CCEK – NSQF ALIGNED PROGRAM

COURSE SYLLABUS

FOR

Software Engineering

CCEK - NATIONAL SKILL DEVELOPMENT TRAINING PROGRAM

Software Engineering

CCEK – NSDC course package covers the following Qualification Packs and leads to the following NSDC certifications. The students who successfully completed the course programs are entitled to get NSDC certification after undergoing the assessment process of NSDC as per the rules and regulations stipulated by NSDC from time to time.

SL. NO.	QUALIFICATIONS PACK	QUALIFICATIONS PACK CODE	NSQF LEVEL
1	**Software Developer-IT Services** **Brief Job Description**: This unit is about contributing to the design of software products and applications where both the business impact and technical complexity are low.	**SSC/Q0501**	**5**

COURSE DETAILS

Software Engineering

EXAMINATION DETAILS

COURSE NAME	COURSE CODE	ELIGIBILITY	DURATION
Software Engineering	G04	Graduate –(Statistics/ Science/Technology/Mathematics), 12th Class – (Math Stream)	420

SL. NO.	EXAM	EXAM CODE	MAXIMUM MARK	INTERNAL	TOTAL MARK
THEORY PAPERS					
1	Software Engineering Principles	T001	100	50	150
2	Software Project Management	T002	100	50	150
PRACTICAL PAPERS					
1	Programming Fundamentals Lab	L001	100	50	150
TOTAL MARKS					
1	Total Examination Marks (Theory Online + Practical Examination)				300
2	Total Internal Marks				150
3	**Total Marks (Total Internal Marks + Total Examination Marks)**				**450**

Software Engineering

INTERNAL MARK CRITERIA FOR EACH

SL NO.	MODULE	MODULE CODE	MAXIMUM MARK	INTERNAL MARK	TOTAL MARK
1	Software Engineering Principles	T001	100	50	150
2	Software Project Management	T002	100	50	150
3	Programming Fundamentals Lab	L001	100	50	150
	TOTAL		300	150	450

ATTENDANCE	GENERAL PERFORMANCE	INTERNAL EXAMINATIONS/ PROJECTS/ ASSIGNMENTS	TOTAL MARKS
5	5	40	50

COURSE SYLLABUS

FOR

Software Engineering

COURSE	Software Engineering	
TOTAL MARKS	Mark: 450	Internal Mark: 150
TOTAL HOURS	420 Hrs	

DEFENITION OF CREDIT

1 Credit	15Hrs Theory/ 30Hrs Practical
Skill Components	60 – 70 % of Total Credit

MODULES INCLUDED IN THIS SUBJECT

SL NO	MODULE NAME	CREDIT BREAKUP
1	Module 1: Programming and Algorithms	**1**
2	Module 2: Analysis and Design of Software Applications	**1**
3	Module 3: Work Requirement, Tools and Software	**1**
4	Module 4: Process of Software Development	**1.5**
5	Module 5: Process of Application Development	**1.5**
6	Module 6: Concept of Software Testing	**1.5**
7	Module 7: Inclusive and environmentally sustainable workplaces	**1**
8	Module 8: Introduction to Employability Skills	**2**
9	Module 9: Constitutional Values - Citizenship	**.5**
10	Module 10: Becoming a Professional in the 21st Century	**.5**
11	Module 11: Basic English Skills	**.5**

12	Module 12: Career Development & Goal Setting	**1**
13	Module 13: Communication Skills	
14	Module 14: Diversity & Inclusion	
15	Module 15: Financial and Legal Literacy	
16	Module 16: Essential Digital Skills	**1**
17	Module 17: Entrepreneurship	
18	Module 18: Customer Service	
19	Module 19: Getting ready for Apprenticeship & jobs	
	Total	**14**

Training Outcomes

- Implement appropriate standards to assist in performing software construction as per specifications.
- Identify software development needs and changes.
- Design algorithms to solve problems and execute test cases to convert them into code.
- Evaluate the various software testing methodology and identify the correct one to deploy.
- Analyse software designs for already built products or services.
- Build data base skills including DBMS, data design for predevelopment process.
- Categorize between UML and Object-Oriented Design.
- Discuss about manual and automated testing of software components.
- Demonstrate application of suitable Unit Test Cases to validate the process of testing.
- Demonstrate effective communication and collaboration with colleagues.
- Apply measures to maintain standards of health and safety at the workplace.
- Use different approaches to effectively manage and share data and information.
- Develop strong relationships at the workplace through effective communication and conflict management.
- Identify best practices to maintain an inclusive, environmentally sustainable workplace.

MODULES

Module 1: Programming and Algorithms

THEORY

- List the steps involved in solving computational problems.
- List the disadvantages of data flow diagrams.
- Identify the process of algorithm development for software programming.

PRACTICAL

- Evaluate various steps to construct the framework using an algorithm for a software application.
- Execute simple programs, showing how input data is processed, output data is produced, and how the values of internal variables change.
- Use proper application of scripting language to automate tasks and write simple programs
- Analyse the error messages of the compiler to identify and correct mistakes in program syntax while developing programs.

Module 2: Analysis and Design of Software Applications

THEORY

- Define the Software Development Life Cycle encompassing Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low-Level Design (LLD).
- List the different techniques used for Requirements Analysis.
- Classify elements for measuring various aspects of software development process.

