श्रीचन्द्रशेखरेन्द्रसरस्वतीविश्वमहाविद्यालयः

**SRI CHANDRASEKHARENDRA SARASWATHI
VISWA MAHAVIDYALAYA**

Deemed to be University u/s 3 of UGC Act 1956 | Accredited with "A" grade by NAAC

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SYLLABUS

DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS

BACHELOR OF SCIENCE IN DATA SCIENCE (B.SC. (DATA SCIENCE))

REGULATIONS EFFECTIVE FROM ACADEMIC YEAR 2024-2025 ONWARDS

SRI CHANDRASEKHARENDRA SARASWATHI VISWA MAHA VIDYALAYA

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Bachelor of Science in Data Science

REGULATIONS

(Effective from the Academic Year 2024-2025)

The Department of Computer Science and Applications was established during 1996 with the vision of Empower every student to be innovative, creative and productive in the field of Computer Science by imparting quality education, developing skills and inculcating human values. The Department of Computer Science offers the following Programmes.

- ❖ B.Sc. in Computer Science
- ❖ BCA
- ❖ MCA

As per the NEP 2020 Policy, The Department offers the following UG 4-Year Honours Programmes with an exit option at the end of the 3rd year, 2nd year and 1st year from the year 2023-2024.

- ❖ B.Sc. in Computer Science
- ❖ BCA

As per the NEP 2020 Policy, The Department offers the following UG 4-Year Honours Programmes with an exit option at the end of the 3rd year, 2nd year and 1st year from the year 2024-2025.

- ❖ B.Sc. in Data Science
- ❖ B.Sc. in Cyber Security

In addition, the Department of Computer Science and Applications offers the following PG Programme.

- ❖ M.Sc. in Computer Science

SALIENT FEATURES OF FOUR YEARS UNDER GRADUATE PROGRAMMES

1. It is a Choice Based Credit System under Semester Scheme.
2. The Programmes comprise of about 50% Discipline Specific Core Courses as Major subjects, 20% Discipline Specific Core Courses / Multi-Discipline Specific Courses as Minor courses, and remaining 30% Ability Enhancement Compulsory Courses, Skill Enhancement Courses along with Open Elective Courses.

3. The relative importance of Courses of the study is measured in terms of credits.
4. The declaration of result is based on Aggregate Percentage of marks obtained and Cumulative Grade Point Average (CGPA) earned.
5. The candidate has an option to exit after TWO, FOUR and SIX semesters of the Programme and shall be awarded Certificate, Diploma, and General Degree, respectively with a provision to reenter and complete the degree.

OBJECTIVES

The **B.Sc. in Data Science** course strives to inculcate job-oriented and value based quality education in Computing Principles, Information Technology and Commercial Application Development using information system and enterprise software. At the end of the course, the students will be well-versed, particularly in core subjects with quality in inter- personal and professional skills. In addition

❖ To create future data scientists and data analysts to work on a real-life data analytic assignments

❖ To provide in-depth learning in basic as well as advanced Probability and Statistics, rigorous practical skills in multiple programming.

❖ To produce outstanding Computer Scientists who can apply the theoretical knowledge into practice in the real world and develop standalone live projects themselves.

❖ To solve real-world issues by developing intelligent computing systems to meet the emerging technology challenges in the industries.

❖ To apply professional and interpersonal skills through lifelong learning such as advanced degrees and research

❖ To participate in collaborative learning and become successful entrepreneurs by ensuring ethical and moral values.

❖ To empower the students to apply their knowledge and skills to work on a real-life data analytic projects.

PROGRAM OUTCOMES

❖ **Discipline knowledge:** Apply the knowledge of mathematics, science and computer to the solution of complex problems

❖ **Problem Analysis**: Identify, formulate, review research literature, and analyze complex problems reaching substantiated conclusions using first principles of mathematics and natural sciences

- ❖ **Design and Development of Solutions:** Ability to design and development of algorithmic solutions to real world problems.
- ❖ **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- ❖ **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern tools including prediction and modeling to complex activities with an understanding of the limitations.
- ❖ **Communication:** Must have a reasonably good communication knowledge both in oral and writing.
- ❖ **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- ❖ **Ethics on Profession, Environment and Society:** Exhibiting professional ethics to maintain the integrality in a working environment and also have concern on societal impacts due to computer-based solutions for problems.
- ❖ **Lifelong Learning:** Should become an independent learner. So, learn to learn ability.
- ❖ **Motivation to take up Higher Studies:** Inspiration to continue educations towards advanced studies on Data Science.

PROGRAM SPECIFIC OUTCOMES FOR B.Sc. IN DATA SCIENCE

The four years **Bachelor of Science in Data Science** program enables students to attain the following additional attributes besides the afore-mentioned attributes:

- ❖ Apply the concepts and algorithms of various learning models for deep analysis of data to provide high-end business decisions for advancement in the data science fields.
- ❖ Design and develop computer programs/computer-based systems in the areas related to AI, networking, web design, cloud computing, IoT and data analytics.

- ❖ Apply and evolve Artificial Intelligence-based models to solve real-world problems in various domains and deliver solutions with innovative ideas.
- ❖ Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems
- ❖ The ability to work independently on a substantial software project and as an effective team member.

ELIGIBILITY FOR ADMISSION

Candidates for admission to the first year of the Degree of **B.Sc. in Data Science** shall be required to have passed the Higher Secondary Examination conducted by the Government of Tamil Nadu or an Examination accepted as equivalent thereof by the University authorities, with Mathematics / Business Mathematics / Statistics / Computer Science as one of the subjects in XII Std. The upper age limit to join the first year is 19.

For Lateral Entry to II year, Candidates for admission to the Second year of the Degree of **B.Sc. in Data Science** shall be required to have passed the Diploma in Computer Technology Examination conducted by the Government of Tamil Nadu, or an Examination accepted as equivalent thereof by the University authorities The upper age limit to join the second year is 21.

DURATION OF THE COURSE

The duration of the UG Programme is 4 years or 8 semesters. Students who desire to undergo a 3-year UG Programme will be allowed to exit after completion of the 3^{rd}year. If a student wants to leave after the completion of the first or second year, the student will be given a UG Certificate or UG Diploma, respectively, provided they secure the prescribed number of credits. Students who exit with a UG certificate or UG diploma are permitted to re-enter within three years and complete the degree Programme.

Students may be permitted to take a break from the study during the period of study but the total duration for completing the Programme shall not exceed 7 years.

REGISTRATION OF COURSE

A newly admitted student will automatically be registered for all the courses prescribed for the first semester without option. Every student shall submit a completed registration form indicating the list of courses intended to be credited during the second to final semester. This registration will be done a week before the last working day of the current semester.

CHOICE BASED CREDIT SYSTEM

The University follows the '**Choice Based Credit System (CBCS)**' for all its Programmes. Each course is normally assigned one credit per lecture per week and one credit for two periods of tutorials or part thereof for laboratory or practical per week.

STRUCTURE OF THE COURSE AND EVALUATION PATTERN

Internal Marks: 40   -   External Marks: 60

The duration of University examination for both theory and practical subjects shall be 3 hours. The maximum marks for each theory and practical course is 100. Continuous Internal Assessment (CIA) will be for 40. The university theory examination will be conducted for 100 marks, which will be then converted to 60 in order to add with continuous internal assessment to make 100 marks for the course. For the conduct of University examinations in practical, the question paper for the practical examination will be set by both internal and external examiners appointed by the University.

PROCEDURES FOR AWARDING MARKS FOR INTERNAL ASSESSMENT

The break-up of assessment and examination marks for theory subjects is as follows.

First Assessment (Test)	:	15	Marks
Second Assessment (Test)	:	15	Marks
Assignment & Attendance	:	10	Marks

Internal Assessment	:	40	Marks

University Examination	:	60	Marks

Total	:	100	Marks

The break-up of the assessment and examination marks for practical is as follows.

Observation	:	10	Marks
Model Examinations	:	20	Marks
Record Book	:	10	Marks

Internal Assessment	:	40	Marks
University Examination	:	60	Marks

Total	:	100	Marks

The break-up of assessment (**Internal Assessment Only**) for the subjects Indian Culture, Yoga/Sports, Principles of Environmental Science, Fundamentals of Cyber Security and Soft Skills is as follows:

Assignment	:	10	Marks
First Internal Test	:	30	Marks
Second Internal Test	:	30	Marks
Seminar	:	10	Marks
Quiz/Objective type test	:	10	Marks
Attendance	:	10	Marks

Total	:	100	Marks

REQUIREMENTS FOR THE COMPLETION OF THE SEMESTER

The candidate who has fulfilled the following conditions shall be deemed to have satisfied the requirements for the completion of the semester.

1. He/ She secures not less than 80% of overall attendance in that semester taking into account the total number of periods in all courses put together attended by the candidate as against the total number of periods in all courses offered during that semester.

2. Condonation of attendance up to 10% is permitted on medical grounds. Relaxation in attendance is permitted up to 10% for the student who represents the university in sports and games. The above two relaxation cannot be taken concurrently.

3. Candidates with 69% - 40% attendance will not be permitted to write the examination (including practical) in the current semester **(Sem-Carry)** and he / she can write the same on the subsequent semester.

4. Candidates with less that 40% attendance will not be permitted to write the end semester examination (including practical) and are not permitted to go for the next semester **(Detained)**. Such candidate required to repeat the incomplete semester in the next academic year, after paying the fee for the break of study as prescribed by the University from time to time.

REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER

1. Candidates shall register their name for the First Semester Examination after the admission in the U.G. course.

2. Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester examinations subject to the condition that the candidates should register for all the arrear subjects of earlier semesters along with current (subsequent) semester subjects.

3. Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed thereof by the University from time to time.

STUDENT MENTOR

To help the students in planning their course of study and for general advice on the academic programme, the Head of the Department will attach a certain number of students to a member of the faculty who shall function as student Mentor for those students throughout their period of study. Such student Mentor shall advise the students, give preliminary approval for the courses to be taken by the students during each semester and obtain the final approval of the Head of the Department.

CLASS COMMITTEE

The composition of the class committees will be as follows.

❖ Course coordinators of the courses, if any, who shall be appointed by the Head of the Department and the staff members teaching the course.

❖ Teaching staff of other individual courses.

❖ One professor, preferably not teaching the concerned class, appointed by the Head of the Department.

❖ The Head of the Department may opt to be a member or the Chairman.

❖ All student of the class, and the Head of the Department (if not already a member) or any staff member nominated by the Head of the Department may opt to be special invitees.

❖ The class committee shall meet three times during the semester.

❖ The first meeting will be held within a week after the completion of the first assessment to review the performance and for follow-up action.

❖ The second meeting will be held within a week after the completion of the second assessment to review the performance and for follow-up action.

❖ The third meeting will be held after all the assessments are completed for all the courses, and at least one week before the commencement of the examinations. During this meeting the assessment on a maximum of 40 marks will be finalized for every student and tabulated and submitted to the head of the department.

WITHDRAWAL FROM A COURSE

A student can withdraw from a course at any time with the approval of the Dean and the recommendation of the Head of the Department.

DISCIPLINE

Every student is required to observe disciplined and decorous behavior both inside and outside the college. They do not indulge in any activity which will tend to bring down the prestige of the University. Boys should wear decent dresses. No casual wear like T – shirts or Jeans pant is permitted. Girls shall wear decent dresses like Chudidhar with Dupatta or Saree.

REVISION OF REGULATION AND CURRICULUM

The university may revise, amend or change the Regulations, Scheme of Examination and Syllabus as found necessary.

AUTHORITY OF BOARD OF STUDIES

The Board of Studies has the full authority to change the syllabus any time according to IT trend and industry needs.

SUBSTITUTE ASSESSMENT:

A student who has missed one or more of assessment tests of a course other than the examinations for genuine reasons as accepted by the Head of the Department may take a substitute assessment for any one of the missed assessment. A student who wishes to have a substitute assessment for missed assessment must apply to the Head of the Department within two week from the date of the missed assessment.

EXAMINATIONS

1. The end semester examinations will ordinarily be conducted during November to December in the odd semesters and during April to May in the even semesters. For

all the theory courses, question papers will be set by external examiners and valued by external and/or internal examiners.

2. All practical examinations including software development lab will be conducted by Internal & External examiners appointed by the University

PASSING AND DECLARATION OF EXAMINATION RESULTS:

PASSING MINIMUM

1. A candidate shall be declared to have passed in each paper / practical if he / she secures not less than 40% of marks (the continuous internal assessment (CIA) and the University examinations (External) put together), provided a minimum of 35% of marks secured in the University examination.

2. If a candidate fails to secure a pass in a particular course, it is mandatory that he/she shall register and reappear for the examination in that course during the next semester. He / She should continue to register and reappear for the examination till he/she secures a pass. However, the internal assessment marks obtained by the candidate in the first attempt shall be retained and considered valid for all subsequent attempts.

3. Assessments of all the courses on absolute marks will be considered and passed by the Results – Passing- Board in accordance with the rules of the University. Thereafter, the Controller of Examinations shall convert the marks of each course to the corresponding letter grade as stated below. In addition the grade point average and the cumulative grade point average calculated. Based on these, the grade cards will be prepared.

Marks	Letter Grade	Grade Point
100	O (Outstanding)	10
90-99	A+ (Excellent)	9
80-89	A (Very good)	8
70-79	B+ (Good)	7
60-69	B (Above average)	6
50-59	C (Average)	5
40-49	P (Pass)	4
	F (Fail)	0
	Ab (Absent)	0

4. A Student who obtains less than 40 marks out of 100 in the examination will be awarded the "**F**" grade and absent for the examination will be awarded the **"Ab"** grade. A Student who earns a grade of "**O**", **"A+", "A", "B+", "B", "C" or "P"** in a course is declared to have successfully completed that course and earned the respective credits for that course. Such a course cannot be repeated by the student.

5. A Student who obtains a letter grade **"F"** or **"Ab"** in a course is to reappear for the examinations in that course.

6. The following grade points are associated with each letter grade for calculating the grade point average and cumulative grade point average.

"O" – 10;	**"B+"** – 07;	**"P"** – 04;
"A+" – 09;	**"B"** – 06;	**"F" - 0;**
"A" – 08;	**"C"** – 05;	**"Ab" - 0;**

7. A Student can apply for revaluation of one or more of her/his examination answer papers within a week from the date of display of the result on payment of the prescribed fee. The application must be made to the Controller of Examinations with the recommendation of the Head of the Department.

8. After the results are declared, grade cards will be issued to the student. The grade cards will contain the list of courses registered during the year/ semester, the grades scored and the grade point average (GPA) for the year/ semester.

9. GPA is the sum of the products of the number of credits of a course with the grade point scored in that course, taken over all the course for the year/semester, divided by the sum of the number of credits for all courses taken in that year/semester. CGPA is similarly calculated by considering all the courses taken from the time of admission.

10. After successful completion of the programme, the degree will be awarded with the following classification based on CGPA.

    a) **First class with Distinction** will be awarded, if the student passed all the courses in the first attempt and obtained a minimum CGPA 0f 8.25.

    b) **First class** will be awarded, if the student earned a minimum CGPA of 6.5 within five years for **B.Sc. (HONOURS)**, four years for **B.Sc.**, three years for **Diploma** and two years for **Certificate course** from the time of admission.

c) **Second Class** will be awarded, if the student completed the course beyond the above said period of the respective course.

- ❖ The total credits for **Bachelor of Science (HONOURS) in Data Science** course are 178.
- ❖ The total credits for **Bachelor of Science in Data Science** course are 136.
- ❖ The total credits for **Diploma in Data Science** course are 88.
- ❖ The total credits for **Certificate course on Basics of Data Science** are 46.

ELIGIBILITY FOR THE AWARD OF THE DEGREE

1. The candidate shall be declared to be eligible for the award of Degree of **Bachelor of Science (HONOURS) in Data Science,** if He / She has successfully completed the course requirements and has passed all the prescribed examinations in all the eight semesters with a minimum of 178 credits within a maximum period of seven years reckoned from the commencement of the first semester to which the candidate was admitted.

2. The candidate shall be declared to be eligible for the award of Degree of **Bachelor of Science in Data Science,** if He / She exits at the end of third year and has successfully completed the course requirements and has passed all the prescribed examinations in all the six semesters with a minimum of 136 credits within a maximum period of five years reckoned from the commencement of the first semester to which the candidate was admitted.

3. The candidate shall be declared to be eligible for the award of **Diploma in Data Science,** if He / She exits at the end of second year and has successfully completed the course requirements and has passed all the prescribed examinations in all the four semesters with a minimum of 88 credits within a maximum period of four years reckoned from the commencement of the first semester to which the candidate was admitted.

4. The candidate shall be declared to be eligible for the award of **Certificate Course on Basics of Data Science,** if He / She exits at the end of first year and has successfully completed the course requirements and has passed all the prescribed examinations in all the two semesters with a minimum of 46 credits within a maximum period of two years reckoned from the commencement of the first semester to which the candidate was admitted.

PATTERN OF QUESTION PAPER (THEORY)

Time   :   3 hours   **Max Marks :**   100

Part – A (10 * 2 = 20 Marks)

      (2 Question from each unit) Theory

Part – B (5 * 16 = 80 Marks)

      (1 Set from each Unit (Either or Pattern))

Marks secured by the candidate will be converted to 60 to make the aggregate 100, while adding with Continuous Internal Assessment 40.

PATTERN OF QUESTION PAPER (PRACTICAL)

Time   :   3 Hours   **Max   :**   60 Marks.

One compulsory lab exercise (may contain sub divisions) should be solved within 3 hours. The External Examiner will set a question paper on the spot with the help of the question bank or list of exercise. The evaluation pattern as follows

Program and output   - 40 Marks

Record   - 10 Marks

Viva- Voce   - 10 Marks.

No more than threecandidates should get the same question in a batch.

STRUCTURE OF THE COURSE

The course of the **B.Sc. in Data Science** Degree shall consist of the following subjects.

1.   Foundation Courses: The course shall comprise the study of,
   a) Part-I Tamil / Sanskrit /Hindi
   b) Part-II English
2.   Core Courses:
   a) Main Subject
   b) Allied Subjects
   c) Application Oriented subjects related to the main subject of study and practical etc.

