Re-Accredited by NAAC with 'A' Grade
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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–: પરિપત્ર :–

કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખા હેઠળની તમામ બી.એસસી.(કોમ્પ્યુટર સાયન્સ) ચલાવતી સંલગ્ન કોલેજોના આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૨–૨૩ થી અમલમાં આવનાર B.Sc. (Computer Science) Sem_5 & 6 નો કોમ્પ્યુટર સાયન્સ વિષયની અભ્યાસસમિતિની તા.૦૭/૧૦/૨૦૨૧ ની સભામાં ઠરાવ ક્રમાંકઃ ૯ થી નિમેલ પેટાસમિતિએ તૈયાર કરેલ અભ્યાસક્રમ કોમ્પ્યુટર સાયન્સ વિષયની અભ્યાસ સમિતિનાં ચેરમેનશ્રીએ બોર્ડવતી અને કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ વિદ્યાશાખાવતી મંજૂર કરેલ છે અને એકેડેમિક કાઉન્સિલવતી માન.કુલપતિશ્રીએ મંજૂર કરેલ છે. જેની આથી જાણ કરવામાં આવે છે.

(બિડાણઃ ઉપર મુજબ)

ક્રમાંક : એસ./સિલેબસ/પરિપત્ર/૧૬૦૭૨/૨૦૨૨
તા.૨૧/૦૭/૨૦૨૨

ઈ.ચા.કુલસચિવ

પ્રતિ,
૧) બી.એસસી.(કોમ્પ્યુટર સાયન્સ)નો અભ્યાસક્રમ ચલાવતી સંલગ્ન કોલેજોના આચાર્યશ્રીઓ.
.....આપશ્રીની કોલેજ/વિભાગના સંબંધિત શિક્ષકોને જાણ કરી અમલ કરવા સારૂ.

૨) ડીનશ્રી, કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખા.
૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
.....તરફ જાણ સારૂ.

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT Syllabus for T. Y. B. Sc (Computer Science) With effect from June 2022

Name of Program	Bachelor in Computer Science
Abbreviation	B.Sc.(Computer Science)
Duration	3 Years (Full Time – Regular Course)
Eligibility	Candidate must have passed standard 12th (H.S.C.) Examination in Science stream through Gujarat Higher Secondary Board (G.H.S.E.B.) or any other equivalent board (C.B.S.E. / I.C.S.E.) with English subject. Students passed with vocational stream in 12th (H.Sc.) are also eligible. Candidate passed ITI and Diploma are eligible as per the Norms of Gujarat Government.
Objective of the Program	The basic objective of the program is to open a channel of admission for computing courses for students, who have done the 10+2 and are interested in taking computing/IT as a Career. The program caters to the needs of the students aspiring to excel in the fields of computers. The program is designed to develop computer professionals versatile in almost all field of computer application .The main emphasis of the course is preparing students in the field of computer science and application areas of computer science including software Development skills.
Program Outcome	It will open field for the aspiring students to opt further career or masters' level study in the fields of Research, Design, Architecture and software development. PSO 1 : Develop and Strengthen the fundamental core computer science concepts that are required to solve complex problems. PSO 2 : Develop the professional skills that needs independent logical and analytical thinking, teamwork for successful computer professional. PSO 3 : Nurture the students for design and development of workable computer application solution for real world problems. PSO 4 : Develop students for self-learning and practicing computer science application problem solutions. PSO 5 : Develop ability to service and excel in fulfilling the modern day

	demands with their knowledge and skills. PSO 6 : Develop technical project and present them among the users.
Medium of Instruction	English
Program Structure	Three years of Graduate level course comprises of six Semesters.

Course Structure for Third Year B.Sc. (Computer Science) Semester-V

Course	Paper Code	Paper Title	Theory (Marks)		Practical (Marks)		Total Credits
			Internal	External	Internal	External	
Core Compulsory	501	Software Engineering	20	50	0	0	18
	502	Computer Networking	20	50	0	0	
	503	Computer Graphics	20	50	0	0	
	504	Java Programming – I	20	50	10	20	
	505	PHP Programming - I	20	50	10	20	
	506	Python Programming-I	20	50	10	20	
		Minor Project	-	-	30	60	
Generic Elective	507-1	Open Source Tools	20	50	NIL	NIL	2
	507-2	Operation Research					
	507-3	System Software					
	507-4	Introduction of Data warehousing & Data mining					
Foundation Compulsory			20	50	NIL	NIL	2
Foundation Elective (to be selected from NCC / NSS / Saptadhara/PT)			NIL				2
Total:			**170**	**420**	**60**	**120**	**24**

1. Batch Size – 20 Maximum
2. In case of more than 10 students in a batch, separate batch should be considered.
3. The journal should be certified by the concerned faculty and also by the Head of the Department, failing which the student should not be allowed to appear for External Practical Examination.
4. In House minor project will be carried out and internal guide will supervise the project work.

P.N.: In case of Generic Elective Paper available in both semesters, it can be opted only during one semester. The same title cannot be repeated in another semester.

Course Code	Theory		Practical		University Examination (Theory + Practical)		Internal Marks	Total Marks
	Credit	Hours	Credit	Hours	Duration	Marks		
501	2	2	-	-	2	50	20	70
502	2	2	-	-	2	50	20	70
503	2	2	-	-	2	50	20	70
504	2	2	1	2	2 + 2	50+20	20+10	100
505	2	2	1	2	2 + 2	50+20	20+10	100
506	2	2	1	2	2 + 2	50+20	20+10	100
507	2	2	-	-	2	50	20	70
Minor Project	-	-	3	6		60	30	90
Foundation Compulsory	2	2	-	-	2	50	20	70
Foundation Elective	2	-	-	-		-	-	-
Total:	**18**	**16**	**6**	**12**		**520**	**220**	**740**

Course Structure for Third Year B.Sc.(Computer Science) Semester-VI

Course	Paper Code	Paper Title	Theory (Marks)		Practical (Marks)		Total Credits
			Internal	**External**	**Internal**	**External**	
Core Compulsory	601	Cloud Computing Fundamentals	20	50	0	0	18
	602	Python Programming-II	20	50	10	20	
	603	IOT	20	50	0	0	
	604	Java Programming – II	20	50	10	20	
	605	Fundamentals of Mobile Programming	20	50	10	20	
	606	Operating System	20	50	0	0	
		Major Project	-	-	30	60	
Generic Elective	607-1	Software Quality Assurance	20	50	NIL	NIL	2
	607-2	Organizational Structure & Behaviors					
	607-3	Information System					
	607-4	Software Testing Automation					
Foundation Compulsory			20	50	NIL	NIL	2
Foundation Elective (to be selected from NCC / NSS / Saptadhara / PT)			NIL				2
Total:			**160**	**400**	**60**	**120**	**24**

For Practical:

1. Batch Size – 20 Maximum
2. In case of more than 10 students in a batch, separate batch should be considered.
3. The journal should be certified by the concerned faculty and also by the Head of the Department, failing which the student should not be allowed to appear for External Practical
4. In-house Major Project can be carried out and internal guide will supervise the project work during the Project hours allotted.

Course Code	Theory		Practical		University Examination (Theory + Practical)		Internal Marks	Total Marks
	Credit	**Hours**	**Credit**	**Hours**	**Duration**	**Marks**		
601	2	2	-	-	2	50	20	70
602	2	2	1	2	2 + 2	50+20	20+10	100
603	2	2	-	-	2	50	20	70
604	2	2	1	2	2 + 2	50+20	20+10	100
605	2	2	1	2	2 + 2	50+20	20+10	100
606	2	2	-	-	2	50	20	70
607	2	2	-	-	3	50	20	70
Minor Project	-	-	3	6	-	60	30	90
Foundation Compulsory	2	2	-	-	2	50	20	70
Foundation Elective	2	-	-	-	-	-	-	-
Total:	**18**	**16**	**6**	**12**	-	**520**	**220**	**740**

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT
T Y B. Sc. (Computer Science)
Syllabus for T. Y. B. Sc. Semester-V
Effective From: June-2022
Course: 501: Software Engineering

<table>
<tr><td>Course code</td><td>501</td></tr>
<tr><td>Course Title</td><td>Software Engineering</td></tr>
<tr><td>Credit</td><td>2</td></tr>
<tr><td>Teaching per week</td><td>2 hrs</td></tr>
<tr><td>Minimum week per semester</td><td>15 (Including Class work, examination, preparation, holidays etc.)</td></tr>
<tr><td>Last Review / Revision</td><td>June 2019</td></tr>
<tr><td>Purpose of the course</td><td>• To make students understand how to develop software in correct way.
• To make students understand various components of software process model and their working.
• To make students understand the importance of requirement analysis.
• To make students understand various approaches of system design.
• To make students get idea of software teams develop skill of project management.</td></tr>
<tr><td>Course Objective</td><td>1) Students should be able to understand how software is developed and importance of various aspects of software engineering.
2) Help students appreciate the role of various design principles.
3) Students should be able to perform requirement analysis and system design for their applications.</td></tr>
<tr><td>Pre-requisite</td><td>Prior knowledge of basic software.</td></tr>
<tr><td>Course out come</td><td>CO1: Students understand software characteristics and problems and Engineering approach to develop software.
CO2: Students understand importance of requirement analysis and Techniques to elicitation.
CO3: Students understand various components of software process Model and their working.
CO4: Students understand the importance of design and principles and concepts and learn how to make system design and detailed design
CO5: Students understand about effort estimation, various software teams management and skill of project management.</td></tr>
<tr><td>Mapping Between COs and PSOs</td><td>
<table>
<tr><th></th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PSO5</th><th>PSO6</th></tr>
<tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Course Content</td><td>Unit 1. Introduction to Software Engineering
1.1 Software
1.1.1 Software & Software Types
1.1.2 Software characteristics & problems
1.1.3 Software quality factors
1.2 Software Engineering & problem related to it
1.3 Software engineering approach
1.3.1 Introduction to phased development approach
1.3.2 Introduction to effort distribution
1.4 Software process models
• Linear sequential / waterfall model</td></tr>
</table>

