॥ सा विद्या या विमुक्तये ॥

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड
'ज्ञानतीर्थ', विष्णुपुरी, नांदेड – ४३१ ६०६ (महाराष्ट्र राज्य) भारत
SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED
'Dnyanteerth', Vishnupuri, Nanded - 431 606 (Maharashtra State) INDIA
Established on 17th September, 1994, Recognized By the UGC U/s 2(f) and 12(B), NAAC Re-accredited with'B++' grade

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विद्यापीठ अनुदान आयोगाने शैक्षणिक वर्ष २०२०—२१ पासून मान्यता दिलेल्या बी. व्होक (व्होकेशनल कोर्सेसचे) पदवी अभ्यासक्रमाचे Syllabus शैक्षणिक वर्ष २०२१—२२ मध्ये द्वितीय वर्ष व शैक्षणिक वर्ष २०२२—२३ पासून तृतीय वर्षाचे अभ्यासक्रम लागू करणे बाबत.

परिपत्रक

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, विद्यापीठ अनुदान आयोगाने शैक्षणिक वर्ष २०२०—२१ पासून मान्यता दिलेल्या बी. व्होक (व्होकेशन कोर्सेस) पदवी अभ्यासक्रमाचे Syllabus शैक्षणिक वर्ष २०२१—२२ पासून द्वितीय वर्ष आणि २०२२—२३ मध्ये तृतीय वर्षाचे Syllabus लागू करण्यास मा. विद्यापरिषदेच्या मान्यतेच्या अधीन राहून मा. कुलगुरू महोदयांनी मान्यता दिली आहे. त्या नुसार खालील अभ्यासक्रम लागू करण्यात येत आहेत.

1. B. Voc Software Development. II & III year
2. B. Voc. Bachelor of Medical Laboratory Technology. II & III year
3. Advance Diploma in Rediological Physics II year

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या **www.srtmun.ac.in** या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी. ही विनंती.

जा.क्र.:शैक्षणिक—१/परिपत्रक/व्होकेशनल अभ्यासक्रम/N-
२०२१—२२/३२९

दिनांक : १७.०२.२०२२

स्वाक्षरित
सहा.कुलसचिव
शैक्षणिक (१—अभ्यासमंडळ) विभाग

प्रत माहिती व पुढील कार्यवाहीस्तव :
१) मा. अधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा, प्रस्तुत विद्यापीठ.
२) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ. याना देवून कळविण्यात येते की, सदरील परिपत्रक विद्यापीठाच्या संकेतस्थळावर प्रसिध्द करण्यात यावे.

Swami Ramanand Teerth Marathwada University, Nanded

(NAAC Re-accredited with 'B++' Grade)

Syllabus of

B. Voc. Software Development
II year

(3 years Degree Course)

Introduced from Academic Year 2021-22

TITLE OF THE PROGRAMME

BACHELOR OF VOCATION IN SOFTWARE DEVELOPMENT
[B. Voc. (Software Development)]

1. Preamble:

Skills and knowledge are the driving forces of economic growth and social development for any country. Presently, the country faces a demand – supply mismatch, as the economy needs more 'skilled' workforce than that is available. In the higher education sphere, knowledge and skills are required for diverse forms of employment in the sectors of education, health care, manufacturing and other services.

Government of India, taking note of the requirement for skill development among students, launched National Vocational Education Qualification Framework (NVEQF) which was later on assimilated into National Skills Qualifications Framework (NSQF). Various Sector Skill Councils (SSCs) are developing Qualification Packs (QPs), National Occupational Standards (NOSs) and assessment mechanisms in their respective domains, in alignment with the needs of the industry.

In view of this our University initiated to start skill based courses which are in demand of industries to be carry responsibilities of society. The programme is highly relevant for all those who want to pursue a professional career in software development.

2. Aim:

The proposed B. Voc. Software development programme aims to build professional capacities and train persons with adequate employability skills. The structure of the program is blended with general education along with skill based education as directed by UGC-NSQF which includes appropriate technical knowledge and skills, personal and professional skills and substantive 'hands-on' and field / site experience required in the IT and ITes trade.
Owing to the industry demands and to provide skilled human resource this program is designed with multiple exit along with specific job roles defined in outcome of the course. By doing this course students will acquire various Information Technology Skills and cater the need of industries.

3. Objective:

The main objective of this program is to build the IT and ITes Skill based Human Resource which will prepare students to undertake careers involving skills , web based application development, Mobile App Development and General Software Development along with problem solving using programming techniques and technologies. Curriculum for this program covers most of the fundamental aspects of programming, and web & mobile application deveopment.

4.Eligibility and Fees

The eligibility of a candidate to take admission to **B. Voc. Software Development** program is as per the eligibility criteria fixed by the University /UGC-NSQF. More details on admission procedure and fee structure can be seen from the prospectus and as well as on website of the University.

5. Program outcome:

This program lies in Information Technology and IT enabled services. SRTM University Designed the complete course to focused on the Skills of software development. After completing the course the student can have following career opportunities in the web development, Mobile App Development, programming and software development.

