



JSS COLLEGE OF ARTS, COMMERCE & SCIENCE

(An Autonomous College of University of Mysore)

Re-accredited by NAAC with 'A' grade

OOTY ROAD, MYSORE-570 025, KARNATAKA

SYLLABUS

Programme: B. Voc. (Software Development)

Scheme of Assessment:

Semester-I:

Sl. no	Course Code	Course Name	Credits		Marks					Hours Per Week		
			L:T:P	Total	Th	C1	C2	Pr	Total	T	P	Total
1	SDA 020	Communication Language Kannada	3:0:0	03	70	15	15	-	100	03	-	03
2	SDA 510	Basic Mathematics	3:0:0	03	70	15	15	-	100	03	-	03
3	SDA 520	C Programming	2:0:1	03	70	15	15	70	170	02	01	03
4	SDA 530	Digital Electronics	2:0:1	03	70	15	15	70	170	02	01	03

Semester-II:

Sl. no	Course Code	Course Name	Credits		Marks					Hours Per Week		
			L:T:P	Total	Th	C1	C2	Pr	Total	T	P	Total
1	SDB 540	Communication Language English	3:0:0	03	70	15	15	-	100	03	-	03
2	SDB 510	Discrete Mathematics	3:0:0	03	70	15	15	-	100	03	-	03
3	SDB 520	Algorithms & Data Structure	2:0:1	03	70	15	15	70	170	02	01	03
4	SDB 550	Microcontroller & Embedded System	2:0:1	03	70	15	15	70	170	02	01	03

Semester-III:

Sl. no	Course Code	Course Name	Credits		Marks					Hours Per Week		
			L:T:P	Total	Th	C1	C2	P	Total	T	P	Total
1	SDC 510	Advanced Calculus	4:0:0	04	70	15	15	-	100	04	-	04
2	SDC 520	Differential Equation	2:0:0	02	70	15	15	-	100	02	-	02
3	SDC 530	Software Architecture and SDLC & Process	2:0:1	03	70	15	15	70	170	02	01	03
4	SDC 550	Indian Constitution	3:0:0	03	70	15	15	-	100	03	-	03

Semester-IV:

Sl. no	Course Code	Course Name	Credits		Marks					Hours Per Week		
			L:T:P	Total	Th	C1	C2	P	Total	T	P	Total
1	SDD 510	Numerical Analysis & Statistics	4:0:0	04	70	15	15	-	100	04	-	04
2	SDD 520	Operation Research	2:0:0	02	70	15	15	-	100	02	-	02
3	SDD 530	Software Modelling & QA	2:0:1	03	70	15	15	70	170	02	01	03
4	SDD560	Environmental Science	3:0:0	03	70	15	15	-	100	03	-	03

Semester-V:

Sl. no	Course Code	Course Name	Credits		Marks					Hours Per Week		
			L:T:P	Total	Th	C1	C2	P	Total	T	P	Total
1	SDE 510	Project Management	2:0:2	04	70	15	15	70	170	02	02	04
2	SDE 520	Configuration Management	3:0:1	04	70	15	15	70	170	03	01	04
3	SDE 530	Human Computer Interaction	3:0:1	04	70	15	15	70	170	03	01	04

Semester-VI:

Sl. no	Course Code	Course Name	Credits		Marks					Hours Per Week		
			L:T:P	Total	Th	C1	C2	P	Total	T	P	Total
1	SDF 510	Operating System	3:0:1	04	70	15	15	70	170	03	01	04
2	SDF 550	Database Design	3:0:1	04	70	15	15	70	170	03	01	04
3	SDF 520	Computer Networks & Security Fundamentals	3:0:1	04	70	15	15	70	170	03	01	04

Program Outcome:

After completing the graduation in Software Development, the students are able to:

- PO1. Contribute to the design of software products and applications
- PO2. Develop software code to specification
- PO3. Provide data/information in standard formats
- PO4. Develop their knowledge, skills and competence
- PO5. Create documents for Knowledge Sharing
- PO6. Develop media content and graphic designs for software products and applications
- PO7. Appreciate the engineering nature of software development
- PO8. Describe key activities in software development and the role of modelling
- PO9. Explain key concepts in software development such as risk and quality
- PO10. Explain the basics of an object-oriented approach to software development

Program Specific Outcome:

After completing the graduation in Software Development, the students are able to:

- PSO1. Apply standard Software Engineering practices and strategies in real-time software project development
- PSO2. Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems
- PSO3. Understand, analyze and develop computer programs of varying complexity
- PSO4. Apply standard Software Engineering practices and strategies in software project development
- PSO5. Acquaint with the contemporary issues, latest trends in technological development
- PSO6. Develop software code to specification
- PSO7. Manage their work to meet requirements
- PSO8. Develop their skills and competence

General Component Syllabus

3. ««ZÀj ĀwAīĀ CfōUMĀ - gēf^a ĀvĒĀ SrŪ ¥ZĒĒĒw EvġÉ
4. ^aĀtġdā PEĒqĀZĀ , ġME¥Ā ^aĀvĀŪ®PĀt
5. ^aĀtġdā ¥MĒĀ ««ZĀ CAUUMĀ
^aĀtġdā ¥MĒĀ- «ZĀgġuĀ ¥MĒDZĀ±Ā ¥MĒGZj ¥MĒ^aĀ ME° ¥MĒe
¥j ZĀiĀ ¥MĒ¥ġĀ^a Ā±DĒĀ ¥MĒ^a PĀ ÁġĒĒĒfĀ^a ĒĀ ¥MĒ¥j ¥MĒe
6. UĀt PĀzP Ē PEĒqĀ-PEĒqĀZĀ CavĒĒĀ® vĀtUMĀ- ĒĀr, SġPĀ - ¥Āj ĀġPA
¥ĒUMĀ
7. ĀġĀAvġĀ: , ġME¥Ā ^aĀvĀŪ®PĀt - PEĒqĀCZĀ EAVġU É EAVġĀZĀ
PEĒqĒĒ

¥ġĀ^a ĀĒĒĒĒĒĒĒĒ

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| 2. ©AZĀ ©AÇUĒ | - | ^a ĒZĀ» |
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| 4. , PĀUBĀ ^a Ā | - | ĀĀZĒe |
| 5. ±ĀĀe®ZĀ , PĀġĀ | - | ĒĀUĀ±i° ŪŪ |
| 6. ^a ĀĀ PĀĀj PPEĒqĀ | - | JZi J ₂ i PĒ |
| 7. DqĀvPEĒqĀ | - | qĀC±ĒĒPĀ ^a ĀġġĒeĀġĀ
^a ĀvĀŪ EvġġĀ |
| 8. PġĀj PĒ; r | - | PĀ ^a Ā¥Ā PEĒqĀ CZĀiĀĒĀ
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| 9. ĀĒĒĒĒĒĒĒĒ | - | J ₂ i ¥ĒĒZġĀ ^a i |
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SDA 510

BASIC MATHEMATICS

Credits: 3 (45 Hours)

(3 Hours of Theory per week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Learn in depth Polynomials
- CO2. Write down the details of Cardon's Method
- CO3. Identify the details of Pair of straight lines
- CO4. Deliberate in details with examples Circle
- CO5. Specify in details with examples Radian Measure
- CO6. Learn in depth Complex Numbers

Unit 1: Algebra1

15 Hours

- Theory of Equations: Polynomials – Relations between the roots and coefficients – Symmetric functions –Synthetic division-Descartes' rule of signs –Cubic equations- Cardon's method.

Unit 2: Analytical Geometry –I

15 Hours

- Two dimensional coordinate geometry – straight line (Revision), Pair of straight lines – standard results and simple problems.
- Circle: Equations of circles, Tangent and normal, radical axis and radical centers.
- Conic: Parabola – Ellipse- Hyperbola (Equations in standard form and problems)

Unit 3: Trigonometry

15 Hours

- Radian measure-Trigonometric ratios –Trigonometric functions of compound angle, multiple angles and half angles-Inverse trigonometric functions-complex numbers.

Reference:

1. Algebra –Natarajan
2. Algebra – Hardy and Wright
3. Algebra –Shanthi Narayan
4. Algebra –Manicavachagam Pillay
5. Elements of Analytical Solid geometry – Shanti Narayan
6. Elements of Analytical Solid geometry –S.L.Loney
7. Differential Calculus –Shanthi Narayan
8. Trigonometry –S.L.Loney

C PROGRAMMING

Credits: 3 (45 Hours)

(2 Hours of Theory and 1 Hour of Practical per Week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Specify in details with examples Problem Design
- CO2. Learn in details with examples Algorithms
- CO3. Deliberate the details of Data Definition Structure
- CO4. Learn the details of Control Structures
- CO5. Learn the details of Functions
- CO6. Identify in details with examples Abstract Data Types

Unit 1

15 Hours

Problem Solving Technique: Problem definition, Problem analysis, Problem Design, Algorithms, Flow charts, Coding, Debugging, Program documentation, Program maintenance and Basic programming construct

Data Definition Structure: Types, constants, variables, keywords and identifiers.

Operators and Expressions: Arithmetic, Relational, Logical, operator precedence rules; input and output statement and Assignment statement

Unit 2

15 Hours

Control Structures: Sequential, Selection (one way, two way), looping (while, do while, for), combinations

Functions: Definition and passing (function depth look), Prototypes: parameter definition and passing (scope: local and global variables)

Data Structures: One and Two dimensional arrays

Abstract data types: Records (Structure definition statement); Strings: Use of main operations, string functions (concatenates string copy and compare etc).

Reference:

- Programming with ANSI C by: E. Balaguruswamy
- Let us C - Yashwanth kanetkar
- Computer concepts and C programming by - P. B. Kotur

Practicals

(1 Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

SDA 530

DIGITAL ELECTRONICS

Credits: 3 (45 Hours)

(2 Hours of Theory and 1 Hour of Practical per Week)

Course Outcome:

After completion of the course, the students are able to:

CO1. Learn in detail with application, logic gates

CO2. Learn the classification and characteristics of combinational digital circuits

CO3. Deliberate the classification and characteristics of sequential digital circuits

CO4. Learn in details with application, flip flop

Unit 1

15 Hours

Representation of Information: Number system, integer and floating point representation, character codes (ASCII, EBCDIC)

Number Systems: Introduction to decimal, binary and hexadecimal number systems. Inter-conversion of decimal, binary and hex numbers

Binary Arithmetic and codes: Addition, multiplication and division in binary systems. Subtraction in binary systems –one's and two's complement methods. Subtraction of binary numbers by one's and two's complement methods. Concept of signed and unsigned numbers

Alphanumeric codes- ASCII and EBCDIC, concept of parity, error detection and correction

Logic Gates: Logic values and variables, positive and negative logic, AND, OR, NOT, NAND, NOR, AND, XOR gates, symbols and truth table. Definition of universal gates, NAND & NOR gates as universal gates

Boolean algebra: Laws of Boolean algebra. Principle of duality. DeMorgan's theorems. Simplification of Boolean expressions. Boolean expression for logic circuits and vice versa SOP and POS notations. Canonical Expressions. Conversion from SOP to POS form and vice versa. Reduction of Boolean expressions (three/ four variables with don't care conditions) using Karnaugh maps

Unit 2

15 Hours

Combinational Circuits: Half Adder, Full Adder, Half subtractor, Full subtractor, Encoders (Decimal to BCD) and decoders (BCD to Decimal), 4 X 1 Multiplexer and 1 X 4 demultiplexer - symbol and truth table

Sequential Circuits: RS flip flop, D flip flop. JK flip flop. Race around condition & T flip-flops. Shift registers –SISO, SIPO, PISO, PIPO registers. Brief explanation with Block diagrams. Counter - Synchronous and Asynchronous - Binary ripple counter and modulo counter

Semiconductor Memories: Idea of different types of Semiconductor memories (RAM, ROM, PROM, EPROM, EEPROM), process of data storage and retrieval, organization of memory, concept of PLA and PAL

Basic Building Blocks: ALU: arithmetic and logic unit operations, organization of control units, memory: types and organization, peripheral devices: I/O devices (video terminals and printers) and controllers, storage devices (tapes and disks), Programmed and interrupt control mechanism, I/O controllers, and bus bandwidths

Reference:

- Digital Electronic – Introduction to Theory & Practice by Gothmann
- Modern Digital Electronic (3rd Ed.) by Jain.
- Digital Principles & applications (6th Ed.) by Leech, Malvino and Saha.
- Digital Electronic by Thomas Floyd.
- The 8086 / 8088 Family Design, Programming & Interfacing by John Uffenbeck.
- 8086 Microprocessors Programming & Interfacing by Duglos V Hall.
- Intel Microprocessors Architecture, Programming & Interfacing (6th Ed.) by Barry B Bery.