Curriculum and Credits

Sem	Course Code	Category	Paper	Hrs	L	T	P	Total Credits
I	BDS231LT01 / BDS231LH01 / BDS231LS01	Multidisciplinary	Tamil - I / Hindi - I / Sanskrit - I	4	3	1	0	3
	BDS231E02	AEC-1	English - I	4	3	1	0	3
	BDS231T03	Major-1	Programming in C	5	3	2	0	4
	BDS231T04	Major-2	Data Science Fundamentals	5	3	2	0	4
	BDS231A05	Minor-1	Allied Mathematics -I	4	3	1	0	4
	BDS231P06	SEC-1	Programming in C Lab	5	0	0	5	2
	BDS231V07	VAC-1	Indian Culture	1	0	1	0	1
	BDS231V08	VAC-2	Principles of Environmental Science	2	0	2	0	2
			Total	**30**	**15**	**10**	**5**	**23**
II	BDS232LT01 / BDS232LH01 / BDS232LS01	Multidisciplinary	Tamil - II / Hindi - II / Sanskrit - II	4	3	1	0	3
	BDS232E02	AEC-2	English - II	4	3	1	0	3
	BDS232T03	Major-3	Relational Data Base Management Systems	5	3	2	0	4
	BDS232T04	Major-4	Data Structures and Algorithms	5	3	2	0	4
	BDS232A05	Minor-2	Allied Mathematics -II	4	3	1	0	4
	BDS232P06	SEC-2	RDBMS Lab	5	0	0	5	2
	BDS232V07	VAC-3	Yoga	1	0	1	0	1
	BDS232V08	VAC-4	Fundamentals of Cyber Security	2	0	2	0	2
			Total	**30**	**15**	**10**	**5**	**23**
III	BDS233LT01 / BDS233LH01 / BDS233LS01	Multidisciplinary	Tamil - III / Hindi - III / Sanskrit - III	4	3	1	0	3
	BDS233E02	AEC-3	English - III	4	3	1	0	3
	BDS233T03	Major-5	Python for Data Science	5	3	2	0	4
	BDS233T04	Major-6	Operating System & System Administration	5	3	2	0	4
	BDS233A05	Minor-3	Probability and Statistics	5	3	2	0	4
	BDS233P06	SEC-3	Python Programming Lab	6	0	0	6	2
	BDS233V07	VAC-5	Soft Skills - I	1	0	1	0	1
			Total	**30**	**15**	**9**	**6**	**21**

Sem	Course Code	Category	Paper	Hrs	L	T	P	Total Credits
IV	BDS234LT01 / BDS234LH01 / BDS234LS01	Multidisciplinary	Tamil - IV / Hindi - IV / Sanskrit - IV	4	3	1	0	3
	BDS234E02	AEC-4	English - IV	4	3	1	0	3
	BDS234T03	Major-7	Data Analytics Using R	5	3	2	0	4
	BDS234T04	Major-8	Data Warehousing and Data Mining	5	3	2	0	4
	BDS234A05	Minor-4	Introduction to Quantum Computing	5	3	2	0	4
	BDS234P06	SEC-4	Data Analytics using R Lab	6	0	0	6	2
	BDS234V07	VAC-6	Soft Skills - II	1	0	1	0	1
			Total	30	15	9	6	21
V	BDS235T01	Major-9	C# and .NET Programming	5	3	2	0	4
	BDS235T02	Major-10	Web Technology	5	3	2	0	4
	BDS235T03	Major-11	Data Wrangling Techniques	4	3	1	0	4
		Major-12	**Major Elective-1**	4	3	1	0	4
	BDS235TE04A		A. Cloud Computing					
	BDS235TE04B		B. Software Engineering					
		Minor-5	**Minor Elective - 1**	4	3	1	0	4
	BDS235AE05A		A. Management Information System					
	BDS235AE05B		B. Human Resource Management					
	BDS235P06	SEC-5	C# Lab	4	0	0	4	2
	BDS235P07	SEC-6	Web Technology Lab	4	0	0	4	2
			Total	30	15	7	8	24
VI	BDS236T01	Major-13	Big Data Analytics	5	3	2	0	4
	BDS236T02	Major-14	Data Handling and Visualization	5	3	0	2	4
	BDS236T03	Major-15	Mobile Communications	4	3	1	0	4
		Major-16	**Major Elective-2**	4	3	1	0	4
	BDS236TE04A		A. Artificial Intelligence					
	BDS236TE04B		B. Machine Learning					
		Minor-6	**Minor Elective-2**	4	3	1	0	4
	BDS236AE05A		A. Digital Marketing					
	BDS236AE05B		B. Organization Behaviour					
	BDS236P06	SEC-7	Big Data Analytics Lab	4	0	0	4	2
	BDS236P07	SEC-8	Software Development Lab	4	0	0	4	2
			Total	30	15	5	10	24

Sem	Course Code	Category	Paper	Hrs	L	T	P	Total Credits
VII	BDS237T01	Major-17	Information Retrieval Techniques	5	3	2	0	4
		Major-18	**Major Elective-3**	5	3	2	0	4
	BDS237TE02A		A. Health Analytics					
	BDS237TE02B		B. No SQL Databases					
		Major-19	**Major Elective-4**	5	3	2	0	4
	BDS237TE03A		A. Data Security and Privacy					
	BDS237TE03B		B. Techniques and Tools for Data Science					
		Major-20	**Major Elective-5**	5	3	2	0	4
	BDS237TE04A		A. Internet of Things (IoT)					
	BDS237TE04B		B. Business Analytics					
		Minor-7	**Minor Elective-3**	4	3	1	0	4
	BDS237AE05A		A. Statistical Inference For Data Science					
	BDS237AE05B		B. Operations Research					
	BDS237P06	IAPC - 1	Mini Project	6	0	0	6	2
			Total	**30**	**15**	**9**	**6**	**22**
VIII	BDS238T01	Major-21	Deep Learning	5	3	2	0	4
		Minor-8	**Minor Elective-4**	4	3	1	0	4
	BDS238AE02A		A. Human Values and Professional Ethics					
	BDS238AE02B		B. Ethical Hacking					
	BDS238P03	IAPC - 2	Project	21	0	0	21	12
			Total	**30**	**6**	**3**	**21**	**20**
			Overall Total					**178**

S.No	Course Category	Total Credits III Year	Total Credits IV Year
1	Multidisciplinary	**12**	**12**
2	Ability Enhancement Course (AEC)	**12**	**12**
3	Minor	**24**	**32**
4	Major	**64**	**84**
5	Skills Enhancement Course (SEC)	**16**	**16**
6	Research Project / Dissertation (IAPC)	**-**	**14**
7	Value Added Course	**8**	**8**
	Overall Credits	**136**	**178**

BDS231LT01	LANGUAGE –I	L	T	P	C
	(TAMIL-I)	3	1	0	3

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

நோக்கம்:

- தற்கால இலக்கியப் போக்குகளையும், இலக்கணங்களையும் மாணவர்கள் அறியுமாறு செய்து அவர்களின் படைப்பாற்றலைத் தூண்டுதல்.
- பாரதியார் காலம் தொட்டு தற்கால புதுக்கவிதைகள் வரை கவிதை இலக்கியம் அறிமுகப்படுத்தப்படுவதால் படைப்பாற்றல் திறன் பெறுதல்.
- மொழி அறிவோடு சிந்தனை திறன் அதிகரித்தல்.
- தமிழ் மொழியை பிழையின்றி எழுதவும் புதிய கலைச் சொற்களை உருவாக்கவும் அறிந்து கொள்ளுதல்.
- புதுக்கவிதையின்மூலம் வாழ்வியல் விழுமியங்களை உணர்த்துதல்
- இலக்கணமும் மொழித் திறனும் மொழியை பிழையின்றி பேச எழுத கற்க தேவையான தமிழ் இலக்கணத்தின் இன்றியமையாமையை உணர்த்துதல்
- பக்தி இலக்கியங்கள் வழி சமயச் சான்றோர்களின் கருத்துக்களை உணர்த்துதல்
- மாணவர்களின் வாசிப்பு திறனையும் படைப்புத் திறனையும் மேம்படுத்த சமூகப் பிரச்சனைகளை அறிய வைத்தல்
- மொழியினைப் பிழையின்றி கற்பதற்கும் பிறத்துரைச் சார்ந்த கலைச் சொற்களையும் அறிய வைத்தல்

பயன்:

- புதுக்கவிதையின் மூலம் வாழ்வியல் விழுமியங்களை உணர்ந்து கொள்ளுதல்
- இலக்கணமும் மொழித்திறனும் மொழியை பிழையின்றிப் பேச எழுத கற்கத் தேவையான தமிழ் இலக்கணத்தின் இன்றியமையாமையை உணர்ந்து கொள்ளுதல்
- பக்தி இலக்கியங்கள் வழி பக்தி நெறிகளை உணர்ந்து கொள்ளுதல்
- மாணவர்களின் வாசிப்பு திறனையும் படைப்புத்திறனையும் மேம்படுத்த சமூகப் பிரச்சனைகளை அறிந்து கொள்ளுதல்
- மொழியினை பிழையின்றி கற்பதற்கும் பிற துறைச் சார்ந்த கலைச் சொற்களையும் அறிந்து கொள்ளுதல்

<u>பாடத்திட்டங்கள்</u>

அலகு - I   இக்கால இலக்கியம்

தமிழ்த் தாய் வாழ்த்து- மனோன்மணியம் சுந்தரனார் போகின்ற பாரதமும் வருகின்ற பாரதம், பாரதியார் வருகின்ற பாரதத்தை வாழ்த்துதல் தமிழின் இனிமை- பாரதிதாசன், ஒரு கிராமத்து நதி- சிற்பி பாலசுப்ரமணியம், அனுபவம்-கண்ணதாசன்,

வண்ணத்துப்பூச்சி-முத்துக்குமார்- சென்னிமலை கிளியோ பாத்ரா ஈரோடு தமிழன்பன்-தொழில் பாடல்கள் -கொண்டாட்டப் பாடல்கள் -வழிபாட்டு பாடல்கள்

12

அலகு - II   இலக்கணம்
எழுத்தின் விளக்கம் - எழுத்தின் வகைகள் - வினா எழுத்துக்கள் – சுட்டெழுத்துக்கள் -வல்லினம் மிகும் இடங்கள் - வல்லினம் மிகா இடங்கள் - ஒலிப்பு மாறுபாடுகளும் பொருள் வேறுபாடுகளும்.

12

அலகு - III   பக்தி இலக்கியம்
விநாயகர் - தத்துவமயமான விநாயகர் - பக்தி - பக்தி செய்வது எதற்காக - ஸ்ரீராமன்-அம்மா - குரு பரம்பரை - சரணாகதியே முக்கியம்- மகான்கள் காட்டும் குரு பக்தி - விநாயகர் துணை- ஸ்ரீ மகா பெரியவர்

12

அலகு - IV   சிறுகதைமற்றும் நாவல்
செவ்வாழை- அறிஞர் அண்ணா, குலத்தங்கரை அரசமரம்- வ.வே.சு ஐயர், வாடாமல்லி – புதுமைப்பித்தன், தனிமை - ராஜம் கிருஷ்ணன் ,நரிப்பில்- இறையன்பு -பார்வதி பிஏ பேரறிஞர் அண்ணா

12

அலகு - V   மொழிப் பயிற்சி
பொருந்திய சொல்லைத் தேர்வு செய்தல் மரபுத்தொடர் நேர்காணல் கலைச்சொல் பிறமொழிச் சொற்களை நீக்கி எழுதுதல்

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TOTAL: 60

பாடநூல் :-

1. பாரதியார் கவிதைகள் 2007 எட்டாம் பதிப்பு தென்றல் நிலையம்
2. சு சக்திவேல் நாட்டுப்புறவியல் ஆய்வு மணிவாசகர் பதிப்பகம் சிதம்பரம்
3. ரா வள்ளிக்கண்ணன் 1999 புதுக்கவிதையில் தோற்றமும் வளர்ச்சியும் நான்காம் பதிப்பு அகரம் வெளியீடு கும்பகோணம்
4. தெய்வத்தின் குரல் தொகுப்பாசிரியர் ரா கணபதி வானதி பதிப்பகம் சென்னை
5. தமிழர் நாட்டுப் பாடல்கள் நியூ செஞ்சுரி புத்தக நிறுவனம்.

பார்வை நூல் :-

1. வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு நியூ செஞ்சுரி புக் ஹவுஸ் சென்னை
2. நாட்டுப்புறவியல் ஆய்வுவானமாமலை
3. சு சக்திவேல் மணிவாசகர் பதிப்பகம் பாரிமுனை சென்னை 108
4. சிற்பி பாலசுப்ரமணியம் இருபதாம் நூற்றாண்டு தமிழ் கவிதைகள்
5. பாரதிதாசன் பாடல்கள் பாவை பப்ளிகேஷன்ஸ் சென்னை
6. அற இலக்கியத்தில் வாழ்வியல் விழுமியங்கள் செம்முதாய்பதிப்பகம் சென்னை.

BDS231LH01	**LANGUAGE –I**	**L**	**T**	**P**	**C**
	(HINDI - I)	**3**	**1**	**0**	**3**

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

UNIT –I   REFLECTION ON HINDI LANGUAGE:
   a) Importance of Hindi learning & the place of Hindi as National language.
   b) Cultural contexts of Hindi : an introduction &Various functional forms of Hindi
   c) Hindi Phonetics – Vowels and Consonants
   d) Barahkhadi & Dwitvakshar and Samyuktakshar
   e) Often wrong spelt words and correction

UNIT –II   HINDI VOCABULORY: made easy
   a) Greetings and Introductory words
   b) Basic words for daily usage – spoken purpose in particular.
   c) Introduction to parts of speech in Hindi
   d) Adjective noun agreements, Oblique and expressions of possession (APNA)

UNIT – III   HINDI GRAMMAR: for Syntax Understanding
   a) Gender and Number
   b) Infinitive Verbs : commands and requests
   c) Parts of speech - sentence making
   d) Verb usage variations
   e) Karakchihn – Introduction

UNIT –IV   WRITING AND READING SKILLS OF HINDI
   a) Application of case-endings in sentences
   b) Sentence formation (Gender specified)
   c) Sentence formation (Number specified)
   d) Changing the sentence according to the instructions (using '*Be* form')
   e) Hindi – reading and writing exercises (Short stories, paragraphs etc.)

UNIT – V   THE FOUNDATION FOR HINDI SPEAKING
   a) Introduction of Tenses
   b) Present Tense and it's variations
   c) Future Tense and it's variations
   d) Transcription of Paragraph
   e) OVER ALL REVIEW OF WHAT WE LEARNED SO FAR

TEXT BOOKS:
1. **HINDI SOURABH,** Prepared by Department of Hindi, SCSVMV

REFERENCES:
1. "Come Let us Learn Hindi" : Dr. Alok Pandey, Published by Milind Prakashan, Hyderabad 2013
2. Pankhudiyan 1&2: Dr. Madhu Dhawan, Lekhan Prakashan, New Delhi 2011
3. SABARI HINDI BODHINI, Published by Shabari Prakasan, Selam, 2012

BDS231LS01	LANGUAGE –I	L	T	P	C
	(SANSKRIT- I)	3	1	0	3

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

UNIT – - I भागः - क

1. Vowels & Consonants
2. Words begin with vowels
3. Words begin with कto ण
4. Words begin with तto ह

UNIT – II भागः - ख

1. Words begin with क to झ with the combination of Vowels.
2. Words begin with टto न with the combination of Vowels.
3. Words begin with प to हwith the combination of Vowels.
4. Combined Letters.
5. Simple Sentences.

UNIT – III भागः - ग

1. Lessons from text book 1-6.

UNIT – IV भागः–घ

1. Lessons from text book 7-12.

UNIT – V भागः – ङ

1. शब्दरूपाणि

1. देवः	6. छात्रा	11. वनम्	16. इदम्
2. मुनिः	7. मतिः	12. अस्मद्	17. किम
3. गुरुः	8. गौरी	13. युष्मद्	
4. पितृ	9. धेनुः	14. तद्	
5. गो	10. मातृ	15. एतद्	

2. धातुरूपाणि(Present tense, Past tense and Future tense) परस्मैपद-आत्मनेपदधातवः

1. भूधातुः
2. पठधातुः
3. गम्धातुः

TEXT BOOKS:

1. Samskrita Siksha - Part I & II, Published by Department of Sanskrit and Indian culture, SCSVMV University (Deemed University), Enathur, Kanchipuram.

BDS231E02	ENGLISH -I	L	T	P	C
		3	1	0	3

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

COURSE OBJECTIVES
- To get inspiration from the life history of great scientists
- To get exposed to the genre of poetry
- To provide students with basic grammar of English
- To understand grammatically correct sentences and make use of it
- To groom the students to become a successful personality

COURSE OUTCOMES
- Read and interpret the text in English language
- Appreciate the poetic language.
- Comprehend the Basic English grammar and its usage.
- Write sentences without errors.
- Develop an integrated sense of personal identity, a positive sense of self, and a personal code of ethics.

SYLLABUS

UNIT – I   BIOGRAPHY
1. Sir C.V. Raman
2. Srinivasa Ramanujan
3. APJ. Abdul Kalam

12

UNIT – II   POETRY
1. Edgar Allan Poe : Sonnet –To Science
2. Walt Whitman : When I heard the Learn'd Astronomer
3. Rudyard Kipling : The Secret of machine

12

UNIT – III   BASIC GRAMMAR – I
1. Articles
2. Pronouns–Personal & Impersonal
3. Adjectives Synonyms & Antonyms
4. Sentence Structure

12

UNIT – IV   BASIC GRAMMAR – II
1. Tense forms
2. Idioms & Phrases
3. Suitability & Verbs
4. E-Mail
5. Patterns of Greeting

12

UNIT – V   PERSONALITY DEVELOPMENT
1. Know your personality
2. Leadership qualities
3. Enhance your effectiveness
4. Career planning
5. Time management

12
TOTAL: 60

TEXT BOOKS:
1. Rajiv K. Mishra.*Personality Development*.Delhi: Rupa Publications, 2004

BDS231T03	PROGRAMMING IN C	L	T	P	C
		3	2	0	4

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / B.Sc. (Data Science)

COURSE OBJECTIVES

- To help the students to learn programming concepts using C Language
- To learn the fundamentals of PST and methodologies which are essential for building good C programs
- To demonstrate a thorough understanding of modular programming by designing programs which require the use of programmer-defined functions
- To impart the knowledge about pointers which is the backbone of effective memory handling
- To demonstrate adeptness of file access in developing solutions to problems

COURSE OUTCOMES

- Learn the fundamental programming concepts and methodologies which are essential for building good C programs.
- Understand the modular programming by designing programs which require the use of programmer defined functions.
- Acquire the knowledge about pointers
- Learn about the Storage Classes and building good C programs.
- Obtain the knowledge of writing programs for file access.

SYLLABUS

UNIT – I
C fundamentals: Character set - Identifier and keywords - data types - constants- Variables - Declarations - Statements - Operators – Expressions.

12

UNIT – II
Data input and output functions: - Simple C programs - Flow of control - if, if else, While, do-while, for loop, Nested control structures - Switch, break and continue, go to statements.

12

UNIT – III
Functions:-Definition - prototypes - Passing arguments – Recursion- Storage Classes - Automatic, External, Static, Register Variables

12

UNIT – IV
Arrays: - Defining and Processing - Passing arrays to functions - Arrays andStrings. Structures and unions - Passing structures to functions - Unions - Bit wise operations.

12

UNIT – V

Pointers: - Declarations - Passing pointers to Functions - Pointer and Arrays -Arrays of Pointers - Structures and Pointers - Files: Creating, Processing, Opening and Closing a data file.

12
TOTAL: 60

TEXT BOOKS:

1. Henry Mullish, Herbert Cooper, The Spirit of C An Introduction to Modern Programming, Jaico Publishing House, 28th Impression, 2006.
2. Yashavant P. Kanetkar, Understanding Pointers In C , BPB Publications, NewDelhi, 14thEdition, 2016

REFERENCE BOOK:

1. Byron C Gottried, Programming with C, Schuams' outline series, 3rd Edition, Tata McGraw Hill Education, 2017.

BDS231T04	DATA SCIENCE FUNDAMENTALS	L	T	P	C
		3	2	0	4

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES

- To understand the basics of data science
- To get thorough knowledge in data mining
- To learn and understand data science packages of python
- To learn and apply data science algorithms using R language
- To study various visualization techniques

COURSE OUTCOMES

- Understand the basics of data science
- Acquire knowledge of various analytical
- Work with data science packages of python
- Apply data science algorithms using R language
- Obtain knowledge of various visualization techniques

SYLLABUS

UNIT – I

Big Data and Data Science Hype–Characteristics of Big Data – Data Science Life Cycle - Applications of Data Science - Exploratory Data Analysis - methods- Types of EDA - Basic tools (plots, graphs and summary statistics) of EDA.

12

UNIT – II

Introduction: Data mining: Architectures of Data mining Systems -Functionalities of Data mining – Classification of Data mining System – Introduction to Data Warehousing – Data Preprocessing: Preprocessing the Data – Data cleaning – Data Integration and Transformation – Data Reduction.

12

UNIT – III

Data science packages–NumPy Basics-Pandas-Data Loading–Data Wrangling-Plotting and Visualization–Data Aggregation and Group Operations – Data Exploration – Visualization using python.

12

UNIT – IV

R Basics -R Objects–R Notations– Packages – Indexing Data– Loading Data – Exploratory Data Analysis using R–Statistical Methods for Evaluation using R - Visualization using R.

