SWAMINARAYAN UNIVERSITY
Program Name: Engineering
Level: Degree
Subject Code: BE100101
Subject Name: Mathematics - 1

w. e. f. Academic Year:	**2025-26**
Semester:	**Ist Year (Sem – 1)**
Category of the Course:	**Basic Science Course**

Prerequisite:	**Geometry, Trigonometry, Algebra**
Rationale:	**To compute rate of change, Compute area, Express the volume and area in term of series and function, Matrix algebra.**

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			**Total Credits L+T+ (PR/2)**	**Assessment Pattern and Marks**				**Total Marks**
				Theory		**Tutorial / Practical**		
L	**T**	**PR**	**C**	**ESE (E)**	**PA / CA (M)**	**PA/CA (I)**	**ESE (V)**	
3	2	0	5	60	40	NA	NA	100

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction of L'Hospital rule and working, Improper integrals, Convergence and Divergence, Gamma function, Application of integral, Length of plane curve, Area of surface revolution in parametric and Polor form	8	10 %
2.	Fourier series, Dirichlet's condition for representation by Fourier series, Fourier series of a function of period 2π, fourier series of even and odd function, Half range expansion	5	15%
3.	Matrix, Inverse matrix by adjoint method and Gauss-jordan method, Rank of matrix by echelon form, Solution of linear equation by Gauss Elimination and Gauss Jordan, Eigen value and Eigen vector, Diagonalization, Cayley-Hamilton theorem.	8	20%

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4.	Convergence and Divergence of sequences, The continuous function theorem for sequences, Sandwich theorem, Bounded monotonic sequences, Geometric series, Telescoping series, First term test for divergent series, Harmonic series, The P series, Test and limit comparison, Ratio test, Root test power series, Taylor series, Maclaurin series.	9	20%
5.	Function of several variables, Limits and continuity, Test for non existence of limit, Partial differentiation and mixed derivative theorem, Chain rule, Implicit differentiation, Gradient and directional derivates, Tangent plane and normal line, Method of lagrange multipliers, multiple, Double and triple integrals, Change the order of integration, Doubles integration for area and volumes, Triple integrals in rectangular, Cylindrical and spherical coordinates, Jacobian multiple integral by substitution	12	35%
	Total	42	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
25	**30**	**35**	**0**	**0**	**0**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

Course Outcome: After Completion of the Course, Student will able to:

No	**Course Outcomes**	**RBT level**
1	To apply differential and integral calculus to improper integrals and to determine applications of definite integral. Apart from some other applications they will have a basic understanding of indeterminate forms,Beta and Gamma functions.	Apply, Understand
2	To apply the various tests of convergence to sequence, series and the tool of power series and fourier series for learning advanced Engineering Mathematics.	Apply, Analyze
3	To compute directional derivative, maximum or minimum rate of changeand optimum value of functions of several variables.	Analyze, Evaluate
4	To compute the areas and volumes using multiple integral techniques.	Apply
5	To perform matrix computation in a comprehensive manner.	Apply, understand

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CO-PO MAPPING

PO / CO	CO1	CO2	CO3	CO4	CO5
PO1 – Engineering knowledge: Apply knowledge of mathematics, science and engineering fundamentals	3	3	3	3	3
PO2 – Problem analysis: Identify, formulate and analyze engineering problems	2	3	3	3	3
PO3 – Design/development of solutions: Design solutions for complex engineering problems	1	2	2	2	2
PO4 – Investigation of complex problems: Use research-based knowledge for analysis and interpretation	2	2	3	3	3
PO5 – Modern tool usage: Use appropriate techniques and IT tools for engineering practice	1	1	2	1	2
PO6 – Engineer and society: Apply contextual knowledge to assess societal, health, safety, legal issues	-	-	-	-	-
PO7 – Environment and sustainability: Understand societal and environmental impact of engineering	-	-	-	-	-
PO8 – Ethics: Apply ethical principles in engineering practices	-	-	-	-	-
PO9 – Individual and team work: Function effectively as an individual and in teams	-	-	-	-	-
PO10 – Communication: Communicate effectively on engineering activities	-	-	-	-	-
PO11 – Project management and finance: Apply management principles to projects	-	-	-	-	-
PO12 – Life-long learning: Recognize the need for and engage in lifelong learning	-	-	-	-	-