Practicals

(1Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

SEMESTER II
COMMUNICATIVE LANGUAGE ENGLISH

Credits: 3 (45 Hours)
(3 Hours of Theory per Week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Deliberate in details with examples Voice
- CO2. Specify in details with examples Articles
- CO3. Learn in depth Speech
- CO4. Deliberate the details of Writing Skills
- CO5. Learn in depth Speaking Skills

Module – 1 Grammar

	Marks	Hrs/ Week
1. Subject and Verb Agreement	5	6
2. Voice	5	5
3. Articles	5	3
4. Speech	5	6
5. Question tag	5	5
6. Framing of Questions	5	3+2=05

Module – 2 Writing Skills

1. Letter Writing Letter of Application/Letter of Grievances/Resume Preparation	10	4
2. Comprehension	10	3
3. Essay Writing	10	3

Module – 3 Speaking Skills

1. Greeting		
2. Requesting		
3. Enquiring		
4. Explaining	10	03+2=05
5. Reporting		
6. Permission		
7. Thanking		
	70	45

SDB 510

DISCRETE MATHEMATICS

Credits: 3 (45 Hours)

(3 Hours of Theory per Week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Understand the details of Matrices and Determinants
- CO2. Learn the details of Hamilton Theorem
- CO3. Understand in details with examples Graph Theory
- CO4. Understand the details of Calculus
- CO5. Identify in details with examples Definite and Indefinite Integrals

Unit 1: Matrices and Determinants

15 Hours

Algebra of Matrices and determinants –Elementary row operations- Rank of a matrix – Linear dependence of row and column vectors- System of Homogeneous linear equations-System of non homogeneous linear equations-Characteristic equations –Eigen values and Eigen vectors-Cayley –Hamilton theorem-Inverse of a matrix

Unit 2: Basics of graph theory

15 Hours

Definition-paths-matrix representation of graphs –planar graphs-non planar graphs- Coloring of graphs-chromatic number of graphs-Independent number

Unit 3: Calculus

15 Hours

Limits–Derivatives-Rules of differentiation-problems-differentiation of implicit Parametric and inverse functions-logarithmic differentiation and derivatives of second order Indefinite and definite integrals-simple problems

Reference:

- 1) Discrete Mathematics – Hari Kishan and Shiv Rajpundir
- 2) Matrices – Frank Ayers, Schaum publishing company
- 3) Text book of Matrices – Shanti Narayan and P k Mittal
- 4) Differential Calculus – Shanti Narayan
- 5) Differential Calculus and Integral Calculus – Piskunov
- 6) F.Harary – Graph Theory, Addition Wesley Reading Mass, 1969
- 7) Calculus – Volumes I & II.

SDB 520

ALGORITHMS AND DATA STRUCTURES

Credits: 3 (45 Hours)

(2 Hours of Theory and 1 Hour of Practical per Week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Deliberate in details with examples Algorithms and Data Structures
- CO2. Learn in depth Arrays
- CO3. Learn in details with examples Binary Search Trees
- CO4. Deliberate the characteristics of Heaps
- CO5. Specify the characteristics of Sorting Algorithms
- CO6. Learn the details of Shortest Path

Unit 1:

15 Hours

Algorithms and Data Structures: Asymptotic and Algorithm Analysis, Properties of data, Asymptotic Analysis, Algorithm Analysis.

Abstract Lists and Implementations: Linked lists and arrays, Stacks, Queues, De-queues.

Abstract Sorted Lists and Implementations: General trees, binary (including binary and complete trees), N-array trees and tree traversals, Abstract Sorted Lists, Binary search trees, Balanced search trees, AVL trees, B-Trees.

Unit 2:

15 Hours

Abstract Priority Queues: Heaps.

Abstract Sets/Maps: Chained Hash Tables, Linear Probing, Double Hashing.

Sorting Algorithms: Insertion and bubble sort, Heap, merge and quick sort, Bucket and radix sort

Graph and Direct Acyclic Graph Algorithms: Topological sort, Minimum spanning trees and shortest path.

Reference:

- Digital Electronic – Introduction to Theory & Practice by Gothmann
- Modern Digital Electronic (3rd Ed.) by Jain

Practicals

(1 Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

SDB 550

INTRODUCTION TO MICROCONTROLLERS AND EMBEDDED SYSTEMS

Credits: 3 (45 Hours)

(2 Hours of Theory and 1 Hour of Practical per Week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Understand the architecture of 8051 microcontroller
- CO2. Write down the instruction set and simple programs of 8051 microcontroller
- CO3. Learn the details of 8051 microcontrollers
- CO4. Specify the characteristics of embedded system

Unit 1: Microcontrollers

15 Hours

Microcontroller 8051 - Introduction, block diagram of microprocessor, block diagram of microcontroller, comparison between microprocessor & microcontroller, Architecture of 8051 and pin out diagram of 8051.

Addressing modes - Data moves, Types of addressing modes - register addressing, immediate addressing, direct addressing, indirect addressing mode.

Instructions set - Data transfer instructions, arithmetic instructions, jump and call instructions.

PIC microcontroller - Core feature and over view of series.

Unit 2: Embedded Systems

15 Hours

Introduction to Embedded Systems - Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

Hardware Side - introduction, The Core Level, Representing Information, Understanding Numbers, Addresses, Instructions, Registers. An Instruction Set View, Embedded Systems- A Register View, Register View of a Microprocessor

The Hardware Side: Storage Elements and Finite-State Machines - Theoretical model.

Reference:

- Microcontroller – K J Ayala.
- Introduction to Embedded Systems - Shibu K.V, McGraw Hill.
- Microcontroller – Mazadi.

Practicals

(1 Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

SDC 510

SEMESTER III
ADVANCED CALCULUS

Credits: 3 (45 Hours)
(3 Hours of Theory per Week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Learn in depth Sequences
- CO2. Specify the details of Series
- CO3. Understand in details with examples Rolle's Theorem
- CO4. Deliberate in details with examples Taylor's Theorem
- CO5. Identify the details of Partial derivatives

Unit 1: Sequences and Series:

15 Hours

Sequences-Bounded and monotonic sequences-convergent, divergent and oscillatory sequences- standard results and simple problems

Infinite series-nth partial sum- geometric series-convergence of $\sum \frac{1}{n^p}$ - comparison test and ratio test-simple problems-alternating series

Unit 2: Calculus

15 Hours

Mean value theorems-Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorems (Statements and Geometrical interpretations)-Taylor's theorem – Maclaurin's expansion (Statement) and problems.

Unit 3: Partial derivatives

15 Hours

Limit and continuity of functions of two and three variables, Partial differentiation, Change of variables, Partial derivation and differentiability of real-valued functions of two and three variables, Euler's theorem on homogeneous functions. Taylor's theorem for functions of two and three variables - Jacobians

Reference:

1. A First Course in Real Analysis – Asharani Singhal.
2. Real Analysis – S.C. Malik.
3. Principles of Mathematical Analysis – Shanthinarayan
4. Calculus ,Volume -1 and Volume -2

SDC 520

DIFFERENTIAL EQUATIONS

Credits: 3 (45 Hours)

(3 Hours of Theory per Week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Specify in details with examples linear differential equations
- CO2. Write down in details with examples nonlinear differential equations
- CO3. Understand in details with examples Homogeneous linear differential equations
- CO4. Learn the details of Non homogeneous linear differential equations
- CO5. Specify the details of Partial differential equations

Unit 1: Linear and nonlinear differential equations

15 Hours

Elimination of arbitrary constant-solutions of linear differential equations - separation of variables –Homogeneous equations-exact equations- equations of the form $\frac{dy}{dx} + Py = Q$ - Integrating factor, Equations solvable for x, y, p. Clairaut's form and singular solutions

Unit 2: Homogeneous and non homogeneous linear differential equations

15 Hours

Homogeneous Linear differential equations with constant coefficients.-non homogeneous linear differential equations –inverse differential operators-Cauchy's homogeneous linear differential equations- Second order linear differential equations-variation of parameters and exact equations.

Unit 3: Partial differential equations

15 Hours

Total differential equations-simultaneous equations- partial differential equations-Lagranges form of linear partial differential equations-charpit's method.

Reference:

1. A short course in differential equations – Rainville and Bedient
2. Advanced Engineering Mathematics – Kreyszig
3. Higher Engineering Mathematics – Grewal
4. Laplace Transform –Murry R Spiegel
5. Applications of Differential equations –Martin Brown

SDC 530

SOFTWARE ARCHITECTURE AND SDLC & PROCESSES

Credits: 3 (45 Hours)

(2 Hours of Theory and 1 Hour of Practical per week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Specify in depth Software Process
- CO2. Deliberate in details with examples SDLC
- CO3. Learn in depth Data Modeling
- CO4. Understand the details of UML and ER Models
- CO5. Specify the details of Loose Coupling

Unit 1:

15 Hours

SDLC & Processes: Software Process, Software Development Life Cycle, Object-Oriented Concepts: connections between design and implementation, Software Testing, Object-Oriented Architecture and Design, Requirements analysis, Safety Critical Software.

Unit 2:

15 Hours

Software Architecture: Introduction to enterprise software architecture, the role of middleware, Cloud computing = SaaS + Utility Computing, Data Modeling, UML and E-R models. XML, Schemas, XML Schemas, Data Processing. Strategies for data processing, introduction to XQuery. JSON and JAXB, Domain-Driven Architecture. Domain-driven, design (DDD), Object-relational mapping (ORM), Service-oriented Architecture (SOA), Standardized service contract, Loose coupling, Service abstraction, Service-oriented Architecture (SOA),

Reference:

1. Designing Software Architectures: A Practical Approach (SEI Series in Software Engineering) 1st Edition, Kindle Edition by Humberto Cervantes
2. Just Enough Requirements and Sdlc: Requirements Documentation, Waterfall, and Agile Paperback – Import, 10 Mar 2017 by Ed Crook shanks

Practicals

(1 Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

SDC 550

INDIAN CONSTITUTION

Credits: 3 (45 Hours)

(3 Hours of Theory per week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Learn the details of Features of Indian Constitution
- CO2. Understand the details of Fundamentals Rights
- CO3. Identify the details of Role of Prime Minister
- CO4. Learn the details of Power and Functions of Lok Sabha
- CO5. Specify the details of Power and Functions of Chief Minister

Unit 1 08 Hours

- a) Preamble of the Indian Constitution
- b) Salient features of Indian Constitution

Unit 2 10 Hours

- a) Fundamental Rights
- b) Fundamental Duties
- c) Directive principles of State Policy

Unit 3 14 Hours

- a) President – Election Method, Powers and Functions
- b) The Role of the Prime Minister
- c) The Parliament – Structure, Power and Functions(Lok Sabha and Rajya Sabha)
- d) Supreme Court – Organization and Jurisdiction

Unit 4 13 Hours

- a) The Role of Governor in the Administration of State
- b) Powers and Functions of the Chief Minister
- c) Composition , Powers and Functions of both the Houses of State Legislature
- d) High Court – Organization and Jurisdiction

Reference:

1. M.V. Pylee, “An Introduction to Constitution of India”, Vikas Publishing, 2002.
2. Brij Kishore Sharma, “Introduction to the Constitution of India”, PHI Learning Pvt. Ltd., New Delhi, 2011.
3. Latest Publications of Indian Institute of Human Rights, New Delhi.

SDD 510

**SEMESTER IV
NUMERICAL ANALYSIS AND STATISTICS**

Credits: 3 (45 Hours)
(3 Hours of Theory per Week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Understand the details of Bisection Method
- CO2. Identify in details with examples Range Kutta IV Order Method
- CO3. Learn the details of Finite differences
- CO4. Understand in depth Numerical Integration
- CO5. Identify in details with examples Linear programming

Unit 1: Numerical techniques

15 Hours

Numerical solutions of algebraic equations-Bisection method -Newton Raphson method, Regula Falsi method -iteration method-Euler method, Range kutta IV order methods

Unit 2: Finite differences and Numerical integration

15 Hours

Finite differences-Interpolation-Newton Gregory forward interpolation formula-Lagranges interpolation formula-Numerical integration: Trapezoidal rule, Simpson's $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ rule Weddle's rule.

Unit 3: Linear programming

15 Hours

Linear programming –Requirements for a linear programming problem, Examples on the Applications of linear programming, Formulation of a linear programming, Standardization, Solving LPP by Graphical Method, Simplex Method (up to two variables)

Reference:

1. Numerical methods: S.S. Sastry.
2. Probability and statistics for engineers and Scientists – Ronald E .Walpole and Raymond H Mayers.
3. Mathematical Statistics - John Freund (Prentice Hall India PVT .Ltd)

OPERATION RESEARCH

Credits: 3 (45 Hours)

(3 Hours of Theory per Week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Understand the details of Different phases of operation research
- CO2. Deliberate in depth Simplex method
- CO3. Identify in depth Duality theorems
- CO4. Understand the details of Sequencing problems
- CO5. Learn in depth Transportation model problems
- CO6. Understand the details of Assignment problems

Unit 1:

15 Hours

Definition of the term Operation Research -Different phases of operation research
Advantages and limitations of O.R. Linear programming –Requirements for a linear programming problem , Examples on the Applications of linear programming ,Formulation of a linear programming , Standardization , Solving LPP by Graphical Method ,Simplex Method (up to two variables)

Unit 2:

15 Hours

Big M method revised simplex method, Dual simplex method, Duality theorems.
Sequencing problems: Processing ‘n’ jobs through two machines –Travelling salesman problems as an application of sequencing

Unit 3:

15 Hours

Transportation Model problems – Formulating, Solution –North West Corner Rule, Least Cost method, Row Minima method, Column minima method and Vogel’s approximation.
Assignment problem: formulating, method of finding initial basic feasible solution to Assignment problem using Hungarian method.