12

UNIT – V

Data Visualization: Basic Principles– Categorical and Continuous Variables – Exploratory Graphical Analysis – Creating Static Graphs– Animated Visualizations – Loops, GIFs and Videos.

12
TOTAL: 60

TEXT BOOKS:

1. Cathy O'Neil and Rachel Schutt. "Doing Data Science, Straight Talk from the Frontline", O'Reilly. 2014.
2. Garrett Grolemund, "Hands on programming with R", O'Reilly, 2014
3. Sebastian Raschka, "Python Machine Learning", Packpub.com, 2015

REFERENCES:

1. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, "An introduction to statistical learning with application in R", Springer, 2014.
2. Wes McKinney, "Python for Data Analysis", O'Reilly Media, 2012

		L	T	P	C
BDS231A05	**ALLIED MATHEMATICS – I**	3	1	0	4

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(For Students admitted from 2025 onwards)
Common to B.Sc. (Computer Science, Data Science and Cyber Security)

</div>

Pre-requisite:
Basic knowledge on Matrices, Trigonometry, Differentiation and Integration.

Course objectives:
- To gain knowledge on eigen values and eigen vectors
- To understand expansions of trigonometric functions
- To know the differentiation of hyperbolic functions and successive differentiation
- To understand partial differentiation and apply Eulers theorem
- To acquire knowledge about solving algebraic and transcendental equations numerically
- To classify type of integral and evaluate

Unit-I Matrices
Introduction to Matrix-Matrix operations- Symmetric and Skew-Symmetric matrices - Orthogonal and Unitary matrices - Rank of a matrix -Test for Consistency of linear equations -Characteristic Equation of a matrix- Characteristic vectors of a matrix - Cayley-Hamilton theorem (without proof)- Simple problems and applications

Unit-II Trigonometry
Introduction to Trigonometry-Expansions: Expansions of sin x, cos x, tan x in terms of x ; hyperbolic functions: hyperbolic functions and inverse hyperbolic functions.

Unit-III Numerical Solution of Equations
Solution of Numerical algebraic and transcendental equation:Bisection Method- Method of false position- Newton – Raphson method-Solution of simultaneous linear algebraic equations: Direct Methods: Gauss elimination method- Gauss Jordon method; Iterative Methods: Gauss Seidel method.

Unit-IV Successive Differentiation and Partial Differentiation
Successive Differentiation- n^{th} order derivatives of standard functions- Leibnitz theorem (without proof)-simple problems- Partial differentiation- Partial derivative-Higher derivatives-Homogeneous functions-Euler's theorem on Homogeneous functions-Problems on Euler's theorem

Unit-V Indefinite Integrals and Definite Integrals
Definite integrals: Properties of Definite integrals (Statement only)-Evaluation of definite integrals and indefinite integrals of types $\int \frac{1}{a+bcosx} dx$, $\int \frac{1}{a+bsinx} dx$, $\int \frac{lx+m}{ax^2+bx+c} dx$, $\int \frac{lx+}{\sqrt{ax^2+bx+c}} dx$, $\int \frac{1}{a+bcosx+bsinx} dx$, $\int \frac{1}{ax+b\sqrt{lx^2+mx+n}} dx$, $\int_0^{\frac{\pi}{2}} sin^n x dx$, $\int_0^{\frac{\pi}{2}} cos^n x dx$ Simple problems

Course Outcome:

At the end of the course, the students will be able to

CO:1. Compute eigen values and eigen vectors

CO:2. To expand trigonometric functions

CO:3. To solve algebraic and transcendental equations using numerical methods

CO:4. To find nth order derivative of functions

CO:5. To apply Eulers theorem on partial differentiation

CO:6. To evaluate definite and indefinite integrals

Text Books:
1. P.R.Vittal, "Allied Mathematics", Fourth Edition, 2009, Margham Publications chennai. Unit I: Chapter 5, Unit II: Chapter 14,Unit IV: Chapter 8, Chapter 9,Unit V: Chapter 15
2. P.Kandasamy, Dr.K.Thilagavathy, Dr.K.Gunavathi, "Numerical Methods", S.Chand and Company Ltd., Third Revised Edition,2013, New Delhi. Chapter 3(3.1-3.4),Chapter 4 (4.1,4.2,4.9)

Reference books:
1. Numerical Methods, Problems and Solutions: M.K.Jain, S.r.K Iyengar, R.K.Jain (2003)
2. Calculus. S.Narayanan and T.K.Manicavachagom Pillay (2004). S.Viswanathan Printers & Publishers Pvt. Ltd. Chennai.

		L	T	P	C
BDS231P06	**PROGRAMMING IN C LAB**	0	0	5	2

(For Students admitted from 2024 onwards)
Common for B.Sc.(CS) / B.Sc.(Data Science)

COURSE OBJECTIVES

- To be able to get trained in programming skills using C
- To help the students to write the programs using conditional Statements and Lopping Statements.
- To learn and write the programs for Array and structure.
- To learn about the usage of functions.
- To impart the knowledge about pointers, files and effective memory handling

COURSE OUTCOMES

- Ability to implement application programs using C Language
- Able to implement structure and functions concepts
- Understand various string functions
- Knowledge on implementing the concepts of Pointers
- Create and use of the file operations.

LIST OF EXERCISES

1. Write a Program to generate a Fibonacci Series
2. Write a Program to Check Whether a Number is Prime or not
3. Write a Program to count the number of positive, negative and 0 values switch case statement.
4. Write a Program to check whether the given string is palindrome or not.
5. Write a Program to print the given number in the reverse order using WHILE loop.
6. Write a Program to sort an array.
7. Write a Program to add two matrices.
8. Write a Program to multiply of two matrices.
9. Write a Program to sort the array of names.
10. Write a Program to find the factorial of an integer using recursion.
11. Write a Program to swap two values using function.
12. Write a Program to perform read and write operation on a file.

BDS231V07	INDIAN CULTURE	L	T	P	C
		0	1	0	1

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

UNIT – I
Introduction to Vedic Cultures; significance & how it is different from the other cultures. Why we have to follow? Important features.

UNIT – II:
Literary Heritage of India–significance of Indian Literature; Chronology of Indian literature; Literature in Sanskrit and other Indian languages;

UNIT – III:
Early Indian Education – significance & advantages. Gurukulas and Guru-sishya parampara.Learningmethods.Evolutionofscriptandlanguages;importantearlyscriptsandwritingm aterials; important early educational centers (ghattikas, universities) & their unique features. Important personalities and their Contribution – Devarishies, Maharishies, Rishies, Seers and contribution of their institutions to protect the cultural heritage.

UNIT – IV:
Scientific thoughts of Early Indian Sages;

UNIT – V
Importance and significance of Upavedas – Ayurveda, Dhanurveda, Gandhravaveda, stapatya & Arthasastra.

TEXT BOOKS:
1. Joshi,K. TheVeda and Indian Culture. Rastriya Veda Vidya Pratishthana, New Delhi, 1992(rp).
2. Kangle, R.P..The Kautilya Arthasastra. Delhi. 1992(rp).
3. Kulkarni, R.P.Geometry according to SulbaSutra. Samsodhana Mandal. Pune. 1983.
4. Majumdar, R.C. Ancient India. Motilal Banarsidas Publishers. Delhi. 1994(rp).
5. Patel,I.S.(ed) Science and the Vedas. Bombay.1984.

REFERENCES:
1. Majumdar, R.C. The History and Culture of the Indian People. Vol I-IV. Bharatriya Vidya Bhavan. Mumbai, 1996 (ed) (rp).
2. Radhakrishna,S. Indian Philosophy. Vol I & II. Oxford University Press. Delhi, 1993(rp).
3. Sri Chandrasekarendra Saraswati Swamihi. The Guru Tradition. Bharatiya Vidya Bhavan. Bombay, 1991.
4. Sri Jayendra Saraswatiji Maharaj. The Vedas and Vedangas. Prakashan Kendra. Lucknow, 1951.
5. Winternize,M. 1996(rp).History of Indian Literature. Delhi.

BDS231V08	PRINCIPLES OF ENVIRONMENTAL SCIENCE	L	T	P	C
		0	2	0	2

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

COURSE OBJECTIVES
- To understand the basic concepts about environment.
- To be familiar with the components and nature of environment.
- To create awareness about the technological and scientific crisis faced by the world community.
- To understand the effects and remediation of various pollutions.
- To expose the students to the real-life ecological issues faced by different parts of the society

COURSE OUTCOMES
- Understanding the importance of the environment.
- Realizing the place of human in the environment and act eco-centrically.
- Inculcate the importance and benefits of biodiversity and natural resources.
- Exemplify the effects of pollution and over utilization of resources.
- Moulding the student as an environmentally responsible citizen.

SYLLABUS

UNIT – I   INTRODUCTION TO ENVIRONMENT AND ENVIRONMENTAL STUDIES

1.1 Introduction to environment – components – nature of environment - need of awareness –reasons for environmental problems – anthropocentric and eco centric views.

1.2 Environmental studies - multidisciplinary nature – scope and aim – sustainable development- principles – RRR concept-Indian environmental movements – environmental calendar.

UNIT – II   ECOSYSTEM AND BIODIVERSITY

2.1 Ecosystem – structure – functions – simplified ecosystem models (food chain and food webs and their types, energy flow) - forest – grassland – pond –ecosystems – ecological succession - ecological pyramids – Bio-geochemical cycles of water – oxygen-carbon-phosphorous and sulphur.

2.2. Biodiversity – definition – types – species – genetic and ecosystem diversities- values of biodiversity – threats to biodiversity – conservation of biodiversity – endemism – biodiversity hotspots – Indian biodiversity– endemic species of India – IUCN lists -red-green and blue data books.

UNIT – III   NATURAL RESOURCES:

3.1 Natural resources – definition – types – forest resources – uses –deforestation- reasons - effects –water resources – dams – effects of dams - food resources – modern agriculture– ill effects -energy resources- types – hydel –nuclear – solar –wind and biomass energy - world scenario – Indian scenario.

3.2 Population and environment – reasons for over exploitation of resources – population – demography – population curves – population explosion – effects – consumerism – effects – urbanization – reasons and effects- role of an individual.

UNIT – IV   ENVIRONMENTAL POLLUTION:

4.1 Pollution – definition – types – air pollution – causes and effects – effects of CO_2 – CO – NOx –SOx – particulates – control of air pollution – water pollution – causes – effects – remedies – soil pollution – solid waste management – e waste – ill effects of e-waste – proper recycling- Noise pollution – reasons – effects – control – nuclear pollution – cases – effects and control –thermal pollution causes – effects and remedies.

4.2 Legal provisions for protecting environment – article 48 A – 51 A (g) – Environment act 1986 – Air act 1981 – Water act 1974 – wild life protection act – Forest act 1980- problems in implementation–reasons.

UNIT – V   SOCIAL ISSUES AND ENVIRONMENTAL ETHICS

5.1 Present environmental scenario – greenhouse effect – climate change – The Kyoto Protocol – ozone layer depletion-The Montreal Protocol - acid rain – causes – effects - disparity among the nations – The Copenhagen UNFCCC summit – carbon currency- virtual water- genetically modified organisms, Disaster management.

5.2 Environmental ethics – introduction – people getting affected - resettlement and rehabilitation – issues involved –Sardhar Sarovar project – Tawa Matsya sang - Melting icebergs of Arctic.

TEXT BOOK:

1. Anubha Kaushik and C.P. Kaushik, ”Prospects of Environmental Science”, New Age International publishers, 2013.

REFERENCES:

1. Environmental Studies, N. Nandini, N. Sunitha and Sucharita Tandon, Sapna Book House, 2007.
2. Textbook of Environmental Science, Ragavan Nambiar, Scitech Publications, 2009.
3. Textbook of Environmental Chemistry and Pollution Control, S.S.Dara, S.Chand and Co., 2002.
4. Environmental Chemistry, Colin Baird, W.H.Freeman and company, New York,1999.
5. Environmental Chemistry, Gary W. VanLoon and Stephen J.Duffy, Oxford University Press, 2000.

BDS232LT01	LANGUAGE -II	L	T	P	C
	(TAMIL - II)	3	1	0	3

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

நோக்கம்:

* அற இலக்கியங்களையும் இலக்கணங்களையும் அறிவியல் தமிழ் மற்றும் கணித தமிழ் குறித்து மாணவர்கள் அறியுமாறு செய்து அவர்களின் படைப்பாற்றலை தூண்டுதல்
* வாழ்வை மேம்படுத்தும் அற சிந்தனைகளை நீதி இலக்கியம் வழி உணர்த்துதல்
* அற இலக்கியங்களான திருக்குறள் நாலடியார் கொன்றைவேந்தன் ஆசாரக்கோவை போன்ற நீதி நூல்கள் வாயிலாக மாணவர்கள் அறவழியிலும் ஒழுக்க நெறியிலும் வாழ்க்கையை வாழ கற்றுக்கொடுத்தல்
* மொழி அறிவோடு சிந்தனைத் திறன் அதிகரித்தல்
* மாணவர்களை அறிவியல் தமிழ் மற்றும் கனித்தமிழ் குறித்த அறிவை வளர்த்துக் கொள்ள செய்தல்
* வாழ்வை மேம்படுத்தும் அர சிந்தனைகளை நீதி இலக்கியம் வழி உணர்த்துதல்
* இலக்கணமும் மொழித்திறனும் மொழியை பிழையின்றி பேச எழுத கற்க தேவையான தமிழ் இலக்கணத்தின் இன்றியமையாமையை உணர்த்துதல்
* பக்தி இலக்கியங்கள் வழி சமயச் சான்றோர்களையும் அறிந்து கொள்ளும் நோக்கில் இலக்கியங்களை அணுகுதல்
* மாணவர்கள் அறிவியல் தமிழ் மற்றும் கணித்தமிழ் குறித்த அறிவையும் இணை கல்வி குறித்து அறிவினை பெறுதல்
* மொழியினை பிழையின்றி கற்பதற்கும் எழுதுவதற்கும் உறுதுணை செய்தல்

பயன்:

* அற இலக்கியங்கள் வழி ஒழுக்கங்களை கற்றுக் கொள்ளுதல்
* மொழிகளை பிழையின்றி எழுத இலக்கணங்களை கற்றுக் கொள்ளுதல்
* பக்தி இலக்கியங்கள் வழி பக்தி நெறிகளை உணர்த்துதல்
* மாணவர்கள் அறிவியல் தமிழ் மற்றும் தனித்தமிழ் குறித்த அறிவையும் இணைய கல்வி குறித்து அறிவினையும் பெறுதல்
* மொழியினைப் பிழையின்றி கற்பதற்கும் எழுதுவதற்கும் கற்றுக் கொள்ளுதல்

<u>பாடத்திட்டங்கள்</u>

அலகு - I அற இலக்கியம்

திருக்குறள் - நட்பு, கூடா நட்பு ,உழவு, மருந்து,

நாலடியார் - 1 ,29, 100, 125, 139

கொன்றைவேந்தன் - முதல் 20 பாடல்களுக்கு கதை எழுதுதல்

ஆசாரக்கோவை-10, 25

12

அலகு - II   இலக்கணம்

சொல் - இலக்கணம் வகைகள்- பெயர்ச்சொல் - வினைச்சொல் – இடைச்சொல் - உரிச்சொல்

12

அலகு - III   பக்தி இலக்கியம்

சுவாமிநாதன் ஜனனம் - குருவிடம் சரணம் - 13 வயதில் பிடாதிபதி- எளியவரிடம் இரக்கம் - பைரவனின் பக்தி - பெருமாளே சாட்சி - அமுதமாகும் மோர் - அன்னதான சிவன்- அகிம்சை முறையில் தயாரிக்கப்பட்டு - அம்பாளின் வஸ்திரம் – கனகாபிஷேகம்.

12

அலகு - IV   அறிவியல் தமிழ் மற்றும் கனித்தமிழ்

அறிவியல் தமிழின் வளர்ச்சி - தனித்தமிழ் வளர்ச்சி -தமிழ் நூல்களை மின் பதிப்பு செய்தல்- தமிழ் மென்பொருட்களை உருவாக்கும்- தமிழ் இணைய கல்விக் கழகம் - தமிழ் மின் நூலகம்- இணையத்தில் தமிழ் அகராதிகள் -சொற்குவைத் திட்டம்

12

அலகு - V   மொழிப் பயிற்சி

இலக்கண குறிப்புகள் ஒரு பொருள் குறித்த பல சொற்கள் பல பொருள் குறித்த ஒரு சொல் அகர வரிசைப்படுத்துதல் ஒருமை பன்மை மயக்கம்

12

TOTAL: 60

பாடநூல் :-

1. பதினெண் கீழ்க்கணக்கு முல்லை நிலையம் 2009 பதிப்புசென்னை
2. ஸ்ரீ பெரியவாளின் ஆன்மீக அனுபவங்கள் கங்கா ராமமூர்த்தி அல்லயன்ஸ் கம்பெனி மைலாப்பூர் சென்னை -4
3. கணினி தமிழ் முனைவர் இல சுந்தரம் விகடன் பிரசுரம்
4. வகைமை நோக்கி இலக்கிய வரலாறு நியூ செஞ்சுரி புக் ஹவுஸ் சென்னை

பார்வை நூல் :-

1. க. த. திருநாவுக்கரசு திருக்குறள் நீதி இலக்கியம் சென்னை பல்கலைக்கழகம் வெளியீடு
2. தமிழ் இலக்கிய வரலாறு ஜெயம் ஜனகா பதிப்பகம்
3. அற இலக்கியத்தில் வாழ்வியல் விழுமியங்கள் செம்முதாய்பதிப்பகம் சென்னை

BDS232LH01	LANGUAGE –II (HINDI - II)	L	T	P	C
		3	1	0	3

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

UNIT –I   INTRODUCTION TO HINDI GRAMMAR:
   a) Identification of different Tenses
   b) Differences of *Sakarmak* & *Akarmak* sentences
   c) Correction of Sentences pertaining to different tenses
   d) Past Tense with special context to *Ne Pratyay*
   e) Future Tense with examples

UNIT – II   SPEAKING*Right*HINDI:
   a) Conversations at different places and contexts
   b) Topics related to different tenses and making sentences
   c) Usage of Sentences according to the direction
   d) Usage of complex sentences and different styles of expression

UNIT – III   LANGUAGE WRITING IN HINDI:
   a) Paragraph setting
   b) Comprehensive paragraph
   c) Paragraph writing
   d) Simple translation of sentences

UNIT – IV   HINDI LITERATURE – INTRODUCTION TO OLD POETRY:
   a) Tulasi Das ke Dohe – Kanthasth evam Vyakhya bhag
   b) Rahim ke Dohe- Kanthasth evam Vyakhya bhag
   c) Tatparya and Kanthasthikaran
   d) Summary and annotation part

UNIT – V   HINDI LITERATURE-INTRODUCTION TO POETRY and PROSE:
   a) Bharat ki Ekataa : Ramdhari Singh Dinkar
   b) "Hum Honge Kamiyab" by Girija Kumar Mathur

TEXT BOOK:
   1. **HINDI SOURABH,** (Prepared by Department of Hindi, SCSVMV)

REFERENCES:
   1. "Come Let us Learn Hindi" : Dr. Alok Pandey, Published by Milind Prakashan, Hyderabad 2013
   2. Pankhudiyan 1&2 : Dr. Madhu Dhawan, Lekhan Prakashan, New Delhi 2011
   3. Sabari Hindi Bodhini – Shabari Prakashan, Selam, Tamil Nadu, 2012.