PRACTICAL

- Analyse program inputs to identify, resolve and record design process.
- Examine the correct software programming procedure or prototyping paradigms using principles of code and design quality.
- Review software development designs to identify any bugs, like Arithmetic, Logical, Syntax, Multithreading, etc.

Module 3: Work Requirement, Tools and Software

THEORY

- Discuss methods to read a detailed program specification and implement it using a programming language.
- Discuss the various software engineering approaches to develop applications and the key processes.

PRACTICAL

- Create software requirement list for the following developmental process, including Testing, Maintenance, Enhancement, Development, etc.
- Plan a logical analysis and pseudo code for software development
- Build data base skills including DBMS, data design, and querying table structures for specific data.
- Construct a documented resolution of statistical analysis accurately using documentation tools.

Module 4: Process of Software Development

THEORY

- List the phases of software development lifecycle.
- Discuss the differences between top down and bottom-up design approaches.

PRACTICAL

- Analyse users' needs to design, test, and develop software as per requirement
- Categorize each piece of an application or system and plan how the pieces will work together.
- Design testing strategies like unit, integration, regression, system, alpha, beta testing, etc. to identify and correct semantic errors in programs.
- Test a variety of models and diagrams that show customers, the software code needed for an application.
- Construct a roadmap for every aspect of an application or system as a reference for future maintenance and upgrades.

Module 5: Process of Application Development

THEORY

- List software quality attributes and characteristics of a good SRS.
- Discuss the primary differences between custom application development and rapid application development.

PRACTICAL

- Categorize the process of top-down approach and bottom-up approach for developing an application.
- Test Data Flow Diagrams (DFD), Structure Charts, HIPO, etc., for structured analysis.
- Develop a decision table based on number of conditions that may affect the development process.
- Categorize between UML and Object-Oriented Design.
- Examine various UML diagrams i.e. Class, Object, Use Case Sequence, Collaboration, etc., to identify the suitability.
- Construct a class diagram of an Order System of an application prior to development.

Module 6: Concept of Software Testing

THEORY

- Discuss validation and verification components covered under software testing.
- Discuss about manual and automated testing of software components.
- List the components of a test plan.
- Discuss the suitability of solutions/ workarounds, where available.

PRACTICAL

- Utilize reusable components, code generation tools and unit testing tools to identify anomalies.
- Design the conversion process of technical specifications into code to meet the requirements.
- Create appropriate Unit Test Cases (UTCs).
- Test and re-develop the code and UTCs to fix identified defects.
- Execute UTCs and document the results for best practice.

Module 7: Inclusive and environmentally sustainable workplaces

THEORY

- Describe different approaches for efficient energy resource utilisation and waste management.
- Describe the importance of following the diversity policies.
- Identify stereotypes and prejudices associated with people with disabilities and the negative consequences of prejudice and stereotypes.
- Discuss the importance of promoting, sharing, and implementing gender equality and PwD sensitivity guidelines at organization level.

PRACTICAL

- Practice the segregation of recyclable, non- recyclable and hazardous waste generated.
- Demonstrate different methods of energy resource use optimization and conservation.
- Demonstrate essential communication methods in line with gender inclusiveness and PwD sensitivity.

Module 8 : Introduction to Employability Skills

THEORY

- Discuss the Employability Skills required for jobs in various industries
- List different learning and employability related GOI and private portals and their usage

Module 9 : Constitutional values - Citizenship

THEORY

- Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen
- Show how to practice different environmentally sustainable practices

Module 10: Becoming a Professional in the 21st Century

THEORY

- Discuss importance of relevant 21st century skills.
- Exhibit 21st century skills like Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life.
- Describe the benefits of continuous learning

Module 11: Basic English Skills

THEORY

- Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone
- Read and interpret text written in basic English
- Write a short note/paragraph / letter/e -mail using basic English

Module 12: Career Development and Goal Setting

THEORY

- Create a career development plan with well-defined short- and long-term goals

Module 13: Communication skills

THEORY

- Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette.
- Explain the importance of active listening for effective communication
- Discuss the significance of working collaboratively with others in a team

Module 14: Diversity and Inclusion

THEORY

- Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD
- Discuss the significance of escalating sexual harassment issues as per POSH

Module 15: Financial and Digital Literacy

THEORY

- Outline the importance of selecting the right financial institution, product, and service
- Demonstrate how to carry out offline and online financial transactions, safely and securely

Module 16: Essential Digital Skills

THEORY

- Describe the role of digital technology in today's life
- Demonstrate how to operate digital devices and use the associated applications and features, safely and securely
- Discuss the significance of displaying responsible online behaviour while browsing, using various social media platforms, e-mails, etc., safely and securely
- Create sample word documents, excel sheets and presentations using basic features
- utilize virtual collaboration tools to work effectively

Module 17: Entrepreneurship

THEORY

- Explain the types of entrepreneurship and enterprises
- Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan
- Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement
- Create a sample business plan, for the selected business opportunity

Module 18: Customer Service Map

THEORY

- Describe the significance of analysing different types and needs of customers
- Explain the significance of identifying customer needs and responding to them in a professional manner.
- Discuss the significance of maintaining hygiene and dressing appropriately

Module 19: Getting Ready for Apprenticeship and Jobs

THEORY

- Create a professional Curriculum Vitae (CV)
- Use various offline and online job search sources such as employment exchanges, recruitment agencies, and job portals respectively
- Discuss the significance of maintaining hygiene and confidence during an interview
- Perform a mock interview
- List the steps for searching and registering for apprenticeship opportunities