CO- PSO MAPPING

CO / PSO	PSO1 – Apply mathematical knowledge to solve engineering problems	PSO2 – Use analytical techniques for designing and modeling engineering systems effectively
CO1	3	2
CO2	3	3
CO3	3	3
CO4	3	2
CO5	3	3

SWAMINARAYAN UNIVERSITY
Program Name: Engineering
Level: Degree
Subject Code: BE100101
Subject Name: Mathematics - 1

References/Suggested Learning Resources:

(a) Books:

- Maurice D. Weir, Joel Hass, Thomas' Calculus, Early Transcendentals, 13e, Pearson, 2014.
- Howard Anton, Irl Bivens, Stephens Davis, Calculus, 10e, Wiley, 2016.
- James Stewart, Calculus: Early Transcendentals with Course Mate, 7e, Cengage, 2012.
- Anton and Rorres, Elementary Linear Algebra, Applications version,Wiley India Edition.
- T. M. Apostol, Calculus, Volumes 1 & 2, Wiley Eastern.
- Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India Edition.
- Peter O'Neill, Advanced Engineering Mathematics, 7th Edition, Cengage.

(b) Open-source software and website:

- Scilab
- MIT open courceware.

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SWAMINARAYAN UNIVERSITY
Program Name: Engineering
Level: Degree
Branch:Electrical Engineering
Subject Code: BE100104
Subject Name : Basic Electrical Engineering

w.e.f.Academic Year:	2025-26
Semester:	1st
Category of the Course:	**Science**

Prerequisite:	**Engineering Science**
Rationale:	Electricity has been the main source of energy for the developing and developed countries. Per capita consumption of electricity of a country can be considered as an indicator of the development of the country. In view of this, it is essential for all engineering graduates to know the basic aspects of electrical engineering. This subject deals with basic circuit solution methods, introduction to electrical machines and basics of domestic electrical installations.

Teaching and Examination Scheme –

Hours per Week			Course Credits	Examination Marks				
				Theory Marks		Practical Marks		
L	T	P		E	M	I	V	150
3	0	2	4	60	40	20	30	

Detailed Syllabus –

Unit	Content	Hours	% Of Weight
1	**DC Circuits:** Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff's current and voltage laws, analysis of simple circuits with dc excitation. Superposition, The venin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.	8	20
2	**AC Circuits:** Representation of sinusoidal waveforms, peak and RMS values, Phasor representation of AC quantities, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), Series and parallel resonance. Three phase balanced circuits, voltage and current relations in star and delta connections, Power measurement in three phase circuits.	10	20

SWAMINARAYAN UNIVERSITY
Program Name: Engineering
Level: Degree
Branch:Electrical Engineering
Subject Code: BE100104
Subject Name : Basic Electrical Engineering

3	**Transformers:** Magnetic materials, BH characteristics. Construction and working principle of single phase and three phase transformers. Ideal and practical transformer. Auto-transformer and its applications**.**	**8**	**20**
4	**Electrical Machines:** Generation of rotating magnetic fields. Construction and working of following machines: • Three-phase induction motor • Single-phase induction motor. • Separately excited DC motor. • Synchronous generators.	**8**	**20**
5	**Electrical Installations:** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB. Types of Wires and Cables. Earthing – Types of earthing and its importance. Safety precautions for electrical appliances. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption. Basics of power factor improvement.	**8**	**20**
	Total	**42**	**100**