First Exit Point (Diploma) and Outcome of First Year

If the student select for the exit at this point then the Student will be awarded Diploma (Software Development) Student can have employability opportunities in the following fields:

- Web Designing
- Web Development in small scale
- Office Assistant
- Programming Assistant
- Technical Assistant
- DTP Operator

Second Exit Point (Advance Diploma) and Outcome of Second Year

If the student opts for the exit at this point then the Student will be awarded Advance Diploma in Software Development. In addition to the opportunities mentioned in 1st Year Exit the Student can have employability opportunities in the following fields:

- Assistant Programmer
- Junior Programmer
- Database Operator
- Technical Assistance/Supervisor (IT)
- Software Developer

• Third Exit Point (B. Voc. Degree) and Outcome of Third Year

At the End of third year the Student will be awarded degree in B.Voc in (SD). In addition to the opportunities mentioned in 1st and 2nd Year Exit the Student can have employability opportunities in the following fields:

- Programmer
- ASP Developer
- Android Application Developer
- Software Project Analyst
- Software Tester

Students will be awarded:

Diploma:	Student shall be required to appear in examinations of all courses. However, to award the Diploma (Software Development) a student shall study the minimum of **60 credits course and opt minimum passing credits as per university rule.**
Advanced Diploma	Student shall be required to appear in examinations of all courses. However, to award the Advanced Diploma (Software Development) a student shall be required to study minimum of **120 credits course and opt minimum passing credits as per university rule.**
B.Voc Degree	Student shall be required to appear in examinations of all courses. However, to award the degree a student shall be required to study minimum of **180 credits course and opt minimum passing credits as per university rule..**

6. Assessment:

The Skill component of the course will be generally assessed by the respective Sector Skill Councils. In case, there is no Sector Skill Council for a specific trade, the assessment may be done by an allied Sector Council or the Industry partner. Further if Sector Skill Council in concerned / relevant trade has no approved QP which can be mapped progressively or due to any other reason, if the SSC expresses its inability to conduct the assessment or cannot conduct the skill assessment in stipulated time frames as per academic calendar, the institutions may conduct skill assessment through a Skill Assessment Board by 'Certified Assessors' as per the provisions enumerated in MHRD Skill Assessment Matrix for Vocational Advancement of Youth (SAMVAY). The Skill Assessment Board may have Vice-Chancellor/Principal/Director/Nodal officer/Coordinator of the programme / Centre, representatives of the partner industy(s),

one nominee of the Controller of Examination or his/her Nominee of affiliating University / Autonomous College and at least one external expert. The affiliating university may nominate additional experts on the Skill Assessment Board, if required.

The certifying bodies may comply with / obtain accreditation from the National Accreditation Board for Certification Bodies (NABCB) set up under Quality Council of India (QCI). Wherever the university/college may deem fit, it may issue a joint certificate for the course(s) with the respective Sector Skill Council(s).

The general education component will be assessed by the concerned university as per the prevailing standards and procedures. General Education credit refers to a unit by which the course work is measured. It determines the number of hours of instructions required per week.

One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week. Accordingly, one Credit would mean equivalent of 14-15 periods of 60 minutes each or 28 – 30 hrs of

workshops/ labs. For internship / field work, the credit weightage for equivalent hours shall be 50% of that for lectures /tutorials. For self-learning, based on e-content or otherwise, the credit weightage for equivalent hours of study shall be 50% of that for lectures / tutorials.

The institutions offering B.Voc degree programme should adopt and integrate the guidelines and recommendations of the respective Sector Skill Councils (SSCs) for the assessment and evaluation of the vocational component, wherever available.

Letter Grades and Grade Points: it is recommended to adopt 10- point grading system with the Letter grades as given below:

Grades and Grade Points

Letter Grade	Grade Point
O (Outstanding)	10
A+ (Excellent)	9
A (Very Good)	8
B+ (Good)	7
B (Above Average)	6
C (Average)	5
P (Pass)	4
F(Fail)	0
Ab (Absent)	0

Passing percentage for each paper each course is 40%. Separate passing for continuous assessment and end semester examination and/or as per time to time guidelines of the university.

A student obtaining Grade F and Ab shall be considered failed and he/she will be required to reappear in the examination.

Computation of Semester Grade Point Average System (SGPA) and Cumulative Grade Point Average (CGPA):

The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the course components taken by a student and the sum of the number of credits of all the courses undergone by a student in a semester, i.e

$$\text{SGPA } (S_i) = \Sigma(C_i \times G_i) / \Sigma C_i$$

where 'C_i'is the number of credits of the ith course component and 'G_i' is the grade point scored by the student in the ith course component.

The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$\text{CGPA} = \Sigma(C_i \times S_i) / \Sigma C_i$$

Where 'S_i' is the SGPA of the ith semester and C_i is the total number of credits in that semester.

The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

The skill component would be taken as one of the course components in calculation of SGPA and CGPA with given credit weightage at respective level.

