YEAR 1 SEMESTER 2						
S.No	**Subject Code**	**Year, semester**	**Subject**	**Classification**	**Credit**	
1	BIT 121	Y1,S2	OOP C++	Major	4	
2	BIT 123	Y1,S2	SYSTEM ANALYSIS & DESIGN	Major	4	
3	BIT 124	Y1,S2	COMPUTER NETWORK	Compulsory	4	
4	BIT 122	Y1,S2	LS & HR	Major	2	
5	BIT 125	Y1,S2	QUANTITATIVE METHODS	Major	4	
6	BIT 126	Y1,S2	DIGITAL LOGIC	Major	4	
Total Credits					**22**	

YEAR 2 SEMESTER 4						
S.No	**Subject Code**	**Year, semester**	**Subject**	**Classification**	**Credit**	
1	BIT241	Y2,S4	TCP/ IP	Major	4	
2	BIT242	Y2,S4	Fundamental of Algorithm	Major	4	
3	BIT243	Y2,S4	Java Programming	Compulsory	4	
4	BIT244	Y2,S4	Software Engineering	Major	4	
5	BIT245	Y2,S4	RDBMS with SQL	Major	4	
Total Credits					**20**	

YEAR 1 SEMESTER 2

<table>
<tr><td>1</td><td colspan="7">Name of Course/Module : OOP C++</td></tr>
<tr><td>2</td><td colspan="7">Course Code: BIT 121</td></tr>
<tr><td>3</td><td colspan="7">Name(s) of academic staff:</td></tr>
<tr><td>4</td><td colspan="7">Rationale for the inclusion of the course /module in the programme:
The course helps to expose students to theory of complex variables, differential equations, Laplace transform and Fourier series and integrals applied to signal processing.</td></tr>
<tr><td>5</td><td colspan="7">Semester and Year offered: year 1 semester 2</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Course Hours</td><td colspan="4">Face to Face</td><td rowspan="2">ILT</td><td rowspan="2">TSLT</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>O</td></tr>
<tr><td></td><td>L=Lecture
T=Tutorial
P=Practical
O=Others
TSLT=Total student learning time</td><td>56</td><td>10</td><td>14</td><td>6</td><td>80</td><td>166</td></tr>
<tr><td>7</td><td colspan="7">Credit Value:4</td></tr>
<tr><td>8</td><td colspan="7">Prerequisite: Nil</td></tr>
<tr><td>9</td><td colspan="7">Learning Outcomes:
On completion of this course students will be able to:
<u>Cognitive:</u>
• Provides in-depth coverage of object-oriented programming principles and techniques using C++.
<u>Psychomotor:</u>
• Apply good programming style and understand the impact of style on developing and maintaining programs.
<u>Affective:</u>
• Explain the benefits of object oriented design and understand when it is an appropriate methodology to use.</td></tr>
<tr><td>10</td><td colspan="7">Transferable Skills:
• Problem Solving
• Thinking logically within constraints
• Ability to plan and organize theoretical learning as well as appliedlearning
• Evaluating results</td></tr>
<tr><td>11</td><td colspan="7">Teaching –learning and assessment strategy
• Lectures
• Tutorials
At the end of the programme, students are given an opportunity to evaluate the course and the lecturer</td></tr>
<tr><td>12</td><td colspan="7">Synopsis:
This course introduces the concepts of object-oriented programming to students with a background in the procedural paradigm. It begins with a brief review of control structures and data types with emphasis on structured data types and array processing.</td></tr>
<tr><td>13</td><td colspan="7">Mode of Delivery:
Lectures, Tutorials.</td></tr>
</table>

14	Content Outline of the course/module and the SLT per topic								
	No	**Subject description**	**Face to face**				**ILT**	**Total**
			Lecture	**Tutorial**	**Practical**	**Others**		
	1	**Introduction to object oriented programming:** • Procedural language vs OOP • Characteristics of object-oriented languages o Objects o Classes o Inheritance o Reusability o Polymorphism & overloading • Applications of OOP	6	2	-	-	8	16
	2	**C++ programming concept :** • Introduction to programming in C++ • Extraction operator (>>) • Insertion operator (<<) • Type conversion: automatic conversion, cast • Arrays and pointers in C++ • New and delete operators • Manipulators • Const • Enumeration	5	-	2	-	7	14
	3.	**Functions used in C++:** • Introduction to functions • Passing arguments to functions • Returning values from functions • Reference arguments • Returning by reference • Functions overloading: different number of arguments, different kinds of arguments • Default arguments • Inline functions	6	-	2	-	8	16

	4	**Classes and objects:**
		• Introduction
		• Access specifier (public, private and protected)
		• Accessing class members
		• Defining member functions
		  ○ Member function inside the class body
		  ○ Member function outside the class body
		• "this" pointer
		• Constructor & destructor
		  ○ Types of constructor
		  ▪ Default constructor
		  ▪ Parameterized constructor
		  ▪ Copy constructor
		  ○ Overloaded constructors
		• Static data member
		• Static member functions
		• Passing objects as arguments
		• Friend functions & friend classes
			9	-	3	-	12	24

	5.	**Operator overloading:**
		• Introduction to operator overloading
		• General rules for overloading operator
		• Operator overloading restrictions
		• Overloading unary and binary operators
		• Operator overloading using friend functions
		• Data conversion
		  ○ Conversion between basic types and object
		  ○ Conversion between object and basic types
		  ○ Conversion between objects of different classes
			6	2	-	-	8	16

	6.	**Inheritance:** • Introduction & benefits of inheritance • Types of inheritance • Inheritance: base classes & derived classes • Using constructors and destructors in derived classes • Abstract base class • Public, private and protected inheritance • Ambiguity in multiple inheritance • Containership	6	2	-	-	8	16
	7.	**Virtual functions and polymorphism:** • Introduction • Early vs late binding • Virtual functions • Pure virtual functions and abstract classes • Virtual base classes	4	2	-	-	6	12
	8.	**File handling:** • Introduction • Opening and closing file o Opening file using constructor o Opening file using open () and open() file modes • Basic functions of seekg(), seekp(), tellg(), tellp() • Sequential input/output operations o put() and get() functions o write() and read () functions	5	-	3	-	8	16
	9.	**Templates:** • Introduction to templates • Function templates • Class templates	3	2	-	-	5	10
	10.	**Namespaces:** • Using namespace • Using the scope resolution operator • Through “using” keyword	3	-	2	-	5	10

	11.	**Exception handling:** • Introduction to exceptions • Exception handling model • Exception handling construct: try, catch, throw	3	-	2	-	5	10
		Total	56	10	14	-	80	160

16. **Main references supporting the course:**

a. Robert Lafore, "Object-Oriented Programming in C++, Galgotia, Publication, India.

