frames and links between frames.
- 8 Write a HTML program to create different types of stylesheets.
- 9 Write a HTML program to create CSS on links, lists, tables and generated content.
- 10 Write a HTML program to create your college web site using multi column layouts.
- 11 Write a HTML program to create your college web site using for mobile device.
- 12 Write a HTML program to create login form and verify username and password using DOM
- 13 a. Write a JavaScript program to calculate area of rectangle using function.
 - b. Write a JavaScript program to wish good morning, good afternoon, good evening depending on the current time.
- 14 a. Write a JavaScript program using switch case?.
 - b. Write a JavaScript program to print multiplication table of given number using loop.
- 15 a. Write a JavaScript programs using any 5 events.
 - b. Write a JavaScript program using JavaScript built in objects.
- 16 Write a JavaScript program to create registration form and validate all fields using form validation
17. Write a XML Program to represent Student Data using DTD.
18. Write a XML Program to represent Data using XML Schema Definition.

B.Sc. (Computer Science)

Semester -VI

Project/Optional	PHP with MySQL	BS606
Theory	3 Hours/Week	3credits
Practical	3 Hours/Week	1credit

Unit – I

Introducing PHP – What is PHP? Why use PHP? Evolution of PHP, Installing PHP, Other ways to run PHP, Creating your first script. PHP Language Basics – Using variables, Understanding Data Types, Operators and Expressions, Constants. Decisions and Loops – Making Decisions, Doing Repetitive Tasks with Looping, Mixing Decisions and Looping with HTML.

Strings – Creating and Accessing Strings, Searching Strings, Replacing Text with Strings, Dealing with Upper and Lowercase, Formatting Strings. Arrays – Creating Arrays, Accessing Array Elements, Looping Through Arrays with for-each, Working with Multidimensional Arrays, Manipulating Arrays.

Unit – II

Functions – What is a Function? Why Functions are useful? Calling Functions, Working with Variable Functions, Writing your own Functions, Working with References, Writing Recursive Functions.

Objects – Introduction OOP Concepts, Creating Classes and Objects in PHP, Creating and using Properties, Working with Methods, Object Overloading with `_get()`, `_set()` and `_call()`, Using Inheritance to Extend Power of Objects, Constructors and Destructors, Automatically Loading Class Files, Storing as Strings.

Handling HTML Forms with PHP – How HTML form works, Capturing Form Data with PHP, Dealing with Multi-Value Fields, Generating Web Forms with PHP, Storing PHP Variables in Forms, Creating File Upload Forms, Redirecting After a Form Submission.

Unit – III

Working with Files and Directories - Getting Information on Files, Opening and Closing Files, Reading and Writing to Files, Copying, Renaming, and Deleting Files, Working with Directories.

Introducing Databases and SQL – Deciding How to Store Data, Understanding Relational Databases, Setting Up MySQL, A Quick Play with MySQL, Connecting MySQL from PHP.

Retrieving Data from MySQL with PHP – Setting Up the Book Club Database, Retrieving Data with SELECT, Creating a Member Record Viewer. Manipulating MySQL Data with PHP – Inserting, Updating, and Deleting Records, Building a Member Registration Application.

**Text Book
Reference s**

Matt Doyle, *Beginning PHP 5.3* (Wrox – WileyPublishing)

Ellie Quigley, *PHP and MySQL by Example*

Joel Murach, Ray Harris, *Murach's PHP and MySQL*

Brett McLaughlin, *PHP & MySQL: The Missing Manual*

Luke Welling, Laura Thomson, *PHP and MySQL Web Development*

W. Jason Gilmore, *Beginning PHP and MySQL From Novice to*

Professional Andrew Curioso, Ronald Bradford, Patrick Galbraith,

Expert PHP and MySQL

B.Sc. (Computer Science)

Semester -I**PHP with MySQLLab****BS606****Practical****3 Hours/Week****1credit**