Swami Ramanand Teerth Marathwada University, Nanded
Syllabus with effective from 2021-2022
B. Voc. Software Development
Second Year

Semester III

Sr. No.	Course Code	Course Title	Continuous Assessment Credits (CA)	End Semester Exam Credits (ESE)	Total Credits
		General Education			
1	BSD301	Windows Programming	2	2	4
2	BSD302	E-Commerce	2	2	4
3	BSD303	Mathematical Foundation	2	2	4
		Skill Courses			
4	BSD304	Python Programming	2	2	4
5	BSD305	Database Management System	2	2	4
6	BSD306	Software Engineering	2	2	4
		Practical Skill Courses			
7	BSD307	LAB7: Python	1	1	2
8	BSD308	LAB8:DBMS	1	1	2
9	BSD309	LAB9: Case Studies on SE	1	1	2
				Total	30

Semester IV

Sr. No.	Course Code	Course Title	Continuous Assessment Credits (CA)	End Semester Exam Credits (ESE)	Total Credits
		General Education			
1	BSD401	Personality Development	2	2	4
2	BSD402	Network Essentials	2	2	4
3	BSD403	Discrete Mathematics	2	2	4
		Skill Courses			
4	BSD404	Shell Programming	2	2	4
5	BSD405	Dot Net Programming-I	2	2	4
6	BSD406	Advances in DBMS	2	2	4
		Practical Skill Courses			
7	BSD407	LAB10: Dot Net	1	1	2
8	BSD408	LAB11:Adv. DBMS	1	1	2
9	BSD409	LAB12: Network Establishment	1	1	2
				Total	30

Course Code	Course Title	Credits
BSD301	Windows Programming	04
Objective	1. To understand the programming environment of windows 2. To understand the components of windows 3. To understand the features of windows	
Outcome	1. Students are able to handle components used in windows environment 2. Students are able to understand the concept like menus, dialog box, icons, cursor 3. Students are able to understand windows programming events	
Unit I	**Windows Programming Basics**: The Advantages of Windows, How Windows Programs Work, Running Several Programs Simultaneously, Messages, An Analogy, Structure of a Windows Program, Code and Resources, Program Instances, Compiling Windows Program, Windows Memory Management	
Unit II	**Windows Programming functions :** The Windows.H, The WinMain() Function and Its Parameters, Creating the Programs Window, Messages and Adding a Message Loop, Creating a New Window Class, Message Processing Function WndProc(), Adding Custom Resource Data, Compiling the Resource Data **Windows Controls:** Window, Types of Controls, The CreateWindow() function, Static Controls, Sending Message to a Control, C language Casts, Button Controls, Processing Button Control Messages, Button Notification Codes, List Boxes, Combo Boxes, Scroll Bars, Edit Controls.	
Unit III	**Menus:** Creating Menus, Menus Defined as Resource Data, Creating a Menu Using the Borland Resource Workshop, Complex Menu, Creating a Menu as the Program Operates, Creating Menu Containing Bitmaps, The System Menu.	
Unit IV	**Dialog Boxes:** What is a dialogue box, How a Dialogue Box Work, Designing a Dialogue Box, Using a Dialogue Box, Exchanging Data with a Dialogue Box-Global Variable Method, Problems with using Global Variables, Exchanging Data with a Dialogue Box-Pointer Method, Modal, Modeless and System Modal Dialogue Boxes, Creating Modeless Dialogue Box	
Unit V	**Text & Graphics Output:** Character Mode vs Graphics Mode, The Device Context, Windows GDI, Text output, The WM_PAINT Message, Changing the Device Context, Device Context Settings, Graphics Output, Animated Graphics, The Peek Message() Loop.	
Suggested Readings	1. Windows Programming Primer Plus by Jim Conger Galgotia Publication 2. Programming Windows. Charles Petzoid. Microsoft Press 1996. 3. The complete Reference Visual C++5 Chris H. Pappas & William H. Murray, III 4. The Visual C++ handbook Chris H. Pappas & William Murray Osborne	

Course Code	Course Title	Credits
BSD302	E-Commerce	04
Objective	1. To gain an understanding of the theories, concepts and business models of E-Commerce. 2. To make students familiar with required mechanisms for conducting business transactions through electronic means. 3. To understand the methodology for online business dealing and payments using E-Commerce Infrastructure.	
Outcome	1. Understand basic electronic commerce functions, client/server infrastructure that supports the E-Commerce. 2. Perform and handle business transactions through different online and electronic means. 3. Perform online business dealing and payments using E-Commerce infrastructure.	
Unit I	**Introduction to E-commerce:** Evolution of E-Commerce, Definition of E-Commerce, Functions and Scope of E-Commerce, Difference between E-Commerce and E-Business Models, Types of E-Commerce and its characteristics ,E-Commerce business models, Limitations and Advantages of E-Commerce, Internet, Intranet, Extranet and Browsers.	
Unit II	**Electronic Data Interchange (EDI):** EDI and electronic messaging, Benefits of EDI, EDI Architecture, EDI Components, EDI software's, communication of EDI messages, EDI implementation issues.	
Unit III	**Electronic Payment Systems and Internet Banking:** Introduction to Electronic Payment System (EPS), components of EPS, payment gateways, Types of e -payment System, Internet Banking, PayPal, SET protocol, financial payments, Retailing payments (Credit Cards, Private label credit/debit cards, Charge Cards), On-line electronic commerce payments Credit card-based payments systems, Digital token-based electronic payments systems), E-cash and currency servers, E-cheques, credit cards, smart cards, electronic purses and debit cards.	
Unit IV	**M-Commerce:** Introduction to Mobile Commerce, Mobile Marketing, M-commerce Applications, M-commerce Strategy and Security, Social and Ethical Issues in M-commerce.	
Unit V	**CASE Study:** E-Stores, E-Product Purchasing, Railway Reservation, Tour Management, E-tender	
Suggested Readings	1. E-Commerce: The cutting edge of Business By Kamlesh K. Bajajand Debjani Nag, Second edition, Tata McGraw Hill company publishing. 2. E-Commerce: Business, Technology, Society, By Kenneth C. Laudon, Carol Guercio Travor, 10th edition Published by Pearson education. 3. E-Commerce: By Sarika Gupta and Gaurav Gupta, Khanna Publishers, 2nd Revised edition. 4. E-Commerce: A simplified approach, By Munesh Chandra Trivedi, Jaico Publishing House, First edition. 5. Concepts Of E-Commerce, By Adesh K. Pandey, Publisher: S. k. Kataria & Sons Edition: 2010.	