BDS232LS01	LANGUAGE -II (SANSKRIT - II)	L	T	P	C
		3	1	0	3

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

UNIT – I भागः - क

Poetry: सुभाषितमालाI - 1 to 6 Slokas

Prose: Lessons 1 to 3 (From Sanskrit Pravesika)

UNIT – II भागः - ख

Poetry: सुभाषितमालाII - 1 to 8 Slokas

Prose: Lessons 4 to 6 (From Sanskrit Pravesika)

UNIT – III भागः - ग

Grammar:
1. 1.अच्सन्धिः
2. 2.हल्सन्धिः

UNIT – IV भागः - घ

Essays:
1.अस्माकंदेशः
2.दीपावलीमहोत्सवः
3.संस्कृतप्रचारस्यआवश्यकता

UNIT – V भागः - ङ

Slokas (Verses):
1. Sowndaryalahari (10 Slokas)

TEXT BOOKS:
1. **Subhashitamala**, Prepared by Dept. of Sanskrit and Indian Culture, SCSVMV University.
2. **Sowndaryalahari**

BDS232E02	ENGLISH -II	L	T	P	C
		3	1	0	3

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

COURSE OBJECTIVES
- To encourage the students to read English essays and appreciate it
- To get inspiration from the great speeches by elite personalities
- To enhance the language skills through literature
- To be familiar with English grammar and its usage
- To get the ability to construct grammatically correct and meaningful sentences

COURSE OUTCOMES
- Read and appreciate the text in English language
- Present the ideas in their own words
- Comprehend the significance of literature in learning language
- Understand that grammar and vocabulary can create different meanings.
- Write and speak with proper usage of grammar.

SYLLABUS

UNIT – I   PROSE
1. Stephen Leacock : My Lost Dollar
2. O.Henry : The Last Leaf
3. G.K.Chesterton : On Running after One's Hat

12

UNIT – II   GREAT SPEECHES
1. Steve Jobs : Stanford Commencement Address
2. Albert Einstein: The Common language of Science
3. Bill Gates : The Future of Innovation

12

UNIT – III   ONE ACT PLAY
1. Rabindranath Tagore : Chitra (A Play in One Act)

12

UNIT – IV   GRAMMAR – I
1. Relative pronouns
2. Adverbs
3. Prepositions
4. Phrasal verbs
5. Idioms

12

UNIT – V   GRAMMAR – II
1. Active Voice & Passive Voice
2. Infinitives & Gerunds
3. Conditionals
4. Collocations
5. American and British words

12
TOTAL: 60

TEXT BOOKS:
1. Aggarwala, N.K.*Asenior English Grammar & Composition*. NewDelhi: Goyal Brothers.1995.
2. http://www.theatrehistory.com/plays/chitra001.html

BDS232T03	RELATIONAL DATA BASE MANAGEMENT SYSTEMS	L	T	P	C
		3	2	0	4

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

COURSE OBJECTIVES
- To understand the different database models and language queries to access databases.
- To understand the normalization forms in building an effective database tables
- To protect the data and the database from unauthorized access and manipulation
- To recognize the importance of database analysis and design in the implementation of any Database application and to understand the process of drawing the ER-Diagrams.
- To get the knowledge of the roles of transaction processing and concurrency control.

COURSE OUTCOMES
- Define, manipulate, and control a relational database management system
- Build a database management system that satisfies relational theory
- Design SQL based applications
- Discuss normalization techniques with simple examples.
- Describe transaction processing and concurrency control concepts.

SYLLABUS

UNIT – I
Database – Database Management Systems – Benefits of DBMS – Levels of Abstraction – Database Models – Database Design: Entities – Attributes – Entity Sets – Relationship – Keys – ER Diagram

12

UNIT – II
Introduction to RDBMS – Codd's Rules for DBMS – Normalization – First Normal Form – Keys and Functional Dependencies – Second Normal Form – Third Normal Form – BCNF.

12

UNIT – III
Introduction to SQL – SQL Query Language – Data Types – Operators – DDL Commands: Create – Delete – truncate – drop. DML Commands: Insert – Delete – Update. DCL Commands: Grant – Revoke. Built in Functions: Numeric – String – Aggregate – Date and Time – Miscellaneous Functions.

12

UNIT – IV
Interactive SQL Statements: Group By – Having – In Statement – Sub-queries. Join statements: Inner join – Outer join – Cross join – Self Joins. Set Operations: Union – Intersect – Minus.

12

UNIT – V

PL/SQL – PL/SQL Block – Data Types – Control Structures – Procedures – Functions – Cursor: Implicit Cursor – Explicit Cursor – Trigger

12
TOTAL: 60

TEXT BOOKS:
1. Abraham Silberchatz, Henry F. Korth, S. Sudarshan, Database System Concepts, 6th Edition, McGraw-Hill, 2010 …. (Unit - 1)
2. Ivan Bayross, SQL, PL/SQL The Programming Language of ORACLE, 4th Revised Edition, BPB Publications 2009 … (Unit - 2 to 5)

REFERENCES:
1. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems, 3rd edition, McGraw-Hill 2003.
2. Date, C.J., An Introduction to Database Systems, 8th Edition, Addison Wesley, 2004.

BDS232T04	DATA STRUCTURES AND ALGORITHMS	L	T	P	C
		3	2	0	4

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

COURSE OBJECTIVES
- To gain knowledge in designing algorithms to solve problems.
- To understand the concept of linear and nonlinear data structures.
- To know the concept of various sorting and searching techniques.
- To apprehend the tree traversal and searching
- To acquire knowledge in graph traversal and searching.

COURSE OUTCOMES
- Compute and Analyze algorithms for efficiency using asymptotic notations.
- Develop knowledge about basic data structures like arrays, linked list, trees.
- Solve problems by applying suitable data structure.
- Define graph and illustrate graph traversal.
- Design and develop projects requiring implementation of the data structure.

SYLLABUS

UNIT – I
Definition of a Data structure - primitive and composite Data Types- Asymptotic notations.
Arrays - Operations on Arrays.

12

UNIT – II
Sorting - Bubble sort - Insertion sort - Selection sort - Quick sort - Merge sort - Searching - Linear search - Binary search..

12

UNIT – III
Stacks – Operations on Stack-Applications of Stack - Infix to Postfix Conversion -recursion - Queues - Operations on Queues, Circular Queue.

12

UNIT – IV
Introduction to single and double Linked lists - Representation – operations on single linked list - Linked stacks and queues.

12

UNIT – V
Trees - Binary Trees - Memory representation - Traversal algorithms - Binary search trees - Graph - Definition, Types of Graphs, Graph Traversal – BFS and DFS.

12
TOTAL: 60

TEXT BOOKS:

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2017.
2. Seymour Lipsuschutz Theory and Problems of Data Structures, Tata Mc.Graw Hill First Edition, Reprint 2013
3. Jean-Paul Tremblay, Paul G. Sorenson, 'An Introduction to Data Structures with Application', TMH, 2017.

REFERENCES:

1. E.Horowitz and S. Shani Fundamentals of Data Structures in C++, Galgotia Pub. 1999, E- book 2012.
2. R. Kruse C.L. Tondo and B. Leung, Data Structures and Program design in C, PHI, 2nd Edition, 1997.

		L	T	P	C
BDS232A05	**ALLIED MATHEMATICS – II**	**3**	**1**	**0**	**4**

(For Students admitted from 2025 onwards)
Common to B.Sc. (Computer Science, Data Science and Cyber Security)

Pre-requisite:
Basic knowledge on differential equation and integration.

Course objectives:

- To understand partial fractions and infinite series.

- To solve ordinary differential equations analytically and numerically.

- To apply multiple integrals and special functions.

- To study about finite differences, interpolation and numerical integration

Unit-I Partial Fractions

Introduction to Partial Fractions, Binomial Series, Exponential Series and logarithmic Series (without Proof) -Simple problems.

Unit- II Solution of ODE

Differential equations of first order and higher degree: Equations solvable for p, Equations solvable for y and Equations solvable for x - Second order linear differential equations with constant coefficients: Linear Operator, Solution for non - homogeneous differential equations, Methods of obtaining the particular integral of e^{ax} , e^{-ax} , $sinax$, $cosax$, x^k and $e^{ax}.v$ where v is any function of x.

Unit-III Multiple Integrals and Beta & Gamma Functions

Double Integral: Definite Integral, Double Integral (Cartesian Co-ordinates only), simple problems -Triple Integral: Triple integral (Cartesian Co-ordinates only), simple problems - Beta and Gamma functions and their properties (without proof) – simple problems.

Unit-IV Interpolation and Numerical Integration

Finite differences - Interpolation (For Equal Intervals): Gregory-Newton's forward difference formula, Gregory-Newton's backward difference formula. Interpolation (For Unequal Intervals): Divided Differences, Newton's divided difference formula, Lagrange's interpolation formula - Numerical integration: Trapezoidal rule- Simpson's 1/3rd rule- Simpson's 3/8th rule .

Unit-V Numerical solution of ODE

Numerical solution of ordinary differential equations: Taylor's Method - Euler's Method -

Modified Euler's method - Runge Kutta Method.

Course Outcome:
At the end of the course, the students will be able to

- CO1: Simplify expressions using partial fractions and series.

- CO2: Solve ordinary differential equations using analytical and numerical methods.

- CO3: Evaluate multiple integrals and apply beta and gamma functions.

- CO4: Use interpolation and numerical integration methods.

- CO5: Apply numerical solutions to ODEs using Taylor, Euler, and Runge-Kutta methods.

Text Books:
1. P.R.Vittal, "Allied Mathematics", Third Edition, 2012 , Margham Publications chennai.
Unit I- Chapter (1-4)
Unit II - Chapter 22 – (Pg. No. 22.1- 22.10), Chapter 23
Unit III - Chapter 20, 30
2. P.Kandasamy, Dr.K.Thilagavathy, Dr.K.Gunavathi, "Numerical Methods", S.Chand and
Company Ltd., Third Revised Edition,2013, New Delhi.
Unit IV: 5.1, 5.2, 6.1-6.3 8.1,8,2,8.5, 8.7, 9.7, 9.9, 9.13, 9.14
Unit V: 11.5, 11.9, 11.11, 11.12, 11.13

BDS232P06	RDBMS LAB	L	T	P	C
		0	0	5	2

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science)

COURSE OBJECTIVES

- To give practical training in design and implementation of relational databases for the selected set of problems.
- To understand and write queries for DDL, DML and DCL Commands.
- To impart the knowledge to implement Sub queries and Joins.
- To learn to implement PL/SQL programs for simple problems.
- To impart the knowledge to implement PL/SQL programs for database access.

COURSE OUTCOMES

- Ability to implement DDL, DML and DCT commands.
- Understand and Implements Sub queries and Joins.
- Implements PL/SQL Program for simple problems.
- Ability to implements functions in PL/SQL.
- Implements PL/SQL programs for Database access.

LIST OF EXERCISES

1. Data Definition Language (DDL) commands in RDBMS.
2. Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS.
3. Sub-queries and JOINs
4. PL/SQL program for inserting record into employee table.
5. PL/SQL program for selecting records from employee table whose name begin with 'a'
6. PL/SQL block to generate EVEN, ODD numbers less than n using any one looping statement.
7. PL/SQL program to display employee names from employee able, those who are in department no.10 using cursor.
8. PL/SQL Program to Raise an Application Error when the Employee Salary is Greater than 3000 using Employee Table.
9. PL/SQL program to copy the content of one Table to another Table.
10. PL/SQL program to find the biggest between two numbers using function.

BDS232V07	YOGA	L	T	P	C
		0	1	0	1

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

COURSE OBJECTIVES
- To impart the students with basic concepts of Yoga for health and wellness.
- To familiarize the students with health-related Exercise and Yoga for Overall growth and development
- To create a foundation for the professionals in Physical Education and Yoga.
- To impart the basic knowledge and skills to teach Yoga activities.

COURSE OUTCOMES
- Students will be able to understand the basic principles and practices of Yoga.
- Students will be able to instruct Yoga practices for Healthy Living.
- To develop professionalism among students to conduct, organize Yoga events at schools and community level.

SYLLABUS
INTRODUCTION TO YOGA
1. Basic Principles of Yogic practices
2. Word meaning and definitions of Yoga
3. Different schools of Yoga
4. Mithahara, Pathya Apatyha in Yogabhyasa.
5. Ashtanga Yoga
6. Shitalikarna Vyayama/Physical Cultural Exercises
7. Introduction to Pranayama
8. Yoga to enhance memory and concentration.

PRACTICAL DEMONSTRATION OF YOGA
1. Shitalikarna Vyayama/Physical Cultural Exercises
2. Suryanamaskara
3. Standing Asanas- Ardhachakrasana, Padahasthasana, Ardhakatichakrasana, Trikonasana.
4. Sitting Asanas – Paschimottasana, Bhadrasana, Vakrasana, Vajrasana.
5. Prone posture Asanas – Makarasana, Bhujangasana, Shalabhasana, Dhanurasana.
6. Supine posture Asanas – Ardha pavana Mukthasana, Purna Pavana Mukthasana, Sethubhandasana, Uttanapadasana.
7. Pranayama- Nadishodhana Pranayama, Bhastrika Pranayama, Bramari Pranayama.
8. Dhyana – Shavasana.

Total: 20

TEXT BOOKS:
1. Dr Nagendra H. R. &Dr Nagarathna R., Samagra Yoga Chikitse. Swami Vivekananda Yoga Prakasana, Bengaluru, 2002.
2. Dr Nagendra H. R. &Dr Nagarathna R. Integrated approach of Yoga Therapy for Positive Health, Swami Vivekananda Yoga Prakasana, Bengaluru, 2006.

REFERENCES:
1. Kumar, Ajith, Yoga Pravesha. Bengaluru: Rashtrothanna Prakashana., 1984.
2. D.M Jyoti, Yoga and Physical Activities, lulu.com3101, Hills borough, NC27609, United State, 2015.

BDS232V08	FUNDAMENTALS OF CYBER SECURITY	L	T	P	C
		0	2	0	2

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cognitive Systems)

COURSE OBJECTIVES
- To introduce the basic concepts of cyber security
- To acquire knowledge on cyber threats and attacks
- To become aware of significant security technologies and tools
- To impart knowledge on cipher methods and cryptographic algorithms
- To gain knowledge about physical security and digital forensics

COURSE OUTCOMES
- Understand the basic concepts, need, approaches, principles and components of security.
- Explain the various cyber threats and attacks.
- Describe the various Security Technologies and Tools.
- Explain the basic principles of cryptography and algorithms.
- Able to explain importance of digital forensics

SYLLABUS
UNIT – I   INTRODUCTION TO CYBER SECURITY
Introduction – Need for Security – Security Approaches – Principles of Security.

6

UNIT – II   CYBER SECURITY – THREATS & ATTACKS
Threats: Intellectual Property - Software Attacks –Theft – Hardware Failures.

6

UNIT – III   SECURITY TOOLS & TECHNOLOGIES
Firewall and VPNs – Intrusion, Detection and Prevention Systems

6

UNIT – IV   CYRPTOGRAPHY
Cryptology Terminology - Cipher methods – Cryptographic Algorithms

6

UNIT – V   PHYSICAL SECURITY AND DIGITAL FORENSICS
Physical Access Controls – Fire Security and Safety.

6

TOTAL: 30

TEXT BOOKS:
1. Michael E. Whitman, Herbert J. Mattord," Principles of Information Security", CENGAGE Learning, 4th Edition, 2012.

REFERENCES:

1. William Stallings," Cryptography and Network Security – Principles and Practice", Pearson Education, 7th Edition.2 017.
2. Atul Kahate," Cryptography and Network Security", Mc Graw Hill, 4th Edition, 2019.

		L	**T**	**P**	**C**
BDS233LT01	**LANGUAGE –III** **(TAMIL - III)**	**3**	**1**	**0**	**3**

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

நோக்கம்:

- காப்பிய இலக்கியங்களையும் அறிவியல் நோக்கில் பார்வையிடலும் பக்தி இலக்கியங்களின் வழி சமயச் சான்றோர்களை அறிதல் மற்றும் படைப்பிலக்கிய பயிற்சி அளித்தல்

- காப்பிய இலக்கியங்களை அறிவியல் தொழில்நுட்பத்தின் வழி கற்றுக் கொடுத்தல்

- கைவினைப் பொருட்கள் குறித்த தொழில்நுட்பத்தைக் கற்றுக்கொடுத்தல்மாணவர்களுக்கு மன அழுத்தம் நீங்கவும் உற்சாகத்தை பெரும் நோக்குடன் கலைகள் மற்றும் விளையாட்டுகள் கற்றுத் தரப்படுகிறது

- பக்தி இலக்கியத்தின் வாயிலாக சமயச் சான்றோர்களையும் மானிடர்களின் துயர் நீக்கும் பதிகங்களையும் மகான்களையும் அறிமுகம் செய்தல்

- தமிழ் புலவர்கள் இயற்றிய இலக்கியங்களின் வழி கணித அறிவியல் சார்ந்த செய்திகளை கற்றுக் கொடுத்தல்

- ஐந்து மாணவர்கள் தங்களுக்குள் இருக்கும் திறமையை வெளிப்படுத்தும் விதமாக அவர்களின் தனித்திறன் ஊக்கப்படுத்த பயிற்சி அளிக்கப்படுதல்

பயன்:

- காப்பிய இலக்கியங்களில் அருவிகள் தொழில்நுட்பத்தை அறிந்து கொள்ளுதல் பக்தி இலக்கியங்களின் வழி பக்தி நெறிகளை உணர்ந்து கொள்ளுதல் சிறந்த படைப்பாளராக பயிற்சியில் தேர்ச்சி பெறுதல்

- காப்பிய இலக்கியங்களில் அறிவியல் தொழில்நுட்பத்தை அறிந்து கொள்ளுதல்

- மாணவர்கள் கைவினைப் பொருட்கள் உருவாக்கும் திறன் குறித்து அறிந்து கொள்ளுதலும் பயிற்சிப் பட்டறையின் வாயிலாக கைவினைப் பொருட்களை உருவாக்குதல். விளையாட்டு,கலைகள் மூலம் மாணவர்கள் உற்சாகம் பெறுகின்றனர். நமது பழமையை பாரம்பரியத்தை அறிய உறுதுணை புரிகின்றது விளையாட்டுக்களினால் வெற்றி தோல்வியை ஏற்றுக்கொள்ளும் மனப்பக்குவமும் உடல் ஆரோக்கியத்தையும் பெறுகின்றனர்.

- பக்தி இலக்கியத்தின் வழி வாழ்வியல் விழுமியங்கள் ஆன்மீகம் சார்ந்த செய்திகளை கற்றுக் கொள்ளுதலும் துன்பங்களை போக்கும் பாடல்களை அறிந்து கொள்ளுதல்.