Reference:

1. ‘Operation Research’ by Kanthiswarup, Guptha, Manmohan – Sultan chand and sons Educational publishers, New Delhi,1996
2. ‘Operation Research’ by H. A.Taha Prentice Hall of India Ltd 1998
3. ‘Operation Research’ by S .D Sharma Kedarnath Ramnath and co (publishers)1997

SDD 530

SOFTWARE MODELING AND SOFTWARE QUALITY ASSURANCE

Credits: 3 (45 Hours)

(2 Hours of Theory and 1 Hour of Practical per week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Deliberate in details with examples Classes and Relationships
- CO2. Specify the details of State diagrams
- CO3. Identify in details with examples Events
- CO4. Deliberate in details with examples Software quality assurance
- CO5. Understand the details of Software quality assurance

Unit 1:

15 Hours

Software Modeling: What is Modeling?, Classes, Relationships, Common Mechanisms, Diagrams, Class Diagrams, Advanced Relationships, Instances, Object Diagrams, Use Cases, Interaction/Activity Diagrams, Events, State Machines, Time, Space, State Diagrams and Events

Unit 2:

15 Hours

Software Quality Assurance: Software Quality, Quality Assurance, Testing Concepts and Issues, Testing Activities, Testing Techniques. Other Techniques, Defect Prevention/Process Improvement, Inspection, Refactoring, CRC, Software Reliability Engineering, Quality Models and Measurements

Reference:

1. Modeling for Software Quality Assurance (English, Paperback, Srivyshnavi Pagadala)
2. Modeling for Software Quality Assurance Paperback – Import, 16 Nov 2013 by Srivyshnavi Pagadala

Practicals

(1 Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

SDD560

ENVIRONMENTAL STUDIES

Credits: 3 (45 Hours)

(3 Hours of Theory per week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Deliberate the details of Components of environment
- CO2. Specify the details of Ecology and Ecosystems
- CO3. Identify in details with examples Natural resources
- CO4. Learn the details of Biodiversity
- CO5. Specify in details with examples Environmental pollution
- CO6. Identify the details of Environmental issues and policies

Unit 1: Environment and natural systems

4 Hours

- Introduction to Environment and Environmental Studies
- Definition and Components of Environment, Relationship between the different components of Environment
- Man and Environment relationship
- Impact of technology on Environment, Environmental Degradation
- Multidisciplinary nature of the Environment studies
- Its scope and importance in the present day Education System

Unit 2: Ecology and Ecosystems

5 Hours

- Introduction: Ecology- Objectives and Classification
- Concept of an ecosystem- structure and functions of ecosystem
- Components of ecosystem- Producers, Consumers, Decomposers
- Bio-Geo- Chemical Cycles- Hydrologic Cycle, Carbon cycle, Energy Flow in Ecosystem, Food Chains, Food webs, Ecological Pyramids
- Major Ecosystems: Forest Ecosystem, Grassland Ecosystem, Desert Ecosystem, Aquatic Ecosystem, Estuarine Ecosystem.

Unit 3: Natural Resources

6 Hours

Renewable and Non-renewable resources, exploitation and conservation,

- Water resources: Surface and Ground water sources, Indian and Global scenario.
- Land as a resource, land use change and land degradation
- Forest resources: Definition and Classification of Forests
Ecological and Economic importance and benefits of forest, Indian scenario
Deforestation: causes and effects, case studies remedial measures
- Food resources: Sources of food, Global and Indian food demand scenario
Limits of food production, Environmental effects of Agriculture
- Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies
- Mineral resources: Definition and Classification of minerals, mining issues
Case studies
- Role of individual in conservation of natural resources.

Unit 4: Biodiversity and its Conservation

7 Hours

- Biodiversity: Definition, Levels of biological diversity: genetic, species and ecosystem diversity
- Bio geographic zones of India
- Hot spots of biodiversity
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational values
- Biodiversity patterns
- India as a mega-biodiversity nation
- Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions.
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit 5: Environmental pollution

6 Hours

- Types of Environmental Pollution:
- Water Pollution: Introduction – Water Quality Standards, Sources of Water Pollution: Industrial Agricultural, Municipal; Classification of water pollutants, Effects of water pollutants, Eutrophication.
- Marine pollution: Causes, effects and control.
- Air Pollution: Composition of air, Structure of atmosphere, Ambient Air Quality Standards, Classification of air pollutants, Sources of common air pollutants like PM, SO₂, NO_X, Natural & Anthropogenic Sources, Effects of common air pollutants
- Soil Pollution: causes, effects and control.
- Noise Pollution: Introduction, Sound and Noise, Noise measurements, Causes and Effects
- Thermal Pollution: Causes, effects and control.
- Nuclear hazards and human health risks.
- Solid waste management: Control measures of urban and industrial waste.
- Role of individual in the prevention of pollution, Pollution case studies.

Unit 6: Sustainable development and Environmental issues and Policies 7 Hours

- Sustainable development: Meaning, changes in resource utilization.
- Water conservation: watershed management and Rain water harvesting.
- Environmental issues: Climate change, global warming, acid rain, ozone layer depletion.
- Disaster management: floods, drought, earthquake, cyclones and landslides.
- Wasteland reclamation.
- Environment Protection Act: Air, Water, Wildlife (Prevention and Control of Pollution)
- Forest Conservation Act.
- Issues involved in enforcement of environmental legislation.
- Environment: rights and duties.

Unit 7: Human Population and the Environment**5 Hours**

- Population growth, Explosion, demographic variation among nations.
- Family welfare Program.
- Environment, human health and welfare; infectious and lifestyle diseases in contemporary world.
- Value Education: Environmental ethics.
- HIV/AIDS
- Women and Child welfare.
- Role of information technology in Environment and human health

Unit 8: Field visit**5 Hours**

- Field work Visit to an area to document environmental assets river/ forest/ grassland/ hill/ mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Visit to the solid waste treatment plant and water treatment plant.
- Video: The one degree (Equal to 5 lectures)

Reference:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha Second edition, 2013 Publisher: Universities Press (India) Private Ltd, Hyderabad.
2. Basics of Environmental Studies by Prof Dr N S Varandani, 2013 Publisher: LAP – Lambert Academic Publishing, Germany.
3. Environmental Studies by Anindita Basak, 2009 Publisher: Drling Kindersley (India) Pvt. Ltd Pearson
4. Textbook of Environmental Studies by Deeksha Dave & S S Kateva, Cengage Publishers.
5. Environmental Sciences by Daniel B Botkin & Edward A Keller Publisher: John Wiley & Sons.
6. Environmental Studies by R. Rajagopalan, Oxford University Press
7. Environmental Studies by Benny Joseph, TMH publishers
8. Environmental Studies by Dr. Suresh K Dhameja, 2007 Published by: S K Kataria & Sons New Delhi
9. Basics of Environmental Studies by U K Khare, 2011 Published by Tata McGraw Hill.
10. Environmental Studies by N. Arumugam & V.Kumaresan, Sara's publication.

SDE 510

SEMESTER V
PROJECT MANAGEMENT

Credits: 4 (60 Hours)

(2 Hour of Theory and 2 Hours of Practical per Week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Understand in depth Project plan
- CO2. Identify the details of User controlled scheduling
- CO3. Deliberate the details of Adding tasks
- CO4. Understand in details with examples Adding work resources
- CO5. Learn the details of Calendar

Unit 1:

15 Hours

- Creating a Project Plan
- User-Controlled Scheduling
- Adding Tasks
- Resolving Common Scheduling Issues

Unit 2:

15 Hours

- Adding Work Resources
- Adding Material and Cost Resources
- Defining a Calendar
- Viewing and Tracking Project Information Gantt Charts

Reference:

1. Project Management for Dummies, 5ed Paperback – 2017 by Stanley E. Portny
2. Project Management 3rd Edition (English, Paperback, Maylor)

Practicals

(2 Hours per week X 15 Weeks = 30 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

SDE 520

CONFIGURATION MANAGEMENT

Credits: 4 (60 Hours)

(3 Hour of Theory and 1 Hour of Practical per Week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Specify in depth Configuration management
- CO2. Understand the details of Configuration management planning
- CO3. Deliberate the details of Configuration control
- CO4. Learn in details with examples Configuration status accounting
- CO5. Identify the details of Configuration audits

Unit 1:

15 Hours

DEFINING CONFIGURATION MANAGEMENT: CM principles and standards, the recent growth of CM

CM PLANNING: Program phasing and milestones, Creating the CM organization, Defining CM system requirements, CM job classifications

CONFIGURATION IDENTIFICATION: First tasks of CM, Configurations & Baselines, Requirements traceability, Item identification and numbering

Unit 2:

15 Hours

ENGINEERING RELEASE: Control of technical data, the document control process, Development vs. formal release

CONFIGURATION CONTROL: Defining a closed-loop process, Change classifications, Review boards and CCBs, Processing changes and RDWs

INTRODUCTION TO SOFTWARE CONFIGURATION MANAGEMENT: Specific software CM tasks, SEI evaluation criteria

Unit 3:

15 Hours

CONFIGURATION STATUS ACCOUNTING: Defining CSA tasks and tailoring, Status accounting elements, Understanding the impact

CM PLANS: CMP preparation techniques, Software CMPs, Assessments and Plans

General procedures and work flow

CONFIGURATION AUDITS: Internal and informal audits, developing the audit plan, The Functional and Physical Audits

Reference:

1. Jessica Keyes, Software Configuration Management, Auerbach Publications, 2004
2. Anne Hass , Configuration Management Principles and Practice, Addison Wesley, 2002

Practicals

(1 Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

SDE 530

HUMAN COMPUTER INTERACTION

Credits: 4 (60 Hours)

(3 Hours of Theory and 1 Hour of Practical per Week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Learn the details of Introduction of human computer interface
- CO2. Understand the details of Human consideration in screen design
- CO3. Identify in details with examples Windows
- CO4. Deliberate in depth Multimedia and coloring
- CO5. Specify in details with examples Hypermedia

Unit 1:

20 Hours

Introduction-Importance-Human-Computer interface-characteristics of graphics interface-Direct manipulation graphical system - web user interface-popularity-characteristic & principles. User interface design process- obstacles-usability-human characteristics in design - Human interaction speed-business functions-requirement analysis-Direct-Indirect methods-basic business functions-Design standards-system timings - Human consideration in screen design - structures of menus - functions of menus-contents of menu-formatting -phrasing the menu - selecting menu choice-navigating menus-graphical menus.

Unit 2:

13 Hours

Windows-Characteristics-components-presentation-styles-types-managements-organizations-operations-web systems-device-based controls: characteristics-Screen -based controls: operate control - text boxes-selection control-combination control-custom control-presentation control.

Unit 3:

12 Hours

Text for web pages - effective feedback-guidance & assistance-Internationalization-accessibility-Icons-Image-Multimedia –coloring, Windows layout-test: prototypes - kinds of tests - retest - Information search - visualization - Hypermedia - www - Software tools.

Reference:

1. Human-Computer Interaction, 3e Paperback – 2004 by Dix
2. Human Computer Interaction Paperback – 2014 by Meena K
3. Human-Computer Interaction Third Edition Paperback – Import, 24 Aug 2018 by Gerardus Blokdyk

Practicals

(1 Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

SDF 510

SEMESTER VI

OPERATING SYSTEM

Credits: 4 (60 Hours)

(3 Hours of Theory and 1 Hour of Practical per Week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Identify the Characteristics of operating system
- CO2. Deliberate in depth Scheduling algorithms
- CO3. Learn in depth Semaphores
- CO4. Specify the details of Message passing
- CO5. Understand the details of Deadlock
- CO6. Identify in details with examples File organisation

Unit 1:

15 Hours

Overview of operating systems, functionalities and characteristics of OS

Hardware concepts related to OS, CPU states, I/O channels, memory hierarchy and microprogramming

The concept of a process, operations on processes, process states, concurrent processes, process control block, process context

UNIX process control and management, PCB, signals, forks and pipes

Interrupt processing, operating system organisation, OS kernel FLIH and dispatcher.

Job and processor scheduling, scheduling algorithms, process hierarchies.

Problems of concurrent processes, critical sections, mutual exclusion, synchronisation, deadlock.

Unit 2:

15 Hours

Mutual exclusion, process co-operation, producer and consumer processes.

Semaphores: definition, init, wait, signal operations.

Use of semaphores to implement mutex, process synchronisation etc., implementation of semaphores, Critical regions, Conditional Critical Regions, Monitors, Ada Tasks

Interprocess Communication (IPC), Message Passing, Direct and Indirect

Unit 3:

15 Hours

Deadlock: prevention, detection, avoidance, banker's algorithm.

Memory organisation and management, storage allocation

Virtual memory concepts, paging and segmentation, address mapping.

Virtual storage management, page replacement strategies

File organisation: blocking and buffering, file descriptor, directory structure, File and Directory structures, blocks and fragments, directory tree, inodes, file descriptors, UNIX file structure.

Reference:

1. D.M Dhamdhere: Operating systems - A concept based Approach, 3rd Edition, Tata McGraw- Hill, 2012.
2. P.C.P. Bhatt: Introduction to Operating Systems Concepts and Practice, 3rd Edition, PHI, 2010.
3. Harvey M Deital: Operating systems, 3rd Edition, Pearson Education, 2011.

Practicals

(1 Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

SDF 550

DATABASE DESIGN

Credits: 4 (60 Hours)

(3 Hours of Theory and 1 Hour of Practical per Week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Understand the details of Database terminology and information types
- CO2. Specify in depth Database planning and designing
- CO3. Learn the details of Cloud computing
- CO4. Specify the details of Sets and normalization
- CO5. Specify in depth Report writing
- CO6. Understand in details with examples Customer service management

Unit 1

15 Hours

Database Basics
Introduction to Devise Digital Storage
Database Terminology & Database Information Types
Microsoft Excel versus Microsoft Access
Database Planning
Database Objects – Creating Fields and Tables
Planning and Designing a Database

Unit 2

15 Hours

Introduction to Cloud Computing
Database Relationships
Designing for the Business Case
Introduction to Data Security & Data Archives
Managing the Database
Database Relationship Development
Introduction to Visual Data Analytics
Introduction to Sets & Normalization
Database Extractions

Unit 3

15 Hours

Database Queries and Basic SQL
Emergence of Social Media Databases
Database Distribution
Report Writing
Introduction to Customer Service Management
Computing Databases
Database Inputs
Form Development

Reference:

1. Korth, Silberchatz, Sudarshan: "Database System Concepts", 6th Edition, McGraw – Hill
2. Elmasri and Navathe: "Fundamentals of Database Systems", 5th Edition, PEARSON Education.
3. Peter Rob and Carlos Coronel: "Database Systems Design, Implementation and Management", Thomson Learning, 5th Edition.