Course Outcomes-

CO No	Course Outcome Description	RBT Level
CO1	**Analyze and solve basic **DC electrical circuits** using network theorems and laws.**	**Analyze**
CO2	**Analyze **single-phase and three-phase AC circuits** for power and resonance conditions.**	**Analyze**
CO3	**Explain the **construction and working** of single-phase and three-phase **transformers****	**Understanding**
CO4	**Describe the construction and working of various **electrical machines** like induction motors and DC motors.**	**Understanding**
CO5	**Identify components of **electrical installations**, apply safety practices, and perform basic energy calculations.**	**Apply**

CO\PO MATRIX

CO \ PO	CO1	CO2	CO3	CO4	CO5
PO1 Engineering Knowledge	**3**	**3**	**3**	**3**	**2**
PO2 Problem Analysis	**3**	**3**	**-**	**-**	**-**
PO3 Design/Development of Solutions	**2**	**2**	**-**	**-**	**1**
PO4 Conduct Investigations of Complex Problems	**2**	**2**	**-**	**-**	**-**
PO5 Modern Tool Usage	**-**	**-**	**-**	**-**	**2**

PO6 The Engineer and Society	-	-	-	-	**3**
PO7 Environment and Sustainability	-	-	-	-	**2**
PO8 Ethics	-	-	-	-	**2**
PO9 Individual and Team Work	-	-	-	-	-
PO10 Communication	-	-	-	-	**2**
PO11 Project Management and Finance	-	-	-	-	-
PO12 Life-long Learning	**2**	**2**	**1**	**1**	**3**

CO\PSO MATRIX

CO \PSO	PSO1(Fundamentals of Electrical Engineering)	PSO2(Application & Safety Practices)
CO1	**3**	**2**
CO2	**3**	**2**
CO3	**3**	**1**
CO4	**3**	**1**
CO5	**2**	**3**

Reference Books –

- U.A. Patel, "Elements of Electrical & Electronics Engineering", Atul Prakashan.
- B.L.Theraja,"Electrical Technology–Part I and II",S. Chand and Co.2012
- J. Nagrath, Basic Electrical Engineering, TMH Publishing Co. Ltd.
- D.P.KothariandI.J.Nagrath,"BasicElectricalEngineering",TataMcGrawHill,2010.

List of Practical–

- To study the standard symbols used in Electrical Engineering.
- Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Resistors, Capacitors and Inductors.
- To study the effect of temperature on Resistance of winding.
- To study of Kirchhoff`s laws.
- Verification of Superposition Theorem.
- Verification of Thevenin's Theorem.
- Verification of Norton's Theorem.
- To verify the resonance in R-L-C circuits.
- To study about measurement of Power factor in R-L- C series circuit

SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course / Subject Code: BE100109

Course / Subject Name: Programming for Problem Solving

w. e. f. Academic Year:	2022-23
Semester:	1st
Category of the Course:	Engineering Science (ESC)

Prerequisite:	• Basic Computer Skills • Logical Thinking and Problem-Solving Abilities • Understanding of mathematical logic and problem-solving strategies
Rationale:	The "Programming for Problem Solving" course is a foundational skill that significantly enhances an engineer's problem-solving abilities, career prospects, and capacity for innovation. Integrating programming into the curriculum ensures that engineering programs prepare students to meet the challenges of the modern technological landscape and contribute effectively to their respective fields.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1	Identify fundamental programming constructs such as variables, data types, operators, expressions, control structures, functions and basic data structures	Remember
2	Explain the principles of programming and software development, including the structure and operation of algorithms, flowcharts, and pseudocode.	Understand
3	Develop simple programs using appropriate data structures and standard libraries.	Apply
4	Apply programming constructs such as loops, conditional statements, and functions to solve basic engineering problems.	Apply
5	Debug and troubleshoot programming errors by systematically testing and refining code.	Analyze

CO PO MAPPING												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	3	3	2	-	-	-	-	-	-	-	-
CO4	3	3	3	2	1	-	-	-	-	-	-	-
CO5	3	3	3	3	2	-	-	-	-	-	-	-