Course Code	Course Title	Credits
BSD303	**Mathematical Foundation**	**04**
Objective	1. Help students understand and acquire basic mathematical concepts and computational skills. 2. Help students develop creativity and the ability to think, communicate, and solve problems. 3. To inculcate the ability to select and apply appropriate inquiry and techniquesfor mathematical problem-solving.	
Outcome	1. Understand the foundations of mathematics as well as be able to perform basic computations in higher mathematics. 2. Be able to read and understand middle-level proofs. 3. Be able to write and understand basic proofs and also develop and maintain problem-solving skills.	
Unit I	**Set theory**; The empty set; finite and infinite sets; equal and equivalent sets; subsets; power set; universal set; Venn diagrams; complement of a set operations on sets; applications of sets.	
Unit II	**Mathematical Logic Basic Logical connections;** Conjunction; Disjunction; Negation; Negation of Compound Statements; Truth tables. Tautologies; Logical Equivalence; Applications. Modern algebra Binary Operation; Addition Modulo n; Multiplication modulo n; semi group; properties of groups; subgroup	
Unit III	**Combinatorics:** Review of Permutation and Combination, Mathematical Induction, Pigeon hole principle, Principle of Inclusion and Exclusion, generating function, Recurrence relations.	
Unit IV	**Matrices and Determinants Definition of a matrix**; Operations on matrices; Square Matrix and its inverse; determinants; properties of determinants; the inverse of a matrix; solution of equations using matrices and determinants; solving equations using determinants.	
Unit V	**Probability Concept of probability**; sample space and events; three approaches of probability; kolmogorov's axiomatic approach to probability; conditional probability and independence of events; bay's theorem.	
Suggested Readings	1. P.R.Vittal-Business Mathematics and Statistics, Margham Publications, Chennai 2. Lidl and pitz., Applied Abstract Algebra, Springer - Verlag, New York, 1984. 3. K.H. Rosen, Discrete Mathematics and its Applications, Mc-Graw Hill Book Company, 1999 4. The elements of Real Analysis, R.G.Bartle. 5. A textbook of Matrices, Shanti Narayan and P.K.Mittal 6. Ordinary and Partial differential equations, M.D.Raisinghania, S.Chand pub. 7. Linear Algebra by A.R.Vasistha and J.N.Sharma (Author), KrishnaPub. 8. Linear Algebra by K.P.Gupta(Author), A PragatiEdition. 9. Dr. B. S. Grewal , Higher Engineering Mathematics , KhannaPublishers.	

Course Code	Course Title	Credits
BSD304	Python Programming	04
Objective	1. Understanding the python programming 2. Student will be provided horizontal learning path where they will be able to implement the Open programming i.e. python 3. Develop of the scripting and applications	
Outcome	1. Students will be able to develop simple console based application 2. Students will be able to use various scripts in Threads and other basic unit application 3. Students will be able to develop complete application	
Unit I	**Introduction:** Why Do People Use Python? What Can I Do with Python? What Are Python's Technical Strengths? Introducing the Python Interpreter, What Not to Type: Prompts and Comments, System Command Lines and Files, Module Imports and Reloads, The IDLE User Interface,	
Unit II	**Data Types:** Python's Core Data Types, Numbers, Strings, Lists, Dictionaries, Tuples, Files, The Case of the Missing Declaration Statements, Variables, Objects, and References,	
Unit III	**String, Lists and Dictionaries**: and Tuples: String Basics, String Literals, Strings in Action, String Methods, String Formatting Expressions and method call, Lists in Action, Basic List Operations, List Iteration and Comprehensions, Indexing, Slicing, and Matrixes, Changing Lists in Place, Dictionaries in Action, Basic Dictionary Operations, Changing Dictionaries in Place, More Dictionary Methods, Example: Movie Database, Dictionary Usage Notes, Other Ways to Make Dictionaries. Tuples, Tuples in Action Why Lists and Tuples? Records Revisited: Named Tuples	
Unit IV	**Introducing Python Statements:** Python's Statements, A Tale of Two ifs, A Quick Example: Interactive Loops, Assignments, Expressions, and Prints, if Tests and Syntax Rules, while and for Loops,	
Unit V	**Functions and Generators:** Why Use Functions? Coding Functions, A First Example: Definitions and Calls, A Second Example: Intersecting Sequences, Python Scope Basics, Arguments, Recursive Functions, Generator Functions and Expressions	
Suggested Readings	1. Learning Python, 5th Edition, powerful Object-Oriented Programming, By Mark Lutz, and Publisher: O'Reilly Media, Final Release Date: June 2013 2. Python Crash Course: A Hands-On, Project-Based Introduction to Programming (2nd Edition) by Eric Matthes 3. Python Programming: An Introduction to Computer Science (3rd Edition) by Author: John M. Zelle 4. Head-First Python: A Brain-Friendly Guide (2nd Edition) by Paul Barry	