Practicals

(1 Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

SDF 520

COMPUTER NETWORKS & SECURITY FUNDAMENTALS

Credits: 4 (60 Hours)

(3 Hours of Theory and 1 Hour of Practical per Week)

Course Outcome:

After completion of the course, the students are able to:

- CO1. Deliberate the details of OSI model
- CO2. Learn the details of Switches
- CO3. Understand the details of Protocols and services
- CO4. Identify in depth Security
- CO5. Learn in depth Encryption
- CO6. Specify the details of E-mail and server protection

Unit 1

15 Hours

COMPUTER NETWORKS

Network Infrastructure - Internet, intranet, and extranet.

Understand the OSI model.

TCP/IP

Local area networks (LANs), Wide area networks (WANs).

Network topologies and access methods

Network Hardware - switches.

Unit 2

15 Hours

Routers, media types

Protocols and Services

Understand IPv4 & IPv6.

Addressing names resolution & networking services.

SECURITY

Understanding Security Layers Principles, Physical, Wireless, Internet & Operating System Security

Unit 3

15 Hours

User authentication, permissions, password, audit policies, encryption, malware,

Network Security & dedicated firewalls.

Network Access Protection (NAP), network isolation, Protocol security, client, e-mail & server protection

Reference:

1. Fundamentals of Computer Networks Kindle Edition by SUDAKSHINA KUNDU
2. Introduction to Computer and Network Security Hardcover – 21 Aug 2013
by Richard R. Brooks

Practicals

(1 Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

QUESTION PAPER SCHEME

**JSS MAHAVIDYAPEETHA
JSS College of Arts, Commerce & Science
(Autonomous)**

Ooty Road, Mysore - 570 025

Title of the paper with code

Time: 3 Hours

Max Marks: 70

Part – A

I Answer any five Questions (out of six) 2x5=10

a)

b)

c)

d)

e)

f)

Part – B

Answer any two questions from each main

II a) 2x5=10

b)

c)

III a) 2x5=10

b)

c)

IV a) 2x5=10

b)

c)

Part – C

Answer any one question from each main

V a) 1x10=10

Or

b)

VI a) 1x10=10

Or

b)

VII a) 1x10=10

Or

b)

Question numbers V, VI and VII internal split-up (5+5, 7+3, 2+8 etc.)

QUESTION PAPER SCHEME

TIME: 3 Hrs

MAX MARKS: 70

Instructions to Students: All sections are compulsory.

SECTION A

- I Fill in the blanks with correct form of verbs 5 X 1 = 05
- a)
 - b)
 - c)
 - d)
 - e)
- II Change the voice of the following sentences 5 X 1 = 05
- a)
 - b)
 - c)
 - d)
 - e)
- III Fill in the blanks with suitable article 5 X 1 = 05
- a)
 - b)
 - c)
 - d)
 - e)
- IV Change the speech of the following 5 X 1 = 05
- a)
 - b)
 - c)
 - d)
 - e)
- V Add question tag to the following 5 X 1 = 05
- a)
 - b)
 - c)
 - d)
 - e)
- VI Frame questions so as to get the underlined words as answers 5 X 1 = 05
- a)
 - b)
 - c)
 - d)
 - e)

SECTION B

- VII 10 X 1 = 10
1. Write a letter of application
- Or
2. Prepare a Resume.
- VIII 10 X 1 = 10
- Read the following essay carefully and answer the questions.
- a)
 - b)
 - c)
 - d)
 - e)
- IX 10 X 1 = 10
- Write an essay on one of the following:
- a)
 - b)
 - c)
- X 5 X 2 = 10
- Answer the following (Dialogue writing)
- 1)
 - 2)

QUESTION PAPER PATTERN

Section A

Q1: Six questions of two marks each .Five questions to be answered $5 \times 2 = 10$

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Section B

Answer any four questions from each main. Each main carries 20 marks $3 \times 20 = 60$

Q2: Five sub questions of 5 marks each from unit 1

Q3: Five sub questions of 5 marks each from unit 2

Q4: Five sub questions of 5 marks each from unit 3

Skill Component Syllabus

Model Curriculum

JUNIOR SOFTWARE DEVELOPER

JUNIOR SOFTWARE DEVELOPER

SECTOR: **IT-ITeS**
SUB-SECTOR: **IT Services**
OCCUPATION: **Application Development**
REFERENCE ID: **SSC/Q0508, version 1.0**
NSQF LEVEL: **4**

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Junior Software Developer

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of **Junior Software Developer** in the **IT-ITeS Sector/Industry** and aims at building the following key competencies in the learner.

Program Name	Junior Software Developer		
Qualification Pack Name & Reference ID.	Junior Software Developer SSC/Q0508, version 1.0		
Version No.	1.0	Version Update Date	31/12/2015
Pre-requisites to Training	10 th Standard		
Training Outcomes	After completing this programme, participants will be able to: <ul style="list-style-type: none"> assist in performing software construction and software testing entry-level tasks in the IT Services industry manage work to meet requirements maintain a healthy, safe and secure working environment 		

The Course encompasses all six National Occupational Standards (NOS) of **Junior Software Developer SSC/Q0508** Qualification Pack issued by **IT-ITeS Sector Skills Council NASSCOM**.

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
1	Basics of IT	05:00	15:00	Candidates will be able to: <ul style="list-style-type: none"> Demonstrate basic computer and internet literacy including operating a computer, describing its major components and how they work, using Windows and Linux OS, operating a browser, searching the internet, managing mails and using social internet media. 	SSC/N0506	Refer to Unique Equipment Required section
2	Problem Solving and Program Design	30:00	60:00	Candidates will be able to: <ul style="list-style-type: none"> Demonstrate aptitude for analysing information and making logical conclusions. 	SSC/N0506	Refer to Unique Equipment Required section

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				<ul style="list-style-type: none"> Demonstrate knowledge of the foundational mathematical concepts in computing. 		
3	Basic Algorithms and Application Development	30:00	60:00	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> Design algorithms to solve problems and convert them into code using the appropriate programming language constructs. Read and execute a test case and record the outcome in the appropriate template. Communicate effectively with appropriate people w.r.t. assigned roles in simple English – both oral and written. 	SSC/N0506	Refer to Unique Equipment Required section
4	Self and work Management	30:00	70:00	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> Establish and agree work requirements with appropriate people Keep immediate work area clean and tidy Utilize time effectively Use resources correctly and efficiently Treat confidential information correctly Work in line with organization’s policies and procedures Work within the limits of job role Obtain guidance from appropriate people, where necessary Ensure work meets the agreed requirements 	SSC/N9001	Refer to Unique Equipment Required section
5	Team Work and Communication	12:00	38:00	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> Obtain guidance from appropriate people to agree the analysis to be performed on the data Obtain advice and guidance from appropriate people on issues with data analysis 	SSC/N9002	Refer to Unique Equipment Required Section

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				<p>outside their area of competence or</p> <ul style="list-style-type: none"> • Review the results of their analysis with appropriate people • Undertake modifications to your analysis based on inputs from appropriate people • Communicate with colleagues clearly, concisely and accurately • Work with colleagues to integrate their work effectively with them • Pass on essential information to colleagues in line with organizational requirements • Work in ways that show respect for colleagues • Carry out commitments they have made to colleagues • Let colleagues know in good time if they cannot carry out your commitments, explaining the reasons • Identify any problems they have working with colleagues and take the initiative to solve these problems • Follow the organization's policies and procedures for working with colleagues 		
6	Managing Health and Safety	12:00	38:00	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> • Comply with organization's current health, safety and security policies and procedures • Report any identified breaches in health, safety, and security policies and procedures to the designated person • Identify and correct any hazards that can deal with 	SSC/N9003	Refer to Unique Equipment Required section

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				<p>safely, competently and within the limits of authority</p> <ul style="list-style-type: none"> • Report any hazards that one is not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected • Follow their organization’s emergency procedures promptly, calmly, and efficiently • Identify and recommend opportunities for improving health, safety, and security to the designated person • Complete any health and safety records legibly and accurately 		
7	Data and Information Management	15:00	35:00	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> • Establish and agree with appropriate people the data/information they need to provide, the formats in which you need to provide it, and when they need to provide it • Obtain the data/information from reliable sources • Check that the data/information is accurate, complete and up-to-date • Obtain advice or guidance from appropriate people where there are problems with the data/information • Carry out rule-based analysis of the data/information, if required • Insert the data/information into the agreed formats • Check the accuracy of work, involving colleagues where required • Report any unresolved anomalies in the 	SSC/N9004	Refer to Unique Equipment Required Section

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				<p>data/information to appropriate people</p> <ul style="list-style-type: none"> • Provide complete, accurate and up-to-date data/information to the appropriate people in the required formats on time 		
8	Learning and Self Development	05:00	20:00	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> • Obtain advice and guidance from appropriate people to develop your knowledge, skills and competence • Identify accurately the knowledge and skills they need for your job role • Identify accurately their current level of knowledge, skills and competence and any learning and development needs • Agree with appropriate people a plan of learning and development activities to address their learning needs • Undertake learning and development activities in line with their plan • Apply new knowledge and skills in the workplace, under supervision • Obtain feedback from appropriate people on their knowledge and skills and how effectively you apply them • Review their knowledge, skills and competence regularly and take appropriate action 	SSC/N9005	Refer to Unique Equipment Required Section
	Total Duration:	<u>114:00</u>	<u>286:00</u>	<p>Unique Equipment Required: Training room should be fully furnished with the following equipment / tools / accessories. Additional / specific resources, wherever applicable (e.g. Hardware, software) are indicated in the main text corresponding to relevant learning outcome.</p>		

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				<p>For Domain NOS, For NOS SSC/N0506 – HTML, C++ / Java, IDE</p> <p>General:</p> <ul style="list-style-type: none"> • Comfortable seats with adequate lighting, controlled temperature and acoustics for training and learning • White Board, Markers and Eraser • Projector with screen • Flip chart with markers • Faculty’s PC/Laptop with latest configuration and internet connection • Supporting software / applications for projecting audio, video, recording, • Presentation Tools to support learning activities: • Intranet • Email • IMs • Learning management system e.g. Moodle, Blackboard to enable blended learning • Microphone / voice system for lecture and class activities • Handy Camera • Stationery kit – Staples, Glue, Chart Paper, Sketch Pens, Paint Box, Scale, A4 Sheets • For IT Lab sessions: Computer Lab with 1:1 PC : trainee ratio and having internet connection, MS Office / Open office, Browser, Outlook / Any other Email Client and chat tools. • Assessment and Test Tools for day to day online Tests and Assessments • For team discussions: Adequate seating arrangement in full / half circle format for one or more teams as per planned team composition. • Reading Resources: Access to relevant sample documents and learning forums to enable self-study before and after each training session. 		

Grand Total Course Duration: **400 Hours 0 Minutes**

(This Syllabus/Curriculum has been approved by IT-ITeS Sector Skills Council NASSCOM.)

Notes from IT-ITeS Sector Skills Council NASSCOM

1. This document outlines the broad scope of coverage. This should be linked with OBF and training delivery plan. OBF (Outcome based framework) reflects the pedagogy used to ensure an expected outcome. Training delivery plan focuses on the sequence of delivery.
2. Though many NOSs have some seemingly common outcomes, notably core/generic, professional and technical skills, it is imperative to understand the contextual difference between them. For example, writing skills required to document program structure and code (in SSC/N0506) are different from the writing skills required to prepare a time plan (in SSC/N9001). Training providers are advised to,
 - a. Embed such skills development in the learning pedagogy for each expected outcome
 - b. Prepare a detailed session plan for training delivery with focus on sequence and duration of training
 - c. Run a diagnostic test to assess prior learning of students and help trainers / students identify the need for gap training, optimal duration and suitable training methodology. Accordingly, more introductory level sessions may be included in guided or self-paced mode of learning. E.g. adding some sessions on Functional English or Use of Internet and MS Office.

Annexure1: Assessment Criteria

Assessment Criteria for Junior Software Developer	
Job Role	Junior Software Developer
Qualification Pack	SSC/Q0508
Sector Skill Council	IT-ITeS

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack (QP) will be created by the Sector Skill Council (SSC). Each performance criteria (PC) will be assigned Theory and Skill/Practical marks proportional to its importance in NOS.
2	The assessment will be conducted online through assessment providers authorised by SSC.
3	Format of questions will include a variety of styles suitable to the PC being tested such as multiple choice questions, fill in the blanks, situational judgment test, simulation and programming test.
4	To pass a QP, a trainee should pass each individual NOS. Standard passing criteria for each NOS is 70%.
5	For latest details on the assessment criteria, please visit www.sscnasscom.com .