b. E. Dalagurusamy, "Object Oriented Programming with C++, McGraw Hill 4/e

c. Deitel & Deitel, "C++ How to Program", 3/e Prentice Hall

d. Yashavant Kanetkar, "Let Us C++", BPB Publication, New Delhi

<table>
<tr><td>1</td><td colspan="7">Name of Course/Module :System Analysis and Design</td></tr>
<tr><td>2</td><td colspan="7">Course Code: BIT 123</td></tr>
<tr><td>3</td><td colspan="7">Name(s) of academic staff:</td></tr>
<tr><td>4</td><td colspan="7">Rationale for the inclusion of the course /module in the programme:
This course will help students to gain knowledge in analytical procedures and designing part of system. This module is essential for students to learn the concepts and skills of system analysis design and includes expanded coverage of data flow diagrams, data dictionary and process specifications.</td></tr>
<tr><td>5</td><td colspan="7">Semester and Year offered: year 1 semester 2</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Course Hours</td><td colspan="4">Face to Face</td><td rowspan="2">ILT</td><td rowspan="2">TSLT</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>O</td></tr>
<tr><td></td><td>L= Lecture
T=Tutorial
P=Practical
O=Others
TSLT=Total student learning time</td><td>59</td><td>21</td><td>-</td><td>6</td><td>60</td><td>166</td></tr>
<tr><td>7</td><td colspan="7">Credit Value:4</td></tr>
<tr><td>8</td><td colspan="7">Prerequisite: Nil</td></tr>
<tr><td>9</td><td colspan="7">Learning Outcomes:
On completion of this course students will be able to:
<u>Cognitive:</u>
• Gain knowledge in business strategy, business process thinking, change management and many other fields to apply their concepts for analysis of the system and design accordingly.
<u>Psychomotor:</u>
• Gain knowledge of analytical and design of system for solving problems and issues in the technical field
<u>Affective:</u>
• Solve system related problems with proper analytical skill.</td></tr>
<tr><td>10</td><td colspan="7">Transferable Skills:
• Problem Solving
• Thinking logically within constraints
• Ability to plan and organize theoretical learning as well as applied learning
• Evaluating results</td></tr>
<tr><td>11</td><td colspan="7">Teaching –learning and assessment strategy
• Lectures
• Tutorials
At the end of the programme, students are given an opportunity to evaluate the course and the lecturer</td></tr>
<tr><td>12</td><td colspan="7">Synopsis:
This module deals with the variety of new software used by analysts, designers to supervise projects, examine document systems, design new systems and execute their plans. The course consists of SA&D concepts, Roles of system analyst, Managing Data Resources, Software engineering and implementation</td></tr>
<tr><td>13</td><td colspan="7">Mode of Delivery:
Lectures, Tutorials.</td></tr>
</table>

14	Content Outline of the course/module and the SLT per topic							
	No	**Subject description**	**Face to face**				**ILT**	**Total**
			Lecture	**Tutorial**	**Practical**	**Others**		
	1	**Overview of system analysis and design:** • Introduction to system analysis and design • Information systems and its types • Stakeholders of information systems • Systems development life cycle and life cycle models (waterfall, spiral, prototype, DSDM, SSADM,RAD,JAD)	8	2	-	-	10	20
	2	**Process and conceptual modeling:** • Introduction to data flow diagram (DFD) • Concepts used in drawings DFDs • DFD design (up to level 1) • Conceptual modeling • Entity relationship diagrams	5	2	-	-	7	14
	3.	**Data and process modeling:** • Introduction • Overview of data & process modeling tools • Data dictionary (Introduction to CASE) o Using CASE tools for documentation o Documenting the data elements o Documenting the data flows o Documenting the data stores o Documenting the processes o ERD o Data dictionary reports	9	3	-	-	12	24

	4	**Logic modeling:** • Decision table • Decision tree • Structured English • Data dictionary	2	2	-	-	4	8
	5.	**Object modeling:** • Overview of object-oriented analysis • Object modeling with the unified modeling language o Flow diagram o System diagram o Activity diagram o Use case diagram	3	2	-	-	5	10
	6.	**System analysis:** • System planning and initial investigation • Project scheduling • Requirement analysis • Types of requirements • Requirement gathering methods • Feasibility study and its types • Steps of feasibility study • Cost/benefits analysis (payback method, NPV method)	8	3	-	-	11	22
	5	**Systems design:** • Introduction to system design • The process and stages of system design • Logical and physical design • Introduction to structured design (modular system design, functional strength, structure • chart, cohesion, coupling) • Database design and overview of file organization • Input/output and forms design	8	3	-	-	11	22

	6.	**System architecture:**
		• Mainframe architecture
		• Impact of the personal computer
		• Network evolution
		• Client/server Design
		  o The Client's role
		  o Clients/Server tiers
		  o Middleware
		  o Cost-benefit issues
		  o Performance issues
		• Impact of the internet:
		  o Cloud computing
		• Ecommerce Architecture
			8	2	-	-	10	20

	7.	**System implementation:** • Introduction to system implementation • System installation and its types • System quality, software quality assurance (formal technical review, walkthrough, inspections) • System maintenance, types of maintenance and process of system maintenance • Introduction to system testing	8	2	-	-	10	20
	8.	**Total**	59	21	-	-	80	160
15	**Main references supporting the course:** **a.** Systems Analysis and Design (9thEdition) by Kenneth E. Kendall and Julie E. Kendall, Prentice Hall; 9thedition (2013). **b.** Systems Analysis and Design by Alan Dennis, Wiley; 5thedition,(2012) **c.** Jeffrey L. Whitten, Loonnie D. Bentley, "*System Analysis & Design Methods*", 5th edition **d.** Grady Booch, "*Object Oriented Analysis & Design with Application*", Pearson education **e.** Tilley, S., & Rosenblatt, H.J. (2016). *Systems Analysis and Design.* (11thed.). U.S.A: Cengage Learning						

<table>
<tr><td>1</td><td colspan="6">Name of Course/Module : Computer Network</td></tr>
<tr><td>2</td><td colspan="6">Course Code: BIT 124</td></tr>
<tr><td>3</td><td colspan="6">Name(s) of academic staff:</td></tr>
<tr><td>4</td><td colspan="6">Rationale for the inclusion of the course /module in the programme:
This module introduces students to computer networks and concentrates on building a firm foundation for understanding Data Communications and Computer Networks.</td></tr>
<tr><td>5</td><td colspan="6">Semester and Year offered: year 1 semester 2</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Course Hours</td><td colspan="4">Face to Face</td><td>ILT</td><td>TSLT</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>O</td><td></td><td></td></tr>
<tr><td></td><td>L= Lecture
T=Tutorial
P=Practical
O=Others
TSLT=Total student learning time</td><td>58</td><td>3</td><td>17</td><td>6</td><td>78</td><td>162</td></tr>
<tr><td>7</td><td colspan="6">Credit Value:4</td></tr>
<tr><td>8</td><td colspan="6">Prerequisite: Nil</td></tr>
<tr><td>9</td><td colspan="6">Learning Outcomes:
On completion of this course students will be able to:
<u>Cognitive:</u>
• Analyze OSI Reference based on Network Layers.
<u>Psychomotor:</u>
• Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols to overcome deficiencies in existing protocols.
<u>Affective:</u>
• Explain the use of cryptography and network security in the Quizzes and Tests.</td></tr>
<tr><td>10</td><td colspan="6">Transferable Skills:
• Problem Solving
• Thinking logically within constraints
• Ability to plan and organize theoretical learning as well as appliedlearning
• Evaluating results</td></tr>
<tr><td>11</td><td colspan="6">Teaching –learning and assessment strategy
• Lectures
• Tutorials
At the end of the programme, students are given an opportunity to evaluate the course and the lecturer</td></tr>
<tr><td>12</td><td colspan="6">Synopsis:
This module provides the student with fundamental knowledge of the various aspects of computer networking and enables students to appreciate recent developments in the area.</td></tr>
<tr><td>13</td><td colspan="6">Mode of Delivery:
Lectures, Tutorials.</td></tr>
<tr><td></td><td colspan="6">Content Outline of the course/module and the SLT per topic</td></tr>
</table>