	• Prototype model • RAD model • Incremental model, • Spiral model. **Unit 2. Software Requirement analysis & specification** 2.1 Requirement gathering formal & informal techniques 2.1.1 Interviews, Questionnaires, System walk through, Document survey 2.1.2 Introduction to FAST , QFD & JAD 2.2 Requirement modeling 2.2.1 Data Modeling - Data, attribute, relationship, Entity Relationship Diagram. 2.2.2 Functional modeling – DFD & process specification 2.2.3 Data Dictionary 2.3 Software Requirement Specification 2.3.1 Structure & Component of SRS 2.3.2 Characteristics of SRS **Unit 3. Software Designing** 3.1 Introduction to Design - Importance of design, Relationship between analysis & design, Design Principals 3.2 Design Concepts 3.2.1 System level design concepts – Abstraction, Refinement , Modularity, Information hiding, Polymorphism and reusability 3.2.2 Module level design concepts – Coupling, Cohesion 3.3 Detailed Design 3.3.1 Database design - Normalization, Indexing, constraints 3.3.2 Overview of Designing software architecture 3.3.3 UI / UX Design guidelines 3.3.4 Procedural design - PDL, Decision table **Unit 4. Software implementation and Project management** 4.1 Programming practices - Pair programming, Extreme Programming, Coding rules and guidelines. 4.2 Project management 4.2.1 Software estimation - COCOMO Model – II 4.2.2 Project scheduling and tracking - Time line charts and project table. 4.2.3 Software team management - CC, CD, DD team structure 4.2.4 Software project maintenance
Reference Books	1 Integrated Approach to Software Engineering Pankaj Jalote Narosa Publication. 2 Software Engineering: A Practitioner's Approach 4e/5e, Roger S. Pressmann McGrawHill Publication. 3 Workbook on System Analysis and Design 1e/2e, Garg, Srinivasan PHI. 4 Software Engineering K. K. Aggrawal, Yogesh Singh New Age International Publishers. 5 Fundamentals of Software Engineering Carlo Ghezzi, Mehdi Jazayeri, Dino Mendrilo PHI. 6 Software Engineering Ian Summwerville Addison Wesley- Pearson Education. 7 Software Engineering K. L. James PHI. 8 System Analysis and Design Elias M. Awad Galgotia Publication. 9 System Analysis and Design in a changing world John W. Stazinger, Robert B. Jacobson, Stephen D Burd, Thomson Learning.
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment

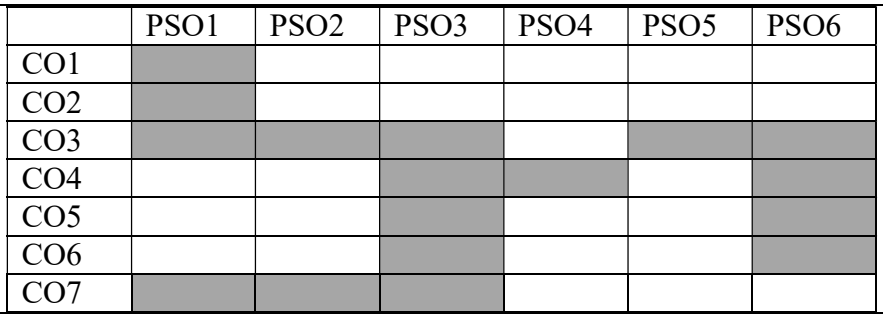
VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT
T Y B. Sc. (Computer Science)
Syllabus for T. Y. B. Sc. Semester-V
Effective From: June-2022
Course: 502: Computer Networking

<table>
<tr><td>Course Code</td><td>502</td></tr>
<tr><td>Course Title</td><td>Computer Networking</td></tr>
<tr><td>Credit</td><td>2</td></tr>
<tr><td>Teaching per Week</td><td>2 Hrs</td></tr>
<tr><td>Minimum weeks per Semester</td><td>15 (Including Class work, examination, preparation, holidays etc.)</td></tr>
<tr><td>Last Review / Revision</td><td>June, 2019</td></tr>
<tr><td>Purpose of Course</td><td>This course imparts the knowledge of Fundamentals of Computer Networks.</td></tr>
<tr><td>Course Objective</td><td>Students should be exposed to fundamentals of computer networks and should be able to understand computer network related protocols and activities.</td></tr>
<tr><td>Pre-requisite</td><td>Basic Knowledge of Computer Organization</td></tr>
<tr><td>Course Out come</td><td>CO1. Explain students about fundaments of network, types of networks, topologies, Data Communication Fundamentals.
CO2. Explain about the OSI models and services of each layer, to make students able to understand working of data transmission from device to device.
CO3. Explain TCP/IP protocol suite, class addressing
CO4. Explain about method of delivery, ICMP, ARP, Port and Sockets.
CO5. Explain in detail about UDP and TCP Protocol.
CO6. Explain and train student about DNS, Name Servers, HTTP
CO7. Understanding about Email architecture, Services and Email Protocols (SMTP, POP3, IMAP).</td></tr>
<tr><td>Mapping between COs with PSOs</td><td>
<table>
<tr><th></th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PSO5</th><th>PSO6</th></tr>
<tr><td>CO1</td><td>■</td><td>■</td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO2</td><td>■</td><td>■</td><td>■</td><td></td><td>■</td><td></td></tr>
<tr><td>CO3</td><td></td><td>■</td><td></td><td>■</td><td></td><td></td></tr>
<tr><td>CO4</td><td></td><td>■</td><td></td><td>■</td><td>■</td><td></td></tr>
<tr><td>CO5</td><td>■</td><td>■</td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO6</td><td>■</td><td>■</td><td></td><td></td><td>■</td><td></td></tr>
<tr><td>CO7</td><td>■</td><td>■</td><td></td><td></td><td>■</td><td></td></tr>
</table>
</td></tr>
<tr><td>Course Content</td><td>1 Network Fundamentals
1.1 Introduction to Networks, types of networks, Need, Uses and advantages of Network.
1.2 Networking topologies
1.3 Client/Server, hybrid and Peer-Peer network
1.4 Data communication fundamentals - Signals, Bandwidth, Frequency, Simplex and duplex communication, Multiplexing.
2 OSI Model and related network infrastructure
2.1 OSI Model&services of each layer
2.2 Physical and Data LinkLayer- MAC and LLC sub layer, CSMA/CD, CSMA/CA, IEEE 802 Standards, Transmission media, NIC, Repeaters, Hubs, and Bridges.
2.3 Nnetwork and transport Layer - Concept of logical addressing, Switching &Routing, L2-L3 Switches and Routers
2.4 OSI Model Upper Layer - Session management, FTP, NFS, Proxy</td></tr>
</table>

	and Gateway **3 Basics of TCP/IP** 3.1 The TCP/IP protocol layer 3.2 IP addressing –IP Subnets –IP routing 3.3 Method of delivery–Unicast, Boradcast, Multicast andAnycast. 3.4 ICMP protocol , ARP protocol 3.5 Concepts of Port and Sockets. 3.6 User Datagram Protocol 3.7 TCP protocol - Features, Connection and Segment, Flow control, error control, Congestion control **4. Internet Basics and Email services** 4.1 DNS – Namespace, Resource records, DNS Query, Name servers 4.2 HTTP 4.3 Email Architecture and Services 4.4 Email Protocols - SMTP, POP3, IMAP
Reference Books:	1. Networking Complete Third edition, BPB Publication 2. Mastering Local Area Networks, Christa Anderson & Mark Minasi BPB Publication 3. Networking Essentials Study Guide, MCSE TataMcGrawHill Publication 4. Computer Networks, TenanBaum PHI 5. Data communication & N/W, B. Forouzan, TataMcGrawHill Publication 6. Internetworking with TCP/IP – Principles, Protocols and Architecture Fifth Edition Douglas Comer, PHI 7. TCP/IP Illustrated, Volume – 1, W. Richard Stevens, G. Gabrani – Pearson 8. Computer Networks Bhushan Trivedi, Oxford 9. Computer Networks Sanjay Sharma Katson Books 10. Introduction to Data and Network Communications by Michel Miller Gengage Learning 11. Fundamental of Computer Network second edition by Sudakshina Kundu PHI 12. Understanding TCP/IP A clear and comprehensive guide to TCP/IP protocols By Libor Dostalek and Alena KabelovaPackt publishing
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT
T Y B. Sc. (Computer Science)
Syllabus for T. Y. B. Sc. Semester-V
Effective From: June-2022
Course 503:Computer Graphics

Course Code	503
Course Title	**Computer Graphics**
Credit	2
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June, 2019
Purpose of Course	• To provide Fundamental knowledge about computer graphics • To understand the geometry of shapes, drawing of line and circle generation algorithms • To understand polygon and filling the polygons • To understand 2D and Homogeneous transformations • To understand viewing, windowing and clipping • To understand graphic shadings and file formats
Course Objective	• Understand and develop line and circle generation algorithms • Understand the concepts of polygons and filing of polygon • Apply 2D and homogeneous transformations • Develop clipping algorithms for point, line and polygons • Learn the concepts of viewing, windowing, light source and shading • Learn different file formats
Pre-requisite	Basic knowledge about the Graphics and computer graphics.
Course Out come	CO1 :Explain students about fundamentals of Image processing, basic input output technology and standards of Graphics. CO2 : Make students understands about display devices like Hardcopy, Raster-Scan display, Video Controller and Image scanners. CO3: Understand and develop line and circle generation algorithms CO4 :Students will be able to understand Polygon, various Polygon testing methods, methods of fill polygon and character generation. CO5 :Students will be able to understand 2D and 3D transformations CO6 :Students will be able to understand various algorithms of

	windowing and clipping such as Cohen – Sutherland Line Clipping Algorithm, Sutherland Hodgman Polygon Clipping Algorithm etc. CO7: Student will be able to understand the concept of shadow, shading and transparency also students understand about different file formats like JPEG,BMP, GIF etc.
Mapping between COs with PSOs	
Course Content	**1.Overview of Computer Graphics and Graphics primitives** 1.1 Overview of Computer graphics 1.1.1 Historical background of computer Graphics 1.1.2 Applications of Computer Graphics 1.1.3 Popular graphics software 1.1.4 Pixel graphics versus Vector Graphics 1.1.5 Hard copy graphics Devices 1.2. Graphics primitive 1.2.1 Line Drawing Algorithms 1.2.1.1 Vecgen Algorithm 1.2.1.2 Brasenham Line Drawing Algorithm 1.2.2 Circle generating algorithms 1.2.2.1 Parametric circle drawing algorithm 1.2.2.2 Brasenham circle algorithm 1.2.3 Different line styles 1.2.3.1 Thick line 1.2.3.2 Line caps 1.2.3.3 Thick line joins 1.2.3.4 Pens and Brushes 1.2.4 Curves - DDA approach for drawing a circular arc 1.2.5 Text and Character Attributes 1.2.6 Anti Aliasing **2. Polygons** 2.1 Polygon formation 2.2 Polygon inside tests 2.2.1 Even – odd method 2.2.2 Winding number method 2.2.3 Some other method for performing inside test 2.3 Polygon area filling 2.3.1 Flood fill method 2.3.2 Scan line fill method 2.3.3 Boundary fill