CO PSO MAPPING		
COs	**PSO1 (Programming Skills)**	**PSO2 (Problem Solving)**
CO1	3	2
CO2	3	2
CO3	3	3
CO4	3	3
CO5	3	3

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	(E)	(M)	(I)	(V)	
2	0	4	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Introduction to Computer and Programming:** Introduction, Basic block diagram and functions of various components of computer, Concepts of Hardware and software, Types of software, Compiler and interpreter, Concepts of Machine level, Assembly level and high level programming, Flowcharts and Algorithms.	5	10
2.	**Basics of 'C' Programming**: Introduction to C, Constants, Variables & Data Types in C. Managing input and output Operators.	3	10
3.	**C Operators:** Arithmetic, Relational, Logical, Increment & Decrement, Assignment and Conditional Operators. Arithmetic Expressions and Precedence rules, Type Conversion in C, Mathematical function in C	4	10
4.	**Control Structure in C:** Decision making and Branching: if and if...else statement, nested and ladder if...else, conditional operator, switch statement, goto statement. Decision making and Looping: while, do...while, and for loops, nested loops, break and continue statements.	6	10
5.	**Fundamentals of Arrays:** Introduction to Arrays, Array Terminology and types of Arrays, Characteristics of Array, Array declaration, Array initialization, Accessing array elements, Sorting/Searching operations on array elements, Two dimensional & multi-dimensional array declaration and initialization,	5	10
6.	**String:** String manipulation operation using arrays, Built in String functions.	2	10

7	**User-defined Functions:** Function prototype and function declaration, function definition, function call, actual and formal parameters/arguments, return type and return statement, Nested function call, Recursion.	6	10
8 9.	**Control Structure: in C:** Decision making and Branching: if and if-else statement, nested and ladder if-else, conditional operator, switch statement, goto statement, Decision making and Looping: while, do-while and for loops, nested loops, break and continue statements. **Structures and Unions:** Defining structure, declaring and initializing structure variables, typedef, accessing structure members, copying and comparing structure variables, nested structures, arrays and structures, structures and functions, unions	5 4	10 10
10.	**Fundamentals of Arrays:** Introduction to Arrays, Array Terminology and types of Arrays, Characteristics of Array, Array declaration, Array initialization, Accessing array elements, Sorting/Searching operations on array elements, Two dimensional & multi-dimensional array declaration and initialization,	4	10
	Total	**44**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
20	**40**	**40**	**-**	**-**	**-**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Programming with C by Byron Gottfried, 3rd Ed., McGraw Hill Education
2. The C Programming Language by Kernighan and Ritchie, 2nd Ed., PHI Learning
3. Expert C Programming: Deep C Secrets by Peter Van Der Linden, Pearson Education
4. Let Us C by YashvantKanetkar, 12th Ed., BPB Publication • Programming in C by Ashok N. Kamthane, 2nd Ed., Pearson Education.
5. Programming with C, Second edition, by Gottfried, Tata McGraw-Hill Publishing Company Limited.

(b) Open source software and website:

1. OnlineGDB : GDB online Debugger | Compiler - Code, Compile, Run, Debug online C, C++ (onlinegdb.com)
2. Compiler Explorer (Godbolt): Compiler Explorer (godbolt.org)
3. JDoodle: JDoodle - Free online cloud coding platform IDE to practice, teach and learn programming

Suggested Course Practical List:

1. Write a program to print HELLO FRIENDS!
2. Write a program that reads two nos. from key board andgives their addition, subtraction, multiplication, division and modulo.
3. Write a program to select & print the largest of the threenos. using Nested-If-Else statement.
4. Write a program to display multiplication table.
5. Write a program to print 1+1/2+1/3+1/4+……+1/Nseries.
6. Write a program to find sum of all integers greater than100 & less than 200 and are divisible by 5.
7. Write a program to find sum of first N odd numbers.