14	No	Subject description	Face to face				ILT	Total
			Lecture	Tutorial	Practical	Others		
	1	**Overview of data communication and Networking: Introduction:** • Data communications: components, data representation(ASCII,ISO etc.),direction of data flow(simplex, half duplex, full duplex) • Networks: distributed processing, network criteria, physical	8	-	3	-	11	22
	2	**Reference models: OSI reference model:** • TCP/IP reference model, their comparative study • Overview of data(analog & digital), signal(analog & digital),transmission (analog & digital)& transmission media (guided & non-guided) • TDM, FDM, WDM; Circuit switching: time division & space division switch, TDM bus	8	-	3	-	11	22
	3.	**Types of errors:** • Framing(character and bit stuffing), error detection & correction methods; Flow control; Protocols: • Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ, HDLC • Wireless LAN: • IEEE 802.11 • Introduction to blue-tooth, VLAN's, Cellular telephony & Satellite network Token bucket algorithm, choke packets • Quality of service: o techniques to improve Qos	9	-	3	-	12	24

	4	**Side Effects and Fringe Benefits:** • Configuring the Kernel for IP Masquerade, Configuring IP Masquerade Process to process delivery • UDP TCP Congestion control algorithm: Leaky bucket algorithm	6	-	2	-	8	16
	5.	**Point to point protocol** • LCP, NCP, FDDI, • token bus, token ring; • Reservation, polling, concentration • Multiple access protocols: o Pure ALOHA, o Slotted ALOHA, o CSMA, o CSMA/CD, o FDMA, o TDMA, o CDMA; o Traditional Ethernet o fast Ethernet o Assigning IP Addresses o Creating Subnets, o Writing hosts and networks Files	10	-	3	-	13	26

	6.	**Configuration for IP:** • ifconfig, netstat command, • Checking the ARP Tables; • Name service and resolver configuration. Network layer: Internetworking & devices: (DNS) o Repeaters o Hubs o Bridges o Switches o Router o Gateway o Addressing o Internet address o Classful address o Subnetting • Routing Routing algorithms: o Shortest path algorithm, o Flooding, distance vector routing o Link state routing	10	-	3	-	13	26
	7	**Security:** • Cryptography, user authentication, • Security protocols in internet, • Firewalls. • Network Address Translation : o ISDN services & ATM o DSL technology o Cable modem, Sonet	7	3	-	-	10	20
		Total	58	3	17	-	78	156
15	**Main references supporting the course:** **a.** Douglas, E. C. (2014). *Computer Networks and Internets.* Pearson. **b.** Chwan-Hwa, J. W., & David, I. J. (2013). *Introduction to Computer Networks and Cybersecurity*(1st ed.). CRC Press Taylor & Francis Group. .							

1.	**Name of Course/Module: Leadership Skills and Human Relations**						
2.	**Course Code:** BIT 122						
3.	**Name(s) of academic staff:**						
4.	**Rationale for the inclusion of the course/module in the programme :** Identify the aspects that affected the productivity, effectiveness and efficiency of the work's quality, various interpersonal skills. Apply the basic principles of leadership by developing the practical skills and discuss about the aspects of human relations by celebrating the diversity of attitudes, self-esteem and interpersonal skills, develop leadership skills in self as a key in creating a realistic leader who relates the importance of leadership style with the construction of an organization or society.						
5.	**Semester and Year offered:** Year 1 Semester 2						
6.	**Course Hours**	Face To Face				ILT	TSLT
		L	T	P	O		
	L=Lecture T=Tutorial P=Practical O=Others TSLT=Total Student Learning Time	39	-	-	6	39	84
7.	**Credit Value:** 2						
8.	**Prerequisite:** Nil						
9.	**Learning Outcomes:** On the completion of this module, students should be able to: **Cognitive:** • Explain what leadership skills are and their impact on the productivity of the work. • Discuss how to use interpersonal skills at all levels of an organization's management. **Psychomotor:** • Enhance the ability to adapt the basic principles of leadership in life. • Build framework for aesthetic response. **Affective:** • Improve communication and relationships between individuals and groups with the conscious of diversity background. • Enhance awareness that theories of motivation and human relations influence impact on change management						
10.	**Transferable Skills:** • Problem Solving • Thinking logically within constraints • Ability to plan and organize theoretical learning as well as applied learning • Evaluating results						
11.	**Teaching-learning and assessment strategy** • Lectures • Tutorials At the end of the programme, students are given an opportunity to evaluate the course and the lecturer						

12.	**Synopsis:** The course will address panoply of topics to enhance effective practices. Among these are motivation, communication skills, power and influence, team building and group facilitation, conflict management and various approaches to leadership styles and methods with emphasis on situational approaches and transformational leadership. The importance of human relations can be summarized in one concise law of personal and organizational success: All work is done through relations.							
13.	**Mode of Delivery:** Lectures, Practical.							
14	**Content outline of the course/module and the SLT per topic**							
	No.	**Subject Description**	**Face-to-face**				**ILT**	**Total**
			Lecture	**Tutorial**	**Practical**	**Others**		
	1.	**Introduction:** • Course Overview & Objectives • What is Leadership? • What is Human Relations?	4	-	-	-	4	8
	2.	**Leadership Communication:** • Introduction to leadership • Introduction to human relations	3	-	-	-	3	6
	3.	**Models and Theories of Leadership:** • Naturalistic theories • Functional leadership theories	3	-	-	-	3	6
	4.	• Situational leadership theories • Autocratic vs Participative leadership theories • Transactional vs Transformational leadership theories	5	-	-	-	5	10
	5.	**Management and leadership:** • Functions of management • Qualities of leadership • Major styles of leadership • Factors affecting leadership styles	5	-	-	-	5	10

	6.	**Career Success Begins With Knowing Yourself:** • Understanding Communication Style • Building High Self-Esteem Personal Values Influence • Ethical Choices • Attitudes Can Shape Your Life Motivating Yourself and Others	8	-	-	-	8	16
	7.	**Personal Strategies for Improving Human Relations:** • Improving Interpersonal Relations with Constructive Self-Disclosure • Achieving Emotional Balance in a Chaotic World Building Stronger • Relationships with Positive Energy Developing Professional Presence	8	-	-	-	8	16
	8.	**Special Challenges in Human Relations:** • Responding to Personal and Work-Related Stress. • Valuing Work Force Diversity • The Changing Roles of Men and Women	3	-	-	-	3	6
		Total	39	-	-	-	39	78
15.	**Main references supporting the course:** **a.** Reece, Brandt, & Howie, (2011). Effective Human Relations :Interpersonal and Organizational Applications. 11thEdition. Canada: South-Western Cengage Learning. **b.** Richard L. Daft (2008). The leadership experience. 4thEdition. USA: Thomson South-Western							

<table>
<tr><td>1</td><td colspan="7">Name of Course/Module : Quantitative Methods</td></tr>
<tr><td>2</td><td colspan="7">Course Code: BIT 125</td></tr>
<tr><td>3</td><td colspan="7">Name(s) of academic staff:</td></tr>
<tr><td>4</td><td colspan="7">Rationale for the inclusion of the course /module in the programme:
The purpose of this course is to provide an introduction to both basic and advanced analytical tools for business disciplines.</td></tr>
<tr><td>5</td><td colspan="7">Semester and Year offered: year 1 semester 2</td></tr>
<tr><td rowspan="3">6</td><td rowspan="2">Course Hours</td><td colspan="4">Face to Face</td><td rowspan="2">ILT</td><td rowspan="2">TSLT</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>O</td></tr>
<tr><td>L=Lecture
T=Tutorial
P=Practical
O=Others
TSLT=Total student learning time</td><td>56</td><td>24</td><td>-</td><td>6</td><td>80</td><td>166</td></tr>
<tr><td>7</td><td colspan="7">Credit Value:4</td></tr>
<tr><td>8</td><td colspan="7">Prerequisite: Nil</td></tr>
<tr><td>9</td><td colspan="7">Learning Outcomes:
On completion of this course students will be able to:
<u>Cognitive:</u>
• Elucidate basic statistical concepts and tests used in educational research
<u>Psychomotor:</u>
• Demonstrate their competence and confidence in using descriptive statistics.
<u>Affective:</u>
• Understand and master the handling of data and employ proper analyses.</td></tr>
<tr><td>10</td><td colspan="7">Transferable Skills:
• Problem Solving
• Thinking logically within constraints
• Ability to plan and organize theoretical learning as well as appliedlearning
• Evaluating results</td></tr>
<tr><td>11</td><td colspan="7">Teaching –learning and assessment strategy
• Lectures
• Tutorials
At the end of the programme, students are given an opportunity to evaluate the course and the lecturer</td></tr>
<tr><td>12</td><td colspan="7">Synopsis:
This course emphasize on achieving an understanding of quantitative methods and associated statistical techniques considered so that you can think critically about suitable procedures for research design, collection and analysis of data, and the usefulness of statistics.</td></tr>
<tr><td>13</td><td colspan="7">Mode of Delivery:
Lectures, Tutorials.</td></tr>
</table>