	3. Geometric Transformation 3.1 Basic transformation - Scaling, Translation, Rotation 3.2 Homogeneous Coordinates 3.3 Rotation relative to and Arbitrary point 3.4 Some other transformations: Reflection, Sharing 3.5 Coordinate Transformation 3.6 Inverse Transformation 3.7 Affine Transformation 3.8 Raster Transformation **4. Viewing in two dimensions and Visual Realism** 4.1 Window and View port 4.2 Viewing Transformation 4.3 Clipping 4.3.1 Point Clipping 4.3.2 Line Clipping 4.3.3 Polygon Clipping 4.3.4 Text Clipping 4.4 Sutherland – Hodgman Polygon clipping algorithm 4.5Visual Realism 4.5.1 Light Sources, 4.5.2 Illumination, 4.5.3 Shading, 4.5.4 Transparency, 4.5.5 Shadow, 4.5.6 Colors 4.5.7 Graphics File formats: Bitmap, JPEG, GIF, PNG
Reference Books:	1) Computer Graphics, Donald Hearn, M Pauline Baker, PHI, New Delhi 2) Computer Graphics : Dr A A Desai, PHI 3) Computer Graphics, Herrington, PHI, New Delhi 4) Principle of Computer Graphics, Newman & Sproul, McGraw Hill 5) Interactive Computer Graphics, Giloi W K , PHI, New Delhi 6) Mukherjee &Jana : Computer Graphics : Algorithms & Implementations, PHI 7) Giloi W.K.: Interactive Computer Graphics – Prentice Hall India 8) New Man W. & Sproul P.F. - Principles of Interactive Computer Graphics, McGraw Hill. 9) Rogers D.F. – Procedural Elements for Computer Graphics McGraw Hill
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT
T Y B. Sc. (Computer Science)
Syllabus for T. Y. B. Sc. Semester-V
Effective From: June-2022
Course: 504: Java Programming – I

<table>
<tr><td>Course Code</td><td>504</td></tr>
<tr><td>Course Title</td><td>Java Programming – I</td></tr>
<tr><td>Credit</td><td>2</td></tr>
<tr><td>Teaching per Week</td><td>2 Hrs</td></tr>
<tr><td>Minimum weeks per Semester</td><td>15 (Including Class work, examination, preparation, holidays etc.)</td></tr>
<tr><td>Last Review / Revision</td><td>June, 2019</td></tr>
<tr><td>Purpose of Course</td><td>To teach object oriented programming concepts through programming using Java as the computer Programming language.</td></tr>
<tr><td>Course Objective</td><td>1. To make students understand object oriented programming.
2. To make students understand various inbuilt java classes those are available along with its working.
3. To make students understand the importance of OOP methodology.
4. To make students understand various types of OOP programming techniques.</td></tr>
<tr><td>Pre-requisite</td><td>Fundamentals of Object Oriented Programming Language. Knowledge of C and C++.</td></tr>
<tr><td>Course Out come</td><td>CO1. Explain students the fundamental aspects of the java programming
CO2. Explain students JVM & garbage collection
CO3. Train students to develop Java programs for the real-world objects using Object-oriented concepts like Classes and Objects, Inheritance, Polymorphism, Interfaces and Abstraction.
CO4. Train students to understand various Java In-built classes and its working.
CO5. Train students to implement exception handling in java program.</td></tr>
<tr><td>Mapping between COs with PSOs</td><td>
<table>
<tr><th></th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PsSO5</th><th>PSO6</th></tr>
<tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Course Content</td><td>Unit 1. Introduction to Java
1.1. Properties of Java
1.2. Comparison of java with C++
1.3. Java Compiler and Interpreter
1.4 Use of JDK, JVM, JIT, JRE
1.5 Garbage Collection

Unit 2. Basic Concepts
2.1. Identifier, Literals, Operators, Variables
2.2. Keywords, static and instance variables
2.3. Data Types and wrapper class
2.4. Branching: If – Else, Switch
2.5. Looping : While, Do-while , For
2.6. Type Casting
2.7. String and String Buffer class
2.7.1. Basic String operations</td></tr>
</table>

	2.7.2. String comparison, concatenation 2.7.3. Important functions of String Buffer class. **Unit 3. Classes and Objects** 3.1. java class structure, Inheritance and Access Control 3.2. Polymorphism: Overriding and overloading. 3.2.1 this and super 3.3. Construction and Initialization 3.4. Concepts of Data Hiding and Encapsulation, Access control 3.5. final, finalize(), finally, transient, volatile, memory leak 3.6. Static members, static class 3.7. Concept of Abstract class 3.8. Interfaces 3.8.1. Introduction to Interfaces. 3.8.2. Interface Declaration, implementing and extending. 3.8.3. Difference between Abstract class and Interfaces. 3.9 Packages 3.9.1 Package Naming, Type Imports 3.9.2. Package Access, Contents, Defining and Importing Package **Unit-4: Exception Handling:** 4.1. Concepts of Exception Handling, try…catch block. 4.2 Types of Exceptions: 4.2.1 Uncaught exceptions, Nested try block 4.2.3 Throw clause 4.2.4 Finally clause 4.2.5 Difference between : Error and Exception, Checked and Unchecked Exceptions, Throw and Throws.
Reference Books:	1.The Complete Reference Java2 Herbert Schildt TMH, New Delhi 2. Mastering JAVA2 John Zukowski BPB 3. Teach Yourself Java2 platform in 21 days Lamey& Cadenhead Teach Media 4 Java in Nut shell - O'Relly Publication 5 Java Language Reference - O'Relly Publication
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT
T Y B. Sc. (Computer Science)
Syllabus for T. Y. B. Sc. Semester-V
Effective From: June-2022
Course: 505: PHP Programming

<table>
<tr><td>Course code</td><td>505</td></tr>
<tr><td>Course Title</td><td>PHP Programming</td></tr>
<tr><td>Credit</td><td>2</td></tr>
<tr><td>Teaching per week</td><td>2 hrs</td></tr>
<tr><td>Minimum week per semester</td><td>15 (Including Class work, examination, preparation, holidays etc.)</td></tr>
<tr><td>Last Review / Revision</td><td>June 2019</td></tr>
<tr><td>Purpose of the course</td><td>• To make students understand open source php server side scripting languagewith MySql database.
• Give students exposer to php language using object oriented concepts and implementing it practically.
• Give students ideasof developing dynamic websiteusing php along withMySql.</td></tr>
<tr><td>Course Objectives</td><td>• To make students understand Open source website development..
• To make students understand various inbuilt features of PHP and in-built functions.
• Fundamentals of dynamic website development.
• Using database like MySQL with PHP.</td></tr>
<tr><td>Pre-requisite</td><td>Prior knowledge HTML & any object oriented language.</td></tr>
<tr><td>Course out come</td><td>CO1: Students will be able to install php and mysql using Appache server.
CO2: Students will be understand features of language and syntax of language and how to embedding it with HTML.
CO3: Students will get understanding various inbuilt features of PHP and in-built functions.
CO4 : Students will get exposer to php language using object oriented concepts and implementing it practically.
CO5: Student will get knowledge of developing interactive web application using server side scripting language having database interaction.</td></tr>
<tr><td>Mapping between COs with PSOs</td><td>
<table>
<tr><th></th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PSO5</th><th>PSO6</th></tr>
<tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Course Content</td><td>Unit-1 Introduction to PHP and Scripting
1.1. Installation of PHP, MySQL and Apache Web Server
1.2 PHP Features
1.3 PHP code parsing
1.4 Embedding PHP and HTML and executing PHP script
1.6 Data types, Operators
1.7 PHP variables: static and global variables
1.8 Comments in PHP

Unit-2 : PHP Scripting
2.1 Control Structures and Looping
2.2 Array in PHP
2.3. Exit, Die, Return
2.4 Working With Data
2.5 FORM element, INPUT elements
2.6 Validating the user input</td></tr>
</table>

	2.7 Passing variables between pages 2.8 Passing variables through GET , POST, REQUEST 2.9 State management 2.9.1 Managing Sessions - Concept of Session, Starting session,Modifying session variables, Un registering and deleting session variable 2.9.2 Managing Cookies - Concept of cookie, Using cookie in PHP 2.10.File uploading and downloading in PHP **Unit 3. Object Oriented Programming using PHP and Exception Handling** 3.1. Built-in functions 3.1.1. Sring Functions: chr, ord, strtolower, strtoupper, strlen, ltrim, rtrim, substr, strcmp, strcasecmp, strpos, strrpos, strstr, stristr, str_replace, strrev, echo, print 3.1.2. Math Functions: abs, ceil, floor, round, fmod, min, max, pow, sqrt, rand 3.1.3. Array Functions: count, list, in_array, current, next, previous, end, each, sort, rsort, assort, array_merge, array_reverse 3.2. User Defined Functions 3.3. Declaring a class and Objects 3.4. The new keyword and constructor, Destructor 3.5. Access method and properties using $this variable 3.6. Public, private, protected properties and methods 3.6. Static properties and method 3.7. Inheritance & code reusability 3.8. Exception handling using Try …catch statement 3.9. Generic Exception class and its sub classes **Unit-4: Using MySQL** 4.1 Types of tables in MySQL 4.2 Database connectivity of PHP with MySQL 4.3 Query in MySQL: Select, Insert, Update, Delete 4.4 Using AJAX with PHP and database 4.5 Using JSON with PHP and MYSQL **Note: Practical should be performed based on all above units.**
Reference Books	**1.** Core PHP Programming ;Leon Atkinson ;Pearson publishers **2.** The Complete Reference PHY; SteverHolzner; McGraw Hill **3.** Beginning PHP 5.0 Database; Christopher Scollo, Harish Rawat, Deepak Thomas; Wrox Press **4.** PHP – A beginners; Ashok Appu; Wiley **5.** PHP 5.0 and MySql Bible; Tim Converse, Joyce Park, Clark Morgan John; Wiley & Sons **6.** MySQL Bible; Steve Suehring John; Wiley &Sons **7.** PHP Black Book; Peter Moulding – **8.** PHP 5 and Mysql; Tim converse, Joyce Park and Clark Morgan; Bible Wiley **9.** Beginning PHP 5.3; Matt Doyle; Wrox Publication **10.** WordPress for Beginners THE MISSING GUIDE, 2nd Edition , covering WordPress 3.5, By Nico Julius WPBRIX publication
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT

T Y B. Sc. (Computer Science)

Syllabus for T. Y. B. Sc. Semester-V

Effective From: June-2022

Course: 506: Python Programming-1

Course Code	506
Course Title	Python Programming-1
Credit	2
Teaching per Week	2 Hrs
Minimum weeks per	15 (Including Class work, examination, preparation, holidays etc.)
Review / Revision	New introduced June 2022
Purpose of course	The purpose of the course is to make students capable of • Implementing Basic concepts, methods • Use Tools/IDE of python programming. • Use Python Object Types and Operations(String, list, dictionary, matrices, set etc.) • Implementing Python Programming Basics like variable, loops, branching, function and modules • Implementing various inbuilt functions of Python Libraries like numpy, pandas etc. • interaction with text and CSV • Data Visualization using data frame.
Course Objective	To make students learn of python programming skill for high level Computational programming.
Pre-Requisite	The basic knowledge of C and C++ and object oriented programming is Required.
Course outcomes	After completion of this course, the student will be capable to develop, manage and maintain basic applications using Python. C01: Understand and aware about Various IDE of Python. C02: Understand the concepts of Basic Python Programming C03: Learn to handle list, set, dictionary and array C04: Understand the use of loops ,branches ,function, modules, libraries etc. C05: Learn pandas library C06: Learn file handling C07: Learn the concepts of leader and leadership style C08: Learn data visualization.