- 1 a) Write a PHP script to find the factorial of a given number.
b) Write a PHP script to find the sum of digits of a given number.
- 2 a) Write a PHP script to find whether the given number is a prime or not.
b) Write a PHP script to demonstrate the use of break, continue statements using nested loops.
- 3 a) Write a PHP script to display the Fibonacci sequence with HTML page.
b) Write a PHP script to create a chessboard.
a) Write a PHP script using built-in string function like strstr(), stripslashes(), substr_count(), etc...
- 4 b) Write a PHP script to transform a string to uppercase, lowercase letters, make a string's first character uppercase
- 6 a) Write a PHP script that inserts a new item in an array in any position.
b) Write a PHP function to check whether all array values are strings or not.
- 7 a) Write a PHP script to count number of elements in an array and display a range of array elements.
b) Write a PHP script to sort a multi-dimensional array set by a specific key.
- 8 a) Write a PHP script using a function to display the entered string in reverse.
b) Write a PHP script using function for sorting words in a block of text by length.
- 9 a) Write a PHP script for creating the Fibonacci sequence with recursive function.
b) Write a PHP script using pass by value and pass by reference mechanisms in passing arguments to functions.
- 10 a) Write a PHP script to demonstrate the defining and using object properties.
b) Write a PHP script to demonstrate the inheritance.
- 11 a) Write a PHP script to demonstrate the object overloading with _get(), _set(), and _call().
a. Write a PHP script to demonstrate the overloading property accesses with _get() and _set().
- 12 a) Write a PHP script to demonstrate the method overloading and method overriding mechanisms.
a. Write a PHP script to demonstrate the use of final classes and final methods.
- 13 a) Write a PHP script to demonstrate the use interfaces.
a. Write a PHP script using constructors and destructors.
- 14 Write a PHP application to handling HTML forms with PHP script.
- 15 a) Write a PHP script to create a file, write data into file and display the file's data.
a. Write a PHP script to check and change file permissions, copying, renaming and deleting files.
- 16 a) Write a PHP application for connecting to MySQL and reading data from database table.
a. Write a PHP application for inserting, updating, deleting records in the database table.
- 17 Write a PHP application for student registration form.

UG (B.Sc.) Scheme of Examinations
Computer Science
 (CBCS 2019-2020)

Elaborations

Paper	Credits	Theory Exam		Practical Exam
		University Exam	Internal Exam	
DSC	4+1	80 Marks	20 Marks	25 Marks
DSE	4+1	80 Marks	20 Marks	25 Marks
SEC	2	40 Marks	10 Marks	No Practical
GE	4	80 Marks	20 Marks	No Practical
AECC	2	40 Marks	10 Marks	No Practical
P/O	3+1	60 Marks	15 Marks	25 Practical

- DSC** – Discipline specific core course
DSE – Discipline specific elective course
SEC – Skill enhancement course
GE – Generic elective
AECC – Ability Enhancement Compulsory
P/O – Project/Optional

PART -A Answer any eight questions in part –A

8X4 M = 32 Marks

UNIT- I 1
2
3

UNIT- II 4
5
6

UNIT- III 7
8
9

UNIT- IV 10
11
12

Part – B

Answer all Questions 12MX4 = 48 Marks

UNIT- I 13
Or
14

UNIT- II 15
Or
16

UNIT- III 17
Or
18

UNIT- IV 19
Or
20

4 Credit Core (DSC) Paper
Internal Exam (Theory)

Time:1Hr.

Maximum marks:20

- Two internal exams (one at the middle of the semester and the other at the end) of one-hour duration are to be conducted carrying 15 marks each.
- Average of the scores of two exams should be taken into account.
- Following is the examination pattern.
 - 10 MCQs (multiple choice questions) of half mark each,
 - 10 FIBs (Fill in the Blanks) of half mark each
 - 5 SAQs (short answered questions) of one mark each
 - Totaling 15 marks.
 - 5 marks meant for assignment.

University Exam (Practical)

Time:2Hrs.