14	Content Outline of the course/module and the SLT per topic							
	No	**Subject description**	**Face to face**				**ILT**	**Total**
			Lecture	**Tutorial**	**Practical**	**Others**		
	1	**Nature and scope of statistics:** • Definitions of statistics • Descriptive and inferential statistics • Scope of statistics • Limitations and distrusts of statistics	3	2	-	-	5	10
	2	**Data and its collection:** • Primary and secondary data • Sources of primary and secondary data • Methods of various data collection • Compilation of administrative records	4	2	-	-	6	12
	3.	**Classification and tabulation of data:** • Classification procedure: qualitative and quantitative classification • Tabulation of data	3	2	-	-	5	10
	4.	**Diagrammatic and graphic presentation of data:** • Importance and limitations • Types of diagrammatic representations: bar diagram, pie diagram; pictogram • Types of graphical representations: histogram, frequency polygon, frequency curve, cumulative frequency curve (Ogive)	5	2	-	-	7	14
	5.	**Measures of central tendency:** • Arithmetic mean • Geometric mean • Harmonic mean • The median: quartiles; deciles and percentiles • The mode • Relation between mean, median and mode	5	2	-	-	7	16

	6.	**Measures of dispersion:** • Absolute and relative measures • The range • Inter-quartile range • Quartile deviation • Mean deviation • Standard deviation • Coefficient of variation • Skewness and Kurtosis	5	2	-	-	7	14
	7	**Probability:** • Preliminaries • Classical, empirical, axiomatic approaches of probability theory • Conditional probability (Baye's Theorem) • Inverse probability • Probability distribution • Mathematical expectation • Variance of random variable	6	2	-	-	8	16
	8.	**Theoretical distribution:** • Introduction • Binominal distribution and it chief features (without proofs) • Fitting a binominal distribution • Normal distribution	4	2	-	-	6	12
	9.	**Estimation theory and testing of hypothesis:** • Sampling distribution and standard error • Test of significance for single proportion • Test of significance for single mean • Student's T-distribution and its applications	5	2	-	-	7	14
	10.	**Chi-Square distribution:** • Introduction • Application • Test of goodness of fit • Test of independence of attributes	5	2	-	-	7	14

	11.	**Correlation and regression analysis:** • Introduction • Correlation analysis • Various methods of calculating correlation coefficient • Regression analysis	5	2	-	-	7	14
	12.	**SPSS/ R program**	6	2		-	8	16
		Total	56	24	-	-	80	160
15	**Main references supporting the course:** **a.** Sukhminder Singh Et. Al., "*Statistical Method for Research Workers*", Kalyani Publishers, New Delhi **b.** B. M. Clarke & D. Cooke, "*A Basic Course in Statistics*", Elbs. (UK) **c.** B. L. Agrawal, "*Basic Statistics*", Wiley Eastern **d.** Minimum & Clarke, "*Elements of Statistical Reasoning*", Johnwiley & Sons **e.** Levin, "*Statistics for Management*", Prentice Hall of India							

<table>
<tr><td>1.</td><td colspan="6">Name of Course/Module: Digital Logic</td></tr>
<tr><td>2.</td><td colspan="6">Course Code: BIT 126</td></tr>
<tr><td>3.</td><td colspan="6">Name(s) of academic staff:</td></tr>
<tr><td>4.</td><td colspan="6">Rationale for the inclusion of the course/module in the programme :
This course is a comprehensive study of the principles and techniques of modern digital systems.</td></tr>
<tr><td>5.</td><td colspan="6">Semester and Year offered: Year 1 Semester 2</td></tr>
<tr><td rowspan="2">6.</td><td rowspan="2">Course Hours</td><td colspan="4">Face To Face</td><td rowspan="2">ILT</td><td rowspan="2">TSLT</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>O</td></tr>
<tr><td></td><td>L=Lecture
T=Tutorial
P=Practical
O=Others
TSLT=Total Student Learning Time</td><td>42</td><td>10</td><td>28</td><td>6</td><td>80</td><td>166</td></tr>
<tr><td>7.</td><td colspan="6">Credit Value: 4</td></tr>
<tr><td>8.</td><td colspan="6">Prerequisite: Nil</td></tr>
<tr><td>9.</td><td colspan="6">Learning Outcomes:
On completion of this course students will be able to:
<u>Cognitive:</u>
• Introduce fundamentals digital logic and switching networks. Exposure of Boolean algebra and its application for circuit analysis.
<u>Psychomotor:</u>
• Identify the multilevel gates networks, flip-flop, counters and logic device.
<u>Affective:</u>
• Demonstrate the acquired knowledge to apply techniques related to the design and analysis of digital electronic circuits.</td></tr>
<tr><td>10.</td><td colspan="6">Transferable Skills:
• Problem Solving
• Thinking logically within constraints
• Ability to plan and organize theoretical learning as well as appliedlearning
• Evaluating results</td></tr>
<tr><td>11.</td><td colspan="6">Teaching-learning and assessment strategy
• Lectures
• Tutorials
At the end of the programme, students are given an opportunity to evaluate the course and the lecturer</td></tr>
<tr><td>12.</td><td colspan="6">Synopsis:
This module focuses on general concepts to be used in the design and analysis of digital systems and introduces the principles of digital computer organization and design.</td></tr>
</table>

13.	**Mode of Delivery:** Lectures, Practical.							
14	**Content outline of the course/module and the SLT per topic**							
	No.	**Subject Description**	**Face-to-face**				**ILT**	**Total**
			Lecture	**Tutorial**	**Practical**	**Others**		
	1.	**Digital systems:** • Digital and Analog system • Block diagram of digital computer • Advantages /disadvantages of digital system	2	1	-	-	3	6
	2.	**Binary Numbers:** • Number system (binary, decimal, octal, hexadecimal), Importance of number system • Number base conversion (binary to decimal, octal & hexadecimal and vice versa etc). • Complements-r's, (r-1)'s • Complement methods of addition/subtraction (r's & r-1's)	3	2	-	-	5	10
	3.	**Binary systems:** • BCD codes, error-detection codes, reflected code, alphanumeric codes (ASCIL, EBCDIC) **Integrated Circuits:** • concept of DIP, SIMM, linear and digital ICs • advantage of ICs • Scale of integration-SSI, MSI, LSI,VLSI	2	-	2	-	4	8

	4.	**Basic definition of Boolean Algebra:** • Introduction • Common postulates **Basic Theory of Boolean Algebra:** • Duality theorem • Basic theorems • DeMorgans theorem **Boolean Function**	2	2	-	-	4	8
	5.	**Logic operations and Logic gates:** • Logic circuits, AND, OR, NOT operation • Logic gates : Basic gates, universal gates, Ex-OR, Ex- NOR, Buffer • Implementation of Boolean function using gates	2	-	2	-	4	8
	6.	**IC Digital Logic Families:** • RTL, TTL, MOS, CMOS, I^2L • Positive and negative logic • Special Characteristics-Fan out, Propagation delay, power dissipation, Noise margin • Characteristics	2	2	-	-	4	8
	7.	**SOP and POS:** • SOP, POS, min- term, max-term, standard and canonical form • Simplification of SOP and POS function using Boolean algebra	2	-	2	-	4	8