- தமிழ் இலக்கியங்களின் ஊடாக கணித அறிஞர்களின் சூத்திரங்களையும் பயன்பாட்டையும் தமிழ் புலவர்களின் பாடல்கள் வழி கற்றுக் கொள்ளுதல்

<u>பாடத்திட்டங்கள்</u>

அலகு - I   காப்பியம்

சிலப்பதிகாரம் -வஞ்சி காண்டம், சீவக சிந்தாமணி -நாமகள் இளம்பகம், கம்ப ராமாயணம்-யுத்த காண்டம் மீட்சி படலம் ,சீறாப்புராணம்- திருநின்ற சருக்கம், தேம்பாவணி -பாயிரம்

அலகு - II   கலைகள்மற்றும் விளையாட்டுகள்

மண்பாண்டங்கள் -மூங்கில் குடைகள் வனைதல் -பாய் முடைதல் -பட்டு நெசவு செய்தல் -
மண் பொம்மைகள் செய்தல் - கூடை பின்னுதல் - கலைஞர்கள் அணியும் அணிகலன்
செய்தல் திட்டம்-தெருக்கூத்து- கரகாட்டம் - வில்லுப்பாட்டு -கணியான் கூத்து - ஒயிலாட்டம்
- தோல்பாவை கூத்து- சிலம்பாட்டம் –வளரி -புலியாட்டம் - தமிழர்களின்
விளையாட்டு(PROJECT)

12

அலகு - III   பக்தி இலக்கியம்

சைவ சமயம் – திருஞானசம்பந்தர்- கோளாறு பதிகம், திருநாவுக்கரசர் -சொல் துணை
வேதியன்- நமச்சிவாய பதிகம், மாணிக்கவாசகர்- திருவாசகம் -போற்றி திரு அகவல்,
திருக்குறிப்புத் தொண்ட நாயனார்- வைணவ சமயம் –பொய்யாழ்வார், சாக்கம் - காஞ்சி
காமாட்சி அம்மன்- ஆதிசங்கரரும் காமாட்சி அம்மன்

12

அலகு - IV   இலக்கியமும் கணித அறிவியலும்

போதையனார் கர்ணம் கண்டறிதல் - குறுக்கையூர் காரி நாயனார் கணக்கதிகாரம் - என்
அறிதல் - நில வளம்அறிதல் - நுட்ப அறிதல் - களஞ்சியறிதல் - எடை அறிதல்- நாழிகை
அறிதல்- அகவை அறிதல் -தேவகாலம் அறிதல்- வெற்றிலை கணக்கு- நெல் விற்பனை
கணக்கு- பால் கணக்கு- முத்து கணக்கு -ரத்தின வாணிபக் கணக்கு -வெள்ளரிக்காய்
கணக்கு- கற்பூர கணக்கு

12

அலகு - V   படைப்பிலக்கிய பயிற்சி

கவிதை,சிறுகதை, நூல் மதிப்பீட்டு பயிற்சி ஏதேனும் ஒரு கருவை கொடுத்து கதை
கவிதை எழுதச் செய்தல்

12

TOTAL: 60

பாடநூல் :-

1. சிலப்பதிகாரம் புலியூர் தேசிகன் பாரிநிலையம் சென்னை-108
2. மணிமேகலைபுலியூர் தேசிகன் பாரிநிலையம் சென்னை-108
3. சீவக சிந்தாமணிபுலியூர் தேசிகன் பாரிநிலையம் சென்னை-108
4. சீறாப்புராணம்புலியூர் தேசிகன் பாரிநிலையம் சென்னை-108
5. கவின்மிகு கைவினைப் பொருட்கள் செய்முறையும் விளக்கமும் நர்மதா பதிப்பகம்
6. கணக்கு அதிகாரம் கொறுக்கையூர் காரி நாயனார் திருநெல்வேலி தென்னிந்திய
   சைவ சித்தாந்த நூல் பதிப்பு கழகம் திருநெல்வேலி
7. பெரிய புராணம்புலியூர் தேசிகன் பாரிநிலையம் சென்னை-108

பார்வை நூல் :-

1. தமிழ் இலக்கியங்களில் வாழ்வியல் சிந்தனைகள் பல்லவி பதிப்பகம் ஈரோடு-11
2. வகைமை நோக்கி தமிழ் இலக்கிய வரலாறு,பாக்கிய மேரி,நியூ செஞ்சுரி புக்
   ஹவுஸ் சென்னை

BDS233LH01	**LANGUAGE –III**	**L**	**T**	**P**	**C**
	(HINDI - III)	**3**	**1**	**0**	**3**

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

UNIT – I   INTRODUCTION TO VOCABULARY:
a) Sabd Rachana and Sabd Vichar
b) Prefix and Suffix practices
c) Correction of Sentences pertaining to NE pratyay
d) *Chahiye* and *Apna* Usage

UNIT – II   HINDI LITERATURE – OLD POETRY:
a) Kabir ke Dohe
b) Vrind Ke Dohe
c) Kanthasthikaran aur Vyakhya bhag

UNIT – III   HINDI LITERATURE – MODERN POETRY:
a) "Jhanda ooncha rahe Hamara" by Shyam lal Parshad
b) Selected 2 poems from Famous Hindi poets (Nirala and Dinkar)

UNIT – IV   HINDI LITERATURE- PROSE:
a) Mundan : Harishankar parsaayee
b) Teen kahaaniyaan (Bhoot, Galib and others)

UNIT – V   HINDI Grammar:
a) Translation of Sentences
b) Different Usage of tense
c) Tense Changing
d) Sentence changing as per given direction (Ling and Vachan)

TEXT BOOKS:
1. **HINDI SOURABH**   (Prepared by Department of Hindi, SCSVMV)

REFERENCES:
1. Dinkar ka Kavya : Jagmohan sharma, Rashtriya Hindi Sahitya Parishad, New Delhi 2016
2. Hindi Kavya me Rashtriya Ekatha : Krishna Bhavuk, Hindi Sahitya Parishad, New Delhi 2016
3. Rashtriyatha aur Hindi Cinema : Kumar Bhaskar, Hindi Sahitya parishad, New Delhi

BDS233LS01	LANGUAGE –III	L	T	P	C
	(SANSKRIT - III)	3	1	0	3

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

UNIT – I भागः - क

Eloquence of Mahabharata 1-15Verses

UNIT – II भागः - ख

Eloquence of Mahabharata 16-30 Verses

UNIT – III भागः - ग

Hitopadesa - Prologue

Stories -   1. Old Tiger and Traveller
            2. Cat and Vulture

UNIT – IV भागः - घ

Hitopadesa - Stories -   1. Pair of Crows
                             2. Pair of Tittibhas
                             3. Rabbits and Elephant

UNIT – V भागः - ङ

Hitopadesa - Stories -   1. Jackal
                             2. Crane and Crab
                             3. Camel

TEXT BOOKS:
1. **Eloquence of Mahabharata**, Prepared by Dept. of Sanskrit and Indian Culture, SCSVMV University.
2. **Hitopadesa** - Complied by Dept. of Sanskrit and Indian Culture, SCSVMV University.

	L	**T**	**P**	**C**
BDS233E02 **ENGLISH -III**	**3**	**1**	**0**	**3**

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

COURSE OBJECTIVES
- To use listening strategies to identify the main ideas from different sources.
- To identify the characteristics of effective speaking and to express the ideas with proper vocabulary and sentence formation.
- To activate and reinforce the basic skills – grammar, vocabulary, pronunciation and writing.
- To use the required writing conventions when creating a paragraph or any type of writing.
- To apply LSRW skills in regular practice.

COURSE OUTCOMES
- Use cohesion mechanism to distinguish different ideas
- Speak with a reasonable degree of fluency and accuracy.
- Understand and use proper vocabulary, grammar and make use of language resources (e.g dictionary and thesaurus)
- Describe, analyze and present the information clearly, concisely and logically.
- Comprehend and use the strategies of LSRW in real time.

SYLLABUS
UNIT – I   LISTENING
Introduction to listening – Listen for gist and respond – Listen for details and key words to understand specific meaning – Listen and respond to questions and requests for personal information – Listen to simple conversations in everyday contexts and respond – Listen to lectures, presentations and other suitable listening materials from electronic media, and take notes – Listen to telephone calls and respond; keep notes while listening – Listening to announcements (railway/bus stations/airport/stadium announcement, etc.) – Listening to radio and TV – Common barriers to the listening process.

12

UNIT – II   SPEAKING
Use conversation starters: Introducing oneself, introducing others, small talk about family, friends, hobbies, profession, studies, etc. – Use of a dictionary for pronunciation practice – Summarize academic readings and lectures, and make presentations – Describe graphs, tables, and charts – Describe machines and their functions, e.g. computers and hardware – Describing processes, e.g. how to download apps in mobile handsets – Ask for and give permission, seek clarification, offer and respond to offers – Ask questions and respond to questions politely – Congratulate people on their success, apologize.

12

UNIT – III   READING

Reading comprehension – Four modes of reading (oral reading to an audience, oral reading to oneself, silent reading, silent reading while listening) – Pre-/during-/post-reading activities – Reading to enrich vocabulary – Skimming through reading texts and determine two or more main ideas or themes – Scanning through reading texts to understand and explain how key details support the – main ideas or themes.

12

UNIT – IV   WRITING

Basic paragraph structure: main idea, supporting sentences, use of examples, conclusion – Use basic sentence structures to write a paragraph; use cohesive devices to connect sentences in a paragraph – Use transitional devices for cohesion and for contrast paragraph internally and between paragraphs (The above structures and devices to be consciously used in all writing tasks) – Understand and use text structures in paragraphs: - sequencing, comparing and contrasting, relating cause and effect, problems and problem solving – Write informal letters, applications, and official letters of request and denial – Write official e-mails, memos and notices.

12

UNIT – V   ACTIVITIES ON LSRW

Teacher and student made activities on Listening, Speaking, Reading and Writing

12

TOTAL: 60

TEXT BOOKS:
1. Ramesh, M.S. Business Communication. New Delhi: R. Chand & Co. 2003
2. FitzGerald, Helen.Cross Cultural Communication. Melbourne: Hospitality Press. 2002

		L	T	P	C
BDS233T03	**PYTHON FOR DATA SCIENCE**	3	2	0	4

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES
- To learn the fundamentals of writing Python scripts
- To learn python control structures.
- To define python functions and other data structures.
- To do input / output with files in python
- To impart the knowledge on database operations.

COURSE OUTCOMES
- Implement python control structures.
- Illustrate the concept of strings and its manipulation.
- Manipulate object oriented programming concepts in python
- Understand the various graphic methods to solve different problems.
- Demonstrate file and database operations.

SYLLABUS

UNIT – I
Python Basics: Data types – input to python program – Strings basics – Operators in Python – Functions: Basics of functions – Passing variables in a function call – function arguments – Modules in Python – Recursion

12

UNIT – II
Control Statements, Arrays and Strings : if - if…else – if... elif...else – While Loop – for Loop – Range function – String : Creating, initializing and accessing elements of a string – Traversing a string – string operations – String functions versus string methods.

12

UNIT – III
List – Tuples – Dictionaries – Regular Expressions: File Operations: Basic of File operation - Reading and Writing a file – Python exception: Basic concepts of exceptions in Python – user defined exceptions – built-in exceptions

12

UNIT – IV
Python Advances: Graphical User Interface : GUI in Python – Root Window – Fonts and Colors – Containers – Canvas – Frame – Widgets : Button, Label, Message, Text, Scrollbar, Check and Radio Button – Spin and List box – Menu – Python's Database Connectivity

12

UNIT – V

Analyzing – Filtering and cleaning data – Group by operations – Pivot table – Visualizing-Plotting with Matplotlib – Barchart – scatter plots – Histograms.

12
TOTAL: 60

TEXT BOOKS:
1. NageswaraRao R.,"Core Python Programming",2nd Edition, Dreamtech Press, New Delhi, 2018.
2. J. Jose, Introduction to Computing and Problem Solving with Python, Khanna Publications,2019.

REFERENCES:
1. Kent D Lee (2010) Python Programming Fundamentals.
2. David M Beazley (2009) Python Essential Reference.
3. John V Guttag. Introduction to Computation and Programming Using Python, Prentice Hall of India.

BDS233T04	OPERATING SYSTEMS AND SYSTEM ADMINISTRATION	L	T	P	C
		3	2	0	4

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science)

COURSE OBJECTIVES
- To impart knowledge on different types of Operating System
- To learn and implement the concept of Process Management
- To observe the concept of storage management
- To understand the concept of I/O and file systems
- To learn the basics of Linux Programming

COURSE OUTCOMES
- Understand the fundamental components of a computer operating system.
- Apply the concepts of CPU scheduling, synchronization and deadlocks in real computing problems.
- Demonstrate the different memory and I/O management techniques used in Operating Systems.
- Design and construct the Memory management systems in the modern operating system.
- Have practical exposure to the concepts of Windows, Linux and shell Programming

SYLLABUS

UNIT – I   INTRODUCTION
Introduction - Operating system structures - System components - OS services - System calls - System structure -Resources Processes - Threads - Device management.

12

UNIT – II   PROCESS MANAGEMENT
Processes - Process concepts - Process scheduling - Operations on processes - Cooperating processes - CPU scheduling -Basic concepts -Scheduling criteria - Scheduling algorithms.

12

UNIT – III   SYNCHRONIZATION AND DEADLOCKS
The critical section problem - Semaphores - Classic problems of synchronization - Critical regions - Monitors-Dead locks -Deadlock characterization -Prevention - Avoidance - Detection - Recovery.

12

UNIT – IV   MEMORY MANAGEMENT
Storage Management Strategies - Contiguous Vs. Non-Contiguous Storage Allocation - Fixed and Variable Partition Multiprogramming - Paging -Segmentation - Paging/Segmentation Systems - Page Replacement Strategies.

12

UNIT – V   WINDOWS, LINUX ADMINISTRATION

LINUX Security – LINUX Protection System – LINUX Authorization – LINUX Security Analysis – LINUX Vulnerabilities – Windows Security – Windows Protection System – Windows Authorization – Windows Vulnerabilities.

12
TOTAL: 60

TEXT BOOKS:
1. Abraham Silberschatz, Peter Galvin and Gagne, "Operating System Concepts", Addison Wesley, 10th Edition, 2018.
2. Harvey M. Deitel," Operating System", Addison Wesley, 3rd Edition, 2004.

REFERENCES:
1. Gary Nutt," Operating System, A modern perspective", Addison Wesley, 3rd Edition, 2004.
2. Richard Peterson, "Linux: The Complete Reference", Tata McGraw Hills, 6th Edition, 2008.

		L	**T**	**P**	**C**
BDS233A05	**PROBABILITY AND STATISTICS**	**3**	**2**	**0**	**4**

(For Students admitted from 2025 onwards)

Pre-requisite:
Basic algebra, calculus, and probability from prior courses.

Course objectives:
• To provide an understanding of probability theory and distributions.
• To equip students with statistical tools for data analysis.
• To introduce hypothesis testing and regression techniques.

Unit I: Probability
Introduction to Probability, Probability spaces, conditional probability, Bayes' Theorem, Discrete and Continuous one dimensional random variables - Expectations, Moments, Variance of a sum, Moment generating function, Tchebyshev's Inequality.
Unit II: Probability Distributions:
Discrete Distributions – Binomial, Poisson and Negative Binomial distributions, Continuous Distributions - Normal, Exponential and Gamma distributions.
Unit III: Statistics:
Measures of Central tendency, Measures of dispersion, co efficient of variation, Moments, Skewness and Kurtosis, Correlation, Rank Correlation and Regression (Bivariate) .
Unit IV: Testing of Hypothesis-I
Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.
Unit V: Testing of Hypothesis-II
Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Course Outcome:
At the end of the course, the students will be able to
• CO1: Understand basic concepts in probability and random variables.
• CO2: Analyze different probability distributions.
• CO3: Compute measures of central tendency and dispersion.
• CO4: Perform statistical testing for large and small samples.
• CO5: Apply curve fitting and chi-square tests in real-life data analysis.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

   Unit 1 - Chapter 2 (1,4,5,7,10,11,13)

2. S.P. Gupta, Statistical Methods, 31st edition, Sultan chand and sons, New Delhi, 2002.

   Unit 2 - Chapter 1 - vol 2
   Unit 3 - Chapter 5,6,7 – vol 1
   Unit 4 - Chapter 8,9,10 – vol 1
   Unit 5 - Chapter 14 – vol 1

References:
1. Srivastava, U.K., Shenoy, G.V., Sharma, S.C. - Quantitative Techniques for ManagerialDecision - New Age International (P) Ltd, New Delhi
2. T. Veerarajan, Probability, Statistics and Random Processes, Third edition, Tata McGraw- Hill, New Delhi, 2010.
3. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. Loeve, M. (2012). Probability Theory I. United States: Springer New York.

BDS233P06	PYTHON PROGRAMMING LAB	L	T	P	C
		0	0	6	2

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES

- To learn python fundamentals and control structures.
- To learn to implement python functions to solve problems.
- To use python data structures – lists, tuples, dictionaries to represent complex data.
- To do input / output with files in python.
- To learn to perform database operations.

-

COURSE OUTCOMES

- Implement python control structures and loops.
- Implement the concept of strings and its manipulation.
- Implement object oriented programming concepts in python.
- Understand the various graphic methods to solve different problems.
- Implement database operations.

LIST OF EXERCISES

1. Write a Program for checking whether the given number is a even number or not.
2. Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . ,1/10
3. Write a program using a for loop that loops over a sequence. What is sequence?
4. Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.
5. Find the sum of all the primes below two million. Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...
6. Write a program to count the number of characters in the string and store them in a dictionary data structure
7. Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.
8. Write a program combine lists that combines these lists into a dictionary.
9. Write a program to print each line of a file in reverse order.
10. Write a program to compute the number of characters, words and lines in a file.
11. Write a program to perform addition of two square matrices
12. Write a program to perform multiplication of two square matrices
    a) Install packages requests, flask and explore them. using (pip)
    b) Write a script that imports requests and fetch content from the page. Eg. (Wiki)
    c) Write a simple script that serves a simple HTTP Response and a simple HTML Page.
13. Write a GUI for an Expression calculator using Tk
14. Write a program to implementing the following figures using Turtle.

15. Develop a python code to interact with Databases.

BDS233V07	SOFT SKILLS- I	L	T	P	C
		0	1	0	1

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

COURSE OBJECTIVES

- To understand the basic English Grammar usage and Vocabulary.
- To sensitize students the significance of nonverbal communication and academic writing.
- To improve students ability to speak fluently and interactively.
- To learn basic concepts of number system
- To understand basic idea about general aptitude

COURSE OUTCOMES

- Use basic grammar in both short conversation and writing.
- Convey information and thoughts in a good manner
- Communicate fluently.
- Able to solve number problems
- Able to understand and solve different quantitative problems

SYLLABUS

UNIT – I   GRAMMAR-I:
Parts of Speech-Tenses-Modal Verbs-Vocabulary – One word substitution, Homophones and Homonyms, phrasal verbs

UNIT – II   WRITING AND COMMUNICATION:
Forms of Non-Verbal Communication – Kinesics, Proxemics, chronemics and effective use of Body language -Effective use of Audio-visual aides and modes of presentation-Note-making, Precise writing, structure of paragraph, Review a book/journal

UNIT – III   SPEAKING:
Introducing Oneself -Greetings and Introduction-Short Group Conversations-Extempore speech – Practice

UNIT – IV   APTITUDE SKILLS – I:
Numbers – H.C.F & L.C.M – Decimal Fractions – Simplifications – Square root & Cube roots

UNIT – V   APTITUDE SKILLS – I:
Problems on Ages – Percentage – Surds & Indices – Profit & Loss – Ratio & Proportion

TEXT BOOKS:
1. Greenbaum, Sidney, "The Oxford English Grammar", Clarendon Press, 1996.
2. Hartley and Bruckmann, "Business Communication", Routledge, 2006.
3. R S Aggarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand Publications,2017

REFERENCES:
1. R S Aggarwal,"A Modern Approach to Non-Verbal Reasoning", S.Chand Publications,2017.