8. Program to print Patterns.

```
*
* *
* * * *
```

9. Program to print Patterns

```
AAAAA
BBBB
CCC
DD
E
```

10. Write a program to print Fibonacci series.
    a. 1,1,2,3,5,……N
11. Write a program to reverse the digit.
12. Add, subtract and multiply two nos. using switch statement.
13. Write a program to add two matrixes.
14. Write a program to given no in ascending order.
15. Write a program to count total words in text.
16. Write a program to copy one string to another string.
17. Write a program convert character into Toggle character.
18. Find given string is palindrome or not using string library Function.
19. Write a function find out maximum out of three numbers.
20. Write a program that used user defined function Swap ( ) and interchange the value of two variable.
21. Write a calculator program (add, subtract, multiply, divide). Prepare user defined function for each functionality.
22. Write a function to enter roll no, marks of the three subjects for 3 students and find total obtained by each student.
23. Write a program using pointer to read an array of integerand print element in reverse order.
24. Write a program to store a character string in block of memory space created by malloc and then modify the same to store a large string.

List of Laboratory/Learning Resources Required:

1. Computer System/Laptop with latest configurations.
2. Internet Connectivity

Suggested Project List:

1. Rock Paper Scissors Game
2. Simple Calculator
3. Bank Management System
4. Tic Tac Toe
5. Library Management System

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SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course/ Subject Code: BE100112

Course/Subject Name: Engineering Graphics & Design

w.e.f.Academic Year:	2022-23
Semester:	1st Semester/ 1stYear
Category of the Course:	Engineering Science

Prerequisite:	Zeal to learn the subject
Rationale:	Engineering Drawing is an effective language of engineers. It is the foundation block which strengthens the engineering & technological structure. Moreover, it is the transmitting link between ideas and realization

Teaching and Examination Scheme:

Teaching Scheme(in Hours)			Total Credits L+T+(PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial/Practical		
L	T	PR	C	(E)	(M)	(I)	(V)	
2	0	4	4	60	40	30	20	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Introduction to Engineering Graphics:** Drawing instruments and accessories, BIS – SP 46. Use of plane scales, Diagonal Scales and Representative Fraction.	*	10
2.	**Engineering Curves: Classification and application of Engineering Curves, Construction of Conics, Cycloidal Curves, Involutes andSpirals**	*	10
3.	**Projections of Points and Lines: Introduction to principal planes of projections, Projections of the points located in same quadrant and different quadrants, Projections of line with its inclination to one reference plane and with two reference planes. True length and inclination with the reference planes.**	4	20

SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course/ Subject Code: BE100112

Course/Subject Name: Engineering Graphics & Design

4.	**Projections of Planes: Projections of planes (polygons, circle and ellipse) with its inclination to one reference plane and with two reference planes**	2	20
5.	**Projections of Solids, Section of Solids: Classification of solids. Projections of solids (Cylinder, Cone, Pyramid and Prism) along with frustum with its inclination to one reference plane and with two reference planes, Section of such solids and the true shape of the section.**	6	20
6.	**Orthographic Projections: Fundamental of projection along with classification, Projections from the pictorial view of the object on the principal planes for view from front, top and sides using first angle projection method and third angle projection method, full sectional view.**	3	20
7.	**Computer Aided Drawing:** **Introduction to AutoCAD, Basic commands for 2D drawing like : Line, Circle, Polyline, Rectangle, Hatch, Fillet, Chamfer, Trim, Extend, Offset, Dim style, etc.**	*	

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
25	**30**	**30**	**15**	**-**	**-**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

Course Outcomes:

No.	**Course Outcomes**	**RBT Level**
CO1	Apply the conventions and the methods of engineering drawing and interpret engineering drawings.	Application
CO2	Construct basic and intermediate geometry and comprehend the theory of projection.	Application
CO3	Dissect the objects in three dimensions with different orientation.	Analyze

SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course/ Subject Code: BE100112

Course/Subject Name: Engineering Graphics & Design

No.	Course Outcomes	RBT Level
CO4	Make use of computer software for engineering drawings.	Application