	8.	**K-map:** • Importance of K-map • Simplification of SOP and POS form • 2 and 3 variable K-map • 4- variable K-map • Don't care combination	2	-	2	-	4	8
	9.	**NAND and NOR implementation:** • NAND and NOR conversion • Rules for NAND and NOR implementation • Implementation of SOP and POS logic expressions using NAND, NOR and basic gates	3	-	2	-	5	10
	10.	**Design Procedure:** • Definition of combinational logic circuit • Design procedure • Realization/Implement ation	2	-	2	-	4	8
	11.	**Adders / Sub-tractors:** • Half Adder – definition, truth table, logic diagram Implementation • Full Adder-definition, truth table, logic diagram, Implementation • Half sub – tractor • Full sub-tractor	3	1	-	-	4	8

	12.	**Code Conversion:** • General concept • Code conversion- BCD to Excess-3 **Analysis Procedure:** • General concept • Steps in analysis • Obtaining Boolean functions form logic diagram • Obtaining truth table from logic diagram	2	-	2	-	4	8
	13.	**NAND, NOR, Ex – OR circuits:** • Concept of multi-level NAND and NOR circuits • Implementation of basic operations using universal Gates • Block diagram method of Boolean function Implementation • Realization of Ex-OR using basic gates and universal gates • Parity Generator, Parity Checker	2	-	2	-	4	8
	14.	**Adders:** • 4-bit Parallel Binary Adder • Decimal Adder –BCD adder **Magnitude Comparator:** • Definition • 4-bit Magnitude Comparator **Decoder:** • Definition of Encoder and Decoder • 3-to-8 line decoder	2	-	2	-	4	8

	15.	**Multiplexers:** • Meaning of multiplexing and de-multiplexing • 4-to-1 line multiplexer **Read-Only-Memory (ROM):** • Types of ROM • Combinational logic implementation of ROM	2	1	-	-	3	6
	16.	**Programmable Logic Array (PLA):** • Difference between ROM and PLA • Block diagram of PLA • PLA Program Table • Implementation of PLA	1	-	2	-	3	6
	17.	**Flip – Flop:** • Definition of sequential circuit • RS flip-flop, clock RS FF • D-flip flop, J-K flip flop, T-flip flop, J-K Master Slave FF	1	-	2	-	3	6
	18.	**Triggering of flip-flop:** • Clock pulse • Positive and negative edge triggering • Clocked JK FF, edge triggered D-FF • Direct Inputs	1	-	2	-	3	6
	19.	**Design with state equations and state reduction table:** • State table • State diagram • State equation • State Reduction and assignment **Design procedure:** • Design procedure of sequential circuits	2	-	2	-	4	8

	20.	**Registers:** • Introduction to registers • Shift registers – serial – in serial – out, parallel in- parallel out, serial in parallel out, parallel in serial Out **Ripple Counters:** • Definition of counter, ripple and synchronous Counter • A synchronous counter- BCD ripple counter, Binary ripple counter	2	1	-	-	3	6
	21.	**Synchronous Counters:** • Binary counters • Binary up/down counter • BCD counter **Timing Sequences** • Word Time generation, Timing signals, Johnson's counter **Memory Unit**	2	-	2	-	4	8
		Total	42	10	28	-	80	160
15	**Main references supporting the course:** **a.** M. Morris Mano, "Digital Logic & Computer Design" **b.** Brain Holdsworth, "Digital Logic Design", Elsevier Science. **c.** John Patrick Hayes, "Introduction to Digital Logic Design", Addison-Wesley. **d.** M. Morris Mano and Charles Kime, "Logic and Computer Design Fundamentals", Pearson New International.							

YEAR 2 SEMESTER 4

<table>
<tr><td>1.</td><td colspan="6">Name of Course/Module: TCP/IP</td></tr>
<tr><td>2.</td><td colspan="6">Course Code: BIT 241</td></tr>
<tr><td>3.</td><td colspan="6">Name(s) of academic staff:</td></tr>
<tr><td>4.</td><td colspan="6">Rationale for the inclusion of the course/module in the programme :
TCP/IP combines LANs and WANs to provide Global access for your customers and suppliers. This course is essential to learn and understand the main ideas behind building of networks and procedure to run it.</td></tr>
<tr><td>5.</td><td colspan="6">Semester and Year offered: Year 2 Semester 4</td></tr>
<tr><td rowspan="2">6.</td><td rowspan="2">Course Hours</td><td colspan="4">Face To Face</td><td rowspan="2">ILT</td><td rowspan="2">TSLT</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>O</td></tr>
<tr><td></td><td>L=Lecture
T=Tutorial
P=Practical
O=Others
TSLT=Total Student Learning Time</td><td>58</td><td>7</td><td>15</td><td>6</td><td>80</td><td>166</td></tr>
<tr><td>7.</td><td colspan="6">Credit Value: 4</td></tr>
<tr><td>8.</td><td colspan="6">Prerequisite: Nil</td></tr>
<tr><td>9.</td><td colspan="6">Learning Outcomes:
On the completion of this module, students should be able to:

<u>Cognitive:</u>
• Independently understand basic computer network technology.
• Understand and explain Data Communications System and its components.

<u>Psychomotor:</u>
• Identify the different types of network devices and their functions within a network.
• Identify the different types of network topologies and protocols
<u>Affective:</u>
• Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.</td></tr>
<tr><td>10.</td><td colspan="6">Transferable Skills:
• Problem Solving
• Thinking logically within constraints
• Ability to plan and organize theoretical learning as well as applied learning
• Evaluating results</td></tr>
<tr><td>11.</td><td colspan="6">Teaching-learning and assessment strategy
• Lectures
• Tutorials
At the end of the programme, students are given an opportunity to evaluate the course and the lecturer</td></tr>
<tr><td>12.</td><td colspan="6">Synopsis:
This course is to provide students with an overview of the concepts and fundamentals of data communication and computer networks. This course covers the topics like: TCP/IP protocols, Transmission control protocol, Internet layer and below, Transport layer protocols of the future.</td></tr>
</table>

13.	**Mode of Delivery:** Lectures, Practical.							
14	**Content outline of the course/module and the SLT per topic**							
	No.	**Subject Description**	**Face-to-face**				**ILT**	**Total**
			Lecture	**Tutorial**	**Practical**	**Others**		

	1.	**Introduction:**
		• Network Devices
		  ○ Routers
		  ○ Firewalls
		  ○ Gateways
		• Network Media and Interfaces
		  ○ Media
		  ○ Interfaces
		• Nodes and Hosts
		• Clients and Servers
		• LAN, MAN, SAN
		• WAN
		  ○ Packet Switches
		  ○ Forwarding a Packet
		• VPN
		• Network Systems
		  ○ Autonomous Systems and Backboned
		  ○ Routers and Gateways
			9	3	-	-	12	24

	2.	**Introduction & overview of TCP:**
		• Network Architecture
		  ○ Client/Server Networks
		  ○ Port Numbers
		• Network Interface Layer
		• Internet Layer
		• Transport Layer
		• Application Layer
		• Internet Security & IPSec
		• Network Management
			5	2	-	-	7	14