	LANGUAGE -IV	**L**	**T**	**P**	**C**
BDS234LT01	**(TAMIL - IV)**	**3**	**1**	**0**	**3**

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

நோக்கம்:

- சங்க இலக்கியத்தின் வாயிலாக அகப்புறக் கோட்பாடுகளை அறிதல்- பக்தி இலக்கியங்களின் வாயிலாக பண்பாட்டுக் கலாச்சாரம் போன்ற வாழ்வியல் விழுமியங்களை கற்று அறிதல்- உரைநடை இலக்கியங்களின் வழியாக மாணவர்களுக்கு வாசித்து திறனை ஊக்குவித்தல்- மாணவர்களுக்கு படைப்பாற்றலைத் தூண்டுதல்

- தமிழர்களின் அகப்புற கோட்பாடுகளை சங்க இலக்கியத்தின் வாயிலாக கற்றுக் கொடுத்தல். தமிழர்களின் வீரம் கொடை அறம் சார்ந்த நிகழ்வுகளை ஊடகங்கள் வழி பதிவு செய்தல்

- உரைநடை இலக்கியத்தின் வாயிலாக மாணவர்களின் வாசிப்புத்திறனை மேம்படுத்துதல்

- சமயச் சான்றோர்களையும் அவர்களின் பாடல்களையும் கற்றுக் கொடுத்தல்

- பயண நூல்களில் வாயிலாக ஒரு ஊரின் முக்கிய சிறப்புகளையும் முக்கிய இடங்களையும் தலைவர்களையும் எடுத்துரைத்தல்

- தனி மனிதன் உரிமைகள் பற்றிய மாணவர்களை அறியச் செய்தல் பெண்ணுரிமை பற்றியும் மனிதர்களுக்கான ஒவ்வொரு உரிமைகளை தெரிந்து கொள்ளுதல் நோக்கமாகும்

பயன்:

- சங்க இலக்கியத்தின் வழி அகப்புறக் கோட்பாடுகளை அறிந்து கொள்ளுதல்- பக்தி இலக்கியங்களின் வழி பண்பாடு கலாச்சார விழுமியங்களை அறிந்து கொள்ளுதல், சிறந்த படைப்பாளராக பன்முகத்திறன் பயிற்சி பெற்று தேர்ச்சி பெறுதல்

- தமிழர்களின் அகப்புறக் கோட்பாடுகளை அறிந்து கொண்டு ஏதேனும் ஒரு ஊடகத்தின் வழி தான் கற்றவற்றை வெளிப்படுத்துதல்

- மாணவர்கள் தங்கள் வாசிப்பு திறனை மேம்படுத்தி தமிழினை தங்கு தடை இன்றி படித்தல்

- சமயச் சான்றோர்களின் பாடல்களைப் படித்து மனனம் செய்து தங்கள் வாழ்க்கையின் நிகழ்வுகளில் பயன்படுத்துதல்

- ஒரு ஊரின் முக்கிய சிறப்புகளையும் முக்கிய இடங்களையும் தலைவர்களையும் சிறப்பினை அறிந்து போற்றுதல்

- மனித உரிமை பற்றிய புரிதல் மனித உரிமை ஆணையம் குறித்து அறிதல் ஒவ்வொரு மனிதர்களும் தனக்கான உரிமையை அறிந்து கொள்ளுதல்

பாடத்திட்டங்கள்

அலகு - I   சங்க இலக்கியம்

தமிழகத்தின் தாவரங்களுக்கும் விலங்குகளும், தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள், தமிழர்கள் போற்றிய அறக்கோட்பாடு, சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி, சங்ககாலத்தில் தமிழர்களின் எழுத்தறிவும் கல்வியும், வீரம் கொடை அறம் சார்ந்த நிகழ்வுகளின் காட்சி பதிவு – திரைப்படம், தொலைக்காட்சி, வானொலி, இதழ்கள் திட்டம் (PROJECT)

12

அலகு - II   உரைநடை

சங்க நெறிகள் முனைவர் வ.சு.ப மாணிக்கம் - தமிழர் பண்பாடு ஒரு விளக்கம் -டாக்டர் சோ. நா. கந்தசாமி விருந்தோம்பல் நேற்று இன்று நாளை சரளா ராஜ கோபாலன்

12

அலகு - III   பக்தி இலக்கியம்

கௌமாரசமயம்- திருப்புகழ்- அருணகிரிநாதர்- கணா பத்தியம்- விநாயகர் அகவல்கள் - சரஸ்வதி அந்தாதி – கம்பர்

12

அலகு - IV   பயண நூல் (வழி காட்டி)

காஞ்சிபுரம் ஒரு தரிசன வழிகாட்டி கோவில்கள் -மடங்கள் -புகழ் பெற்ற இடங்கள்

12

அலகு - V   மனித உரிமைகள்

மனித உரிமை பற்றிய புரிதல் - மனித உரிமை வரலாறு பண்புகளும் அறிதல் - ஒவ்வொரு மனிதர்களும் உள்ள உரிமைகளைத் தெரிந்து கொள்ளுதல்- குழந்தைகளின் உரிமைகள் - கொத்தடிமைகள் -பெண் உரிமை

12

TOTAL: 60

பாடநூல் :-

1. தமிழக வரலாறு மக்கள் பண்பாடு கேகே பிள்ளை தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் கழகம்
2. வகைமை நோக்கி தமிழ் இலக்கிய வரலாறு, பாக்கிய மேரி,நியூ செஞ்சுரி புக் ஹவுஸ் சென்னை
3. சங்க இலக்கியம் பாரிநிலையும் சென்னை 108
4. காஞ்சிபுரம் ஒரு தரிசன வழிகாட்டி தங்கத்தாமரை பதிப்பகம் அடையாறு சென்னை 20
5. கீழடி வைகை நதிக்கரையில் சங்க கால நாகரிகம் தொல்லியல் துறை வெளியீடு
6. முனைவர் . ஜெ. தியாகராஜன் மனித உரிமைகள் நிர்மலா பதிப்பகம் மதுரை -1

பார்வை நூல் :-

1. தமிழ் இலக்கியங்களில் வாழ்வியல் சிந்தனைகள் பல்லவி பதிப்பகம் ஈரோடு-11

BDS234LH01	LANGUAGE –IV (HINDI - IV)	L	T	P	C
		3	1	0	3

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

UNIT –I   INTRODUCTION TO FUNCTIONAL HINDI:
   a) Raj Bhasha Rashtra Bhasha and Sampark Bhasha
   b) Functional Hindi- Introduction

UNIT – II   INTRODUCTION TO OFFICIAL LANGUAGE TERMINOLOGY:
   a) Technical usage of Official Terminology
   b) Introduction to Official Language – Glossary

UNIT – III   HISTORY OF HINDI LITERATURE:
   a) Introduction to History of Hindi Literature
   b) The different periods of Hindi Literature – an Outlook
   c) Pakshiyon se udnaa seekha : Abdul Kalam

UNIT – IV   HISTORY OF HINDI LITERATURE- FAMOUS PERSONALITIES:
   a) Famous Hindi Poets
   b) Famous Hindi Prose Writers

UNIT – V   LETTER WRITING:
   a) Different models of Letters – Practice
   b) Personal Letters- Practice
   c) Official Letters - Practice

TEXT BOOKS:
   1. **HINDI SOURABH**   (Prepared by Department of Hindi, SCSVMV) & material of Translation prepared by Department of Hindi.

REFERENCES:
   1. Hindi Sahitya ka naya Ithihas : Dr. Ramkumar Varma, Rajkamal Prakashan 1997.
   2. Pramukh Kala Jayi Hindi kavi : KrishnaDev Jhari, Hindi Sahitya Parishad, New Delhi 2016.
   3. Aadhunik Hindi Kavitha : Dr. Jagadish Chandra Sharma, Hindi Sahitya parishad, New Delhi 2016.

BDS234LS01	LANGUAGE –IV	L	T	P	C
	(SANSKRIT - IV)	3	1	0	3

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

UNIT – I भागः - क
Ramodantam - Balakanda 1-20 Verses

UNIT – II भागः - ख
Ramodantam - Balakanda 21-30 Verses

UNIT – III भागः - ग
Vyasavacanabhagavatam (From Kathamukham to Putanavadha)

UNIT – IV भागः - घ
Vyasavacanabhagavatam (From Sakatabhanga to Devendragarva Bhanga)

UNIT – V भागः - ङ
Poets of Sanskrit - Kalidasa, Bharavi, Magha, Sriharsa.

Text Books:
1. **Ramodantam** - R.S. Vadhyar & Son, Palaghat.
2. **VyasavacanaBhagavatam** - K.Srinivasacari, The little flower & Co, Madras.
3. **History of Sanskrit literature.**

BDS234E02	ENGLISH -IV	L	T	P	C
		3	1	0	3

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

COURSE OBJECTIVES

- To comprehend the significance of communication and its purpose
- To listen actively, speak clearly and using proper language in telephone conversation.
- To apply effective communication skills in a variety of public and interpersonal settings
- To build the professional skills needed for career development and to present it effectually and ethically.
- To utilize the strategies of Verbal and Nonverbal communication in various facets of presentation

COURSE OUTCOMES

- Understand the importance of communication and its techniques
- Use proper language and speak convincingly and pleasingly.
- Interact proficiently and ethically
- Present professional skills in an effectual way.
- Apply the essential components of a presentation.

SYLLABUS

UNIT – I   COMMUNICATION

Communication: Meaning, Nature, Importance and Purpose of Communication - Types of Communication - Process of Communication – Communication Network in an Organization – Strategy for Effective Communication – Verbal and Non- Verbal Communication – Barriers to Communication – Essentials of Good Communication – Communication Techniques.

12

UNIT – II   TELEPHONIC SKILLS

Basics of telephone communication – how to handle calls – telephone manners – leaving a message – making requests – greeting and leave taking over phone(etiquette) – asking for and giving information – giving instructions – listening for tone / mood and attitude at the other end handling the situations especially trouble shooting – teleconference handling – handling Tele interviews for Call Centres

12

UNIT – III   EFFECTIVE COMMUNICATIONS

Making enquiry & requests – Answering general questions – railway enquiry – looking for accommodation – asking about a course – asking for / and giving directions.

12

UNIT – IV   CAREER SKILLS

Applying for job – Cover letters – Resume and Effective Profiling – Interviews – Group discussions. Importance and Factors Involving Job Interview – Characteristics of Job Interview – Job Interview Process – Job Interview Techniques – Manners and etiquettes to be maintained during an interview – Sample Questions Commonly asked During Interview.

12

UNIT – V   PRESENTATION SKILLS

Presentation Skills – Interviews – Public Speaking – Preparing a Speech – Organising the Speech – Special Occasion Speeches – self-introduction.

12
TOTAL: 60

TEXT BOOK:

1. Kavita Tyagi, Padma Misra. Professional Communication. New Delhi: PHI Learning Pvt. Ltd. 2011

BDS234T03	DATA ANALYTICS USING R	L	T	P	C
		3	2	0	4

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES
- To Learn Fundamentals of R.
- To illustrate how to use different functions in R, how to read data into R, accessing R packages, writing R functions, debugging, and organizing data using R functions.
- To study the Basics of statistical data analysis using data set with examples.
- To understand and get an idea to collect, compile and visualize data using statistical functions.
- To learn to write basic programs using statistical methods in R.

COURSE OUTCOMES
- Able to apply the principles python programming.
- Understand about loading, retrieval techniques of data.
- Create applications to analyze and visualize data using statistic functions.
- Ability to develop the applications for reading and manipulation of data on files
- Implements various algorithms using R.

SYLLABUS

UNIT – I   INTRODUCTION TO R:
What is R? – Why R? – Advantages of R over Other Programming Languages - R Studio: R command Prompt, R script file, comments – Handling Packages in Installing a R Package, Few commands to get started: installed.packages(), package Description(), help(), find.package(), library() - Input and Output – Entering Data from keyboard – Printing fewer digits or more digits – Special Values functions : NA, Inf and – inf.

12

UNIT – II   R DATA TYPES:
 Vectors, Lists, Matrices, Arrays, Factors, Data Frame – **R - Variables:** Variable assignment, Data types of Variable, Finding Variable ls(), Deleting Variables - **R Operators**: Arithmetic Operators, Relational Operators, Logical Operator, Assignment Operators, Miscellaneous Operators - **R Decision Making:** if statement, if – else statement, if – else if statement, switch statement – **R Loops:** repeat loop, while loop, for loop – Loop control statement: break statement, next statement.

12

UNIT – III   R-FUNCTION:
Function definition, Built in functions: mean(), paste(), sum(), min(), max(), seq(), user-defined function, calling a function, calling a function without an argument, calling a function with argument values - **R-Strings** – Manipulating Text in Data: substr(), strsplit(), paste(),

grep(), toupper(), tolower() - **R Vectors –** Sequence vector, rep function, vector access, vector names, vector math, vector recycling**,** vector element sorting **- R List -** Creating a List, List Tags and Values, Add/Delete Element to or from a List, Size of List, Merging Lists, Converting List to Vector -**R Arrays:** Naming Columns and Rows, Accessing Array Elements, Manipulating Array Elements, Calculation Across Array Elements.

12

UNIT – IV   DATA FRAMES:

Create Data Frame, Data Frame Access, Understanding Data in Data Frames: dim(), nrow(), ncol(), str(), Summary(), names(), head(), tail(), edit() functions - Extract Data from Data Frame, **Expand Data Frame**: Add Column, Add Row - Joining columns and rows in a Data frame rbind() and cbind() – Merging Data frames merge() – Melting and Casting data melt(), cast().

12

UNIT – V   INTRODUCTION TO TABLEAU

What is Tableau-Features of Tableau-Installation of Tableau Desktop-Introduction to Various File Types in Tableau-Using Data File Formats-Connecting Data to Tableau with Excel-Working with Data –Sorting Data-Building Charts with Data.

12

TOTAL: 60

TEXT BOOKS:
1. Sandip Rakshit, R Programming for Beginners, McGraw Hill Education (India), 2017, ISBN: 978-93-5260-455-5.
2. Seema Acharya, Data Analytics using R, McGrawHill Education (India), 2018, ISBN: 978-93-5260-524-8.

REFERENCES:
1. Tutorials Point (I) simply easy learning, Online Tutorial Library (2018), R Programming, Retrieved from https://www.tutorialspoint.com/r/r_tutorial.pdf.
2. Andrie de Vries, Joris Meys, R for Dummies A Wiley Brand, 2nd Edition, John Wiley and Sons, Inc, 2015, ISBN: 978-1-119-05580-8

BDS234T04	DATA WAREHOUSING AND DATA MINING	L	T	P	C
		3	2	0	4

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science)

COURSE OBJECTIVES
- To understand data warehouse concepts and architecture.
- To study the principles of data mining techniques.
- To learn the need and importance of pre-processing
- To understand and characterize the kinds of patterns that can be discovered by an association rule
- To learn various classification and clustering techniques

COURSE OUTCOMES
- Design a Data warehouse system
- Able to understand and apply data mining functionalities
- Gain knowledge for pre-processing of data and able to apply on various datasets.
- Analyze the frequent patterns using association rule mining algorithms
- Design and deploy appropriate classification and clustering techniques

SYLLABUS

UNIT–I:

Introduction to Data warehouse - Data warehouse architecture - Differences between OLAP and OLTP- A Multi dimensional data model- OLAP Operations in the Multidimensional Data Model - A three tier Data warehouse architecture – Data Ware house implementation.

12

UNIT–II:

Introduction to Data Mining- Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy - Architecture of Data Mining Systems- Classification Of Data Mining Systems.

12

UNIT–III:

Association Rule Mining – Apriori Algorithm – Frequent Pattern Growth algorithm- Multilevel Association Rules from transactiondatabases – Multi dimension Association Rules from Relational Database.

12

UNIT-IV:

Classification - Introduction – Issues – Decision Tree Induction –Bayesian Classification – KNN- Classification of Back Propagation–Prediction – Introduction – Classifier Accuracy.

12

UNIT–V:

     Clustering - Cluster Analysis – Types of Data in Cluster Analysis – Partitioning-Methods: K-Means – K- Medoids - Hierarchical Methods: Agglomerative hierarchical clustering method - Divisive Hierarchical Clustering method.

12
TOTAL: 60

TEXT BOOKS:
1. Alex Berson and Stephen J.Smith, ―Data Warehousing, Data Mining & OLAP, Tata McGraw – Hill Edition, 35th Reprint 2016.
2. Jiawei Han , Micheline Kamber, "Data Mining Concepts and Techniques", 3rd Edition, 2011, Harcourt India Pvt. Ltd- New Delhi.
3. Arum K Pujari, "Data Mining Techniques", 3rd Edition, Universities Press, 2005

REFERENCES:
1. Pualraj Ponnaiah, Wiley, "Data Warehousing Fundamentals", Student Edition, 2004.
2. K.P. Soman, ShyamDiwakar, V.Ajay, "Insight into Data Mining Theory and Practice", Prentice Hall of India Pvt. Ltd - New Delhi, 2006.
3. Margaret H. Dunham, "Data Mining : Introduction and Advance Topics", Pearson Education, 2003

BDS234A05	INTRODUCTION TO QUANTUM COMPUTING	L	T	P	C
		3	2	0	4

(For Students admitted from 2025 onwards)

OBJECTIVES

- To know the background of classical computing and quantum computing
- To learn the fundamental concepts behind quantum computation.
- To study the details of quantum mechanics and its relation to Computer Science.
- To gain knowledge about the basic hardware and mathematical models of quantum computation
- To learn the basics of quantum information and the theory behind it.

SYLLABUS

UNIT I : QUANTUM COMPUTING BASIC CONCEPTS
Complex Numbers Linear Algebra - Postulates of Quantum Mechanics - Matrices and Operators- Global Perspectives Quantum Bits Representations of Qubits - Super positions.

12

UNIT II : QUANTUM GATES AND CIRCUITS
Universal logic gates - Basic single qubit gates - Multiple qubit gates - Circuit development - Quantum error correction

12

UNIT III : QUANTUM ALGORITHMS
Quantum parallelism - Deutsch's algorithm - The Deutsch-Jozsa algorithm - Quantum Fourier transform and its applications - Quantum Search Algorithms: Grover's Algorithm

12

UNIT IV : QUANTUM INFORMATION THEORY
Data compression - Shannon's noiseless channel coding theorem Schumacher's quantum noiseless channel coding theorem - Classical information over noisy quantum channels

12

UNIT V : QUANTUM CRYPTOGRAPHY
Classical cryptography basic concepts - Private key cryptography - Shor's Factoring Algorithm - Quantum Key Distribution - BB84 - Ekart

12

TOTAL: 60

TEXT BOOKS
1. Parag K Lala, Mc Graw Hill Education, "Quantum Computing, A Beginners Introduction", First edition (1 November 2020).
2. Michael A. Nielsen, Issac L. Chuang, "Quantum Computation and Quantum Information", Tenth Edition, Cambridge University Press, 2010.
3. Chris Bernhardt, The MIT Press; Reprint edition (8 September 2020), "Quantum Computing for Everyone".

REFERENCE BOOKS

1. Scott Aaronson, "Quantum Computing Since Democritus", Cambridge University Press, 2013.
2. N. David Mermin, "Quantum Computer Science: An Introduction", Cambridge University Press. 2007.

BDS234P06	DATA ANALYTICS USING R LAB	L	T	P	C
		0	0	6	2

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES
- To Demonstrate the use of basic functions
- To learn to Create their own customized functions
- To know how to Construct tables and figures for descriptive statistics
- To Learn to understand new data sets and functions by yourself
- To illustrate to Work on built in real time cases for analysis and visualization

COURSE OUTCOMES
- Enable to build programming logic and thereby developing skills in Programming
- Clear understanding on how to organize data and analyze data using real time examples
- Develop algorithms and finding out the accuracy rate on the data.
- Develop data visualization using R.
- Develop good knowledge in R programming by analyzing datasets in R.

LIST OF EXERCISES

1. Write a program to check whether a year (integer) entered by the user is a leap year or not?
2. Write an R program to find the sum of natural numbers without formula using the if–else statement and the while loop.
3. Write a program to perform searching within a list (1 to 50). If the number is found in the list, print that the search is successful otherwise print that the number is not in the list.
4. Create a list and data frame that stores the marks of any three subjects for 10 students. Find out the total marks, average, maximum marks and minimum marks of every subject.
5. Write the steps to import data from Excel to CSV files and apply data viewer functions like rm(), dim(), head(), tail(), sorting, filtering, searching to view few set of rows and display different types of charts for the data which is imported from excel.

6. Write an R program to create a Data Frame with following details and do the following operations.'

itemCode	itemCategory	ItemPrice
1001	Electronics	70300
1002	Desktop Supplies	30600
1003	Office Supplies	35400
1004	USB	40100
1005	CD Drive	80500

   a. Subset the Data frame and display the details of only those items whose price are greater than or equal to 350.
   b. Subset the Data frame and display only the items where the category is either "Office Supplies" or "Desktop Supplies"
   c. Create another Data Frame called "item-details" with three different fields itemCode ,ItemQtyonHand and ItemReorderLvl and merge the two frames.