Course Code	Course Title	Credits
BSD305	**Database Management System**	04
Objectives	1. To understand the fundamental concepts of database and Database Management System. 2. To give understanding of systematic database design approaches using different data modelling and design methods. 3. To understand the concept of relational algebra and its operations. 4. To understand the process of relations decomposition using normalization for creating good databases 5. To understand the SQL language for database creation and its manipulations.	
Outcomes	After successful learning of this course students will be able to: 1. Identify the domains of databases and DBMS applications with different information systems. 2. Practice different data modelling techniquesand convert into database and relations design. 3. Write the relational algebra notations or queries for user required data manipulations. 4. Apply different normal forms to normalize the databases for reducing operations anomalies. 5. Understand SQL syntax and write queries for table creation, manipulation and control.	
Unit I	**Introduction to Database and DBMS:** Database and need for DBMS, applications of DBMS, Characteristics of DBMS, Database Users, 2-tier and 3-tier architecture of DBMS, schema, views, instances, General architecture of DBMS, Roles of DBA, Data Dictionary,Advantages and disadvantages of DBMS.	
Unit II	**Data Abstraction and Data Models:** Concepts ofdata abstraction and data models, various data models, Cardinality ratio and types of relationships, Representation of entities, attributes, relationship attributes, relationship set,Generalization, Aggregation,Structure of relational Database, E-R diagrams, Conversion of E-R diagrams into databases or relations.	
Unit III	**Relational Algebra and its Operations :** Basics of Relational Algebra, Selection, Projection, division, cross product Set Operations on relations, Join and its types, writing Relational Algebra notations for user queries.	
Unit IV	**Relational Database design using Normalization :** Introduction to attributes and its types, Keysand their types, Anomalies in databases, Functional Dependencies(Determinant, partial, full, transitive, multi valued, etc), Normalization process: First Normal form, Second Normal Form, Third Normal Form, BCNF, Fourth NF, Fifth NF, Loss less joins and dependency preserving decomposition.	
Unit V	**Introduction to SQL, PL/SQL:** Data types, creation of tables, View Definitions,DDL Statements, DML Statements, DCL Statements, TCL statements, SQL Functions,Introduction to PL/SQL, Cursors.	
Suggested Readings	"Database System Concepts", Silber Schatz Korth, Tata McGraw Hill. "Database Management Systems", Raghu Ramakrishnan, Johannes, Gehrke, Tata McGraw Hill. "Fundamental of Database System", Sham Kanth B. Navathe, Pearson Education. "Introduction to Database management System", Bipin Desai, Galgotia Publications. "SQL, PL/SQL the Programming Language of Oracle", By Ivan Bayross, Third revised or Fourth edition, BPB publication,	

Course Code	Course Title	Credits
BSD306	Software Engineering	04
Objectives	1. To learn and understand the principles of the Software Engineering. 2. To understand the disciplined way of software development lifecycle and its models. 3. To understand the methods of collecting, specifying, visualizing and analysing software requirements. 4. To understand the methods of software testing and its maintenance. 5. To learn and understand CASE tools and discuss recent trends in software engineering.	
Outcome	**After successful learning of this course students will be able to:** 1. Identify unique features of various software application domains and classify software applications. 2. Choose and apply appropriate SDLC lifecycle model for the software development. 3. Choose appropriate requirement collection methods and analyse software requirements by applying different modelling and design techniques. 4. Choose appropriate testing method for software testing. 5. List and classify the CASE tools and discuss recent trends in software engineering.	
Unit I	**Introduction to Software Engineering :** Nature of Software (Software definition and types, Software Characteristics, Software Applications), Software Process and engineering, Generic view of software engineering, Software Engineering Practice, Software Myths.	
Unit II	**Software Process Models :** Software Process Models: Waterfall Model,Prototyping model, Incremental Models, Evolutionary Models, 4GT, RAD, Comparison of all models.	
Unit III	**Software requirement Specification and Design:** Software requirement collection methods and their comparison, Software design process and design quality, Design concepts, Design principles, Design models, User Interface Design: Golden rules, User interface analysis and design, interface analysis	
Unit IV	**Software Testing and Maintenance :** Introduction to software testing, Testing Objectives, Verification and Validation, Validation testing, system testing, different testing types like white box, black box etc., Software maintenance, Types of software maintenance.	
Unit V	**CASE Tools :** Introduction to CASE tools, Types of CASE tools, Advantages and disadvantages of CASE Tools	
Suggested Readings	1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, Mcgraw-Hill, ISBN: 0073375977, Seventh or Eighth Edition. 2. PankajJalote, Software Engineering: A Precise Approach, Wiley India, ISBN: 9788126523115. 3. Richard Fairley,"Software Engineering", Tata McGraw Hill. 4. K.K. Aggarwal, "Software Engineering", Third edition, New age international publisher. 5. Richard Fairly, "Software Engineering Concepts", Tata McGraw Hill edition.	