Mapping between COs with PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1						
CO2						
CO3						
CO4						
CO5						
CO6						
CO7						
C08						

Course Content

Unit 1 Introduction to Python

1.1 Python History and Usability

1.1.1 Application area's of Python

1.1.2 Technical Strengths of Python

1.2 Program Execution in Python - Program Execution, Python Virtual Machine (PVM)

1.3 IDLE of Python, Jupiter Notebook

Unit 2 Python Object Types and Operations

2.1 String : Indexing, Slicing, Text Parsing

2.2 List : Indexing, Slicing and Merging List

2.3 Dictionaries : Add, Update, Remove and Sort

2.4 Arrays and Matrices : Sorting and Searching

Unit 3 Python Programming Statements

3.1 Comments, Indentations, Exception Handling

3.2 Assignment, Expressions, and print

3.3 Branching and Looping - if , while and For loops

3.4 List and Dictionary Traversal

3.5 Function Basics

3.5.1 Definition, Call, Passing Arguments

3.5.2 Lambda Functions

3.6 Modules

3.6.1 Python program structure

3.6.2 Import and Attributes

3.6.3 Module Creation and Usage

Unit 4 : Useful Python Libraries and interaction with text and CSV

4.1 Introduction to NumPy

Creating Arrays, Array Slicing, Copy, Shape, Reshape, Array Iterating, Array Join, Array Split, Array Search, Array Sort,

	Array Filter 4.2 Introduction to pandas Slicing the data frame, Merging & Joining. Concatenation. Changing the index. Change Column headers, Data mugging. 4.3 Data frame Handling using Panda and Numpy 4.3.1 csv and excel file extract and write using Data frame 4.3.2 Extracting specific attributes and rows from Data frame. 4.3.3 Central Tendency measures : 4.3.3.1 mean, median, mode, variance, Standard Deviation 4.3.4 Data frame functions: head, tail, loc, iloc, value, to_numpy(), describe() 4.4 File handling (text and CSV files) using CSV module : 4.4.1 CSV module , File modes: Read , write, append 4.5 Important Classes and Functions of CSV modules: 4.5.1 Open(), reader(), writer(), writerows(), DictReader(), DictWrite( ). **Unit-5: Data Visualization using dataframe:** 5.1 Importing matplotlib.pyplot and plotting: (only two dimensional Plots) 5.1.1 range() , subplot() , legend(), columns(), len() functions. 5.2 Scatter plot: concept of Scatter plot, set title, xlabel and ylabel) 5.3 Line chart : concept of line plot: plot(), set_title(), legend() 5.4 Histogram chart : Concepts of histogram hist(),set title, xlabel,ylabel 5.5 Bar Chart : Concepts of Bar chart, bar(),set title, xlabel and ylabel.
Reference Book	1. Learning Python -Mark Lutz : O'Reilly Media 2. Core Python Programming – by Wesley J Chun ISBN-13: 978-0132269933 3. Python for Everybody: Exploring Data in Python 3, by Charles Severance (Author), Aimee Andiron (Illustrator), Elliott Hauser (Editor), Sue Blumenberg (Editor) 4. An Introduction to Python - by van Rossum Guido ISBN: 9780954161767, 0954161769 5. Core Python Applicaiton Programming – by Wesley J Chun Prentice Hall
Teaching Methodology	Discussion, Independent Study, Seminars / Assignment
Evaluation Method	30% Internal assessment is based on class attendance, participation, class test, quiz, assignment / seminar, internal examination etc. 70% assessment is based on end semester written examination

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT
T Y B. Sc. (Computer Science)
Syllabus for T. Y. B. Sc. Semester-V
Effective From: June-2022
Course: GENERIC ELECTIVE (IDS) – 507-1

<table>
<tr><td>Course Code</td><td>507-1 GENERIC ELECTIVE (IDS)</td></tr>
<tr><td>Course Title</td><td>Open Source Tools</td></tr>
<tr><td>Credit</td><td>2</td></tr>
<tr><td>Teaching per Week</td><td>2 Hrs</td></tr>
<tr><td>Minimum weeks per Semester</td><td>15 (Including Class work, examination, preparation, holidays etc.)</td></tr>
<tr><td>Last Review / Revision</td><td>June, 2022</td></tr>
<tr><td>Purpose of Course</td><td>• To make Students understand why we need Open Source Tools
• To make Students understand freedom behind Open Source Tools
• To make Students understand Open Source Project’s Mechanism
• To make Students understand Ethics and Economics of Open Source Tools
• To make Students gain understanding on open source graphical tool GIMP</td></tr>
<tr><td>Course Objective</td><td>To have awareness of open source technologies and development process. To get understanding on open source graphical tool GIMP.</td></tr>
<tr><td>Pre-requisite</td><td>NIL</td></tr>
<tr><td>Course Out come</td><td>CO1: Students will understand why we need Open Source Tools
CO2: Students will understand freedom behind Open Source Tools
CO3: Students will understand Open Source Project’s Mechanism
CO4: Students will understand Ethics and Economics of Open Source Tools
CO5: Students will gain understanding on open source graphical tool GIMP.</td></tr>
<tr><td>Mapping Between COs and PSOs</td><td>
<table>
<tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td></tr>
<tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO5</td><td></td><td></td><td></td><td></td><td></td></tr>
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</td></tr>
<tr><td>Course Content</td><td>1. Introduction to Open Source
1.1. Open Source: Meaning, Need, History and Principles
1.2. Success of Open Source
1.3. Free Software and Open Source Software</td></tr>
</table>

	1.4. FOSS 1.5. Open Source Initiative and Open Source Standards 1.6. Software Freedom and Open Source Software Development **2. Open Source Projects** 2.1. Open Source Project Development Process 2.2. Open Source Project Maintenance 2.3. Open Source Hardware 2.4. Open Source Design 2.5. Open Source Teaching Platform 2.6. Case Study of Linux Project **3. Ethics and Economies of Open Source** 3.1. Open Source and Closed Source Software 3.2. Open Source Government 3.3. Ethics of Open Source and Social Impact, Share Software and Resources 3.4. Shared Software and Shared Sources **4. GIMP Basics** 4.1. GIMP Basics, GIMP Windows and Dialogs: Toolbox, Image Window, Layers, Channels, Paths Dialogs, The Dialogs for Color, Brushes, Patterns, Gradients, and Palettes 4.2. Loading, Saving and Creating New Images, RGB, Grayscale, and Indexed Images 4.3. Layers and the Role: Layers Dialog and Layers Menu, Channels and their Relationship to Layers, Channels Dialog 4.4. Conversions of Selections, Channel Masks, Layer Masks, and Alpha Channels, Masks and Selection
Reference Books	1. Open Source Technology, Kailash Vadera & Bhavyesh Gandhi, University Science Press, Laxmi Publications 2. Grokking the GIMP, Carey Bunks, New Riders Publishing 3. Open Source Technology and Policy, Fadi Greek & James Hugh, Cambridge University Press 4. Open Source for the enterprise, Dan Woods, Gautam Guliani, O'Reilly 5. http://www.gimp.org/tutorials/ 6. GIMP for Absolute Beginners, Jan Smith, Roman Joost, Apress 7. GIMP, Olivier Lecarme, Karine Delvare, Pearson Education
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT
T Y B. Sc. (Computer Science)
Syllabus for T. Y. B. Sc. Semester-V
Effective From: June-2022
Course: 507-2 : OPERATION RESEARCH

<table>
<tr><td>Course Code</td><td>507 – 2</td></tr>
<tr><td>Course Title</td><td>507-2 :OPERATION RESEARCH</td></tr>
<tr><td>Credit</td><td>2</td></tr>
<tr><td>Teaching per Week</td><td>2 Hrs</td></tr>
<tr><td>Minimum weeks per Semester</td><td>15 (Including Class work, examination, preparation, holidays etc.)</td></tr>
<tr><td>Last Review / Revision</td><td>June, 2019</td></tr>
<tr><td>Purpose of Course</td><td>This course imparts knowledge of mathematical model formulations and findings optimize solution of real world problem.</td></tr>
<tr><td>Course Objective</td><td>• Understand and aware about operation research
• To introduce basic understanding of mathematical model formulation
• Understand the concepts of linear programming problems and learn Simplex and graphical methods for solving LPP
• Understand and solving the transportation and assignment problems
• Learns and solve the game theory</td></tr>
<tr><td>Pre-requisite</td><td>Should have Basic Knowledge of matrices and Basic Maths</td></tr>
<tr><td>Course Out come</td><td>CO1. After completion of the course the student will be aware about the Operation Research
CO2. Also have better understanding and solving LPP using different methods
CO3. Student will understand the concepts of the assignment problems and transportation problem and solve them.
CO4. Understand the concept of Game theory and solve them</td></tr>
<tr><td>Mapping between COs with PSOs</td><td>
<table>
<tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td></tr>
<tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Course Content</td><td>1: Linear Programming Problem (LPP) and Simplex Method:
1.1 Model Formulation Basic,
1.2 Non-basic, Degenerate,</td></tr>
</table>

	1.3 Non-Degenerate and basic feasible Solution of LPP in the Standard Matrix form , 1.4 Graphical Solution. 1.5 Simplex Method **2: Transportation Problem** 2. 1 Transportation Problem, 2.2 Method for finding initial basic feasible Solution, 2. 3 Optimal Solution of TP Problem by MODI method, 2.4 Unbalanced Transportation Problem. 3: **Assignment Problem:** 2.1 Assignment problem, 2.2 The Hungarian method, Balanced & Unbalanced Assignment Problem. **4: Game Theory:** 4.1 Competitive Problem, 4.2 Two-person zero –sum game, 4.3 Maximin and Minimax Principle, 4.4 Saddle point and the Value of the game(based on pure Strategies) 4.5 Mixed strategies , 4.6 Solution of games with saddle point , 4.7 Dominance rule
Reference Books:	1. OR Theory &Application , J.K Sharma , Mac Millian India Ltd.,1998 2. Operation Reasearch ,Kanti Swaroop ,P.K.Gupta& Man Mohan , S.Chand& Son ,New Delhi,1098 3. Linear Programming, G.Handley , Narsa Publication House ,New Delhi,1995 4. Linear Programming, Transportation, Assignment, G.Paria , Books & Allied Pvt.Ltd.Calcutta-9 5. Linear Programming , P.M. Karak , New Central Book Agency Pvt.Ltd 6. Optimization method in O.R and System Analysis , K.V.Mittal&L.Mohan , New Age International Publications. O.R. , Goel & Mittal , Pragati Prakashan ,Meerut.
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT
T Y B. Sc. (Computer Science)
Syllabus for T. Y. B. Sc. Semester-VI Effective From: June-2022
Course: 507-3: System Software