7. Write a program to create two 3 X 3 matrices A and B and perform matrix addition
8. Write a program that prints the grades of the students according to the marks obtained. The grading of the marks should be as follows. Marks Grades 800-1000 A+ 700 – 800 A 500 – 700 B+ 400-500 B 150 – 400 C Less than 150 D.
9. Create a list and data frame that stores the marks of any three subjects for 10 students. Find out the total marks, average, maximum marks and minimum marks of every subject.
10. Create a dataset or table ['Smart Phone"] in an excel sheet that stores the mobile information [price, company name, model, SalePercent] of five different companies. Store at least 20 rows. Write the scripts and find out the output for the following information.
   a. Maximum price of the mobile of each company
   b. Minimum price of mobile of each company
   c. Average price of mobile of each company
   d. Total Price of mobile of each company

BDS234V07	SOFT SKILLS - II	L	T	P	C
		0	1	0	1

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber Security)

COURSE OBJECTIVES

- To familiarize students the importance and appropriate usage of grammatical structures.
- To impart knowledge on various interpersonal, intrapersonal communication and the qualities of leadership.
- To introduce students to various technologies that influence our communication conduct in order to achieve targeted communication goals and objectives.
- Effort has been made to accommodate fundamental, mathematical aspects to instill confidence among students
- To demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions

COURSE OUTCOMES

- Use grammatical structures in extended conversations and discussions
- Comprehend the significance of various types of communication and its application.
- Interact effectively and uprightly.
- Use their logical thinking and analytical thinking to solve quantitative questions
- Enhance the aptitude round clearing ability in interview process

SYLLABUS

UNIT – I   REMEDIAL ENGLISH GRAMMAR AND USAGE:
Prepositions and words followed by prepositions-Concord (Agreement of the Verb with the Subject) - Error Analysis (Correction of Errors in a given sentence - errors in the use of words -Errors of Indianisms - use of slang - errors in punctuation)-Words commonly misspelt-Often confused words

UNIT – II   SOFT SKILLS FOR LEADERSHIP AND TEAM MANAGEMENT:
Qualities of a Good Leader - Decision Making- Intrapersonal skills - Interpersonal skills Problem solving - Critical thinking - Negotiation skills

UNIT – III   ELECTRONIC COMMUNICATION:
Internet, e-mail - Video conferencing - Blogging and Websites - Phone calls and Voice messages - Text Messages

UNIT – IV   APTITUDE SKILLS – III:

Problems on Numbers – Partnership – Time & Work – Time & Distance – Problems on Trains

UNIT – V   APTITUDE SKILLS – IV:

Permutation & Combination – Probability – True Discounts – Banker's Discount – Odd Man out & Series

TEXT BOOKS:
1. Raman Meenakshi and Prakash Singh, "Business Communication", 2nd Edition, Oxford Press, 2012.
2. Simon Sweeney, "English for Business Communication", Cambridge University Press, 2003.
3. R S Aggarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand Publications, 2017

REFERENCES:
1. Jaggan Saneja, "Quantitative Aptitude Simplified", 1st Edition, Notion Press, 2017.

		L	T	P	C
BDS235T01	**C# AND .NET PROGRAMMING**	3	2	0	4

(For Students admitted from 2023 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science)

COURSE OBJECTIVES
- To understand the foundations of CLR execution and .NET Framework.
- To develop background knowledge as well as core expertise in C#
- To learn the object oriented concepts
- To be aware of application development in .NET (Window Application and ADO.NET).
- To impart the knowledge on creation of web based applications on .NET (ASP.NET).

COURSE OUTCOMES
- List the major elements of the .NET frame work
- Explain how C# fits into the .NET platform.
- Analyze the basic structure of a C# application
- Debug, compile, and run a simple application.
- Design and develop Console, Window and Web based applications on .NET using C#.

SYLLABUS

UNIT – I:
Introduction to .NET: .NET Framework Architecture -.NET Framework Class Hierarchy- the System Namespace -**Introducing C#:**Data Types - Value and Reference Types, Boxing and Unboxing. Flow Control: Branching, Switching and Looping - Arrays – Jagged Arrays.

12

UNIT – II:
Object Oriented Capabilities: Classes and Objects – Inheritance - Polymorphism Abstract Classes-Sealed Classes- Partial Classes- Overriding – Overloading - Indexers and Properties – Delegates - Exception Handling- File IO – Serialization and Deserialization.

12

UNIT – III:
Window Applications : Window Forms –Properties – Events - **Controls:** Label – Textbox – Dutton – Radio Button – Check Box – List Box – Combo Box - Timer - Mouse and Keyboard Events – Designing Menus – Building MDI Applications- Common Dialog Controls – Rich Textbox Control.

12

UNIT – IV:

      Database and ADO.Net : Sql Database – Data Controls : Grid view – List View – Form View – Details View – Repeater -   **ADO.NET:** ADO.NET Architecture-ADO.NET Managed Providers: SQL Managed Provider-OLEDB Managed Provider - Accessing Data using ADO.NET - Reports.

12

UNIT – V:

      ASP.NET: Introducing ASP.NET web forms – The Life Cycle of an ASP.NET Web Page - Server Controls:Textbox – Listcontrols – FileUpload – Link Button- Image Button, Calendar – Radio Button - Checkbox- Validation Controls-Data Binding-Building Database Applications.

12

TOTAL: 60

TEXT BOOKS:
1. Ben Albahari and Joseph Albahari, C# 7.0 in a Nutshell, O′Reilly; 7th edition,2017.
2. Andrew Troelsen, Philip Japikse, "C# 6.0 and the .NET 4.6 Framework", 7th Edition, Apress, 2015.
3. Greg Buczek, ASP.NET Developer's Guide, Tata McGraw Hill Education 2017

REFERENCES:
1. Herbert Schildt, "The Complete Reference: C# 4.0", 1st Edition, Tata McGraw Hill, 2012.
2. Michael Otey , Denielle Otey, ADO.NET Complete Reference, Tata McGrawHill, 4th reprint 2005

BDS235T02	WEB TECHNOLOGY	L	T	P	C
		3	2	0	4

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science)

COURSEOBJECTIVES
- To study about the World Wide Web and scripting languages.
- To emphasize on the contemporary use of mark-up and scripting to create effective and attractive web sites.
- To develop the most important technologies that is being used today by web developers to build a wide variety of web applications.
- To understand and practice web development techniques on client-side
- To impart the knowledge on Web applications using technologies such as HTML, Javascript, Angular JS and PHP.

COURSE OUTCOMES:
- Able to create HTML5 documents, manipulation of images, tables, links and realizes the power of Cascading Style Sheets (CSS).
- Acquire an in-depth knowledge-on writing client-side JavaScript and to integrate JavaScript into web pages.
- Gain a good practical knowledge on writing successful HTML/PHP code utilizing MySQL database.
- Exposed to handle and design rich client presentation using Angular JS.
- Acquire an in-depth knowledge on structural framework for dynamic web apps.

SYLLABUS

UNIT – I   HTML5 AND CSS
Introduction to Web development – Websites – Languages – Tools - Structure of HTML – Contents: Text, Links, Images, Lists, Tables, Global Attributes, Form - Definition, Elements, Submission- Cascading Style Sheets - Applying Styles – References: Keywords, Id Attribute, Class Attribute, Other Attributes, Pseudo-Classes – Properties: Text, Colors, Sizes, Background, Borders, Shadows, Gradients, Filters, Transformations, Transitions, Animations.

12

UNIT – II   JAVASCRIPT
Introduction to JavaScript – Variables, Conditionals and Loops, Control Transfer Instructions – Functions: scope, anonymous, standard function – Objects – methods, constructor, inheritance - keywords, constructors - Standard objects: String Objects, Array Objects, Date Objects, Math Object, Window Object, Document Object, Element Objects, Creating Element Objects – Events – Debugging – error event, exception – APIs.

12

UNIT – III   PHP

Introduction to PHP – Expressions and Control flow – PHP functions and objects – Array – Form handling – Cookies, Sessions and Authentication.

12

UNIT – IV   PHP and MySQL

Introduction to MySQL – Making a Connection – Handling Errors - Creating Tables – Insert, Update and Delete Records with PHP - Retrieving data using Select.

12

UNIT – V   ReactJS and AngularJS

Basic of ReactJS - Angular JS: Basics of AngularJS – MVC – Filters and Modules – Directives – Working with Forms – Creating and Using Services.

12
TOTAL: 60

TEXT BOOKS:
1. J.D.Gauchat,HTML5 for Masterminds, Third Edition,2017
2. RobinNixon, Learning PHP, MySQL, JavaScript, CSS & HTML5, Oreilly, Third Edition, 2014.
3. BasaratAli Syed, Beginning Node.js, Apress publications, 2014.
4. RaviKantSoni, AngularJS for java developers, Apress publications, 2017,

REFERENCES:
1. Deitel & Deitel, Goldberg, Internet and World Wide Web – How to Program, Fifth Edition, Pearson Education Asia, 2012.
2. Tom Butler & Kevin Yank, PHP & MySQL – Novice to Ninja, Sixth edition, SitePoint, 2012.
3. Ravichandran, Internet and Web Technology, Khanna Book Publishing Company, first Edition, 2013.
4. Steceb Holzner PHP: The Complete Reference, Tata McGraw Hill, 2007
5. Pawel Kozlowski and Peter Bacon Darwin, Mastering Web Application Development with Angular JS, Packt Publishing, 2013.
6. https://nptel.ac.in/courses/106105084/

		L	T	P	C
BDS235T03	**DATA WRANGLING TECHNIQUES**	**3**	**1**	**0**	**4**

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES
- To perform data analysis in a literate programming environment
- To Import and manage structured and unstructured data
- To Manipulate, transform, and summarize the data
- To Join disparate data sources and to explore and visualize the data
- To develop the functions to perform basic predictive analytic modelling.

COURSE OUTCOMES
- Understand the basics of Data Clean up and work on No SQL
- Relate data clean up and test the new dataset
- Transform and wrangle data
- Visualize the data using different libraries
- Scrap data from websites using Beautiful Soap library

SYLLABUS

UNIT – I   INTRODUCTION TO DATA AND DATA CLEAN UP

Acquiring and Storing Data: Readability, Cleanliness, and Longevity – NoSQL: Installation and usage-Data Cleanup-Investigation, Matching, and Formatting.

12

UNIT – II   STANDARDIZING AND SCRIPTING

Normalizing and Standardizing, Determining What Data Cleanup Is Right for Your Project, Scripting Your Cleanup, Testing with New Data, Data Exploration and Analysis-Importing Data, Joining Numerous Datasets.

12

UNIT – III   DATA WRANGLING

Handling Missing Data- Data Transformation- String Manipulation, Join, Combine, and Reshape: Hierarchical Indexing Combining and Merging Datasets Reshaping and Pivoting.

12

UNIT – IV   VISUALIZATION OF DATA

Charts, Time-Related Data, Maps, Interactives, Words, matplotlib, Plotting with pandas and seaborn, Other Python Visualization Tools.

12

UNIT – V   WEB SCRAPING

Acquiring and Storing Data from the Web- Analyzing a Web Page, Reading a WebPage with Beautiful Soup. Screen Scrapers and Spiders- Browser-Based Parsing, Spidering theWeb.

12
TOTAL: 60

TEXT BOOKS:

1. Jacqueline Kazil & Katharine Jarmul, "Data Wrangling with Python", O'Reilly Media, Inc, 2016.
2. Wes McKinney, Python for Data Analysis Data Wrangling with Pandas, NumPy, and Python, O'Reilly Media, Inc, 2016.

REFERENCES:

1. Jeffrey Heer, Sean Kandel & Connor Carreras, Principles of Data Wrangling: Practical Techniques for Data Preparation, O'Reilly Media, Inc, 2017
2. Allan Visochek, Practical Data Wrangling: Expert Techniques for Transforming Your Raw Data into a Valuable Source for Analytics, Pack, 2017.
3. https://www.fintechfutures.com/files/2017/10/Trifacta_Principles-of-Data-Wrangling.pdf

BDS235TE04A	CLOUD COMPUTING	L	T	P	C
		3	1	0	4

(For Students admitted from 2024 onwards)
Common for B.Sc.(CS) / BCA / B.Sc.(Data Science)

COURSE OBJECTIVES
- To learn the Basic concept and technologies of Cloud Computing.
- To learn the principle of Abstraction, Virtualization and load balancing.
- To know about the core issues in cloud security.
- To learn the different type of interoperability and storage issues in modern cloud.
- To learn about the mobile cloud and mobile services.

COURSE OUTCOMES
- Describe the main concepts, key technologies, strengths and limitations of Cloud computing.
- Outline the principle of abstraction, virtualization, load balancing, capacity planning and cloud based services.
- Identify the core issues in cloud security and apply remedial measures.
- Determine the various interoperability and storage issues in modern cloud.
- Discover the key Smartphone web features.

SYLLABUS

UNIT – I   INTRODUCTION
Defining Cloud computing – Cloud Types – Characteristics of Cloud computing – Cloud Architecture – Cloud Computing Stack – Infrastructure as a Service – Platform as a Service – Software as a Service – Identity as a Service – Compliance as a Service – Parallel Processing: Introduction – Distributed Processing: Introduction.

12

UNIT – II   PLATFORMS AND CLOUD BASED SERVICES
Abstraction and Virtualization – Load Balancing and Virtualization – Hypervisors – Machine Imaging – Porting Applications – Capacity Planning – Google Web Services – Amazon Web Services – Microsoft Cloud Services.

12

UNIT – III   MANAGING AND SECURING THE CLOUD
Administrating the Cloud – Cloud Management Products – Cloud Management Standards – Securing the Cloud – Securing Data – Establishing Identity and Presence.

12

UNIT – IV   CLOUD BASED STORAGE AND PRODUCTIVITY SOFTWARE
Digital Universe – Provisioning Cloud Storage – Cloud Backup Solutions – Cloud Storage Interoperability – Using Productivity Applications – Online Office Systems.

12

UNIT – V   MOBILE CLOUD AND MOBILE WEB SERVICES

Mobile Market – Smart Phones with the Cloud – Mobile Web Services – Service Types – Service Discovery – Using SMS – Defining WAP and Other Protocols – Performing Synchronization.

12

TOTAL: 60

TEXT BOOKS:
1. Barrie Sosinsky, "Cloud Computing Bible", 1st Edition, Wiley Publishing, 2015. For Unit I, II, III, IV, V
2. S.K. Basu, "Parallel And Distributed Computing: Architectures And Algorithms", PHI Learning Private limited -Delhi, 2016. For Unit - I

REFERENCES:
1. Thomas Erl, Zaigham Mahood, Richard Puttini, "Cloud Computing, Concept, Technology and Architecture", Prentice Hall, USA 2013.
2. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", 1st Edition, Morgan Kaufmann Publishers, USA, 2017.

BDS235TE04B	SOFTWARE ENGINEERING	L	T	P	C
		3	1	0	4

(For Students admitted from 2024 onwards)
Common for B.Sc.(CS) / BCA / B.Sc.(Data Science) / B.Sc.(Cyber security)

COURSE OBJECTIVES
- To provide an insight into the process of software development life cycle
- To gain basic knowledge about pre-requisites for planning a software product
- To learn how to design software
- To study about basic idea about architectural design
- To gain knowledge about software testing strategies

COURSE OUTCOMES
- Understand and apply various phases of software development lifecycle for a given problem
- Analyze the requirements systematically and develop the model
- Ability to design and implement software projects
- Skill to design and develop software architecture
- Develop and apply various software testing strategies

SYLLABUS

UNIT – I   SOFTWARE AND SOFTWARE ENGINEERING
Introduction – The Nature of Software – Software Process – Software Engineering Practice – Software Myths - Software Process Models: Waterfall Model, Prototype Model, Increment Model, Spiral Model, RAD model, Win-Win model, Agile Model

12

UNIT – II   UNDERSTANDING   REQUIREMENTS   AND   REQUIREMENTS MODELING
Requirements engineering, Requirement Elicitation Techniques - Software Requirement Specification – Data Modeling Concepts - Flow Oriented modeling – Creating a Behavioral Model.

12

UNIT – III   DESIGN ENGINEERING
Design within the context of software engineering – Design Process and Design Quality - Design Concepts – The Design Model

12

UNIT – IV   CREATING AN ARCHITECTURAL DESIGN
Software Architecture – Data Design – Architectural Styles and Patterns – Architectural Design – Transform Flow Mapping – Transaction Flow Mapping.

12

UNIT – V   SOFTWARE TESTING

Software Testing fundamentals, White box testing - Black box testing - A Strategic Approach to Software Testing - System Testing.

12
TOTAL: 60

TEXT BOOKS:

1. Roger S.Pressman, "Software Engineering: A Practitioners Approach", 7th Edition, Tata McGraw Hill, 2010.

REFERENCES:

1. Richard Fairley, Software Engineering Concepts – Tata McGraw Hill, 2010.
2. Wamans Jawadekar, Software Engineering Principles & Practices, Tata McGraw Hill, 2010.

BDS235AE05A	**MANAGEMENT INFORMATION SYSTEM**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

(For Students admitted from 2024 onwards)
Common for B.Sc.(CS) / BCA / B.Sc.(Data Science) / B.Sc.(Cyber security)

COURSE OBJECTIVES

- To describe the role of information technology and decision support systems in business.
- To introduce the fundamental principles of computer-based information systems analysis.
- To enable the students to understand the various knowledge representation methods.
- To enable the students to use information to assess the impact of the Internet and Internet technology on electronic commerce
- To provide the theoretical models used in database management systems to answer business questions.

COURSE OUTCOMES

- Relate the basic concepts and technologies used in the field of management information systems;
- Compare the processes of developing and implementing information systems.
- Outline the role of the ethical, social, and security issues of information systems.
- Translate the role of information systems in organizations, the strategic management processes, with the implications for the management.
- Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization.

SYLLABUS

UNIT – I
Introduction: Definition of key terms – Management Information, System – Nature and Scope of MIS - Kinds of System; Systems Approach – Classification of MIS

12

UNIT – II
Organization for MIS: Structure for Management; Information requirements at various levels of Management; Manual vs. computerized information system; Data Bank Concept; Types of Computer-Based /applications

12

UNIT – III
Data Base Management: Meaning of Data-Base; Electronic Data-Base; DBMS – Objectives – Technical Overview – Data Aggregates – Physical and Logical Structures; System Security

12

UNIT – IV
System Development Stages: Investigation, Analysis Design, Construction, Testing, Implementation, Maintenance

UNIT – V

MIS in functional areas of Management: MIS for Marketing, Human Resource, Operations, Finance, General Management – Decision Making.

<div align="right">

12

TOTAL: 60

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TEXT BOOKS:

1. Goyal, Management Information Systems, Managerial Perspectives, Macmillan India Limited, New Delhi, 2014.
2. Jawadekar, W.S., "Management Information Systems", Tata McGraw Hill Private Limited, New Delhi, 2009.
3. Kenneth C. Laudon and Jane P. Laudon: "Management Information Systems" 9/e, Pearson Education, New Delhi.

REFERENCES:

1. Mahadeo Jaiswal, Monika Mital: "Management Information System", Oxford University Press, New Delhi, 2008.
2. Murthy C.S.V.: "Management Information System", Himalaya Publications, New Delhi, 2008.
3. Panneerselvam R.: "Database Management System", PHI Private Limited, New Delhi, 2008.

BDS235AE05B	HUMAN RESOURCE MANAGEMENT	L	T	P	C
		3	1	0	4

(For Students admitted from 2024 onwards)
Common for B.Sc.(CS) / BCA / B.Sc.(Data Science) / B.Sc.(Cyber security)

COURSE OBJECTIVES

- To acquire fundamental knowledge about human resource management and system at various levels in general and in certain specific industries or organizations
- To understand structure and functions of job design and empowerment
- To develop relevant skills with respect to recruitment process
- To provide knowledge about training and development methods
- To enable the students to integrate and understanding the importance of compensation in order to take correct business decisions.