Course Code	Course Title	Credits
BSD307	LAB7: Python	02
	Students should provide hands-on knowledge with the python to prepare small Scripts with the knowledge they acquired through Course Code BVSD304 and Objectives and Outcome as per the Lab Manual designed by the subject Teacher.	

Course Code	Course Title	Credits
BSD308	LAB8:DBMS	02
	Students should provide hands-on knowledge with the preparation of sql statements and database through Course Code BVSD305 and Objectives and Outcome as per the Lab Manual designed by the subject Teacher.	

Course Code	Course Title	Credits
BSD309	LAB9: Case Studies on SE	02
	Students should provide hands-on knowledge with the case studies of Software Engineering as prescribed in BSD306. The course Objectives and Outcome as per the Lab Manual designed by the subject Teacher.	

Semester IV

Course Code	Course Title	Credits
BSD401	Personality Development	04
Objective	1. It helps students to develop their overall development 2. It will create positive attitude and good kind of motivation 3. It helps to manage time and stress	
Outcome	1. Students will be able analyze themselves 2. Students will be able to find the positive and negative approaches in their day to day life 3. Students will be able to manage time and stress	
Unit I	**Personality:** Meaning of personality, ability and learning, Personality Determinants, Personality Traits, The Myers-Briggs Type Indicator (MBTI) , The Big Five Model , Type A Personality, Type B Personality, resilience, SWOT analysis	
Unit II	**Attitude & Motivation:** Values, Beliefs, Attitude - Concept - Significance - Factors affecting attitudes - Positive attitude –Negative attitude, Concept of motivation - Significance – Internal and external motives - Importance of self- motivation- Factors leading to de-motivation	
Unit III	**Body Language** Non-Verbal Communication, Types of Body Language, Functions of Body Language Role of Body Language	
Unit IV	**Time and Stress Management** Time wasters, Time Management, Goal setting, and Techniques of Time Management, Stress, Causes of Stress, Stress management, techniques of stress management	
Unit V	**Interview Preparation** Introduction, Resume Writing, Dress Code, Mock-Interview, How to be Successful in an Interview	
Suggested Readings	1. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill 2. Robbins S.,(2014) Organizational Behavior,16th edition, Prentice Hall International Inc 3. Davis K.(2010), Organizational Behavior -Human Behavior at Work,13th edition, McGraw-Hill Higher Education,Newyork 4. LuthansF.(2005) , Organizational Behavior,11th edition, McGraw-Hill 5. Andrews, Sudhir. How to Succeed at Interviews. 21st (rep.) New Delhi.Tata McGraw-Hill 1988	

Course Code	Course Title	Credits
BSD 402	**Network Essentials**	04
Objective	1. To aware Network topology 2. To establish various kinds of Networks 3. To aware Network Communication	
Outcome	1. Students will be able to establish the Local Area Network 2. Students will be able to perform the communication between client and server	
Unit I	**Introduction to Network:** Definition of Network, Uses of Computer Networks, Network Hardware, LAN, MAN, WAN, Wireless Networks, Network Software.	
Unit II	**LAN Hardware:** Network Interface Card , Drivers , Magnetic Media, Twisted Pair Cable, Coaxial Cable, Fiber Optic Cable, Network Topologies-Bus Ring, Star, Tree and other Topologies , Networking Devices-Repeaters, Bridges, Routers, Gateways, Hub and Switch.	
Unit III	**OSI Reference Model:** Protocol Layering, OSI Model, TCP/IP Model, OSI vs. TCP/IP	
Unit IV	**IP Address (IPV4 and IPV6) :** IP addresses – Network part and Host Part , Network Masks, Network addresses and Broadcast addresses, Address Classes, Loop back address, IPV6: The next generation Protocol	
Unit V	**Network Establishment :** Crimping of cable: Colour coding of Twisted Pair cable, standard and cross cabling, use of crimping tool, Configuration of IP address, Sharing of device and drives	
Suggested Readings	1. Douglas E. Comer , "Computer Networks and Internets with Internet Applications", PHI, 4th ed,2008 2. Eugene Blanchard, "Introduction to Networking and Data Communications" 3. H.Kim Lew , Steve Spanier , Tim Stevenson , Merilee Ford, " Internetworking Technology Handbook CISCO System", Cisco press, 4th Ed., 2003 4. Network Essential Notes GSW MCSE Study Notes 5. William R. Cheswick , "Firewalls and Internet Security", Addison-Wesley, 2nd Ed., 2004	