Course Outcome to Programme Outcome (CO-PO) Mapping

CO-PO Mapping:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	2	-	-	-	-	2	-	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-
CO3	3	3	2	-	2	-	-	-	-	-	-	-
CO4	2	-	-	-	3	-	-					

CO-PSO Mapping;

CO\PSO	PSO1 (Fundamentals & Principles)	PSO2 (Software Skills & Tools)	PSO3 (Design Interpretation & Communication)
CO1	3	-	2
CO2	3	-	2
CO3	3	-	3
CO4	2	3	2

SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course/ Subject Code: BE100112

Course/Subject Name: Engineering Graphics & Design

References/Suggested Learning Resources:

(a) Books:

1. A Text Book of Engineering Graphics by P.J.Shah S.Chand & Company Ltd., New Delhi.
2. Elementary Engineering Drawing by N.D.Bhatt Charotar Publishing House, Anand.
3. A text book of Engineering Drawing by R.K.Dhawan, S.Chand & Company Ltd., New Delhi.
4. A text book of Engineering Drawing by P.S.Gill, S.K.Kataria & sons, Delhi.
5. Engineering Drawing by B. Agrawal and C M Agrawal, Tata McGraw Hill, New Delhi.

(b) Open-source software and website:

1. AutoCAD

Suggested Course Practical List:

Students must prepare sketch book and drawing sheets on the following topics.

1. Practice sheet (which includes dimensioning methods, different types of line, construction of different polygon, divide the line and angle in parts, use of stencil) – 2 Hrs.
2. Plane scale and diagonal scale – 2 Hrs.
3. Engineering curves- 4 Hrs.
4. Projection of point and line – 4 Hrs.
5. Projection of plane – 4 Hrs.
6. Projection of solid, section of solid - 4 Hrs.
7. Orthographic projection – 6 Hrs.
8. At least one orthographic drawing (three views) using above mentioned AutoCAD commands. – 4 Hrs.

List of Laboratory/Learning Resources Required:

Suggested Project List:

1. Students must prepare at least one model using cardboard/paper to understand the fundamentals of topic no. 1 to 6. This project work will be considered for practical evaluation.

SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: DEGREE

Course/ Subject Code: BE100112

Course/Subject Name: Engineering Graphics & Design

SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course/ Subject Code: BE100115

Course/Subject Name: PHYSICS (GROUP 2)

w.e.f.Academic Year:	2022-23
Semester:	1st Semester/ 1stYear
Category of the Course:	Basic Science

Prerequisite:	Basic understanding of math's, physics course on Differentiate equations
Rationale:	The basic science - physics program is to prepare students for careers in engineering where physics principles can be applied to the advancement of technology. To make the students in understanding the importance of mechanics, understanding the importance of quantum physics.

Teaching and Examination Scheme:

Teaching Scheme(in Hours)			Total Credits L+T+(PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial/Practical		
L	T	PR	C	(E)	(M)	(I)	(V)	
3	0	2	4	60	40	30	20	150

Course Content:

Unit No.	Content	No. of Hours	% of Weight age
1.	**Electronic Materials**: Free Electron Theory, Energy Diagram, Density Of States, Introduce Origin Of Band Gap In Solid, Direct Gap And Indirect Gap, Type Of Electronic Material, Occupation Probability, Fermi Level, Phonons.	9	20
2.	**Semiconductors:** Intrinsic And Extrinsic Semiconductors, Dependence Of Fermi Level On Carrier Concentration And Temperature, Diffusion And Drift, P-N Junction, metal semiconductor junction, optoelectronic devices.	9	20
3.	**Measurements:** Four Point Probe and VAN DER PAUW Measurements For Carrier Density, Resistivity, Hot-Point Probe Measurement, Measurement Of Voltage, Electric Current, Capacitances	8	18