Maximum marks:25

- The question paper is to be typeset with **four** programs with due weightage to **all the units** from the question bank provided in the syllabus.
- The candidates are to answer any **two** of them in the practical exam.
- Each question has to carry **six** marks totaling **12** marks.
- Viva - **8** marks
- Record - **5** marks

2 Credit (SEC) Paper

University Exam (Theory)

Time: 2Hrs.

Maximum marks: 40

Section - A (4X 4M = 16 Marks)

Answer any four of the following six questions. Each carries four marks.

- Q1. From Unit 1
- Q2. From Unit 1
- Q3. From Unit 1
- Q4. From Unit 2
- Q5. From Unit 2
- Q6. From Unit 2

Section - B (2 X 12M = 24Marks)

Answer all the following two questions. Each carries fifteen marks.

- Q09. (a) or (b) from Unit 1
- Q10. (a) or (b) from Unit 2

Internal Exam (Theory)

Time: 1/2Hr.

Maximum marks: 10

- One internal exam at the end of the semester, of half an hour duration is to be conducted carrying 10 marks.
- Following is the examination pattern.
 - 10 MCQs (multiple choice questions) of one mark each, No assignment is required.

University Exam (Theory) for Sermester VI (Project/optional) only

3 Hours

Max Marks -60

Credits -3

PART -A Answer any Six questions in part –A 6X4 M = 24 Marks

UNIT- I 1
 2
 3

UNIT- II 4
 5
 6

UNIT- III 7
 8
 9

Part – B

Answer all Questions 12MX3 = 36 Marks

UNIT- I 13
 Or
 14

UNIT- II 15
 Or
 16

UNIT- III 17
 Or
 18

Internal Exam(Theory)for Semester VI (Project /optional)only

Time:1Hr.

Maximum marks:15

- Two internal exams (one at the middle of the semester and the other at the end) of one-hour duration are to be conducted carrying 15 markseach.
- Average of the scores of two exams should be taken intoaccount.
- Following is the examinationpattern.
 - 10 MCQs (multiple choice questions) of half markeach,
 - 10 FIBs (Fill in the Blanks) of half markeach
 - 5 SAQs (short answered questions) of one markeach
 - Totaling 15marks.
 - No assignment required.

**OSMANIA UNIVERSITY
FACULTY OF SCIENCE
B.Sc. (Computer Science)**

Practical Question Paper(Project /optional)

3 HoursMax Marks -25

Credits -1

Answer any Two

6X2=12MARKS

UNIT – I	1 Program
UNIT- II	1 Program
UNIT-III	1 Program
UNIT-I or UNIT-II or UNIT-III	1 Program

Viva - 8 Marks

Record – 5 Marks

E-Learning:

- NPTEL :nptel.ac.in [Core Subjects Certification]
- C++INSTITUTE :cppinstitute.org [C++ Certification]
- ORACLEEDUCATION :education.oracle.com [Java, DBMS Certification]
- BIG DATAUNIVERSITY :bigdatauniversity.com [Big Data Certification]
- COURSERA :coursera.org [Core Subjects Certification]
- CODEACADEMY :codecademy.com [Coding Certification]
- KHANACADEMY :khanacademy.org [Core Subjects Certification]
- PIXAR INABOX :khanacademy.org/partner-content/pixar
- VIDEOLECTURES :videolectures.net
- YOUTUBEEDU :plus.google.com/+YouTubeEDU/posts
- DISNEYRESEARCH :disneyresearch.com
- ALISON :alison.com [Core Subjects Certification]
- INTERNETARCHIVE :archive.org

Freeware:

- SCILAB : scilab.org [MatLab Equivalent]
- GEOGEBRA :geogebra.org [Software for Class Room Teaching]

Search Engine:

- WOLFRAMALPHA :wolframalpha.com [Computing Engine]
- CITESEER :citeseerx.ist.psu.edu [Searching Research Articles]
- DOAJ :doaj.org [Open Access to Journals]