Course Code	Course Title	Credits
BSD403	**Discrete Mathematics**	04
Objective	1. The objective of this course is to teach students how to think logically and mathematically. 2. The course focuses on mathematical reasoning and describes different ways in which mathematical problems could be solved. 3. This course serves as an introductory course in discrete mathematics for B. Voc. students.
Outcome	1. The student will gain knowledge of the topics such as mathematical reasoning, combinatorial analysis, discrete structures, and mathematical modeling. 2. The student will be able to understand and solve problem related to logic, proofs, set theory and graph theory.
Unit I	**Combinatorics:** Permutations and combinations, Distinct and non-distinct objects, Generating functions for combinations, Enumerators for permutations, Distribution of distinct objects. Matrices: Basic concepts, Types of matrices, Arithmetic operations on matrices, Scalar Multiplication, Transpose of matrix, Symmetric matrix, Inverse of matrix, Solving simultaneous equation using matrices, Boolean matrices, Eigen values, Eigen vectors, Determinant.
Unit II	**Mathematical Logic:** Notations, Connectives, Normal forms, Theory of inference for statement calculus, Propositional logic, Predicate calculus, Inference theory of the predicate calculus.
Unit III	**Relations and Functions:** Elementary set theory, product sets, Relations, Closure properties and related algorithm, Functions, Types of functions, Computer representation of sets, Relations, functions and their manipulations, ordering functions, Recursion.
Unit IV	**Graph Theory:** Definition, walks, paths, trails, connected graphs, Di-graph representation of relations, regular and bipartite graphs, cycles and circuits, eccentricity of a vertex, radius and diameter of a graph, Central graphs, Hamiltonian and Eulerian graphs, and planar graphs.
Unit V	**Adv. Graph Theory:** Definition, walks, paths, trails, connected graphs, Di-graph representation of relations, regular and bipartite graphs, cycles and circuits, eccentricity of a vertex, radius and diameter of a graph, Central graphs, Hamiltonian and Eulerian graphs, and planar graphs.
Suggested Readings	1. Applied Discrete Structure for Computer Science: Kenneth Levasseur, Alan Doerr, Galgotia Publications, 1986. 2. Discrete Mathematical Structures for Computer Science: B. Kolman and R. C. Busby, Prentice Hall, 1987. 3. Foundations of Discrete Mathematics: K. D. Joshi, Wiley Eastern. 4. Elements of Discrete Mathematics: C. L. Liu, D. P. Mahapatra, Tata McGraw Hill, 1977. 5. Concepts in Discrete Mathematics: S. K. Sahni, Camelot Publishing Co., USA. 6. Discrete Mathematics: Schaums series, McGraw Hill. 7. Discrete Mathematical Structures with applications to the Computer Science: Tremblay and Manohar, Tata McGraw Hill, 1977.

Course Code	Course Title	Credits
BSD404	Shell Programming	04
Objective	1. To understand the basic operating system command. 2. To understand the basic concept of shell programming 3. To become familiar with open source software and user interface. 4. To securely handle OS without any viruses and malwares.	
Outcome	1. Students are able to write shell script 2. Students are aware with DOS and LINUX environment 3. Students are able to maintain the system using system utility 4. Students are able to execute the commands of DOS and Linux	
Unit I	**Introduction to Operating systems :** DOS, Linux, DOS Internal and External Commands, Linux commands, Compiling a DOS and Linux Program, command prompt, Vi editor.	
Unit II	**DOS Shell Programming:** creating a batch file, executing a batch file, modifying a batch file, saving a batch file, Copy Con command, echo, echo off , rem, set, pause statements, operators, if, if else, while , for loop statements	
Unit III	**Introduction to Linux Shell programming:** Shell keywords, Shell variables, operators, Read and Echo Statements, eval command, tput command, Control Instructions in shell.	
Unit IV	**Control Structure :** Taking Decisions: If- then –fi statement, if –then-else – fi statement, nested if, The case control structure, use of logical operators The loop control structure: While , until, for loop, nested loop , break statement, The continue statement	
Unit V	**System administration** Disk management: Formatting a disk, Making a file system, mounting a file system, un-mounting a file system. Monitoring disk usage. Disk defragmentation.	
Suggested Readings	1. Unix Shell Programming, Y.P. Kanetkar, BPB publication 2. Microsoft Windows Shell Script Programming JERRY LEE FORD, JR. Premier Press,Publication 3. Linux For Dummies- Dee-Ann LeBlanc, R. K. Blum, Wiley Publishing 4. Fedora 10 and Red Hat Enterprise Linux Bible- Christopher Negus, Wiley Publishing 5. Ubuntu for Non-Geeks, 2nd Edition: A Pain-Free, Project-Based, Guide book - Rickford Grant, Phil Bull, William Pollock Press.	