	3.	**TCP/IP protocols:** • IP o IP Address o IP Address Classes\ o Netmasks o Subnet Address o IP Routing o ARP o Directed Broadcast Address o Limited Boradcast Address • The Transport Layer o TCP Connection/ Socket o TCP Header • The Application Layer o DNS	6	-	2	-	8	16
	4.	**Transmission control protocol:** • Problem statement • Transmission Control Protocol Attributes and Features • Transmission Control Protocol Basics o Transmission Control Protocol Headers o Segment Size o Three way handsake o The TCP Synchronize Flood Attack o TCP Termination • Transmission Control Protocol Performance o Slow Start o Congestion Avoidance o Fast Retransmit o Fast Recovery	7	-	3	-	10	20

	5.	**Internet layer and below:** • The Internet Protocol o Internet Protocol Addressing o Address Notation o Internet Address Types o Network Address Architecture o IPv4 Type of Service o IPV4 Routing – Moving Packets – Hosts and Routers – Internet Protocol Packet Processin – Source Routing	7	-	3	-	10	20
	6.	**Transport layer protocols of the future:** • Stream Control Transmission Protocol o Stream Control Transmission protocol Architecture o Stream Control Transmission protocol Element o Stream Control Transmission protocol Functions o Datagram Control Protocol o The Future	5	-	2	-	7	14

	7.	**Next generation ip: ipv6**
		• Why IPV6?
		  ○ Whats New in IPv6
		  ○ IPv6 Addressing
		  ○ Header Simplification
		  ○ Authentication and Privacy
		• IPV6 Datagram Headers
		• IPV6 Options
		• IPV6 Addressing
		  ○ IPv6 Address Representation
		  ○ IPv6 Address Architecture
		  ○ IPv6 Address Space Structure
		• Migrating to IPV6
		  ○ Protocol Tunnelling
		  ○ IPv4/ IPv6 Dual Stack
			8	-	3	-	11	22

	8.	**Simple network management protocol:** • Managing Networks with SNMP • Simple Network Management Protocol • SNMP Commands • Structure of Management Information • Remote Network Monitoring	6	-	2	-	8	16
	9.	**Internet security:** • Security Concepts • The human Factor • Laws of Computing • Laws of Nature	5	2	-	-	7	14
		Total	58	7	15	-	80	160
15.	**Main references supporting the course:** **a.** TCP IP fourth edition(The morgan Kaufmann series in networking) **b.** TCPIP Tutorial and Technical Overview **c.** The TCP-IP Guide by Charles M. Koziero							

<table>
<tr><td>1</td><td colspan="6">Name of Course/Module : Fundamental of Algorithm</td></tr>
<tr><td>2</td><td colspan="6">Course Code: BIT 242</td></tr>
<tr><td>3</td><td colspan="6">Name(s) of academic staff:</td></tr>
<tr><td>4</td><td colspan="6">Rationale for the inclusion of the course /module in the programme:
The purpose of this course is to provide fundamental knowledge of data structure, various algorithms used and their implementations.</td></tr>
<tr><td>5</td><td colspan="6">Semester and Year offered: year 2 semester 4</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Course Hours</td><td colspan="4">Face to Face</td><td rowspan="2">ILT</td><td rowspan="2">TSLT</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>O</td></tr>
<tr><td></td><td>L= Lecture
T=Tutorial
P=Practical
O=Others
TSLT=Total student learning time</td><td>59</td><td>8</td><td>12</td><td>6</td><td>79</td><td>164</td></tr>
<tr><td>7</td><td colspan="6">Credit Value:4</td></tr>
<tr><td>8</td><td colspan="6">Prerequisite: Nil</td></tr>
<tr><td>9</td><td colspan="6">Learning Outcomes:
On completion of this course students will be able to:
<u>Cognitive:</u>
• Learn good principles of algorithm design.
<u>Psychomotor:</u>
• Analyze the performance of algorithms.
<u>Affective:</u>
• Explain fundamental computing algorithms.</td></tr>
<tr><td>10</td><td colspan="6">Transferable Skills:
• Problem Solving
• Thinking logically within constraints
• Ability to plan and organize theoretical learning as well as applied learning
• Evaluating results</td></tr>
<tr><td>11</td><td colspan="6">Teaching –learning and assessment strategy
• Lectures
• Tutorials
At the end of the programme, students are given an opportunity to evaluate the course and the lecturer</td></tr>
<tr><td>12</td><td colspan="6">Synopsis:
This core course covers the study of data and its types, algorithm efficiency and its complexity. It provides depth knowledge of ethical concepts in the context of software production.</td></tr>
<tr><td>13</td><td colspan="6">Mode of Delivery:
Lectures, Tutorials.</td></tr>
</table>

14	Content Outline of the course/module and the SLT per topic							
	No	Subject description	Face to face				ILT	Total
			Lecture	Tutorial	Practical	Others		
	1	**Introduction:** • Introduction to algorithm • Implementation issues(completeness, Time & space complexity, optimality, implementation issues with Data structure, errors and implementation of API) • Analyzing Algorithms(scientific , mathematical, Theory of Algorithm)	9	3	-	-	12	24
	2	**Model of computation:** • Introduction and Types	3	2	-	-	5	10
	3.	• Analysis of Brute-Force Algorithm(Running time analysis) • Analysis of Brute-Force Maxima Algorithm • Introduction to plane sweep algorithm • Comparison between plane sweep and Brute-Force Algorithm	9	-	3	-	12	24
	4.	**Recursion:** • Definition and recursive functions • Recursion vs iteration with advantages and disadvantages • Application of recursion – factorial calculation, Fibonacci series, TOH, natural numbers multiplication with algorithms and examples • Efficiency of recursion	10	3	-	-	13	26
	5.	**Sorting techniques:** • Analysis of Selection sort • Divide and conquer Strategy (introduction) • Quick and Merge Sort • Heap sorting	9	-	3	-	12	24

	6.	**Graph:** • Representation, Traversal • Generic graph Traversal Algorithm , Analysis of BFS • Greedy Approach(Counting Money and Huffman Encoding) • Computing Minimum Spanning Tree(Generic and Greedy MST Approach)	10	-	3	-	13	26
	7.	**Greedy Approaches of Graph Traversal:** • Kruskal's algorithm • Prim's Algorithm • Dijkstra's Algorithm • Bellman –Ford Algorithm	9	-	3	-	12	24
		Total	59	8	12		79	158
15	**Main references supporting the course:** **a.** Algorithm by Robert Sedgewick,Kevin Wayne , 4thEditon, 2011 **b.** Introduction to algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest Clifford Stein 3rd edition, 2010. **c.** "*Fundamentals of Algorithms*", G. Brassand & P. Bratley, PHI							

<table>
<tr><td>1</td><td colspan="6">Name of Course/Module : Java Programming</td></tr>
<tr><td>2</td><td colspan="6">Course Code: BIT 243</td></tr>
<tr><td>3</td><td colspan="6">Name(s) of academic staff:</td></tr>
<tr><td>4</td><td colspan="6">Rationale for the inclusion of the course /module in the programme:
This course provides basic concepts on knowledge of object-oriented paradigm in the Java programming language.</td></tr>
<tr><td>5</td><td colspan="6">Semester and Year offered: year 2 semester 4</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Course Hours</td><td colspan="4">Face to Face</td><td rowspan="2">ILT</td><td rowspan="2">TSLT</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>O</td></tr>
<tr><td></td><td>L= Lecture
T=Tutorial
P=Practical
O=Others
TSLT=Total student learning time</td><td>56</td><td>2</td><td>20</td><td>6</td><td>78</td><td>162</td></tr>
<tr><td>7</td><td colspan="6">Credit Value:4</td></tr>
<tr><td>8</td><td colspan="6">Prerequisite: Nil</td></tr>
<tr><td>9</td><td colspan="6">Learning Outcomes:
On completion of this course students will be able to:
<u>Cognitive:</u>
• Knowledge of the structure and model of the Java programming language.