<table>
<tr><td>Course Code</td><td>507-3 GENERIC ELECTIVE (IDS)</td></tr>
<tr><td>Course Title</td><td>System Software</td></tr>
<tr><td>Credit</td><td>2</td></tr>
<tr><td>Teaching per Week</td><td>3 Hrs</td></tr>
<tr><td>Minimum weeks per Semester</td><td>15 (Including Class work, examination, preparation, holidays etc.)</td></tr>
<tr><td>Last Review / Revision</td><td>June, 2019</td></tr>
<tr><td>Purpose of Course</td><td>This course imparts knowledge of System Softwares and Language processing activities and idea of assemblers, compilers and interpreters. Course Objective To Give idea of System Softwares and Language processing activities and idea of assemblers, compilers and interpreters.</td></tr>
<tr><td>Pre-requisite</td><td>Basic idea of Fundamentals of computers and basic knowledge of computer programming</td></tr>
<tr><td>Course Out come</td><td>Students should get idea of System Softwares and Language processing activities and idea of assemblers, compilers and interpreters.
CO1: Explain and classify different methodologies, concepts and approaches to System Software Programming.
CO2: Passes and Phases of Language Processor
CO3: Understanding working of interpreter and compiler stages.
CO4: Understanding of achieving optimum solution based of system problems by applying various techniques of compiler, interpreter and debugger.
CO5: Working functionalities of linker and loader.</td></tr>
<tr><td>Mapping between COs with PSOs</td><td>
<table>
<tr><th></th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PSO5</th></tr>
<tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO5</td><td></td><td></td><td></td><td></td><td></td></tr>
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</td></tr>
<tr><td>Course Content</td><td>1. Introduction to system software and Language Processing
1.1 System Software & its characteristics
1.2 Overview of System Software Categories
1.3 Language Processing Activities
1.3.1 Program Generation
1.3.2 Program Execution-Translation & Interpretation
1.4 Passes and Phases of Language Processor
1.4.1 Intermediate Representation of Program
1.4.2 Lexical Analysis-scanning
1.4.3 Syntax Analysis-parsing
1.4.4 Semantic analysis
1.4.5 Memory Allocation
1.4.6 Code Generation
1.5 Fundamentals of Language Specification
1.5.1 Programming Language Grammar, its classification, ambiguity in Grammatical Specification & its elimination
1.5.2 Binding and Binding Times</td></tr>
</table>

	2 Assemblers 2.1 Instruction formats, Addressing Modes and program Relocation 2.2 Literals, symbols, expressions, program blocks, control section and program linking 2.3 Design of a One pass /Single pass assembler25 3. Compilers and Interpreters 3.1 Introduction to data types, data structures, scope rules and control structures 3.2 Basic Compiler Functions-Grammars, Lexical Analysis, Syntactic Analysis and Code Generation 3.3 Introduction to memory allocation 3.4 Compilation of expressions 3.5 Compilation of Control structures 3.6 Code Optimization 3.7 Interpreters, P-code Compilers & Compiler –compilers 4. Loaders & Linkers 4.1 Basic Loader Functions 4.2 Relocation and Linking Concepts 4.3 Design of a loader / linker
Reference Books:	1. System Programming and Operating Systems , D M Dhamdhere , Tata McGrawhill Publication 2. System Software- An introduction to Systems Programming , Leland L. Beck & D Manjula , Pearson Education 3.. Compiler Design , Chattopadhyay Santanu , PHI 4. Engineering a compiler , Cooper Keith , Elsevier(Academic Press) 5. Compiler Construction: Principles and Practices , Louder Kenneth C , Cengage Learning
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT
T Y B. Sc. (Computer Science)
Syllabus for T. Y. B. Sc. Semester-V
Effective From: June-2019
Course: GENERIC ELECTIVE (IDS) – 507-4

<table>
<tr><td>Course Code</td><td>507-4 GENERIC ELECTIVE (IDS)</td></tr>
<tr><td>Course Title</td><td>Introduction of Data Ware Housing & Data Mining</td></tr>
<tr><td>Credit</td><td>2</td></tr>
<tr><td>Teaching per Week</td><td>3 Hrs</td></tr>
<tr><td>Minimum weeks per Semester</td><td>15 (Including Class work, examination, preparation, holidays etc.)</td></tr>
<tr><td>Last Review / Revision</td><td>June, 2019</td></tr>
<tr><td>Purpose of Course</td><td>This course imparts
The knowledge of Data Warehousing and Data Processing
Knowledge of various phases of data mining.
knowledge of associative rules
Classification and clustering in large datasets.
Types of Data and Categorization Methods.</td></tr>
<tr><td>Course Objective</td><td>To have awareness .of what of Data Warehousing and Data processing and its phases and give idea of associative rules, classification and clustering in large dataset.</td></tr>
<tr><td>Pre-requisite</td><td>Students should have Basic knowledge of DBMS and RDBMS</td></tr>
<tr><td>Course Out come</td><td>Students will have knowledge of
CO1:Types of Data Warehousing
CO2: Data preprocessing and its languages
CO3: Student get idea of associative rules
CO4: Students will get idea of classification and clustering in large dataset.
C05: Students will get idea of Predictions
C06: Student will get knowledge of Types of Data and Categorization methods.</td></tr>
<tr><td>Mapping between COs with PSOs</td><td>
<table>
<tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td></tr>
<tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO6</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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</td></tr>
<tr><td>Course Content</td><td>1. INTRODUCTION AND DATA WAREHOUSING
1.1 Introduction,
1.2 Data Warehouse,
1.3 Multidimensional Data Model,
1.4 Data Warehouse Architecture,
1.5 Implementation
1.6 Data Warehousing to Data Mining
2. DATA PREPROCESSING, LANGUAGE, ARCHITECTURES, CONCEPT DESCRIPTION
2.1 Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization,
2.2 Concept Hierarchy Generation, Data Mining Primitives, Query Language,
2.3 Graphical User Interfaces, Architectures,
2.4 Concept Description, Data Generalization, Characterizations.</td></tr>
</table>

	3. ASSOCIATION RULES 3.1 Association Rule Mining, 3.2 Single-Dimensional Boolean Association Rules from Transactional Databases **4. CLASSIFICATION AND CLUSTERING** 4.1 Classification and Prediction, 4.2 Issues, Decision Tree Induction, 4.3 Bayesian Classification, Association Rule Based, 4.4 Prediction, 4.5 Types of data, Categorization of methods.
Reference Books	1. Data Mining: Concepts and Techniques, J. Han, M. Kamber, Harcourt India / Morgan Kauffman, 2001. 2. Data Mining: Introductory and Advanced Topics , Margaret H.Dunham , Pearson Education 2004 3. Data Warehousing in the real world , Sam Anahory, Dennis Murry , Pearson Education 2003 4. Principles of Data Mining, David Hand, Heikki Manila, Padhraic Symth, PHI 2004. 5. Building the Data Warehouse 3rd Edition, W.H.Inmon, Wiley, 2003. 6. Data Warehousing, Data Mining & OLAP , Alex Bezon, Stephen J.Smith , McGraw-Hill Edition,2001 7. Data Warehousing Fundamentals , Paulraj Ponniah , Wiley-InterscIencePublication, 2003
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT
T Y B. Sc. (Computer Science)
Syllabus for T. Y. B. Sc. Semester-VI
Effective From: June-2022
Course: 601: Cloud Computing Fundamentals

Course code	601
Course Title	Cloud Computing Fundamentals
Credit	2
Teaching per week	2 hrs
Minimum week per semester	15 (Including Class work, examination, preparation, holidays etc.)
Review / Revision	June 2019
Purpose of the course	• To provide fundamental knowledge of cloud computing system • To provide idea of various types of services of cloud computing • To provide idea of various deployment models • To provide idea of virtualization
Pre-requisite	Basic understanding of operating system and computer network
Course out come	CO1:Students will understand History and Evolution of cloud computing along with that they will come to know merits and demerits of cloud computing. CO2:Students will understand core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the variousmodels and services in cloud computing. CO3:Students will get idea of use of virtualization in cloud computing and know about its various types.

	CO4: Students will get idea of applications of various services models. CO5: Students will get idea of system virtualization and outline its role in enabling the cloud computing system model
Mapping between COs and PSOs	

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1						
CO2						
CO3						
CO4						
CO5						

Course Content

Unit 1: Introduction to cloud computing

1.1 Introduction to Cloud Computing

1.2 History and Evolution of Cloud Computing,

1.3 Merits of Cloud computing

1.4 Obstacles for cloud technology, Cloud vulnerabilities, Cloud Migration

1.5 Cloud service provider – role and responsibility

1.6 Cloud service consumer – Expectations

1.7 Service level agreement (SLA)

Unit 2: Cloud system and Virtulization

2.1 Types of clouds- Private Public, hybrid and community cloud

2.2 Cloud Computing architecture

2.3 Cloud computing infrastructure

2.4 Virtulization

2.4.1 Basics of Virtualization

	2.4.2 Types of Virtualization 2.4.3 Virtualization of CPU, Memory, I/O Devices 2.5 Virtual Clusters and Resource management **Unit 3: Introduction to Cloud computing delivery models and services** 3.1 Iaas – Use, Merits and Demerits of Iaas, Characteristics, Application of Iaas : Azure, 3.2 Paas – Use, Merits and Demerits ,Characteristics , Applications : Azure, Google AppEng 3.3 SaaS – Use, Merits and Demerits, Characteristics, Application : Google Apps, Salesforce **Unit 4 Various aspects related to Cloud services** 4.1 Service oriented architecture 4.2 Diversified services 4.3 Performance issues in cloud computing services 4.4 Role of data centre in cloud services 4.5 Legal issues in cloud computing service provision
Reference Books	**1.** Cloud Computing: Principles and Paradigms - R. Buyya et al - Wiley 2010 **2.** Cloud Computing : Principles Systems and Application - L Gillam et al - Springer 2010 **3.** Cloud Computing Bible - Sosinsky - Wiley - India, 2011 **4.** Cloud Computing Second Edition Dr. Kumar Saurabh - Wiley - India, 2012 **5.** Service Oriented Architeture: Concepts , Technology and Design - Thomas Erl - Prentice Hall publication, 2005 **6.** Understanding Enterprise SOA - Enterprise Service Oriented Architecture - Eric Pulier, Hugh Taylor - Dreamtech Press 2008 **7.** Cloud Computing - Insight into New Era Infrastructure - Dr Kumar