Course Code	Course Title	Credits
BSD405	**Dot Net Programming-I**	**04**
Objectives	1. To understand .Net programming environment for developing fast and good quality software project. 2. To give understanding of Vb.Net programing language for writing console and windows applications. 3. To understand object oriented programing features supported by VB.Net 4. To understand the exception handling technique in Vb.Net programing 5. To give systematic understanding of handling databases in windows application using VB.Net.
Outcome	**After successful learning of this course students will be able to:** 1. Identify application areas for developing the software project using .Net platform. 2. Write the console and windows applications for different tasks or modulesin Vb.Net programing. 3. Understand OOP's features supported by VB.Net and write programs for small modules 4. Develop small software program in some application areas using windows application and ADO.Net database.
Unit I	**Introduction to .Net Framework:** Introduction to Microsoft .Net framework, .Net framework architecture, Versions of .Net framework and studio, Working of Common Language Runtime, CTS and CLS, Garbage collection, Assembly, Components of Assembly and their types.
Unit II	**Console applications using VB .Net** Console Applications, Structure of console program, Data types, Input-Output statements, keywords, tokens, constants identifiers, Decision making statements, Control flow statements, working with collections, arrays and enumeration. Exception Handling: Importance of Exception handling, Exception handling using Try_Catch., User defined Exception handling programs such as divide by zero.
Unit III	**Windows applications using VB .Net :** Windows Forms: Working with forms, adding control to form, working with properties at design time, setting properties at run time, working with multiple forms, creating message box and input box and dialog box, handling events, creating MDI forms. Controls: Label control, Texbox, Button,Combobox, Listbox, Checkbox, Radio Button, Group Box, Panel, Picture Box, Progress bar, Timer, Treeview, Menustrip and Built in Dialogue boxes Mouse Events: Click, DoubleClick, Mouse UP and Down, Hover Keyboard Events: Keypress, Keydown, Keyup.
Unit IV	**Object Oriented Programming using VB .Net** Class and objects, properties, methods and events, member functions, constructor and destructors, Inheritance and its types, Access modifiers: Private, Public, Protected, Friend, Interfaces, and Polymorphism.
Unit V	**Handling Databases in VB.Net** ADO and ADO.Net, Database connection, Data adapter, Datasets, connection to the database with server control, data binding with some control like Text Boxes, List boxes, Navigating Data source, data validation, connection objects, command object, connected and disconnected architecture using ADO.Net.
Suggested Readings	1. Beginning VB.NET by Blair Richard, Matthew Reynolds, and Thearon Willis 2. Beginning VB.NET 2003; Willis, Cross Land and Blair. 3. Visual Basic .Net Programming, Black Book Steven Holzner 4. Learning Visual Basic. NET, Jesse Liberty 5. ASP.Net & VB.Net web programming- Math J. Croush (Pearson Education)

Course Code	Course Title	Credits
BSD406	**Advances in DBMS**	04
Objectives	1. To understand advanced concepts in DBMS like ODBMS, SOAP, Multimedia, Spatial and mobile databases. 2. To understand transaction management and concurrency control techniques. 3. Togive understanding ofdatabase backup method in system crashes. 4. To give understanding of security and privacy methods in database security. 5. To understand concepts of distributed and parallel databases with its working.	
Outcomes	After successful learning of this course students will be able to: 1. Identify different application areas wherein advanced techniques of DBMS can be used. 2. Know and use the different transaction management and concurrency control techniques to resolve the transactions conflicts. 3. Understand and decide appropriate database backup and recoverytechnique in system crashes. 4. Apply different techniques in securing and providing privacy in databases. 5. Understand mechanism of distributed and parallel databases and their application areas.	
Unit I	**Introduction to DBMS and advanced concepts:** General architecture of DBMS, 2-tier and 3-tier architecture of DBMS, DBA and his roles, Concept of object oriented database management system, Overview of client server architecture, Databases and web architecture, N-tier Architecture, SOAP, Multimedia databases, Mobile database, Spatial and temporal databases.	
Unit II	**Transaction Management and Concurrency control:** Concept of transaction, ACID property, States of transaction, Schedules and its types, Serializibility, Concurrency control, Locking techniques, Deadlocks, Time stamp based protocols.	
Unit III	**Database Backup, Security and Privacy :** Failure classifications, storage structure, Atomicity, Log based recovery, Recovery from concurrent transactions, Database backup from failures, Remote Backup System, Database security issues, Access control based on grant & revoking privilege, Mandatory access control and role based access control for multilevel security, Encryption & public key infrastructures.	
Unit IV	**Distributed Databases** Introduction to DDBMS, DDBMS architectures, Homogeneous and Heterogeneous Databases,Advantages & Disadvantages of DDBMS, Difference between Parallel and DDBMS, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control & recovery in distributed databases	
Unit V	**Parallel Databases :** Parallel database, Study of Parallel database architecture, I/O parallelism, Inter-query and Intra-query parallelism, Inter-operational and Intra-operational parallelism, parallel query evaluation.	
Suggested Readings	1. "Database System Concepts", Silber Schatz Korth, Tata McGraw Hill. 2. "Database Management Systems", Raghu Ramakrishnan, Johannes, Gehrke, Tata McGraw Hill. 3. "Fundamental of Database System", Sham Kanth B. Navathe, Pearson Education. 4. "Introduction to Database management System", Bipin Desai, Galgotia Publications. 5. "Database systems : Design implementation and management"- Rob Coronel, 4th Edition, (Thomson Learning Press). 6. Fundamentals of Database Systems - RemezElmasri, ShamkantNavathe	

Course Code	Course Title	Credits
BSD407	LAB10: Dot Net	02
	Students should provide hands-on knowledge with the knowledge they acquired through Course Code BVSD405 and Objectives and Outcome as per the Lab Manual designed by the subject Teacher.	

Course Code	Course Title	Credits
BSD408	LAB11:Adv. DBMS	02
	Students should provide hands-on knowledge through Course Code BVSD406 and Objectives and Outcome as per the Lab Manual designed by the subject Teacher.	

Course Code	Course Title	Credits
BSD409	LAB12: Network Establishment	02
	Students should provide hands-on knowledge with the Network connection and configuration. Objectives and Outcome as per the Lab Manual designed by the subject Teacher.	