ASSESSMENT OUTCOME (NOS CODE AND DESCRIPTION)	Assessment criteria (PC)	Total Marks	Out Of	MARKS ALLOCATION	
				Theory	Skills Practical
1.SSC/N0506 (Deal remotely with customer queries - Domestic)	PC1. greet customers and verify details, following your organization’s procedures	120	12.5	2.5	10
	PC2. read carefully, summarize, and obtain customer confirmation of, your understanding of queries		12.5	2.5	10
	PC3. express your concern for any difficulties caused and your commitment to resolving queries		15	0	15
	PC4. record and categorize queries accurately using your organization’s query management tool		5	0	5
	PC5. refer queries outside your area of competence or authority promptly to appropriate people		2.5	0	2.5
	PC6. access your organization’s knowledge base for solutions to queries, where available		2.5	0	2.5
	PC7. resolve queries within your area of competence or authority in line with organizational guidelines and service level agreements (SLAs)		15	0	15
	PC8. obtain advice and guidance from appropriate people, where necessary		2.5	0	2.5
	PC9. obtain confirmation from customers that queries have been resolved to satisfaction		10	0	10



	PC10. record the resolution of queries accurately using your organization's query management tool		35	15	20
	PC11. comply with relevant standards, policies, procedures and guidelines when dealing remotely with customer queries		7.5	0	7.5
		NOS Total	120	20	100
2.SSC/N9001 (Manage your work to meet requirements)	PC1. establish and agree your work requirements with appropriate people	40	10	5	5
	PC2. keep your immediate work area clean and tidy		5	0	5
	PC3. utilize your time effectively		5	5	0
	PC4. use resources correctly and efficiently		5	2.5	2.5
	PC5. treat confidential information correctly		5	0	5
	PC6. work in line with your organization's policies and procedures		2.5	0	2.5
	PC7. work within the limits of your job role		2.5	0	2.5
	PC8. obtain guidance from appropriate people, where necessary		2.5	0	2.5
	PC9. ensure your work meets the agreed requirements		2.5	0	2.5
			NOS Total	40	12.5
3.SSC/N9003 (Maintain a healthy, safe and secure working environment)	PC1. comply with your organization's current health, safety and security policies and procedures	40	10	5	5
	PC2. report any identified breaches in health, safety, and security policies and procedures to the designated person		5	0	5
	PC3. identify and correct any hazards that you can deal with safely, competently and within the limits of your authority		10	5	5
	PC4. report any hazards that you are not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected		5	0	5
	PC5. follow your organization's emergency procedures promptly, calmly, and efficiently		5	0	5
	PC6. identify and recommend opportunities for improving health, safety, and security to the designated person		2.5	0	2.5
	PC7. complete any health and safety records legibly and accurately		2.5	0	2.5
		NOS Total	40	10	30



Annexure2: Trainer Prerequisites for Job role: Junior Software Developer mapped to Qualification Pack: SSC/Q0508

Sr. No.	Area	Details
1	Job Description	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack SSC/Q0508.
2	Personal Attributes	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in this field.
3	Minimum Educational Qualifications	Minimum 12 th Standard; Preferred Master’s degree in any discipline
4a	Domain Certification	Minimum accepted score in SSC Assessment is 90% per NOS being taught in QP SSC/Q0508. Additional certification in customer orientation, dealing with difficult customers, written communication etc. will be an added advantage.
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: “Trainer” mapped to the Qualification Pack: “SSC/Q1402”. Minimum accepted score is 70% per NOS.
5	Experience	Field experience: Minimum 2 years’ experience in the same domain Training experience: 1 year preferred



Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

IT-ITES SECTOR SKILLS COUNCIL NASSCOM

for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/Qualification Pack: **'Junior Software Developer'** QP No. **'SSC/Q0508NSQF Level 4'**

Date of Issuance: December 31st, 2015

Valid up to*: December 31st, 2016

* Valid up to the next review date of the Qualification Pack

Authorised Signatory
Lakshmi Narayan
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Model Curriculum

WEB DEVELOPER

WEB DEVELOPER

SECTOR: **IT-ITeS**
SUB-SECTOR: **IT Services**
OCCUPATION: **Application Development**
REFERENCE ID: **SSC/Q0503, version 1.0**
NSQF LEVEL: **5**

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Web Developer

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of **Web Developer** in the **IT-ITeS Sector/Industry** and aims at building the following key competencies in the learner.

Program Name	Web Developer		
Qualification Pack Name & Reference ID.	Web Developer SSC/Q0503, version 1.0		
Version No.	1.0	Version Update Date	31/12/2015
Pre-requisites to Training	Graduate degree/ diploma in web design/ media design or any other related field		
Training Outcomes	<p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> • Contribute to the design of software products and applications • Develop media content and graphic designs for software products and Applications • Manage their work to meet requirements • Work effectively with colleagues • Maintain a healthy, safe and secure working environment • Provide data/information in standard formats • Develop their knowledge, skills and competence 		

The Course encompasses all seven National Occupational Standards (NOS) of **Web Developer SSC/Q0503** Qualification Pack issued by **IT-ITeS Sector Skills Council NASSCOM**.

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
1	Programming for the Web	20:00	30:00	Candidates will be able to: <ul style="list-style-type: none"> • Design basic programming structures to implement functionality in line with requirements defined in BRS/URS, SRS and HLD 	SSC/N0501	Refer to Unique Equipment Required Section
2	Analysis and Design of Web based Applications	20:00	30:00	Candidates will be able to: <ul style="list-style-type: none"> • Check their understanding of the Business Requirements Specification (BRS)/User 	SSC/N0501	Refer to Unique Equipment Required Section



Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				Requirements Specification (URS) with appropriate people <ul style="list-style-type: none"> • Check their understanding of the Software Requirements Specification (SRS) with appropriate people • Check their understanding of High Level Design (HLD) with appropriate people • Review their designs with appropriate people • Analyse inputs from appropriate people to identify, resolve and record design defects and inform future designs • Document their designs using standard templates and tools • Comply with their organization’s policies, procedures and guidelines when contributing to the design of software products and applications 		
3	Media Content and Graphics Design	20:00	80:00	Candidates will be able to: <ul style="list-style-type: none"> • Check their understanding of the Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD) with appropriate people • Access reusable components, media and graphical packages and tools from their organization’s knowledge base 	SSC/N0503	Refer to Unique Equipment Required Section

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				<ul style="list-style-type: none"> Convert requirements into media content and graphic designs, leveraging reusable components where available Review media content and graphic designs with appropriate people and analyze their feedback Record any defects and corrective actions taken to inform future work Rework media content and graphic designs, incorporating feedback Submit media content timely and graphic designs for approval by appropriate people Update their organization's knowledge base with their experiences of the media content and graphic designs developed Comply with their organization's policies, procedures and guidelines when developing media content and graphic designs for software products and applications 		
4	Self and work Management	12:00	38:00	Candidates will be able to: <ul style="list-style-type: none"> Establish and agree their work requirements with appropriate people Keep their immediate work area clean and tidy utilize their time effectively 	SSC/N9001	Refer to Unique Equipment Required Section



Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				<ul style="list-style-type: none"> • Use resources correctly and efficiently • Treat confidential information correctly • Work in line with organization’s policies and procedures • Work within the limits of their job role • Obtain guidance from appropriate people, where necessary • Ensure their work meets the agreed requirements 		
5	Team Work and Communication	12:00	38:00	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> • Communicate with colleagues clearly, concisely and accurately • Work with colleagues to integrate their work effectively with them • Pass on essential information to colleagues in line with organizational requirements • Work in ways that show respect for colleagues • carry out commitments they have made to colleagues • Let colleagues know in good time if they cannot carry out their commitments, explaining the reasons • Identify any problems they have working with colleagues and take the initiative to solve these problems • Follow the organization’s policies and procedures for working with colleagues 	SSC/N9002	Refer to Unique Equipment Required Section

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
6	Managing Health and Safety	05:00	20:00	Candidates will be able to: <ul style="list-style-type: none"> • Comply with their organization's current health, safety and security policies and procedures • Report any identified breaches in health, safety, and security policies and procedures to the designated person • Identify and correct any hazards that they can deal with safely, competently and within the limits of their authority • Report any hazards that they are not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected • Follow their organization's emergency procedures promptly, calmly, and efficiently • Identify and recommend opportunities for improving health, safety, and security to the designated person • Complete any health and safety 	SSC/ N 9003	
7	Data and Information Management	15:00	35:00	Candidates will be able to: <ul style="list-style-type: none"> • Establish and agree with appropriate people the data/information they need to provide, the formats in which they need to provide it, and when they need to provide it 	SSC/N9004	Refer to Unique Equipment Required Section

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				<ul style="list-style-type: none"> • Obtain the data/information from reliable sources • Check that the data/information is accurate, complete and up-to-date • Obtain advice or guidance from appropriate people where there are problems with the data/information • Carry out rule-based analysis of the data/information, if required • Insert the data/information into the agreed formats • Check the accuracy of their work, involving colleagues where required • Report any unresolved anomalies in the data/information to appropriate people • Provide complete, accurate and up-to-date data/information to the appropriate people in the required formats on time 		
8	Learning and Self Development	5:00	20:00	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> • Obtain advice and guidance from appropriate people to develop their knowledge, skills and competence • Identify accurately the knowledge and skills they need for their job role • Identify accurately their current level of knowledge, skills and 	SSC/N9005	Refer to Unique Equipment Required Section

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				competence and any learning and development needs <ul style="list-style-type: none"> • Agree with appropriate people a plan of learning and development activities to address their learning needs • Undertake learning and development activities in line with their plan • Apply their new knowledge and skills in the workplace, under supervision • Obtain feedback from appropriate people on their knowledge and skills and how effectively they apply them • Review their knowledge, skills and competence regularly and take appropriate action 		
	Total Duration:	<u>109:00</u>	<u>291:00</u>	Unique Equipment Required: Training room should be fully furnished with the following equipment / tools / accessories. Additional / specific resources, wherever applicable (e.g. Hardware, software) are indicated in the main text corresponding to relevant learning outcome. For Domain NOSs: <ul style="list-style-type: none"> • NOS SSC/N0501: HTML5, Javascript, CSS, SQL, Web Builder, Word Press, Joomla and modelling tools such as Visio, UML • NOS SSC/N0503: HTML5, CSS, Flash, Photoshop, Windows media player, Eclipse, XAMPP General: <ul style="list-style-type: none"> • Comfortable seats with adequate lighting, controlled temperature and acoustics for training and learning 		



Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				<ul style="list-style-type: none"> • White Board, Markers and Eraser • Projector with screen • Flip chart with markers • Faculty’s PC/Laptop with latest configuration and internet connection • Supporting software / applications for projecting audio, video, recording, • Presentation Tools to support learning activities: <ul style="list-style-type: none"> ○ Intranet ○ Email ○ IMs ○ Learning management system e.g. Moodle, Blackboard to enable blended learning • Microphone / voice system for lecture and class activities • Handy Camera • Stationery kit – Staples, Glue, Chart Paper, Sketch Pens, Paint Box, Scale, A4 Sheets • For IT Lab sessions: Computer Lab with 1:1 PC:trainee ratio and having internet connection, MS Office / Open office, Browser, Outlook/ other Email Clients • Assessment and Test Tools for day to day online Tests and Assessments • For team discussions: Adequate seating arrangement in full / half circle format for one or more teams as per planned team composition. • Reading Resources: Access to relevant sample documents and learning forums to enable self-study before and after each training session. 		

Grand Total Course Duration: **400 Hours 0 Minutes**

(This Syllabus/Curriculum has been approved by IT-ITeS Sector Skills Council NASSCOM.)



Notes from IT-ITes Sector Skills Council

1. This document outlines the broad scope of coverage. This should be linked with OBF and training delivery plan. OBF (Outcome based framework) reflects the pedagogy used to ensure an expected outcome. Training delivery plan focuses on the sequence of delivery.
2. Though many NOSs have some seemingly common outcomes, notably core/generic, professional and technical skills, it is imperative to understand the contextual difference between them. For example, writing skills required write design specifications (in SSC/N0501) are different from the writing skills required to prepare a time plan (in SSC/N9001). Training providers are advised to,
 - a. Embed such skills development in the learning pedagogy for each expected outcome
 - b. Prepare a detailed session plan for training delivery with focus on sequence and duration of training
 - c. Run a diagnostic test to assess prior learning of students and help trainers / students identify the need for gap training, optimal duration, and suitable training methodology. Accordingly, more introductory level sessions may be included in guided or self-paced mode of learning. E.g. adding some sessions on Functional English or Use of Internet and MS Office.



Annexure 1: Assessment Criteria

Assessment Criteria for Web Developer	
Job Role	Web Developer
Qualification Pack	SSC/Q0503
Sector Skill Council	IT-ITeS

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack (QP) will be created by the Sector Skill Council (SSC). Each performance criteria (PC) will be assigned Theory and Skill/Practical marks proportional to its importance in NOS.
2	The assessment will be conducted online through assessment providers authorised by SSC.
3	Format of questions will include a variety of styles suitable to the PC being tested such as multiple choice questions, fill in the blanks, situational judgment test, simulation and programming test.
4	To pass a QP, a trainee should pass each individual NOS. Standard passing criteria for each NOS is 70%.
5	For latest details on the assessment criteria, please visit www.sscnasscom.com .