	Saurabh - Wiley India 2012 **8.** Understanding SOA with Web Services - SanjivaWeerawarana, FransciscoCubera, Frank Leymann, Tony Storey, Donald F Ferguson, Eric Newcomer, Greg Lomow - AddisionWesely Publication, 2004 **9.** Enterprise Service Bus - Dave Chappelll - O'Reilly Publications 2004 **10.** Amazon Web Services For Dummies. Bernard Golden. For Dummies. ISBN-13: 978- 111857183
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT

T Y B. Sc. (Computer Science)

Syllabus for T. Y. B. Sc. Semester-VI

Effective From: June-2022

Course: 602 : Python Programming-2

CourseCode	602
CourseTitle	Python Programming-2
Credit	2
Teachingper Week	2 Hrs
Minimumweeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Review /Revision	Newly Introduced subject
Purpose of Course	The purpose of the course is to make students capable of implementing Basic concepts, methods and tools of python programming like. • GUI Designing for Python Desktop Application • Web site Development using Python • To make students understand handling database and dumping the database to csv and text file as well as converting csv and text files to database. • To make students understand the importance of library functions to connect python with SQLite and handle the database using python. • To handle csv and excel files using python and use various statistical analysis using Numpy and Pandas library. • To make student understand and learn matplotlib functions to perform basic visualization of data.
Course Objective	To make students learn of python programming skill for high level Computational programming as well as developing Python GUI application and Web Application.

<table>
<tr><td>Pre-requisite</td><td>The basic knowledge of C and C++ and object oriented programming is

Required.</td></tr>
<tr><td>Course Outcomes</td><td>After completion of this course, the student will be capable to develop, manageand maintain basic applications using Python.

C01: Understand and aware about how to design GUI for Python Desktop Application
C02: Understand aware about how to Create Web pages for Python Web Application
C03: Introduction to Web Development Frameworks
C04: Understand how to take backup of database and .csv file
C05: Understand read, write and other operation of file
C06: Learn the database connectivity with various types of databases
C07: Learn to deal with Sqlite3 database using Python .</td></tr>
<tr><td>Mapping between COs with PSOs</td><td>
<table>
<tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PsSO5</td><td>PSO6</td></tr>
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<tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>C06</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>C07</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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</td></tr>
<tr><td>Course Content</td><td>Unit-1 : Developing Python GUI with Tkinter

1.1 introduction
1.2 Import Tkinter Libraries
1.3 Tkinter Widgets
1.4 Widgets Attributes

Unit-2 : Introduction to Web Development Frameworks

2.1 Flask

2.2 Django

2.3 GIS Web Services</td></tr>
</table>

	Unit-3: Database backup and CSV handling: 3.1 SQLite dump : 3.1.1 Dump specific table into file, Dump only table structure 3.1.2 Dump entire database into file 3.1.3 Dump data of one or more tables into a file 3.2 CSV files handling: 3.2.1 Import a CSV file into a table 3.2.2 Export a CSV file from table 3.3 Python Connectivity with different types of databases **Unit-4: Python interaction with SQLite:** 4.1 Module: Concepts of module and Using modules in python. 4.1.1 Setting PYTHONPATH, Concepts of Namespace and Scope 4.1.2 Concepts of Packages in python 4.2 Importing sqlite3 module 4.2.1 connect () and execute() methods. 4.2.2 Single row and multi-row fetch (fetchone(), fetchall()) 4.2.3 Select, Insert, update, delete using execute () method. 4.2.4 commit () method.
Reference Book	1. Learning with Python, Author: Allen Downe Publisher: DreamTech Press, ISBN: 978-9351198147 2. Python: The Complete Reference, Author: by Martin C. Brown, McGraw Hill Education,ISBN:978-9387572942 3. Python In - Depth, Author: AhidjoAyeva , KamonAyeva, Publisher: BPB Publication, ISBN:978-9389328424

	4. The SQLite Handbook, Author: by Rita Blackburn, Publisher: EmereoPublishing, ISBN:978-1489136459 5. Using SQLite, Author: Jay A. Kreibich, Publisher: O'Reily, ISBN:978-0596521189 6. Android SQLite Essentials, Author: Sunny Kumar Adity, Publisher: Packt Publishing:978-1783282951
Methodology	Discussion, Independent Study, Seminars / Assignment
Evaluation Method	quiz, assignment / seminar, internal examination etc. 70% assessment is based on end semester written examination

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT
T Y B. Sc. (Computer Science)
Syllabus for T. Y. B. Sc. Semester-VI
Effective From: June-2022
Course: 603 Introduction to Internet of things (IoT)

Course code	603
Course Title	Introduction to Internet of things
Credit	2
Teaching per week	2 hrs
Minimum weeks per semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	Newly Introduced
Purpose of the course	• Give exposer of application domains of ofIoT . • To give understanding of protocols used for connecting devices/ sensors through Internet. • Basic Idea of hardware of sensors/ devices and interfacing them to operating systems like linux for IoT applications
Course objectives	To understand the concepts and protocols related to Internet of Things. To get an idea where the application areas are available for the Internet of Things to be applied.
Pre-requisite	Basic knowledge of networking and Digital fundamental
Course out come	CO1. Student will understand IoT Technologies behind intelligent and smart devices CO2. Students will get idea of Sensors and Actuators used in IoT. CO3. Students will learn about network of physical devices that are embedded with sensors, software, and other technologies. CO4: Students will understand about devices/endpoints of IOT and their functionality. CO5. Students will get idea of InterfacingIoT devices with Linux.

Mapping between COs PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	■		■		■	
CO2			■		■	
CO3	■	■	■		■	
CO4	■	■	■		■	■
CO5	■	■	■		■	■

Course Content

Unit 1: Introduction to Internet of Things

1.1 Definition & Characteristics of IoT

1.2 Understanding of IoT Architecture

1.3 Various domains of IoT

1.4 Physical Design of IoT

1.4.1 IoT devices

1.4.2 IoT protocols

1.5 Logical Design of IoT

1.5.1 IoT Functional Blocks

1.5.2 IoT Communicational Models and APIs

Unit 2. IoT and M2M

2.1 Introduction M2M

2.2 Introduction to Sensor Technology

2.3 Difference between IoT and M2M,

2.4 Security for IoT

Unit 3.Sensors and Actuators in IoT

3.1 Definition of Sensors

3.2 Types of sensors and its usage

(Temperature, Humidity, Gas Detector, Ultrasonic, Fire detector, Light, Sound, IR, Water Level)

	3.3 Introduction to Actuators 3.4 Types of Actuators 3.5 Difference between Sensors & Actuators **Unit 4. IoT Physical Devices & Endpoints** 4.1 Building blocks of an IoT device 4.2 Exemplary Device: Raspberry Pi 4.2.1 Concepts, purpose, Application areas of Raspberry 4.2.2 Understanding of Raspberry pi board components 4.2.3 Various Interfaces of Raspberry pi 4.2.4 Interfacing Raspberry pi with various flavours of Linux 4.3 Basics idea of IOT Physical Servers & Cloud Offerings
Reference Books	1. Internet of Things , A Hands – On Approach, ArshdeepBahga, Vijay Madisetti published by ArshdeepBahga& Vijay Madisetti 2. Internet of Things architecture and Design Principles, Raj Kamal, 3. McGrawhill Education private limited, 2017 Learning Internet of Things, Peter Waher, / Packt Publishing Limited, 2015 4. The Internet of Things, HakimaChaouchi, Wiley,2017 5. Getting started with the Internet of Things: by CunoPfister, O"Reilly Media. **6.** The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT
T Y B. Sc. (Computer Science)
Syllabus for T. Y. B. Sc. Semester-VI
Effective From: June-2019
Course: 604: Java Programming – II

<table>
<tr><td>Course Code</td><td>604</td></tr>
<tr><td>Course Title</td><td>Java Programming – II</td></tr>
<tr><td>Credit</td><td>2</td></tr>
<tr><td>Teaching per Week</td><td>2 Hrs</td></tr>
<tr><td>Minimum weeks per Semester</td><td>15 (Including Class work, examination, preparation, holidays etc.)</td></tr>
<tr><td>Last Review / Revision</td><td>June, 2019</td></tr>
<tr><td>Purpose of Course</td><td>To teach advanced object oriented programming concepts through programming using Java as the computer Programming language.</td></tr>
<tr><td>Course Objective</td><td>1. To make students understand object oriented programming.
2. To make students understand various inbuilt java concepts like threads
3. To make students understand the GUI and concepts of APPLET.
4. To make students understand various components and their properties.</td></tr>
<tr><td>Pre-requisite</td><td>Fundamentals of Object Oriented Programming Language. Knowledge of Core Java.</td></tr>
<tr><td>Course Out come</td><td>CO1. Explain students the concepts of thread with needs.
CO2. Train students to develop Java program with multi thread concepts.
CO3. Explain implementation of Thread communication and synchronization to make students able to develop read world application.
CO4. Train students to develop Applets, GUI Programming using various control classes, Event Handling.
CO5. Explain implementation of Crud operation using JDBC.
CO6. Explain basics of JSP to make students able to use java for web application
CO7. Explain students to Servlet life cycle.</td></tr>
<tr><td>Mapping between COs with PSOs</td><td>
<table>
<tr><th></th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PSO5</th><th>PSO6</th></tr>
<tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td>CO6</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO7</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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</td></tr>
<tr><td>Course Content</td><td>Unit 1. Concepts of Thread</td></tr>
</table>