<u>Psychomotor:</u>
• Develop software in the Java programming language.

<u>Affective:</u>
• Propose the use of certain technologies by implementing them in the Java programming language to solve the problem.</td></tr>
<tr><td>10</td><td colspan="6">Transferable Skills:
• Problem Solving
• Thinking logically within constraints
• Ability to plan and organize theoretical learning as well as appliedlearning
• Evaluating results</td></tr>
<tr><td>11</td><td colspan="6">Teaching –learning and assessment strategy
• Lectures
• Tutorials
At the end of the programme, students are given an opportunity to evaluate the course and the lecturer</td></tr>
<tr><td>12</td><td colspan="6">Synopsis:
This course deals with the programming in the Java programming language. It provides the knowledge about the use of Java in a variety of technologies and on different platforms.</td></tr>
<tr><td>13</td><td colspan="6">Mode of Delivery:
Lectures, Tutorials.</td></tr>
</table>

14	Content Outline of the course/module and the SLT per topic							
	No	Subject description	Face to face				ILT	Total
			Lecture	Tutorial	Practical	Others		
	1	**Elements Of Java Language**: • Java as a Programming tools • Benefits of Java • Historical Background of Java • A simple Java Program, Data type, Variable, Assignment and Initialization, Operator, String, Control Flow • Class Method (User Defined Function), Array	7	2	-	-	9	18
	2	**Object Oriented Programming In Java:** • Introduction to object oriented programming in Java • Reusability using Existing classes • Building User defined class, Package • Inheritance • Casting Abstract classes • Access Protection Mechanism • Reflection • Designing Inheritance • Interface, Inner Classes	5	-	2	-	7	14
	3.	**Exception, Stream and I/O:** • Handling Error and Exception • Catching Exception • Tips on handling Exception • Debugging techniques • Stream: Zip files Stream, Object Stream • Handling Files	4	-	2	-	6	12
	4	**Applets and Application:** • Fundamental concept of Applet • Simple Applet • Testing Applets • Converting Application to Applets • Applets HTML tags and Attribute • Pop –UP Windows in Applet • Multimedia Applets context	5	-	2	-	7	14

	5.	**Java Servlets:** • Introduction to Java Servlets • Life Cycle of servlets • Creating, Compiling and running servlet • Reading the servlet Parameters, Reading Initialization Parameter • Handling HTTP Request and Response (GET / POST Request) • Cookies, Session Tracking	5	-	2	-	7	14
	6.	**Java Server Pages:** • Advantage of JSP technology (Comparison with ASP / Servlet) • JSP Architecture • JSP Syntax (Directions, Declarations, Expression, Scriptlets, Comments) • Implicit Object of JSP, Object Scope • Exception Handling • Session Management • Creating and Processing Forms	6	-	2	-	8	16
	7.	**Events, Handling Events and AWT/Swing:** • Basic of Event handling • AWT Event hierarchy • Semantics and low level Events in AWT • Event Handling • Individual Events, Separating GUI and Application code • Multicasting • Advance Event Handling • An Introduction of layout management, Text input choice, scroll Bar • Complex layout management, Menus, Dialog Box	8	-	3	-	11	22

	8.	**Graphics and Images / Animation / Multimedia**: • Introduction to Graphics Programming • Creating Closable frames • Terminating graphics program • Frame layout displaying information in a frame • Graphics object. Text and fonts, color • Drawing shapes from lines drawing rectangle and Ovals • Filling shapes paint mode images	5	-	3	-	8	16
	9.	**Network Programming:** • Networking Basics • Introduction to Socket • Socket Programming • Understanding Port • Networking Classes in Java • Creating Own Server and Client in Java • Creating Multithread Java Server • URL and URL connection Class	6	-	2	-	8	16
	10.	**Java Database Connectivity (JDBC):** • Understanding JDBC • Database Driver • JDBC-ODBC bridge • Java Native Driver • Intermediate Database Access Server • JDBC API • Making a JDBC Application • Using Prepared Statement	5	-	2	-	7	14
		Total	56	2	20	-	78	156
15	**Main references supporting the course:** **a.** Dietel H.M and Dietel P.J., Java: How to Program, Third Edition, Pearson Education Asia **b.** Naughton Java 2: The Complete Reference, Tata McGraw Hill **c.** Balagurusamy E., Programming in Java: 2nd Edition, Tata McGraw Hill							

<table>
<tr><td>1</td><td colspan="6">Name of Course/Module : Software Engineering</td></tr>
<tr><td>2</td><td colspan="6">Course Code: BIT 244</td></tr>
<tr><td>3</td><td colspan="6">Name(s) of academic staff:</td></tr>
<tr><td>4</td><td colspan="6">Rationale for the inclusion of the course /module in the programme:
This course provides basic concepts on software engineering with its principle, characteristics its process and life cycle models.</td></tr>
<tr><td>5</td><td colspan="6">Semester and Year offered: year 2 semester 4</td></tr>
<tr><td rowspan="3">6</td><td rowspan="2">Course Hours</td><td colspan="4">Face to Face</td><td rowspan="2">ILT</td><td rowspan="2">TSLT</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>O</td></tr>
<tr><td>L=Lecture
T=Tutorial
P=Practical
O=Others
TSLT=Total student learning time</td><td>50</td><td>3</td><td>27</td><td>6</td><td>80</td><td>166</td></tr>
<tr><td>7</td><td colspan="6">Credit Value:4</td></tr>
<tr><td>8</td><td colspan="6">Prerequisite: Nil</td></tr>
<tr><td>9</td><td colspan="6">Learning Outcomes:
On completion of this course students will be able to:
<u>Cognitive:</u>
• Understand the principles of large scale software systems, and the processes that are used to build them.
<u>Psychomotor:</u>
• Acquire skills to think about problems and their solutions using appropriate methods of analysis and design.
<u>Affective:</u>
• Identify some of the main risks of software development and use.</td></tr>
<tr><td>10</td><td colspan="6">Transferable Skills:
• Problem Solving
• Thinking logically within constraints
• Ability to plan and organize theoretical learning as well as applied learning
• Evaluating results</td></tr>
<tr><td>11</td><td colspan="6">Teaching –learning and assessment strategy
• Lectures
• Tutorials
At the end of the programme, students are given an opportunity to evaluate the course and the lecturer</td></tr>
<tr><td>12</td><td colspan="6">Synopsis:
Study a body of knowledge relating to Software Engineering, Software reengineering, and maintenance. It helps to investigate and improve the specification of a software system as well as use and evaluate appropriate tools and techniques.</td></tr>
<tr><td>13</td><td colspan="6">Mode of Delivery:
Lectures, Tutorials.</td></tr>
</table>

14	Content Outline of the course/module and the SLT per topic								
	No	**Subject description**	**Face to face**				**ILT**	**Total**
			Lecture	**Tutorial**	**Practical**	**Others**		
	1	**Introduction to software engineering:** • Basic concepts • Software engineering principles • Software characteristics • Applications • Objectives of software engineering • Phases of software engineering	4	3	-	-	7	14
	2	**Software process and Life Cycle models:** • Software process • Project and product • Process assessment • Software Process capability maturity model: CMM Model • Life cycle models: Waterfall model, Incremental model, spiral model, advantages and disadvantages	4	-	3	-	7	14
	3.	**Software life cycles Models -2:** • Prototyping Model, • Object-oriented model, • Agile model, • Extreme programming (Latest models can be discussed), advantages and disadvantages.	4	-	2	-	6	12
	4	**Software requirements:** • Functional- non-functional requirements • User requirement • System requirements • Software requirements documentation	4	-	2	-	6	12
	5.	**Software Requirement engineering process:** • Feasibility studies • Requirements elicitation and analysis • Requirement validation • Software prototyping • Requirement management	6	-	2	-	8	16