ASSESSMENT OUTCOME (NOS CODE AND DESCRIPTION)	ASSESSMENT CRITERIA (PC)	TOTAL MARKS	OUT OF	MARKS ALLOCATION	
				THEORY	SKILLS PRACTICAL
1. SSC/N0501 (Contribute to the design of software products and applications)	PC1. check their understanding of the Business Requirements Specification (BRS)/User Requirements Specification (URS) with appropriate people	100	10	10	0
	PC2. check their understanding of the Software Requirements Specification (SRS) with appropriate people		10	10	0
	PC3. check their understanding of High Level Design (HLD) with appropriate people		10	10	0
	PC4. design basic programming structures to implement functionality in line with requirements defined in BRS/URS, SRS and HLD		30	0	30
	PC5. review their designs with appropriate people		5	5	0
	PC6. analyze inputs from appropriate people to identify, resolve and record design defects and inform future designs		15	5	10
	PC7. document their designs using standard templates and tools		10	0	10
	PC8. comply with their organization's policies, procedures and guidelines when contributing to the design of software products and applications		10	0	10
	Total		100	40	60
2. SSC/N0503 (Develop media)	PC1. check their understanding of the Business Requirements Specification (BRS), Software	100	10	10	0



content and graphic designs for software products and Applications)	Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD) with appropriate people			
	PC2. access reusable components, media and graphical packages and tools from their organization's knowledge base	10	0	10
	PC3. convert requirements into media content and graphic designs, leveraging reusable components where available	20	0	20
	PC4. review media content and graphic designs with appropriate people and analyze their feedback	10	5	5
	PC5. record any defects and corrective actions taken to inform future work	10	0	10
	PC6. rework media content and graphic designs, incorporating feedback	10	5	5
	PC7. submit media content and graphic designs for approval by appropriate people	10	0	10
	PC8. update their organization's knowledge base with their experiences of the media content and graphic designs developed	10	0	10
	PC9. comply with their organization's policies, procedures and guidelines when developing media content and graphic designs for software products and applications	10	0	10
	Total	100	20	80
3.SSC/N9001 (Manage their work to meet requirements)	PC1. establish and agree their work requirements with appropriate people	7.5	0	7.5
	PC2. keep their immediate work area clean and tidy	15	7.5	7.5
	PC3. utilize their time effectively	15	7.5	7.5
	PC4. use resources correctly and efficiently	15	7.5	7.5
	PC5. treat confidential information correctly	7.5	0	7.5
	PC6. work in line with their organization's policies and procedures	15	0	15
	PC7. work within the limits of their job role	7.5	0	7.5
	PC8. obtain guidance from appropriate people, where necessary	7.5	0	7.5
	PC9. ensure their work meets the agreed requirements	10	0	10
	Total	100	22.5	77.5
4.SSC/N9002 (Work effectively with colleagues)	PC1. communicate with colleagues clearly, concisely and accurately	20	0	20
	PC2. work with colleagues to integrate their work effectively with theirs	10	0	10



	PC3. pass on essential information to colleagues in line with organizational requirements		10	10	0
	PC4. work in ways that show respect for colleagues		20	0	20
	PC5. carry out commitments you have made to colleagues		10	0	10
	PC6. let colleagues know in good time if you cannot carry out their commitments, explaining the reasons		10	10	0
	PC7. identify any problems you have working with colleagues and take the initiative to solve these problems		10	0	10
	PC8. follow the organization's policies and procedures for working with colleagues		10	0	10
		Total	100	20	80
5.SSC/N9003 (Maintain a healthy, safe and secure working environment)	PC1. comply with their organization's current health, safety and security policies and procedures		20	10	10
	PC2. report any identified breaches in health, safety, and security policies and procedures to the designated person		10	0	10
	PC3. identify and correct any hazards that you can deal with safely, competently and within the limits of their authority		20	10	10
	PC4. report any hazards that you are not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected	100	10	0	10
	PC5. follow their organization's emergency procedures promptly, calmly, and efficiently		20	10	10
	PC6. identify and recommend opportunities for improving health, safety, and security to the designated person		10	0	10
	PC7. complete any health and safety records legibly and accurately		10	0	10
		Total	100	30	70
6.SSC/N9004 (Provide data/information in standard formats)	PC1. establish and agree with appropriate people the data/information you need to provide, the formats in which you need to provide it, and when you need to provide it		15	15	0
	PC2. obtain the data/information from reliable sources		15	0	15
	PC3. check that the data/information is accurate, complete and up-to-date	100	15	5	10
	PC4. obtain advice or guidance from appropriate people where there are problems with the data/information		5	5	0
	PC5. carry out rule-based analysis of the data/information, if required		20	0	20



	PC6. insert the data/information into the agreed formats		10	0	10
	PC7. check the accuracy of their work, involving colleagues where required		10	0	10
	PC8. report any unresolved anomalies in the data/information to appropriate people		5	5	0
	PC9. provide complete, accurate and up-to-date data/information to the appropriate people in the required formats on time		5	0	5
		Total	100	30	70
7.SSC/N9005 (Develop their knowledge, skills and competence)	PC1. obtain advice and guidance from appropriate people to develop their knowledge, skills and competence	100	20	7	13
	PC2. identify accurately the knowledge and skills you need for their job role		14	7	7
	PC3. identify accurately their current level of knowledge, skills and competence and any learning and development needs		14	0	14
	PC4. agree with appropriate people a plan of learning and development activities to address their learning needs		7	0	7
	PC5. undertake learning and development activities in line with their plan		12	0	12
	PC6. apply their new knowledge and skills in the workplace, under supervision		12	0	12
	PC7. obtain feedback from appropriate people on their knowledge and skills and how effectively you apply them		7	0	7
	PC8. review their knowledge, skills and competence regularly and take appropriate action		14	7	7
		Total	100	21	79



Annexure 2: Trainer Prerequisites for Job role: Web Developer mapped to Qualification Pack: SSC/Q0503

Sr. No.	Area	Details
1	Job Description	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack SSC/Q0503.
2	Personal Attributes	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in this field.
3	Minimum Educational Qualifications	Minimum Graduate degree/ diploma in web design/ media design or any other related field; Preferred Master's Degree in Media Design
4a	Domain Certification	Minimum accepted score in SSC Assessment is 90% per NOS being taught in QP SSC/Q0503. Certification in relevant software competencies: Software Development Certifications in C++, Embedded, C#, C, Java etc., is an added advantage.
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: "Trainer" mapped to the Qualification Pack: "SSC/1402". Minimum accepted score is 70%.
5	Experience	Field experience: Minimum 2 years' experience in the same domain Training experience: 1 year preferred



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for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: **'Web Developer'** QP No. **'SSC/Q0503 NSQF Level 5'**

Date of Issuance: December 31st, 2015

Valid up to*: December 31st, 2016

* Valid up to the next review date of the Qualification Pack

Authorised Signatory
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(Chairman, IT-ITeS Sector Skills Council NASSCOM)



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Model Curriculum

Software Developer

SECTOR: IT-ITES

SUB-SECTOR: IT SERVICES

OCCUPATION: DATA SCIENTISTS

REF. ID: SSC/Q0401, VERSION 1.0

NSQF LEVEL: 7



Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

IT-ITES SECTOR SKILLS COUNCIL NASSCOM

for the

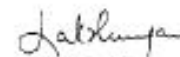
MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/Qualification Pack: **Software Developer** QP No. **SSC/Q0501 NSQF Level 7**

Date of Issuance: December 31st, 2015

Valid up to*: December 31st, 2016

* Valid up to the next review date of the Qualification Pack



Authorised Signatory
Lakshmi Narayan
(Chairman, IT-ITeS Sector Skills Council NASSCOM)

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Software Developer

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of **Software Developer** in the **IT-ITeS** Sector/Industry and aims at building the following key competencies in the learner.

Program Name	Software Developer		
Qualification Pack Name & Reference ID.	Software Developer SSC/Q0501, version 1.0		
Version No.	1.0	Version Update Date	31/12/2015
Pre-requisites to Training	BSc (Stat, Math, Physics, Chemistry, Geology) or BE/ BTech		
Training Outcomes	<p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> • Contribute to the design of software products and applications • Develop software code to specification • Manage their work to meet requirements • Work effectively with colleagues • Maintain a healthy, safe and secure working environment • Provide data/information in standard formats • Develop their knowledge, skills and competence 		

The Course encompasses all seven National Occupational Standards (NOS) of Software Developer SSC/Q0501 Qualification Pack issued by IT-ITeS Sector Skills Council NASSCOM.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	<p>Programming and Algorithms</p> <p>Theory Duration (hh:mm) 20:00</p> <p>Practical Duration (hh:mm) 30:00</p> <p>Corresponding NOS Code SSC/N0501</p>	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> Design basic programming structures to implement functionality in line with requirements defined in BRS/URS, SRS and HLD 	Refer to Unique Equipment Required Section
2	<p>Analysis and Design of Software Applications</p> <p>Theory Duration (hh:mm) 20:00</p> <p>Practical Duration (hh:mm) 30:00</p> <p>Corresponding NOS Code SSC/N0501</p>	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> Check their understanding of the Business Requirements Specification (BRS)/User Requirements Specification (URS) with appropriate people Check their understanding of the Software Requirements Specification (SRS) with appropriate people Check their understanding of High Level Design (HLD) with appropriate people Review their designs with appropriate people Analyse inputs from appropriate people to identify, resolve and record design defects and inform future designs Document designs using standard templates and tools Comply with organization's policies, procedures and guidelines when contributing to the design of software products and applications 	Refer to Unique Equipment Required Section
3	<p>Application Development</p> <p>Theory Duration (hh:mm) 20:00</p> <p>Practical Duration (hh:mm) 80:00</p> <p>Corresponding NOS Code SSC/N0502</p>	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> Check their understanding of the Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD) with appropriate people Access reusable components, code generation tools and unit testing tools from their organization's knowledge base Convert technical specifications into code to meet the requirements, leveraging reusable components, where available Create appropriate unit test cases (UTCs) Review codes and UTCs with appropriate people Execute UTCs and document results Rework the code and UTCs to fix identified defects 	Refer to Unique Equipment Required Section

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<ul style="list-style-type: none"> Analyse inputs from appropriate people to inform future designs Record corrective actions for identified defects to inform future designs Submit tested code timely for approval by appropriate people Update their organization's knowledge base with their experiences of the code developed Comply with their organization's policies, procedures and guidelines when developing software code to specification 	
4	<p>Self and work Management</p> <p>Theory Duration (hh:mm) 12:00</p> <p>Practical Duration (hh:mm) 38:00</p> <p>Corresponding NOS Code SSC/N9001</p>	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> Establish and agree their work requirements with appropriate people Keep their immediate work area clean and tidy utilize their time effectively Use resources correctly and efficiently Treat confidential information correctly Work in line with organization's policies and procedures Work within the limits of their job role Obtain guidance from appropriate people, where necessary Ensure their work meets the agreed requirements 	Refer to Unique Equipment Required Section
5	<p>Team Work and Communication</p> <p>Theory Duration (hh:mm) 12:00</p> <p>Practical Duration (hh:mm) 38:00</p> <p>Corresponding NOS Code SSC/N9002</p>	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> Communicate with colleagues clearly, concisely and accurately Work with colleagues to integrate their work effectively with them Pass on essential information to colleagues in line with organizational requirements Work in ways that show respect for colleagues carry out commitments they have made to colleagues Let colleagues know in good time if they cannot carry out their commitments, explaining the reasons Identify any problems they have working with colleagues and take the initiative to solve these problems Follow the organization's policies and procedures for working with colleagues 	Refer to Unique Equipment Required Section
6	<p>Managing Health and Safety</p> <p>Theory Duration (hh:mm) 05:00</p>	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> Comply with their organization's current health, safety and security policies and procedures Report any identified breaches in health, safety, and security policies and procedures to the designated person Identify and correct any hazards that they can deal 	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	<p>Practical Duration (hh:mm) 20:00</p> <p>Corresponding NOS Code SSC/ N 9003</p>	<p>with safely, competently and within the limits of their authority</p> <ul style="list-style-type: none"> Report any hazards that they are not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected Follow their organization's emergency procedures promptly, calmly, and efficiently Identify and recommend opportunities for improving health, safety, and security to the designated person Complete any health and safety 	
7	<p>Data and Information Management</p> <p>Theory Duration (hh:mm) 15:00</p> <p>Practical Duration (hh:mm) 35:00</p> <p>Corresponding NOS Code SSC/N9004</p>	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> Establish and agree with appropriate people the data/information they need to provide, the formats in which they need to provide it, and when they need to provide it Obtain the data/information from reliable sources Check that the data/information is accurate, complete and up-to-date Obtain advice or guidance from appropriate people where there are problems with the data/information Carry out rule-based analysis of the data/information, if required Insert the data/information into the agreed formats Check the accuracy of their work, involving colleagues where required Report any unresolved anomalies in the data/information to appropriate people Provide complete, accurate and up-to-date data/information to the appropriate people in the required formats on time 	Refer to Unique Equipment Required Section
8	<p>Learning and Self Development</p> <p>Theory Duration (hh:mm) 05:00</p> <p>Practical Duration (hh:mm) 20:00</p> <p>Corresponding NOS Code SSC/N9005</p>	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> Obtain advice and guidance from appropriate people to develop their knowledge, skills and competence Identify accurately the knowledge and skills they need for their job role Identify accurately their current level of knowledge, skills and competence and any learning and development needs Agree with appropriate people a plan of learning and development activities to address their learning needs Undertake learning and development activities in line with their plan Apply their new knowledge and skills in the workplace, under supervision Obtain feedback from appropriate people on their 	Refer to Unique Equipment Required Section

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<p>knowledge and skills and how effectively they apply them</p> <ul style="list-style-type: none"> Review their knowledge, skills and competence regularly and take appropriate action 	
	<p>Total Duration</p> <p>Theory Duration 109:00</p> <p>Practical Duration 291:00</p>	<p>Unique Equipment Required: Training room should be fully furnished with the following equipment / tools / accessories. Additional / specific resources, wherever applicable (e.g. Hardware, software) are indicated in the main text corresponding to relevant learning outcome.</p> <p>For Domain NOSs:</p> <ul style="list-style-type: none"> For NOS SSC/N0501: C/C++, UML tools such as Rational suite For NOS SSC/N0502: JDK / Eclipse <p>General:</p> <ul style="list-style-type: none"> Comfortable seats with adequate lighting, controlled temperature and acoustics for training and learning White Board, Markers and Eraser Projector with screen Flip chart with markers Faculty's PC/Laptop with latest configuration and internet connection Supporting software / applications for projecting audio, video, recording, Presentation Tools to support learning activities: <ul style="list-style-type: none"> Intranet Email IMs Learning management system e.g. Moodle, Blackboard to enable blended learning Microphone / voice system for lecture and class activities Handy Camera Stationery kit – Staples, Glue, Chart Paper, Sketch Pens, Paint Box, Scale, A4 Sheets For IT Lab sessions: Computer Lab with 1:1 PC: trainee ratio and having internet connection, MS Office / Open office, Browser, Outlook/ other Email Clients Assessment and Test Tools for day to day online Tests and Assessments For team discussions: Adequate seating arrangement in full / half circle format for one or more teams as per planned team composition. Reading Resources: Access to relevant sample documents and learning forums to enable self-study before and after each training session. 	