	1.1. Basics of Thread 1.2. Thread Life cycle, working of Thread. 1.3. Creating Thread using Thread class and Runnable Interface. 1.4. Extending, Stopping and Pausing Threads. 1.5 Concepts of Daemon Thread. 1.6 Priority of Thread and Thread scheduling 1.7 Parallel execution of Thread in Synchronous and asynchronous mode. **Unit 2. GUI Programming using Java** 2.1 Applet 2.1.1 Introduction to applet 2.1.2 Difference between Applet and Application. 2.1.3 Life cycle of Applet 2.1.4 Invoking Applet, Passing parameters to Applet 2.2 Abstract Window Toolkit (AWT)- Component Class: Container, Panel, LayoutManager 2.3 UI Controls:- Lables, TextFields, CheckBoxes, RadioButtons, ChoiceList, ChoiceMenu, List 2.4 Event handling 2.4.1 Handling Button, Checkbox, RadioButton Events 2.4.2 Handling Combobox, List, TextField, TextArea Events **Unit-3 JDBC** 3.1 Introduction to JDBC 3.1.1 Java database connectivity, Driver class 3.1.2 CRUD operations with Statement Object, PreparedStatement object, callable statement object 3.1.3 The ResultSet Object **Unit - 4 Java Server Pages &Java Servlets** 4.1 Overview of Java Server Pages (JSP) & JSP lifecycle, 4.1.1 Directives Page Directive, Include Directive, Taglib Directive 4.1.2 Scripting Elements-Comment Element, Declaration Element, Scriptlets , Expression Element 4.1.3 Standard Actions – include, forward, plugins 4.2 Introduction to Java Servlets 4.2.1 The Java Servlet API 4.3.1 The Servlet Life Cycle
References Books:	1.The Complete Reference Java2 Herbert Schildt TMH, New Delhi 2. Mastering JAVA2 John Zukowski BPB 3. Teach Yourself Java2 platform in 21 days Lamey&Cadenhead Teach Media 4 Java in Nut shell - O'Relly Publication 5 Java Language Reference - O'Relly Publication
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments

Evaluation Method	30% Internal assessment. 70% External assessment

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT
T Y B. Sc. (Computer Science)
Syllabus for T. Y. B. Sc. Semester-VI
Effective From: June-2022
Course: 605: Fundamentals of Mobile Programming

Course Code	605
Course Title	Fundamentals of Mobile Programming
Credit	2
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June, 2019
Purpose of Course	To introduce the most demanding and developing mobile app technology. Fundamentals of android open source technology.
Course Objective	1. To make students understand fundamentals of mobile app technology. 2. To make students understand various inbuilt features of android. 3. To make students understand the android design essentials. 4. To make students understand android user interface design basics .
Pre-requisite	Fundamentals of web technologies and fundamentals related to mobile OS.
Course Out come	CO1. Introduction and History of Android and OHA. CO2. Train students for installing and using the Android Developer's Toolkit such as SDK Manager, Android Virtual Device, Dalvik Debug Monitor Service (DDMS), Android Debug Bridge (ADB) and make them capable to develop, manage and maintain applications (Apps) using Android CO3. Understand the Android Activity Lifecycle stack & program building blocks like activities, services and notifications to use them effectively to develop Android applications. CO4. Explain working with AndroidManifest, and its common settings related to permissions, and xml resources like layout and values and incorporate xml resources with Java code. CO5. Train students to design UI using different layout, use java library for views, widgets, menus, dialogs, graphics, media, storage, SQLiteDatabase etc. to make applications. CO6. Train students to build Android app that perform crud operation on SQLite database. CO7. Train students to prepare and use apk.

Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6

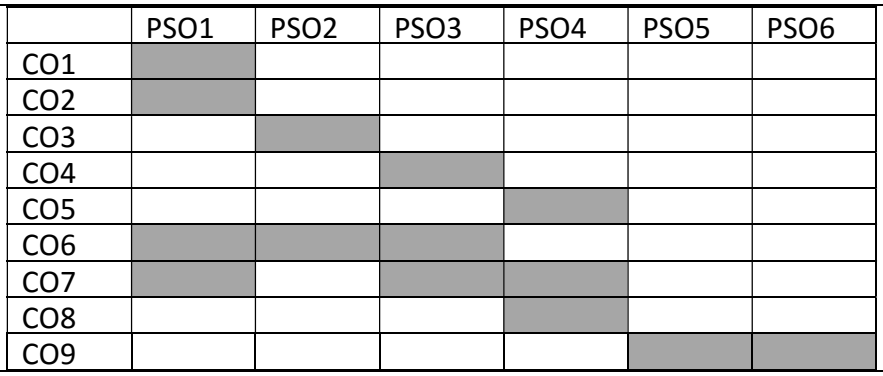
	CO1						
	CO2						
	CO3						
	CO4						
	CO5						
	CO6						
	CO7						

Course Content	**Unit-1 :** 1. Introduction to Android 1.1 History of Mobile Software Development 1.2 The Open Handset Alliance 1.3 The Android Platform, Architecture 1.4 Android SDK 1.5 Building a sample Android application **Unit-2 :** 2. Android Application Design Essentials 1.1 Android Life Cycle 1.2 Android terminologies – Activity, Layout, Emulator, AVD, logcat, Gradle 1.3 Application Context, Activities Intents. 1.4 Android Manifest File and its common settings 1.5 Using Intent Filter, Permissions 1.6 Resource Management in Android. **Unit-3 :** 3. Android User Interface Design Essentials 1.1 UI elements – EditText, TextView, Button, RadioButton, CheckBox, Spinner, ListView, ProgressBar, ToggleButton 1.2 Designing User Interfaces with Layouts 1.2.1 Relative Layouts 1.2.2 Linear Layouts 1.2.3 Table Layouts **Unit-4 :** 4. Preserving and Saving data in Android 4.1 Shared preferences – Creating, Saving and Retrieving data 4.2 Managing data using SQLite – Creating database and performing CRUD operations 4.3 Preparing and using apk
Reference Books:	1. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011) 2. http://developer.android.com/ **3.**Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd (2011) 4.Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd(2009)

	5.Sayed Y Hashimi and Satya Komatineni, “Pro Android”, Wiley India Pvt Ltd(2009)
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT
T Y B. Sc. (Computer Science)
Syllabus for T. Y. B. Sc. Semester-VI
Effective From: June-2019
Course: 606: Operating System

Course Code	606
Course Title	Operating System
Credit	2
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June, 2019
Purpose of Course	This course imparts the knowledge of operating system concepts
Course Objective	Provide fundamental principles of operating systems design of memory, process management and its relevant Unix concepts
Pre-requisite	-
Course Out come	CO1. Explain students the insight of the evolution of operating system, the needs of operating system and types of operating system. CO2. Students will be able to understand steps of Booting process and interrupt handling. CO3. Explain implementation of different file systems to make students able to efficiently manage files and directory with any operating system. CO4. Students will be able to understand process states, process scheduling. CO5. Explain and train the students differentimplementations of theScheduling algorithm. CO6. Knowledge of process communication, deadlocks and deadlock avoidance help the students while developing Software. CO7. Knowledge of various algorithms for memory management makes the student efficiently utilize memory while developing software. CO8. Students can utilize their knowledge of device management to configure the different devices as per requirement and

	perform troubleshooting. CO9. Students will be able to select particular configuration of computer and operating system necessary for the application and perform troubleshooting when required
Mapping between COs with PSOs	
Course Content	**1. Operating System Concepts** 1.1. Evolution ofOS, Need of an Operating System, Types of OS 1.2. Booting process 1.3. Functions of OS 1.4. Interrupt and System call, Data bus and Address bus **2. I/O Device and File Management** 2.1 I/O Devices, Device controllers and drivers, DMA, Programmed I/O, Interrupt driven I/O, I/O using DMA 2.2 Disk space Management 2.3 Allocation and Disk Arm Scheduling Methods (FCFS, SSTF, SCAN, C-SCAN) 2.4 File- Structure, Attributes, Types, Access, Operations, Protection, Directory - Structures and operations. 2.5 File system management and optimization - Disk space management, backup, consistency, Performance, Defragmentation **3 Memory Management** 3.1 Address space, Contiguous and non contiguous allocation, Managing free space (Garbage collection) 3.2 Virtual memory - Paging, Page size, Page table, Page fault, Demand Paging, Page replacement algorithms (FIFO, LRU, 2nd Chance NRU Optimal) , Shared page 3.3 Segmentation - Implementation of pure segmentation, segmentation with paging. **4. Process Management** 4.1 Process, Process states, PCB, Process scheduling 4.2 Scheduling Algorithms (Round-robin, FCFS, SJF, SRTF, Priority) 4.3Overview of Inter process communication 4.4s Deadlocks - Overview of Deadlock Avoidance, Prevention and Recovery.
Reference Books	1. Operating System Concepts, James Peterson McGrawHill 2. An OS Concept ,SilberschatzAdditionWesley Publication 3. An Operating Systems, W.Stallings Pearson Education 4. Understanding Operating Systems, I.M.Flinn, A.M.Mchoes – Thomson Learning

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	■					
CO2	■					
CO3		■				
CO4			■			
CO5				■		
CO6	■	■	■			
CO7	■		■	■		
CO8				■		
CO9					■	■

	5. Operating Systems, Donovan M McGrawHill Publication 6. Operating Systems: A Design Oriented Approach, Crowley TataMcGrawHill Publication 7. Operating Systems, S. Godbole TMH. 8. OperatingSystems: DesignandImplementation,Tanenbaum &Woodhull 9. The Design of the Unix Operating System, Maurice J. Bach PHI
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT
T Y B. Sc. (Computer Science)
Syllabus for T. Y. B. Sc. Semester-VI
Effective From: June-2022
Course: 607-1 : Software Quality Assurance

Course code	607-1 GENERIC ELECTIVE (IDS)
Course Title	Software Quality Assurance
Credit	2
Teaching per week	2 hrs
Minimum week per semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2019
Purpose of the course	This course imparts the knowledge of software Quality its factors & Models along with it, it gives knowledge of Reviews & Audits and Statistical Quality Assurance and Metrics
Course Objectives	To have awareness of software Quality its factors & Models along with it awareness about Reviews & Audits and Statistical Quality Assurance ,Quality Assurance Standards and Metrics
Pre-requisite	Basic understanding of operating system and computer network
Course out come	CO1:Student will have awareness of what software Quality assurance is and its factors & Models CO2: Students will get understanding about Reviews, Audits and Defect identification and removal techniques. CO3: Students will understandof statistical Quality Assurance. CO4: Students will get understanding of the importance of metrics with reference qualityassurance and get to know about various metricstaken during various phases of software lifecycle development. CO5: Students will get knowledge about Quality standards like ISO 9000, 9001:2000 and 9001:2008,CMM&CMMi.