	6.	**Software Reliability:** • Software Reliability • Software Reliability Metrics • Programming for Reliability • Software Reuse	5	-	2	-	7	14
	7	**Software design:** • Basics of software design • Data design • Architectural design • Component level design and user interface design • Fundamental design concepts-module and modularization • Design techniques	5	-	2	-	7	14
	8.	**Object oriented design:** • Objects and object classes • Relationship: An Object Oriented design process • Object identification • Design model (sequence model, state diagram)	4	-	2	-	6	12
	9.	**Software Implementation:** • **Implementation:** o Structures coding technique o Coding styles o Coding methodology o Coding verification techniques o Coding tools o Code documentation o Standards and guidelines	2	-	2	-	4	8
	10.	**Software maintenance:** • Software re-engineering • Change management • Configuration management • Maintenance tools and techniques	2	-	2	-	4	8
	11.	**Software testing strategies:** • A strategic approach to software testing • Test strategies for convention software • Black-box and white box testing • Validation and system testing and debugging	3	-	2	-	5	10

	12.	**Software metrics:** • Software quality metrics • Metrics for analysis models • Metrics for design model • Metrics for source code • Metrics for testing • Metrics for maintenance	3	-	2	-	5	10
	13.	**Quality Management:** • Quality Management • Quality concepts • Software quality assurance • Software reviews • Formal Technical reviews • The ISO 9000 quality standards	3	-	2	-	5	10
	14.	**Software project management:** • Project planning • Project scheduling • Project staffing • People capability maturity model	2	-	2	-	4	8
		Total	50	3	27	-	80	160

15 **Main references supporting the course:**

a. *Software Engineering*, A Practitioner's Approach Roger S. Pressman, 6th edition. McGraw Hill International edition

b. *Software Engineering*, Sommerville, 7th edition, Pearson education, 2004

<table>
<tr><td>1.</td><td colspan="6">Name of Course/Module: RDBMS with SQL</td></tr>
<tr><td>2.</td><td colspan="6">Course Code: BIT 245</td></tr>
<tr><td>3.</td><td colspan="6">Name(s) of academic staff:</td></tr>
<tr><td>4.</td><td colspan="6">Rationale for the inclusion of the course/module in the programme :
The course is essential to understand a relational database management system (RDBMS) and database management system (DBMS) that is based on the relational model.</td></tr>
<tr><td>5.</td><td colspan="6">Semester and Year offered: Year 2 Semester 4</td></tr>
<tr><td rowspan="2">6.</td><td rowspan="2">Course Hours</td><td colspan="4">Face To Face</td><td rowspan="2">ILT</td><td rowspan="2">TSLT</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>O</td></tr>
<tr><td></td><td>L=Lecture
T=Tutorial
P=Practical
O=Others
TSLT=Total Student Learning Time</td><td>55</td><td>3</td><td>20</td><td>6</td><td>78</td><td>162</td></tr>
<tr><td>7.</td><td colspan="6">Credit Value: 4</td></tr>
<tr><td>8.</td><td colspan="6">Prerequisite: Nil</td></tr>
<tr><td>9.</td><td colspan="6">Learning Outcomes:
On the completion of this module, students should be able to:

<u>Cognitive:</u>
• Explain the concepts of relational database management system (RDBMS),particularly:
• What an RDBMS is, and how it differs from older flat file systems.

<u>Psychomotor:</u>
• The importance of the data model, its building blocks, and how it relates to business rules.
• How data is organized through the use of integrity rules and primary and foreign keys
<u>Affective:</u>
• The importance of relational set operators, the data dictionary, and indexes.
• Explain the fundamental differences between logical and physical database design.</td></tr>
<tr><td>10.</td><td colspan="6">Transferable Skills:
• Problem Solving
• Thinking logically within constraints
• Ability to plan and organize theoretical learning as well as applied learning
• Evaluating results</td></tr>
<tr><td>11.</td><td colspan="6">Teaching-learning and assessment strategy
• Lectures
• Tutorials
At the end of the programme, students are given an opportunity to evaluate the course and the lecturer</td></tr>
<tr><td>12.</td><td colspan="6">Synopsis:
This course is an introductory application-oriented course covers the relational database systems RDBS – the predominant system for business, scientific and engineering applications at present.</td></tr>
<tr><td>13.</td><td colspan="6">Mode of Delivery:
Lectures, Practical.</td></tr>
<tr><td>14</td><td colspan="6">Content outline of the course/module and the SLT per topic</td></tr>
</table>

	No.	Subject Description	Face-to-face				ILT	Total
			Lecture	Tutorial	Practical	Others		
	1.	**Introduction:** • The SQL Language • The Role of SQL • SQL Success Factors o Official SQL Standards o Microsoft Support o Relational Foundation o Complete Database Language o Client/ Server Architecture o Retrieving Data o Creating a Database	6	3	-	-	9	18
	2.	**Relational databases:** • Early Data Models o File Management Systems o Hierarchical Databases o Network Databases • The Relational Data Model o The Sample Database o Tables o Primary Keys o Relationships o Foreign Keys • Codd's 12 Rules for Relational Databases	6	-	3	-	9	18

	3.	**Retrieving data:** • SQL Basics o Name: – Table Names – Column Names o Data Types o Constants • Simple Queries o The SELECT Statement – The SELECT Clause – The FROM Clause o Multitable Queries (Joins) o Duplicate Rows o Row Selection o Search Conditions o The Comparison Test (=, <,>, <=, >=) o The Range Test (BETWEEN) o The Set Membership Test (IN) o The Pattern Matching Test (LIKE) o The Null Value Test (IS NULL) o Compound Search Conditions (AND, OR and NOT) o Sorting Query Results (ORDER BY Clause)	10	-	4	-	14	28

	4.	**Relational algebra – the foundation:** • Introduction • Operators: Select, Project, Rename, Union, Intersection, Minus, Cartesian Product, Theta Join, Equijoin, Natural Join, Division • Relations and Predicates • Relational Operators and Logical Operators • JOIN and AND • RENAME • Projection, Restriction and AND • Extension and AND • UNION and OR • Database Updates • Data Integrity • Transaction Processing	8	-	4	-	12	24
	5.	**Database design i: projection – join normalization:** • Introduction • Creating a Database • SQL Security • Avoiding Redundancy • Join Dependency • Normalization upto BCNF • The role of FDs and Keys in Optimization • Boyce – Codd Normal Form (BCNF) • Surrogate Keys • Entity Relationship (ER) Modelling • What is Type?	8	-	3	-	11	22

	6.	**Data models:** • The Entity Relationship Model • Advantages and Disadvantages of E-R Data Model	5	-	2	-	7	14

	7.	**SQL today and tomorrow:**
		• Database Processing and Stored Procedural SQL
		• SQL and Data Warehousing
		• SQL and Application Servers
		• SQL and XML
		• Database Market Trends
		  ○ Enterprise Database Market maturity
		  ○ Software-as-a-Service (SaaS)
		  ○ Database Server Appliances
		  ○ SQL Standardization
		• SQL in Next Decade
		  ○ Distributed Databases
		  ○ Massive Data Warehousing for Business Optimization
		  ○ Embedded Databases
		  ○ Cloud Based and Horizontally Scalable Databases
			12	-	4	-	16	32

		Total	55	3	20	-	78	156
15.	**Main references supporting the course:** **a.** An_Introduction_to_Relational_Database_Theory_Hugh Darwen **b.** Mcgraw hill sql the complete reference 3rd edition 10 2009 **c.** MySQL Cookbook, 3rd Edition							