Grand Total Course Duration: 400 Hours 0 Minutes
(This Syllabus/Curriculum has been approved by IT-ITeS Sector Skills Council NASSCOM.)

Notes from IT-ITeS Sector Skills Council

1. This document outlines the broad scope of coverage. This should be linked with OBF and training delivery plan. OBF (Outcome based framework) reflects the pedagogy used to ensure an expected outcome. Training delivery plan focuses on the sequence of delivery.
2. Though many NOSs have some seemingly common outcomes, notably core/generic, professional and technical skills, it is imperative to understand the contextual difference between them. For example, writing skills required to communicate results of testing (in SSC/N0501) are different from the writing skills required to prepare a time plan (in SSC/N9001). Training providers are advised to,
 - a. Embed such skills development in the learning pedagogy for each expected outcome
 - b. Prepare a detailed session plan for training delivery with focus on sequence and duration of training
 - c. Run a diagnostic test to assess prior learning of students and help trainers / students identify the need for gap training, optimal duration, and suitable training methodology. Accordingly, more introductory level sessions may be included in guided or self-paced mode of learning. E.g. adding some sessions on Functional English or Use of Internet and MS Office.

Trainer Prerequisites for Job role: Software Developer mapped to Qualification Pack: SSC/Q0501

Sr. No.	Area	Details
1	Job Description	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack SSC/Q0501.
2	Personal Attributes	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in this field.
3	Minimum Educational Qualifications	Minimum Bachelor's Degree in Computer Science or any related field; Preferred Master's Degree in Computer Science
4a	Domain Certification	Minimum accepted score in SSC Assessment is 90% per NOS being taught in QP SSC/Q0501. Certification in relevant software competencies: Software Development Certifications in C++, Embedded, C#, C, Java etc., is an added advantage.
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: "Trainer" mapped to the Qualification Pack: "SSC/Q1402". Minimum accepted score is 70%.
5	Experience	Field experience: Minimum 2 years' experience in the same domain Training experience: 1 year preferred

Annexure: Assessment Criteria

Assessment Criteria for Software Developer	
Job Role	Software Developer
Qualification Pack	SSC/Q0501
Sector Skill Council	IT-ITeS

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack (QP) will be created by the Sector Skill Council (SSC). Each performance criteria (PC) will be assigned Theory and Skill/Practical marks proportional to its importance in NOS.
2	The assessment will be conducted online through assessment providers authorised by SSC.
3	Format of questions will include a variety of styles suitable to the PC being tested such as multiple choice questions, fill in the blanks, situational judgment test, simulation and programming test.
4	To pass a QP, a trainee should pass each individual NOS. Standard passing criteria for each NOS is 70%.
5	For latest details on the assessment criteria, please visit www.sscnasscom.com .

				MARKS ALLOCATION	
ASSESSMENT OUTCOME (NOS CODE AND DESCRIPTION)	ASSESSMENT CRITERIA (PC)	TOTAL MARKS	OUT OF	THEORY	SKILLS PRACTICAL
1.SSC/N0501 (CONTRIBUTE TO THE DESIGN OF SOFTWARE PRODUCTS AND APPLICATIONS)	PC1. check their understanding of the Business Requirements Specification (BRS)/User Requirements Specification (URS) with appropriate people	100	10	10	0
	PC2. check their understanding of the Software Requirements Specification (SRS) with appropriate people		10	10	0
	PC3. check their understanding of High Level Design (HLD) with appropriate people		10	10	0
	PC4. design basic programming structures to implement functionality in line with requirements defined in BRS/URS, SRS and HLD		30	0	30
	PC5. review their designs with appropriate people		5	5	0
	PC6. analyze inputs from appropriate people to identify, resolve and record design defects and inform future designs		15	0	15
	PC7. document their designs using standard templates and tools		10	0	10
	PC8. comply with their organization's policies, procedures and guidelines when contributing to the design of software products and applications		10	0	10
	Total		100	35	65
2.SSC/N0502 (DEVELOP SOFTWARE CODE TO SPECIFICATION)	PC1. check their understanding of the Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD) with appropriate people	100	5	5	0
	PC2. access reusable components, code generation tools and unit testing tools from their organization's knowledge base		5	0	5
	PC3. convert technical specifications into code to meet the requirements, leveraging reusable components, where available		30	0	30
	PC4. create appropriate unit test cases (UTCs)		10	0	10
	PC5. review codes and UTCs with appropriate people		5	5	0
	PC6. execute UTCs and document results		5	0	5
	PC7. rework the code and UTCs to fix identified defects		10	0	10
	PC8. analyze inputs from appropriate people to inform future designs		5	5	0
	PC9. record corrective actions for identified defects to inform future designs		10	0	10
			5	5	0

				MARKS ALLOCATION	
ASSESSMENT OUTCOME (NOS CODE AND DESCRIPTION)	ASSESSMENT CRITERIA (PC)	TOTAL MARKS	OUT OF	THEORY	SKILLS PRACTICAL
	PC10. submit tested code for approval by appropriate people				
	PC11. update their organization's knowledge base with their experiences of the code developed		5	0	5
	PC12. comply with their organization's policies, procedures and guidelines when developing software code to specification		5	0	5
	Total		100	20	80
3.NOS/N9001 (MANAGE THEIR WORK TO MEET REQUIREMENTS)	PC1. establish and agree their work requirements with appropriate people	100	6.25	0	6.25
	PC2. keep their immediate work area clean and tidy		12.5	6.25	6.25
	PC3. utilize their time effectively		12.5	6.25	6.25
	PC4. use resources correctly and efficiently		18.75	6.25	12.5
	PC5. treat confidential information correctly		6.25	0	6.25
	PC6. work in line with their organization's policies and procedures		12.5	0	12.5
	PC7. work within the limits of their job role		6.25	0	6.25
	PC8. obtain guidance from appropriate people, where necessary		6.25	0	6.25
	PC9. ensure their work meets the agreed requirements		18.75	6.25	12.5
	Total	100	100	25	75
4.SSC/N9002 (WORK EFFECTIVELY WITH COLLEAGUES)	PC1. communicate with colleagues clearly, concisely and accurately	100	20	0	20
	PC2. work with colleagues to integrate their work effectively with theirs		10	0	10
	PC3. pass on essential information to colleagues in line with organizational requirements		10	10	0
	PC4. work in ways that show respect for colleagues		20	0	20
	PC5. carry out commitments you have made to colleagues		10	0	10
	PC6. let colleagues know in good time if you cannot carry out their commitments, explaining the reasons		10	10	0
	PC7. identify any problems you have working with colleagues and take the initiative to solve these problems		10	0	10
	PC8. follow the organization's policies and procedures for working with colleagues		10	0	10
		Total	100	100	20
5.SSC/N9003 (MAINTAIN A	PC1. comply with their organization's current health, safety and security policies and procedures	100	20	10	10

				MARKS ALLOCATION	
ASSESSMENT OUTCOME (NOS CODE AND DESCRIPTION)	ASSESSMENT CRITERIA (PC)	TOTAL MARKS	OUT OF	THEORY	SKILLS PRACTICAL
HEALTHY, SAFE AND SECURE WORKING ENVIRONMENT)	PC2. report any identified breaches in health, safety, and security policies and procedures to the designated person		10	0	10
	PC3. identify and correct any hazards that you can deal with safely, competently and within the limits of their authority		20	10	10
	PC4. report any hazards that you are not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected		10	0	10
	PC5. follow their organization's emergency procedures promptly, calmly, and efficiently		20	10	10
	PC6. identify and recommend opportunities for improving health, safety, and security to the designated person		10	0	10
	PC7. complete any health and safety records legibly and accurately		10	0	10
		Total	100	30	70
6.SSC/N9004 (PROVIDE DATA/INFORMATION IN STANDARD FORMATS)	PC1. establish and agree with appropriate people the data/information you need to provide, the formats in which you need to provide it, and when you need to provide it	100	12.5	12.5	0
	PC2. obtain the data/information from reliable sources		12.5	0	12.5
	PC3. check that the data/information is accurate, complete and up-to-date		12.5	6.25	6.25
	PC4. obtain advice or guidance from appropriate people where there are problems with the data/information		6.25	0	6.25
	PC5. carry out rule-based analysis of the data/information, if required		25	0	25
	PC6. insert the data/information into the agreed formats		12.5	0	12.5
	PC7. check the accuracy of their work, involving colleagues where required		6.25	0	6.25
	PC8. report any unresolved anomalies in the data/information to appropriate people		6.25	6.25	0
	PC9. provide complete, accurate and up-to-date data/information to the appropriate people in the required formats on time		6.25	0	6.25
		Total	100	25	75
7.SSC/N9005 (DEVELOP THEIR KNOWLEDGE, SKILLS AND COMPETENCE)	PC1. obtain advice and guidance from appropriate people to develop their knowledge, skills and competence	100	10	0	10
	PC2. identify accurately the knowledge and skills you need for their job role		10	0	10
	PC3. identify accurately their current level of		20	10	10

				MARKS ALLOCATION	
ASSESSMENT OUTCOME (NOS CODE AND DESCRIPTION)	ASSESSMENT CRITERIA (PC)	TOTAL MARKS	OUT OF	THEORY	SKILLS PRACTICAL
	knowledge, skills and competence and any learning and development needs				
	PC4. agree with appropriate people a plan of learning and development activities to address their learning needs		10	0	10
	PC5. undertake learning and development activities in line with their plan		20	10	10
	PC6. apply their new knowledge and skills in the workplace, under supervision		10	0	10
	PC7. obtain feedback from appropriate people on their knowledge and skills and how effectively you apply them		10	0	10
	PC8. review their knowledge, skills and competence regularly and take appropriate action		10	0	10
		Total	100	20	80



IT-ITeS Sector Skill Council

4E-Vandana Building (4th Floor) 11, Tolstoy Marg, New Delhi-110001

Model Curriculum

User Interface (UI) Developer

User Interface (UI) Developer

SECTOR: IT-ITeS
SUB-SECTOR: IT Services
OCCUPATION: **Application Development**
REFERENCE ID: **SSC/Q0502**
NSQF LEVEL: **7**

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User Interface (UI) Developer

Curriculum / Syllabus

This program is aimed at training candidates for the job of a **User Interface (UI) Developer** in the **IT-ITeS Sector/Industry** and aims at building the following key competencies amongst the learner.

Program Name	User Interface (UI) Developer		
Qualification Pack Name & Reference ID.	User Interface (UI) Developer SSC/Q0502		
Version No.	1.0	Version Update Date	31/01/2015
Pre-requisites to Training	Bachelor's Degree in Science/Technology/Computers or any graduate course		
Training Outcomes	<p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> • Contribute to the design of software products and applications • Develop software code to specification • Develop media content and graphic designs for software products and applications • Manage your work to meet requirements • Work effectively with colleagues • Maintain a healthy, safe and secure working environment • Provide data/information in standard formats • Develop your knowledge, skills and competence 		

This course encompasses all Eight National Occupational Standards (NOS) of **User Interface (UI) Developer** Qualification Pack issued by **IT-ITeS Sector Skills Council NASSCOM**.

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
1.	Contribute to the design of software products and applications	17:00	33:00	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> • check your understanding of the Business Requirements Specification (BRS)/User Requirements Specification (URS) with appropriate people • check your understanding of the Software Requirements Specification (SRS) with appropriate people • check your understanding of High Level Design (HLD) with appropriate people • design basic programming structures to implement functionality in line with requirements defined in BRS/URS, SRS and HLD • review your designs with appropriate people 	SSC/N0501	Refer to Unique Equipment Required

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				<ul style="list-style-type: none"> analyze inputs from appropriate people to identify, resolve and record design defects and inform future designs document your designs using standard templates and tools comply with your organization's policies, procedures and guidelines when contributing to the design of software products and applications 		
2.	Develop software code to specification	20:00	80:00	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> check your understanding of the Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD) with appropriate people access reusable components, code generation tools and unit testing tools from your organization's knowledge base convert technical specifications into code to meet the requirements, leveraging reusable components, where available create appropriate unit test cases (UTCs) review codes and UTCs with appropriate people execute UTCs and document results rework the code and UTCs to fix identified defects analyze inputs from appropriate people to inform future designs record corrective actions for identified defects to inform future designs submit tested code for approval by appropriate people update your organization's knowledge base with your experiences of the code developed comply with your organization's policies, procedures and guidelines when developing software code to specification 	SSC/N0502	

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
3.	Develop media content and graphic designs for software products and applications	12:00	38:00	Candidates will be able to: <ul style="list-style-type: none"> • check your understanding of the Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD) with appropriate people • access reusable components, media and graphical packages and tools from your organization’s knowledge base • convert requirements into media content and graphic designs, leveraging reusable components where available • review media content and graphic designs with appropriate people and analyze their feedback • record any defects and corrective actions taken to inform future work • rework media content and graphic designs, incorporating feedback • submit media content and graphic designs for approval by appropriate people • update your organization’s knowledge base with your experiences of the media content and graphic designs developed • comply with your organization’s policies, procedures and guidelines when developing media content and graphic designs for software products and applications 	SSC/N0503	
4.	Manage your work to meet requirements	12:00	38:00	Candidates will be able to: <ul style="list-style-type: none"> • establish and agree your work requirements with appropriate people • keep your immediate work area clean and tidy • utilize your time effectively • use resources correctly and efficiently • treat confidential information correctly • work in line with your organization’s policies and procedures • work within the limits of your job role • obtain guidance from appropriate people, where necessary • ensure your work meets the agreed requirements 	SSC/N9001	