4.	**Superconductivity** Introduction Of Superconductivity, Magnetic, Meissner, Pressure, Impurity, Isotopic Mass Effect, Bcs Theory, Penetration Depth, Josephson's Junction, Application of Superconductors	6	16
5.	**Light-Semiconductor Interaction:** Absorption, Spontaneous Emission, And Simulated Emission, Joint Density Of States, Density States For Photons, Fermi's Golden Rule, Photovoltaic Effect, Drude Model.	10	24
	Total	**42**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
23	**28**	**49**	**-**	**-**	**-**

WhereR:Remember;U:Understanding;A:Application,N:AnalyzeandE:EvaluateC:Create(as per Revised Bloom's Taxonomy)

Course Outcomes (COs)

After completion of this course, the student will be able to:

CO No.	Course Outcomes	RBT Level
CO1	Understand the principles of electronic materials and their energy band structure.	Understand
CO2	Explain the working of semiconductors and their application in devices.	Understand
CO3	Perform measurements related to electrical properties using various instruments.	Apply
CO4	Explain the concepts and applications of superconductivity.	Understand
CO5	Interpret the interaction of light with semiconductors and its relevance to modern devices.	Analyze

SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Course/ Subject Code: BE100115

Course/Subject Name: PHYSICS (GROUP 2)

CO-PO Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	1	-	-
CO3	3	3	2	2	2	-	-	-	-	2	-	1
CO4	3	2	-	-	-	-	-	-	-	1	-	-
CO5	3	3	2	2	1	-	-	-	-	2	-	1

CO-PSO Mapping (Assuming general PSOs for Engineering Physics)

CO \ PSO	PSO1: Application of physics in engineering domains	PSO2: Ability to use physical principles for measurements and analysis
CO1	3	-
CO2	3	-
CO3	2	3
CO4	3	-
CO5	3	2

Reference Books –

- Engineering Physics; G. Vijayakumari, Vikas Publication House Pvt. Ltd., New Delhi.
- Engineering Physics by Dattu R Joshi, McGraw hill Publications
- Engineering Physics by Shatendra Sharma & Jyotsan Sharma, Pearson Publication
- R.Kolenkow D.Kleppner and. An Introduction to Mechanics. McGraw Hill Education, 2017.
- D.Halliday, R.Resnick and J.Walker. Principles of Physics. John Wiley & Sons, 2015.
- Modern Engineering Physics; A.S. Vasudeva, S. Chand & Company Ltd, New Delhi.

- A Textbook of Engineering Physics; S. Chand and Company Ltd, New Delhi.
- Applied Physics for Engineers, Neeraj Mehta, PHI Learning Private Ltd., New Delhi.

List of Practical –

- Check superconductivity of different material.
- Measure resistance and voltage.
- Measure capacitance in series and parallel connection.
- Stress and strain diagram of superconductor.
- Superconductivity of different material at different temperature.
- Use of Multimeter.
- Energy absorption diagram of different material.

Swaminarayan University

Teaching & Examination Scheme

Course – Faculty of Engineering (Degree)

Branch – Electrical Engineering

Semester – 1st

Subject Code	Subject Name	Category	L	T	P	Total Credit	E	M	I	V	Total Marks
BE100101	Mathematics - 1	Basic Science	3	2	0	5	60	40	0	0	100
BE100112	Engineering Graphics & Design	Engineering Science	2	0	4	4	60	40	20	30	150
BE100104	Basic Electrical Engineering	Engineering Science	3	0	2	4	60	40	20	30	150
BE100109	Programming for Problem Solving	Engineering Science	3	0	2	4	60	40	20	30	150
BE100115	Physics (Group - 2)	Basic Science (Elective)	3	0	2	4	60	40	20	30	150
BE100114	Chemistry	Basic Science (Elective)	3	0	2	4	60	40	20	30	150
BE100113	Induction Program	Mandatory	0	0	0	0	0	0	0	0	0
	Total		**14**	**2**	**10**	**21**					

L=Lecture, T=tutorial, P=Practical, E=Theory External, M=Theory Internal, I=Practical Internal, V=Practical External