Mapping between COs and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1						
CO2						
CO3						
CO4						
CO5						

Course Content

1 Unit 1:Introduction to Software Quality & Quality Assurance

1.1 Definition of Quality & Software Quality

1.2 Quality Factors &Models

1.3 Quality Control & Assurance

2 Unit 2: Software Quality Assurance

2.1 SQA & its Activities

2.2 Software Reviews & Audits

2.2.1 Defect identification & removal

2.2.2 Formal technical reviews—Guidelines for meeting & record keeping

2.2.3 Requirement Reviews

2.2.4 Design Reviews

2.2.5 Code Reviews

3 Unit 3: Introduction to Statistical Quality Assurance

3.1 Quality Assurance Standards

3.2 Overview: ISO 9000 , 9001:2000 and 9001:2008,CMM &CMMi.

4 Unit 4: Technical Metrics for Quality Measurement

4.1 Metrics & Measurements and Measurement Principals

4.2 Attributes of Effective Software Metrics

4.3 Overview of Project, Product & process related metrics

	4.4 Metrics for Analysis modeg service provision 4.4.1 Function based metrics 4.4.2 Bang metrics 4.5 Metrics for design model 4.5.1 High level Design Metrics 4.5.2 Component Level Design Metrics 4.6 Metrics for Source Code, Testing & Maintenance 4.7 Software Reliability &itsMeasuremen
Reference Books	1. Software Engineering: A Practitioner's Approach, 4e/5e, Roger S. Pressmann ,McGrawHill Publication. 2. Software Quality for Producing Practical and Consistent Software , Mordechai Ben-Monachem, Gray S. Marliss , Thomson Learning 3. Software Quality Assurance , Milind Limaye , McGraw Hill. 4. CMM in Practice , Pankaj Jalote , Pearson Education 5. ISO 9001:2000 for software organizations, SwapnaKishor, Rajesh Naik, Tata McGrawHill. 6. Software Engineering , K. K. Aggrawal, Yogesh Singh , New Age International Publishers. 7. Fundamentals of Software Engineering , carloGhezzi, Mehdi Jazayeri, Dino Mendrilo , PHI 8. Software Engineering , Ian Summwerville, Addison Wesley , Pearson Education **9.** Software Engineering , K. L. James , PHI
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT
T Y B. Sc. (Computer Science)
Syllabus for T. Y. B. Sc. Semester-V
Effective From: June-2022
Course: 607 -2 :ORGANIZATION STRUCTURE & BEHAVIOUR

Course Code	607 – 2
Course Title	**ORGANIZATION STRUCTURE & BEHAVIOUR**
Credit	2
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June, 2019
Purpose of Course	• to make students aware about the Structure of an Organization • to better understanding of human behaviour in an organization. • To Give idea of Organization and its Structure and need of Management in Organization • To understand the functions of skills of manager • To understand the terms Attitude, Motivation & leadership. • To understand the skills of leader and styles of leaderdhip • To understand concept of BPO and call center.
Course Objective	• Understand and aware about organization structure • Understand the concepts of human behaviour • Understand need of management • Understand functions and skill of manager • To understand importance of motivation and develop attitude • Learn the concepts of leader and leadership style • Learn about BPO and call center.
Pre-requisite	Basic Communication Skills
Course Out come	CO1. After completion of the course the student will be aware about the Structure of an Organization CO2. Also, will have better understanding of human behaviour in an

	organization. CO3. Students will understand and develop their attitude CO4. Students will learn the importance of motivation CO5. Students will be able to understand the leader, skills of leader and leadership styles CO6. students will have idea about BPO and call canters
Mapping between COs with PSOs	

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1						
CO2						
CO3						
CO4						
CO5						
CO6						

Course Content	**1. Introduction to Organization** 1.1. What makes an organization 1.2. Structure of organization 1.3. What is Management 1.4. Scope of Management **2. Need for Management** 2.1. Role of Management 2.2. Manager's Role (Interpersonal Role, Information Role and Decisional Role) 2.3. Managerial Skills (Technical Skills, Human Skills, Conceptual Skills) **3. Attitude , Motivation & Leadership** 3.1. Meaning of Attitudes 3.2. Characteristics of Attitudes 3.3. What is motivation? 3.4. Nature and Characteristics of Motivation 3.5. Importance & Benefits of Motivation 3.6. What is Leadership? 3.7. Characteristics of Leadership 3.8. Leadership Styles 3.9. Leadership Skills (Technical Skills, Human Skills, Conceptual Skills. Personal Skills)

	4. BPO & Call Center 4.1. What is B.P.O? 4.2. What is out-sourcing? Benefits of outsourcing 4.3. What is Call Center? 4.4. Call center setup & functions
Reference Books:	1. Management & Organization Development , Ahmed AbodRachnaPrakashan, New Delhi 2. Organization Behaviour , Aplewhite Philip , Prentice hall 3. Management & Organization Development , Argyris Chris , McGraw Hill 4. Human Behaviour at work , Davis Keeth , Tata McGraw Hill 5. Organization Behaviour , L.M. Prasad
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT

T Y B. Sc. (Computer Science)

Syllabus for T. Y. B. Sc. Semester-VI Effective From: June-2022

Course: 607-3 INFORMATION SYSTEMS

Course Code	607-3 GENERIC ELECTIVE (IDS)
Course Title	INFORMATION SYSTEMS
Credit	2
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June, 2019
Purpose of Course	Make students aware and understand various types of Information Systems.
Pre-requisite	NIL
Course Objective	CO1: Learn the different types of Information Systems. CO2: To emphasize on the application of information to business management CO3: Develop an understanding of fundamental concepts and key principles in the area of Information Systems. CO4: Explain students about organizations and role of IS in organizations. Also make them understand strategic IS. Make them learn E-Commerce and E-Business. CO5: Understanding Transaction Processing Systems activities
Mapping between COs with PSOs	

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1					

		CO2					
		CO3					
		CO4					
		CO5					
Course Out come	After completion of the course the students will understand and appreciate the basic concepts of Information System, importance of MIS for an organization and understand Transaction processing systems and its types.						
Course Content	1. Introduction 1.1. Data & Information 1.2. Information need and benefits 1.3. Input, Processing , Output and feedback 2. Concepts of Systems 2.1. Definition of system in an organization 2.2. Types of systems. 2.3 Business as an information system 3. Introduction to various Information Systems 3.1. Business information Systems 3.1.1. ERP 3.2. Management Information Systems 3.2.1. Characteristics of MIS 3.2.2. Development process of MIS 3.3. Decision support systems and GDSS. 4. Transaction Processing Systems 4.1. Overview of Transaction Processing System 4.2. Transaction Processing methods & objectives 4.3. Transaction Processing Activities 4.4. Traditional transaction processing Applications 4.4.1. Order Processing Systems						

	4.4.2. Purchase Systems 4.4.3. Accounting Systems
Reference Books:	1. Principles of information system , Ralf M. Stair & George W.Reynolds , Thomson LearningPublisher 2. Management information Systems– Text & Applications , CVS Murthy , HPH 3. Management information Systems Organization and technology – Forth Edition , K.C.Laudan & J.P. Laudan , Prentice Hall India 4. Management information system , W.S.Jawadekar , Tata McGraw Hill
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment

VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT

S Y B. Sc. (Computer Science)

Syllabus for T. Y. B. Sc. Semester-VI

Effective From: June-2022

Course: 607-4: Software Test Automation

Course Code	**607-4 GENERIC ELECTIVE (IDS)**
Course Title	Software Test Automation
Credit	2
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2019
Purpose of Course	• This course imparts the knowledge of • Software Testing. • The concepts of • Software testing • Role of testing • Testing tools and reporting are covered in this course. • The course is aimed to give inner depth of Software testing.
Course Objective	To make students understand concepts of testing and testing practices. To make students understand test automation process. To make students understand Testing tools. To make students writing and tracking test cases.

Pre-requisite	Concepts of Software Engineering
Course Outcome	At the end of the course, student is expected to have clear concepts about C01: Testing Concept and terminology C02: Learn various Testing Types C03: Learn software testing activities C04: Able to create various test case C05: Able to use Various testing tools.

Mapping Between COs and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1					
CO2					
CO3					
CO4					
CO5					

Course Content

Unit 1. Fundamentals of Testing

1.1 Testing concepts

1.1.1 Terminology - Error, Fault, Failure, Bug, Cost of bug, Testing, Testcase, Test Data, Test Result, Test suite, Test Reports

1.1.2 Testing life cycle, Test Exit criteria

1.1.4 Testing and debugging, software reliability

1.1.5 Test driven development

1.2 Testing practices

1.2.1 Overview of testing types - Ad-hoc testing, Gorilla testing, Random testing and Systematic testing, Static testing and Dynamic Testing, Functional, Non functional and Behavioural

	Testing, Usability Testing, Configuration Testing and Compatibility Testing 1.2.2 White box testing - Data and code coverage testing techniques 1.2.3 Black box testing - Equivalence partitioning, Boundary value Analysis 1.2.4 Levels of testing - Unit, Integration, System and Acceptance testing 1.2.5 Smoke testing, Sanity Testing and Regression Testing 1.2.6 Practices for static testing **Unit 2. Test Automation** 2.1 Manual Testing vs. Test Automation-advantages and limitations. 2.2 Automation of various testing activities and related test tools – Win runner, JMETER, Test director, IBM Rational, Load runner 2.3 Criteria for selecting test tools **Unit 3. Testing Tools-1** 3.1 Testing tools for White box testing 3.1.1 Testing tools for code coverage 3.1.2 Testing tools for Data coverage 3.2 Testing tools for Unit Testing 3.2.1 Writing and executing test cases with NUnit- NUnit framework, Test Fixture, Test, Septp & Tear Down, Asserts and Exception 3.2.2 Writing and executing test cases with JUnit- JUnit framework, Test Fixture, TestCase, Septp & Tear Down, Asserts and Exception **Unit 4. Testing Tools-2** 4.1 Testing tool for Blackbox testing 4.1.1 Test recording and playback using Selenium 4.2 Testing tool for Bug tracking and Bug reporting-case study of BugZilla 4.3 Testing tool for Test Management- case study of Testlink

Reference Books:	1. Ron Patton ―Software Testing‖, Techmedia Publication, 2000 2. Dr. K.V.K.K prasad, ―Software Testing Tools‖, Dreamtech, 2006 3. Srinivas D and Gopalswamy R, ―Software Testing: Principles and Practices‖. Pearson Education, 2013 4.K. Mustafa and R.A Khan, ―Software Testing -concepts and practices‖, Narosa, 2012 5.Bill Hamilton, ―NUnit: pocket Referance‖, SDP-OReilly, , 2004 6.Andrew Hunt and David Thomus, ―Pragmatic Unit Testing in Java with JUnit‖, SPD, 2006 7.Testing with JUnit by Frank appeal PACKT Publishing 8.Software testing Principal and practices by Naresh Chauhan – OXFORD 9.Software testing (A Practical approach) by Rajiv Chopra – S K Kataria & Sons (KATSON Books) 10 Software testing and quality assurance Theory and practice by Kashirasagar Naik and Priyadarshini Tripathy – Wiley india Pvt Ltd. 11. Software testing by Hitesh Gupta – International book house P. ltd 12. Fundamentals of Software Testing by Aditya P. Mathur – Pearson
Teaching Methodology	Discussion, Seminars and Assignment
Evaluation Method	30% Internal assessment and
	70% assessment is based on end semester written examination.