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
5.	Work effectively with colleagues	10:00	40:00	Candidates will be able to: <ul style="list-style-type: none"> • communicate with colleagues clearly, concisely and accurately • work with colleagues to integrate your work effectively with theirs • pass on essential information to colleagues in line with organizational requirements • work in ways that show respect for colleagues • carry out commitments you have made to colleagues • let colleagues know in good time if you cannot carry out your commitments, explaining the reasons • identify any problems you have working with colleagues and take the initiative to solve these problems • follow the organization's policies and procedures for working with colleagues 	SSC/N9002	
6.	Maintain a healthy, safe and secure working environment	7:00	18:00	Candidates will be able to: <ul style="list-style-type: none"> • comply with your organization's current health, safety and security policies and procedures • report any identified breaches in health, safety, and security policies and procedures to the designated person • identify and correct any hazards that you can deal with safely, competently and within the limits of your authority • report any hazards that you are not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected • follow your organization's emergency procedures promptly, calmly, and efficiently • identify and recommend opportunities for improving health, safety, and security to the designated person 	SSC/N9003	

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				<ul style="list-style-type: none"> complete any health and safety records legibly and accurately 		
7.	Provide data/information in standard formats	12:00	38:00	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> establish and agree with appropriate people the data/information you need to provide, the formats in which you need to provide it, and when you need to provide it obtain the data/information from reliable sources check that the data/information is accurate, complete and up-to-date obtain advice or guidance from appropriate people where there are problems with the data/information carry out rule-based analysis of the data/information, if required insert the data/information into the agreed formats check the accuracy of your work, involving colleagues where required report any unresolved anomalies in the data/information to appropriate people provide complete, accurate and up-to-date data/information to the appropriate people in the required formats on time 	SSC/N9004	
8.	Develop your knowledge, skills and competence	5:00	20:00	<p>Candidates will be able to:</p> <ul style="list-style-type: none"> obtain advice and guidance from appropriate people to develop your knowledge, skills and competence identify accurately the knowledge and skills you need for your job role identify accurately your current level of knowledge, skills and competence and any learning and development needs agree with appropriate people a plan of learning and development activities to address your learning needs undertake learning and development activities in line with your plan apply your new knowledge and skills in the workplace, under supervision obtain feedback from appropriate people on your knowledge and skills and how effectively you apply them 	SSC/N9005	

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				<ul style="list-style-type: none"> review your knowledge, skills and competence regularly and take appropriate action 		
	Total Duration:	<u>95:00</u>	<u>305:00</u>	<p>Unique Equipment Required: Training room should be fully furnished with the following equipment / tools / accessories. Additional / specific resources, wherever applicable (e.g. Hardware, software) are indicated in the main text corresponding to relevant learning outcome.</p> <p>Domain NOS requirements</p> <ul style="list-style-type: none"> Visio, UML, freeminds, mockingbird HTML 5, CSS, Java Script and SQL IDEs such as Web Builder, Word Press, Joomla Wordpress, psdGraphics etc. HTML, CSS, Flash, Photoshop, Windows media player, Eclipse, XAMPP <p>Common requirements</p> <ul style="list-style-type: none"> Comfortable seats with adequate lighting, controlled temperature and acoustics for training and learning White Board, Markers and Eraser Projector with screen Flip chart with markers Faculty's PC/Laptop with latest configuration and internet connection Supporting software / applications for projecting audio, video, recording, Presentation Tools to support learning activities: <ul style="list-style-type: none"> Intranet Email IMs Learning management system e.g. Moodle, Blackboard to enable blended learning Microphone / voice system for lecture and class activities Handy Camera Stationery kit – Staples, Glue, Chart Paper, Sketch Pens, Paint Box, Scale, A4 Sheets For IT Lab sessions: Computer Lab with 1:1 PC:trainee ratio and having internet connection, MS Office / Open office, Browser, Outlook / Any other Email Client and chat tools. Assessment and Test Tools for day to day online Tests and Assessments For team discussions: Adequate seating arrangement in full / half circle format for one or more teams as per planned team composition. 		

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				<ul style="list-style-type: none"> Reading Resources: Access to relevant sample documents and learning forums to enable self-study before and after each training session. 		

Grand Total Course Duration: **400 Hours 0 Minutes**

(This syllabus/ curriculum has been approved IT-ITeS Sector Skills Council NASSCOM.)

Notes from IT-ITeS Sector Skills Council NASSCOM

1. This document outlines the broad scope of coverage. This should be linked with OBF and training delivery plan. OBF (Outcome based framework) reflects the pedagogy used to ensure an expected outcome. Training delivery plan focuses on the sequence of delivery.
2. Though many NOSs have some seemingly common outcomes, notably core/generic, professional and technical skills, it is imperative to understand the contextual difference between them. Training providers are advised to,
 - a. Embed such skills development in the learning pedagogy for each expected outcome
 - b. Prepare a detailed session plan for training delivery with focus on sequence and duration of training
3. Run a diagnostic test to assess prior learning of students and help trainers / students identify the need for gap training and suitable training methodology. Accordingly, more introductory level sessions may be included in guided or self-paced mode of learning. E.g. adding some sessions on Functional English or Use of Internet and MS Office.

**Annexure1: Assessment Criteria**

Assessment Criteria for <QP Name>	
Job Role	User Interface (UI) Developer
Qualification Pack	SSC/Q0502
Sector Skill Council	IT-ITeS

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack (QP) will be created by the Sector Skill Council (SSC). Each performance criteria (PC) will be assigned Theory and Skill/Practical marks proportional to its importance in NOS.
2	The assessment will be conducted online through assessment providers authorised by SSC.
3	Format of questions will include a variety of styles suitable to the PC being tested such as multiple choice questions, fill in the blanks, situational judgment test, simulation and programming test.
4	To pass a QP, a trainee should pass each individual NOS. Standard passing criteria for each NOS is 70%.
5	For latest details on the assessment criteria, please visit www.sscnasscom.com .

Assessable Outcomes	Assessment criteria for the outcome	Total Mark	Out of	Theory	Skills Practical
1. SSC/N0501 (Contribute to the design of software products and applications)	PC1. check your understanding of the Business Requirements Specification (BRS)/User Requirements Specification (URS) with appropriate people	100	10	10	0
	PC2. check your understanding of the Software Requirements Specification (SRS) with appropriate people		10	10	0
	PC3. check your understanding of High Level Design (HLD) with appropriate people		10	10	0
	PC4. design basic programming structures to implement functionality in line with requirements defined in BRS/URS, SRS and HLD		30	0	30
	PC5. review your designs with appropriate people		5	5	0
	PC6. analyze inputs from appropriate people to identify, resolve and record design defects and inform future designs		15	0	15
	PC7. document your designs using standard templates and tools		10	0	10
	PC8. comply with your organization's policies, procedures and guidelines when contributing to the design of software products and applications		10	0	10
	Total		100	35	65
2. SSC/N0502 (Develop software code to specification)	PC1. check your understanding of the Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD) with appropriate people	100	5	5	0
	PC2. access reusable components, code generation tools and unit testing tools from your organization's knowledge base		10	0	10

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Assessable Outcomes	Assessment criteria for the outcome	Total Mark	Out of	Theory	Skills Practical	
	PC3. convert technical specifications into code to meet the requirements, leveraging reusable components, where available		10	0	10	
	PC4. create appropriate unit test cases (UTCs)		10	0	10	
	PC5. review codes and UTCs with appropriate people		5	5	0	
	PC6. execute UTCs and document results		10	0	10	
	PC7. rework the code and UTCs to fix identified defects		10	0	10	
	PC8. analyze inputs from appropriate people to inform future designs		5	5	0	
	PC9. record corrective actions for identified defects to inform future designs		10	0	10	
	PC10. submit tested code for approval by appropriate people		5	5	0	
	PC11. update your organization's knowledge base with your experiences of the code developed		10	0	10	
	PC12. comply with your organization's policies, procedures and guidelines when developing software code to specification		10	0	10	
			Total	100	20	80
	3. SSC/N0503 (Develop media content and graphic designs for software products and Applications)		PC1. check your understanding of the Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD) with appropriate people	100	10	10
PC2. access reusable components, media and graphical packages and tools from your organization's knowledge base		10	0		10	
PC3. convert requirements into media content and graphic designs, leveraging reusable components where available		25	0		25	
	PC4. review media content and graphic designs with appropriate people and analyze their feedback		10	10	0	
	PC5. record any defects and corrective actions taken to inform future work		10	0	10	
	PC6. rework media content and graphic designs, incorporating feedback		10	0	10	
	PC7. submit media content and graphic designs for approval by appropriate people		5	5	0	
	PC8. update your organization's knowledge base with your experiences of the media content and graphic designs developed		10	0	10	
	PC9. comply with your organization's policies, procedures and guidelines when developing media content and graphic designs for software products and applications		10	0	10	
	Total	100	25	75		
4.SSC/N9001 (Manage your work to meet requirements)	PC1. establish and agree your work requirements with appropriate people	100	6.25	0	6.25	
	PC2. keep your immediate work area clean and tidy		12.5	6.25	6.25	
	PC3. utilize your time effectively		12.5	6.25	6.25	
	PC4. use resources correctly and efficiently		18.75	6.25	12.5	

Assessable Outcomes	Assessment criteria for the outcome	Total Mark	Out of	Theory	Skills Practical
	PC5. treat confidential information correctly		6.25	0	6.25
	PC6. work in line with your organization's policies and procedures		12.5	0	12.5
	PC7. work within the limits of your job role		6.25	0	6.25
	PC8. obtain guidance from appropriate people , where necessary		6.25	0	6.25
	PC9. ensure your work meets the agreed requirements		18.75	6.25	12.5
		Total	100	25	75
5.SSC/N9002 (Work with colleagues)	PC1. communicate with colleagues clearly, concisely and accurately	100	20	0	20
	PC2. work with colleagues to integrate your work effectively with theirs		10	0	10
	PC3. pass on essential information to colleagues in line with organizational requirements		10	10	0
	PC4. work in ways that show respect for colleagues		20	0	20
	PC5. carry out commitments you have made to colleagues		10	0	10
	PC6. let colleagues know in good time if you cannot carry out your commitments, explaining the reasons		10	10	0
	PC7. identify any problems you have working with colleagues and take the initiative to solve these problems		10	0	10
	PC8. follow the organization's policies and procedures for working with colleagues		10	0	10
		Total	100	20	80
6.SSC/N9003 (Maintain a healthy, safe and secure working environment)	PC1. comply with your organization's current health, safety and security policies and procedures	100	20	10	10
	PC2. report any identified breaches in health, safety, and security policies and procedures to the designated person		10	0	10
	PC3. identify and correct any hazards that you can deal with safely, competently and within the limits of your authority		20	10	10
	PC4. report any hazards that you are not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected		10	0	10
	PC5. follow your organization's emergency procedures promptly, calmly, and efficiently		20	10	10
	PC6. identify and recommend opportunities for improving health, safety, and security to the designated person		10	0	10
	PC7. complete any health and safety records legibly and accurately		10	0	10
		Total	100	30	70
	PC1. establish and agree with appropriate people the data/information you need to provide, the formats	100	12.5	12.5	0

Model Curriculum for **User Interface (UI) Developer**

Assessable Outcomes	Assessment criteria for the outcome	Total Mark	Out of	Theory	Skills Practical
7.SSC/N9004 (Provide data/information in standard formats)	in which you need to provide it, and when you need to provide it				
	PC2. obtain the data/information from reliable sources		12.5	0	12.5
	PC3. check that the data/information is accurate, complete and up-to-date		12.5	6.25	6.25
	PC4. obtain advice or guidance from appropriate people where there are problems with the data/information		6.25	0	6.25
	PC5. carry out rule-based analysis of the data/information, if required		25	0	25
	PC6. insert the data/information into the agreed formats		12.5	0	12.5
	PC7. check the accuracy of your work, involving colleagues where required		6.25	0	6.25
	PC8. report any unresolved anomalies in the data/information to appropriate people		6.25	6.25	0
	PC9. provide complete, accurate and up-to-date data/information to the appropriate people in the required formats on time		6.25	0	6.25
		Total	100	25	75
8.SSC/N9005 (Develop your knowledge, skills and competence)	PC1. obtain advice and guidance from appropriate people to develop your knowledge, skills and competence	100	10	0	10
	PC2. identify accurately the knowledge and skills you need for your job role		10	0	10
	PC3. identify accurately your current level of knowledge, skills and competence and any learning and development needs		20	10	10
	PC4. agree with appropriate people a plan of learning and development activities to address your learning needs		10	0	10
	PC5. undertake learning and development activities in line with your plan		20	10	10
	PC6. apply your new knowledge and skills in the workplace, under supervision		10	0	10
	PC7. obtain feedback from appropriate people on your knowledge and skills and how effectively you apply them		10	0	10
	PC8. review your knowledge, skills and competence regularly and take appropriate action		10	0	10
		Total	100	20	80



Annexure2: Trainer Prerequisites for Job role: User Interface (UI) Developer mapped to Qualification Pack: SSC/Q0502

Sr. No.	Area	Details
1	Job Description	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack SSC/Q0502.
2	Personal Attributes	<p>Aptitude to conduct training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in the mentioned field.</p> <p>The individual should be result oriented. The individual should also be able to demonstrate skills for communication, creative and logical thinking.</p>
3	Minimum Educational Qualifications	Bachelor's Degree in Science/Technology/Computers or any graduate course
4a	Domain Certification	<p>Minimum accepted score in SSC Assessment is 90% per NOS being taught in SSC/Q0502.</p> <p>Additional certification in computers/technology/ animation/graphics</p>
4b	Platform Certification	<p>Recommended that the Trainer is certified for the Job Role: "Trainer" mapped to the Qualification Pack: "SSC/Q1402".</p> <p>Minimum accepted score is 70% per NOS.</p>
5	Experience	<p>Field experience: Minimum 2 years' experience in the same domain</p> <p>Training experience: 1 year preferred</p>



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