

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/ Spec.	Computer Science & Engineering Computer Science & Engineering (Big Data and Analytics) Computer Science & Engineering (Cyber Security) Computer Science & Engineering (Artificial Intelligence and Machine Learning)
Semester	II	Version	1.0.0.0
Course Code	2ESC1117	Course Name	ESSENTIAL OF SOFTWARE FOUNDATION & PROGRAMMING–II
Effective from Academic Year	2026-27	Effective for the batch admitted in	July 2026
Course Category	ESC		

Teaching, Learning, and Examination Scheme

Teaching & Learning Scheme							Examination scheme (Marks)					
Hours (per week)				Cr	SL	TSL	Theory			Practical		
L	TU	P	TTH				CE	SEE	Total	CE	SEE	Total
3	0	4	7	5	45	150	50	50	100	50	50	100

L: Lecture, TU: Tutorial, P: Practical, TTH: Total Teaching Hours/Week, Cr: Credit, SL: Min. Self Learning/Term Work Hours/Sem, TSL: Min. Total Teaching & Learning Hours/Sem, CE: Continuous Evaluation, SEE: Semester End Examination,

Pre-requisites

C Programing, GCC, Flowchart, Algorithm

Course Outcomes

COs	After completing the Course, students will be able to
CO1	Understand the principles of object-oriented programming.
CO2	Apply the concepts of class, object, abstraction, inheritance, polymorphism, and encapsulation
CO3	Understand the principles of object-oriented programming using JAVA
CO4	Learn the concept of Interface, Collection, Exception handling, Threading, and Database Connectivity in JAVA

Theory Syllabus

Unit	Content	Hrs
1	C++ Programming basics What is object-oriented programming? Output using cout Directives. Input with cin, type bool, the setw manipulator, and type conversions.	4
2	Classes and Objects in C++ Implementation of class, Objects, data types constructor, Object as function arguments. types of constructors, returning objects from function, Structures and Classes.	4
3	Polymorphism Overloading unary-binary operators, data conversion, pitfalls of operators overloading and conversion keywords, function overloading, Explicit and Mutable. Virtual Function: Inline function, Virtual Function, friend function, this pointer	5
4	Inheritance Concept of inheritance, Derived class and base class, Derived class constructors, member function, inheritance in the English distance class, class hierarchies, inheritance and graphics shapes, public and private inheritance, aggregation.	5
5	Introduction to Java JAVA, Data types, variable, operators, type casting, operators, scanner class, OOPs Concepts in JAVA	3
6	Classes and Objects in JAVA Class and object, Method in Java, Method Overloading, Constructor, garbage collection, Inheritance, Interface, Method Overriding, Class visibility, Static members and Initialization Blocks: Static Class members, Implement static variable, Static Methods, Super keyword, this keyword, Final keyword in javaAccess Levels, package and import	6
7	Exception Handling Checked and unchecked exceptions, handling exceptions using try-catch, Exception Hierarchy,	6

	Implement Exception, The Throw and Throws Keyword, finally keyword, Implement Custom Exception	
8	MultiThreading Thread life cycle, Creating Threads, Extending the thread class and Implement runnable interface, Synchronization, Synchronization Issues, Race Condition, Inter-Thread communication	6
9	Collection Framework Generics: Collections, Bounded types, Collection framework in Java, Vector and Stack, Stack Iterators: Iterable and Iterator, Collections utility class, Arrays utility class, The Set interface, Implement Array As List, Queue Implementations, Hashtable and Properties.	6

Practical Content

Practicals cover topics such as objects, classes, arrays, strings, Inheritance, Polymorphism, Pointers, Virtual Functions, I/O Streams and Files, and Templates.

Text Books

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|---|--|
| 1 | Object-Oriented Programming in C++ By Robert Lafore |
| | Thinking in Java by Bruce Eckel, Pearson Publication |

Reference Books

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| 1 | Object-Oriented Programming with C++ By E. Balagurusamy |
| 2 | Programming with Java – A primer by Balaguruswamy, McGraw-Hill |
| 3 | Java Complete Reference, Java By Herbet Shield, McGraw-Hill. |

ICT/MOOCs Reference

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| 1 | Course Name: Programming in C++
https://onlinecourses.nptel.ac.in/noc21_cs02/preview |
| 2 | Spoken Tutorial STP:
Link: https://spoken-tutorial.org/tutorial-search/?search_foss=C+and+C++&search_language=English |

Mapping of Cos, POs, and PSOs

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	3	2	2	1	1	0	0	0	1	1	0	2	3	3
CO2	2	2	2	3	2	2	2	1	1	2	2	3	3	3
CO3	3	3	2	2	3	3	3	2	1	2	2	2	3	3
CO4	3	3	3	3	2	2	2	2	2	1	1	3	3	3
Unit	Unit Title								Aligned COs	Learning Hours	BTL Level			
1	C++ Programming basics								1,3	4	R,U			
2	Classes and Objects in C++								1,2	4	A,U			
3	Polymorphism & Virtual Function:								2,3	5	A,C,U			
4	Inheritance								2,3	5	A,N			
5	Introduction to Java								1,3	3	R,U			
6	Classes and Objects in JAVA								3,4	6	A,U			
7	Exception Handling								3,4	6	A,N			
8	MultiThreading								3	6	U,A,N			
9	Collection Framework								3,4	6	A,E,C			

Note:

- Version 1.0.0.0 (First Digit= New syllabus/Revision in Full Syllabus, Second Digit=Revision in Teaching Scheme, Third Digit=Revision in Exam Scheme, Forth Digit= Content Revision)
- L=Lecture, TU=Tutorial, P= Practical/Lab., TW= Term work, DT= Direct Teaching, Lab.= Laboratory work
CE= Continuous Evaluation, SEE= Semester End Examination
- 1 Hour Lecture = 1 Credit, 1 Hour Tutorial = 1 Credit, 2 Hours Practical = 1 Credit, 2 Hours Internship/Project/Seminar = 1 Credit
- As per NCrF/NEP 2020, Minimum Self-Learning or Term Work Hours per Semester should be calculated in such a way that 1 Credit should have minimum 30 Hours of Teaching and Self Learning Engagement per semester