COURSE OUTCOMES

- Ability to handle employee issues and evaluate the new trends in HRM
- To develop necessary skill set for application of various HR issues.
- Ability to plan human resources and implement techniques of job design
- Competency to recruit, train, and appraise the performance of employees
- Rational design of compensation and salary administration

SYLLABUS

UNIT – I   FROM PERSONAL MANAGEMENT TO HUMAN RESOURCES MANAGEMENT

Evolution of Human Resources Management - Principles underlying Human Resources Management - Similarities between Personal Management and Human Resources Management- Human Resources in the Changing Environment - Changing Work Design-Human Resources Development Department and its Functions

12

UNIT – II   JOB DESIGN AND EMPOWERMENT

Job Enrichment-Job Rotation-Shorter Work Week - Flexi time or Flexible Working Hours – Types of Empowerment – Importance of Empowerment

12

UNIT – III   RECRUITMENT AND SELECTION

Man Power Recruitment Process-Recruitment and Selection-Man Power Selection Process – Selection Procedure

12

UNIT – IV   TRAINING AND DEVELOPMENT

Needs of Training and Development – Induction Training and Levels of Training – Methods of Training – Training Programme – Management Development Programme – Employee Appraisal

12

UNIT – V   COMPENSATION ADMINISTRATION

General Compensation – Executive Compensation – Job Evaluation – Pricing Evaluated Jobs – Role of Merit Rating in a Wage Program

12
TOTAL: 60

TEXT BOOKS:

1. Biswanath Ghosh, "Human Resource Management", Vikas Publishing House Pvt Ltd, 2010.

REFERENCES:

1. K.Aswathappa, "Human Resource Management", 5th Edition, Tata McGraw Hill Publishing Company Ltd, 2008
2. David A.Decenzo and Stephen P.Robbins, "Personnel/Human Resource Management", 3rd Edition, Prentice Hall of India Pvt Ltd, 1991

BDS235P06	C# LAB	L	T	P	C
		0	0	4	2

(For Students admitted from 2023 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science)

COURSE OBJECTIVES

- To Introduce to .Net IDE Component Framework.
- To learn Programming concepts in .Net Framework.
- To update and enhance skills in writing Windows applications.
- To study about the data connectivity using ADO.NET.
- To impart knowledge to create website using ASP.Net Controls.

COURSE OUTCOMES

- Write various Console applications using C# Language in the .NET Framework.
- Debug and run a window application.
- Create data binding applications using ADO.Net connectivity.
- Perform Database operations for Windows Form and web applications.
- Design user interactive web pages using ASP.Net.

LIST OF EXERCISES

1. Console Application to implement the concept of Class and Interface using C#
2. Console Application for Exception Handling using C#
3. Console Application for Serialization and DeSerialization using C#
4. Console Application to implement Jagged Array using C#
5. Console Application to implement Properties and Indexers using C#
6. Designing Window Application using Basic Controls.
7. Designing Notepad using Menu option.
8. Window application to connect with database and manipulate the records in the database using ADO.NET.
9. Web Application to perform validation using validation controls.
10. Web application to Connect with the database using ADO.NE to manipulate the records.

BDS235P07	WEB TECHNOLOGY LAB	L	T	P	C
		0	0	4	2

(For Students admitted from 2023 onwards)
Common for B.Sc. (CS) / BCA / B.Sc. (Data Science)

COURSE OBJECTIVES
- To learn the fundamentals of writing JavaScript.
- To learn the mark-up and scripting languages and to create effective and attractive web sites.
- To learn and build a wide variety of web applications.
- To learn and practice web development techniques on client side.
- To impart the knowledge on web applications using technologies such as HTML, Javascript , AngularJS and PHP.

COURSE OUTCOMES
- Demonstrate the fundamental concepts of JavaScript and PHP Programming
- Implement markup and scripting languages and to create attractive web sites.
- Implement database application using PHP and MYSQL.
- Implement to handle and design rich client presentation using Angular JS.
- Demonstrate the dynamic web applications using various structural frameworks.

LIST OF EXERCISES
1. Write a HTML Code to design the class timetable using table tags and to apply the styles.
2. Write a HTML Code to design a login form and validate it using JavaScript.
3. Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient.
4. Write a JavaScript that calculates the squares and cubes of the numbers from 0 to 10 and outputs HTML text that displays the resulting values in an HTML table format.
5. Write a PHP program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings.
6. Write a PHP program to display a digital clock which displays the current time of the server.
7. Write the PHP programs to do the following:
   a. Implement simple calculator operations.
   b. Find the transpose of a matrix.
   c. Multiplication of two matrices.
   d. Addition of two matrices.
8. Write a PHP program to demonstrate the PHP Regular and expressions.
9. Write a PHP program to Develop student registration form and display all the submitted data on another page.
10. Write a PHP program to sort the student records which are stored in the database.

BDS236T01	BIG DATA ANALYTICS	L	T	P	C
		3	2	0	4

(For Students admitted from 2024 onwards)
Common for B.Sc. (CS) / BCA /B.Sc. (Data Science)

COURSE OBJECTIVES

- To understand fundamentals of BigData and Hadoop
- To learn about file system configuration in HADOOP
- To learn Map Reduce concept of Hadoop in executing Task
- To learn the Queue Processing and stream processing of Data
- To learn about Hadoop Frameworks

COURSE OUTCOMES

- Able to apply Hadoop for analyzing Big Volume of Data
- Able to access, store, do operations on data as Files and directories
- Able to implement MapReduce Concept in analyzing BigData
- Able to implement event streaming using Kafka API
- Able to access volume of data with Hadoop Framework

SYLLABUS

UNIT– I

Types of Digital Data - Introduction to Big Data - Challenges of conventional systems - Web data – Evolution of Analytic scalability - Analytic Processes and Tools - Analysis vs Reporting -History of Hadoop - Apache Hadoop - Analyzing Data with Hadoop - Hadoop Streaming

12

UNIT – II

The Design of HDFS- HDFS Concepts- The Command-Line Interface- Hadoop File Systems- Data Flow- Parallel Copying with distcp- Hadoop Archives- Hadoop I/O: Data Integrity- Compression- Serialization

12

UNIT – III

Analyzing the Data with Hadoop- Hadoop Pipes- MapReduce Types - Input Formats- Output Formats- MapReduce Features - MapReduce Works - Anatomy of a MapReduce Job Run – Failures - Job Scheduling - Shuffle and Sort - Task Execution

12

UNIT – IV

Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.

12

UNIT – V
Hive: Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data

12
TOTAL: 60

TEXT BOOKS:
1. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced analytics, John Wiley & sons, 2012.
2. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007
3. Tom White, Hadoop: The Definitive Guide, O'Reilly, 2009

REFERENCES:
1. Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , 72 David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications, 2012.
2. Kafka: The Definitive Guide- Real-Time Data and Stream Processing at Scale, by Gwen Shapira, Neha Narkhede ,Todd Palino.

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES

- To explain the basics of Data Visualization
- To enable students to Implement visualization of distributions
- To make students to write programs on visualization of time series, proportions & associations
- To make students to apply visualization on Trends and uncertainty
- To enable students, understand the principles of proportions

COURSE OUTCOMES

- Understand basics of Data Visualization
- Implement visualization of distributions
- Write programs on visualization of time series, proportions & associations
- Apply visualization on Trends and uncertainty
- Explain principles of proportions

SYLLABUS

UNIT – I   INTRODUCTION TO VISUALIZATION

Visualizing Data-Mapping Data onto Aesthetics, Aesthetics and Types of Data, Scales Map Data Values onto Aesthetics, Coordinate Systems and Axes- Cartesian Coordinates, Nonlinear Axes, Coordinate Systems with Curved Axes, Color Scales-Color as a Tool to Distinguish, Color to Represent Data Values, Color as a Tool to Highlight.

12

UNIT – II   VISUALIZING DISTRIBUTIONS

Visualizing Amounts-Bar Plots, Grouped and Stacked Bars, Dot Plots and Heat maps, Visualizing Distributions: Histograms and Density Plots- Visualizing a Single Distribution, Visualizing Multiple Distributions at the Same Time, Visualizing Distributions: Empirical Cumulative Distribution Functions and Q-QPlots - Empirical Cumulative Distribution Functions, Highly Skewed Distributions.

12

UNIT – III   VISUALIZING ASSOCIATIONS

Visualizing Proportions-A Case for Pie Charts, A Case for Side-by-Side Bars, A Case for Stacked Bars and Stacked Densities, Visualizing Proportions Separately as Parts of the Total, Visualizing Nested Proportions- Nested Proportions Gone Wrong, Mosaic Plots and Tree maps, Nested Pies, Parallel Sets. Visualizing Associations among Two or More Quantitative Variables-Scatter plots – Correlograms.

12

UNIT – IV   VISUALIZING UNCERTIANITY

Visualizing Trends-Smoothing, Showing Trends with a Defined Functional Form, Detrending and Time-Series Decomposition, Visualizing Geospatial Data-Projections, Layers, Choropleth Mapping, Cartograms, Visualizing Uncertainty-Framing Probabilities as Frequencies, Visualizing the Uncertainty of Point Estimates, Visualizing the Uncertainty of Curve Fits, Hypothetical Outcome Plots.

12

UNIT – V   PRINCIPLE OF PROPORTIONAL INK

The Principle of Proportional Ink-Visualizations Along Linear Axes, Visualizations Along Logarithmic Axes, Direct Area Visualizations, Handling Overlapping Points-Partial Transparency and Jittering, 2D Histograms, Contour Lines.

12
TOTAL: 60

TEXT BOOKS:
   1. Claus Wilke, "Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures", 1st edition, O'Reilly Media Inc, 2019

REFERENCES:
   1. Tony Fischetti, Brett Lantz, R: Data Analysis and Visualization, O'Reilly ,2016
   2. Ossama Embarak, Data Analysis and Visualization Using Python: Analyze Data to Create Visualizations for BI Systems, Apress, 2018
   3. https://www.netquest.com/hubfs/docs/ebook-data-visualization-EN.pdf

		L	T	P	C
BDS236T03	**MOBILE COMMUNICATIONS**	3	1	0	4

(For Students admitted from 2024 onwards)
Common for B.Sc.(CS) / BCA / B.Sc.(Data Science)

COURSE OBJECTIVES

- To understand the basic concepts of mobile computing
- To be familiar with the network protocol stack
- To learn the basics of mobile telecommunication system
- To be exposed to Ad-Hoc networks
- To gain knowledge about different mobile platforms and application development

COURSE OUTCOMES

- Outline the spread spectrum techniques and medium access schemes.
- Interpret the features of GSM and Satellite systems, Routing
- Determine the concepts of wireless LAN and Bluetooth.
- Illustrate the characteristics of mobile IP and demonstrate various Adhoc network protocols. .
- Exemplify the application environment and protocols

UNIT – I   WIRELESS COMMUNICATION FUNDAMENTALS

Introduction: History of Wireless Communication – Wireless Transmission: Frequencies for Radio Transmission – Signals – Antennas – Signal Propagation – Multiplexing – Modulation – Spread Spectrum – Cellular Systems – Medium Access Control: Motivation for a specialized MAC – SDMA – FDMA – TDMA – CDMA

12

UNIT – II   TELECOMMUNICATIONS SYSTEMS

GSM: Mobile Services – System Architecture - Protocols – Localization and Calling – Handover – Security – New Data Services – Satellite Systems: Basics – Routing – Localization – Handover.

12

UNIT – III   WIRELESS LAN

Infra Red vs Radio Transmission – Infrastructure and Ad-hoc Network – IEEE 802.11: System Architecture – Protocol Architecture – Physical Layer – Medium Access Control (MAC) Layer – MAC Management – Bluetooth: User Scenarios – Architecture – Radio Layer – Baseband Layer – Link Manager Protocol – L2CAP.

12

UNIT – IV   MOBILE NETWORK LAYER

Mobile IP: Goals, Assumptions and Requirements – Entities and Terminology – IP Packet Delivery – Agent Discovery – Registration – Tunneling and Encapsulation – Optimizations – Reverse Tunneling – IPv6 – IP Micro Mobility Support – Dynamic Host Configuration Protocol – Mobile Ad–hoc Networks: Routing – Destination Sequence Distance Vector – Dynamic Source Routing – Alternative Metrics – Overview Ad–hoc Routing Protocols.

12

UNIT – V   MOBILE TRANSPORT LAYER AND APPLICATION LAYER:

Mobile Transport Layer: Traditional TCP: Congestion Control – Slow Start – Fast Retransmit/Fast Recovery – Implications of Mobility – Classical TCP Improvements: Indirect TCP – Snooping TCP – Mobile TCP – Transaction Oriented TCP – TCP over 2.5/3G Wireless Networks.

Mobile Application Layer: Wireless Application Protocol: Architecture – Wireless Datagram Protocol – Wireless Transport Layer Security – Wireless Transaction Protocol – Wireless Session Protocol – Wireless Application Environment.

12
TOTAL: 60

TEXT BOOKS:
1. Jochen H Schiller, "Mobile Communications", 2nd Edition, Pearson Education, New Delhi, 2018.

REFERENCES:
1. Raj Kamal, "Mobile Computing", 2nd Edition, Oxford University Press, New Delhi, 2013.
2. Asoke K Talukder, "Mobile Computing: Technology Applications and Service Creation", 2nd Edition, Mcgraw-Hill Education (India) Private Limited, New York, 2013.

BDS236TE04A	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	2	0	4

(For Students admitted from 2024 onwards)
Common for B.Sc.(CS) / BCA / B.Sc.(Data Science) / B.Sc.(Cyber security)

COURSE OBJECTIVES

- To understand the various characteristics of Intelligent agents
- To learn about the different search strategies in AI
- To learn the knowledge representation using Mapping issues, Function and predicates.
- To illustrate the logical representation, Semantic Network Representation, Frame Representation.
- To learn techniques for solving problems with complete and uncertain models.

COURSE OUTCOMES

- Apply the basic principles of Artificial Intelligence (AI) in problem space and search programs.
- Demonstrate the various heuristic search techniques.
- Interpret the techniques to represent and manipulate the knowledge.
- Implement the knowledge representation techniques and structures.
- Explore techniques for solving problems with complete and uncertain models.

SYLLABUS

UNIT – I   INTRODUCTION AND PROBLEM SPACES
Artificial Intelligence: AI Problems – Assumption – Technique – Model – Criteria – Problems – Problem Spaces and Search: Definition – Production Systems – Characteristics – Issues in the Design of Search Programs.

12

UNIT – II   HEURISTIC SEARCH TECHNIQUES
Heuristic Search Techniques: Generate and Test – Hill Climbing – Best-First Search – Problem Reduction – Constraint Satisfaction – Means-Ends Analysis.

12

UNIT – III   FUNDAMENTALS OF KNOWLEDGE REPRESENTATION
Knowledge Representation Issues: Representations and Mappings – Approaches – Issues – Frame Problem – Using Predicate Logic: Representing Simple Facts in Logic – Instance and ISA Relationships – Functions and Predicates – Resolution – Deduction.

12

UNIT – IV   KNOWLEDGE REPRESENTATION AND STRUCTURES
Representing Knowledge Using Rules: Procedural Versus Declarative Knowledge – Logic Programming – Reasoning – Matching – Control Knowledge – Weak Slot-and-Filler Structures: Semantic Nets – Frames – Strong Slot-and-Filler Structures: Conceptual Dependency – Scripts – CYC.

UNIT – V   REASONING

Symbolic Reasoning Under Uncertainty: Non monotonic Reasoning – Logics – Issues – Problem Solver – Implementation – DFS –BFS – Statistical Reasoning: Probability and Bayesian Theorem – Bayesian Networks –Introduction to Generative AI.

12
TOTAL: 60

TEXT BOOK:

1. Elaine Rich, Kevin Knight, Shivashankar B.Nair, "Artificial Intelligence", 3rd Edition, McGraw Hill Education Pvt. Ltd., 2018.

REFERENCE:

1. Russell Stuart, Norvig Peter, "Artificial Intelligence: A Modern Approach", 3rd Edition, Pearson Education, 2016.
2. Parag Kulkarni, Prachi Joshi, "Artificial Intelligence –Building Intelligent Systems", PHI Learning Private Ltd, 2015.

BDS236TE04B	MACHINE LEARNING	L	T	P	C
		3	2	0	4

(For Students admitted from 2024 onwards)
Common for B.Sc.(CS) / BCA / B.Sc.(Data Science) / B.Sc.(Cyber security)

COURSE OBJECTIVES
- To understand the need of Machine learning.
- To acquire the knowledge of various classification techniques.
- To study the various algorithms related to supervised and unsupervised learning.
- To learn the theoretical and practical aspects of probabilistic graphical models.
- To expose the applications of machine learning.

COURSE OUTCOMES
- Able to explain the need of machine learning and model building.
- Understand the concept to apply the supervised algorithms.
- Develop a skill to implement unsupervised algorithms for problem solving.
- Understand the concept of reassurance learning algorithms.
- Able to apply the learning algorithms in real world problem solving.

SYLLABUS

UNIT – I   INTRODUCTION TO MACHINE LEARNING
Introduction to Machine learning: Type of Learning and Examples, basic concepts in machine learning, Computational Learning theory, Introduction to Parametric Models – Non-Parametric Models Probability Basics.

12

UNIT – II   SUPERVISED LEARNING
Algorithms Supervised Machine Learning Algorithms, working of supervised machine learning algorithm, Naive Bayes algorithm, decision tree, Support Vector Machines, KNN, Random Forest algorithm.

12

UNIT – III   UNSUPERVISED LEARNING
 Clustering- K-means -EM Algorithm- Mixtures of Gaussians - Dimensionality Reduction - Factor analysis – Feature Selection - Principal Component Analysis - Probabilistic PCA - Independent components analysis - Singular Value Decomposition.

12

UNIT – IV   REINFORCEMENT LEARNING
Reinforcement Learning Algorithms Reinforcement Machine Learning Algorithms, working of reinforcement machine learning algorithm, Finite Markov Decision Processes, Dynamic Programming, Monte Carlo Methods.

12

UNIT – V   INSTANCE BASED AND REINFORCEMENT LEARNING

K Nearest Neighbour Learning-Locally Weighted Regression Radial Basis Function Cased Based Reasoning Q Learning and Q Function.

12
TOTAL: 60

TEXT BOOKS:
1. Ethem Alpaydın, Introduction to Machine Learning, The MIT Press Cambridge, Fourth Edition, MIT Press Hardcover,2020
2. Shai Shalev-Shwartz, Shai Ben-David, Understanding Machine Learning: From Theory to Algorithms, Cambridge University Press, 2014.

REFERENCES:
1. V Kishore Ayyadevara, Pro Machine Learning Algorithms A Hands On Approach to Implementing Algorithms in Python and R, Apress, 2018.
2. Kevin P. Murphy, Probabilistic Machine Learning an Introduction. The MIT Press, 2022.

BDS236AE05A	DIGITAL MARKETING	L	T	P	C
		3	1	0	4

(For Students admitted from 2024 onwards)
Common for B.Sc.(CS) / BCA / B.Sc.(Data Science) / B.Sc.(Cyber security)

COURSE OBJECTIVES
- To provide students with an overview and understanding of marketing with a specific emphasis on digital Marketing
- To learn the fundamental concept of internet marketing
- To understand basic idea about how to make an effective advertisements
- To study the need and importance of social media marketing
- To understand various emerging platforms in digital marketing

COURSE OUTCOMES
- Able to identify the importance of the digital marketing for marketing success.
- Articulate innovative insights of internet marketing enabling a competitive edge
- Able to explain various search engine advertisements
- Gain knowledge on Social Media Marketing and Web Analytics
- Able to apply and analysis various emerging digital marketing tools for success of any business.

SYLLABUS

UNIT – I   INTRODUCTION
Objectives – Evolution of Digital Marketing from Traditional to the Modern Era – Web Advertising – Current Trends – The Emergence of digital Marketing as a Tool – POEM Framework.

12

UNIT – II   INTERNET MARKETING
Objectives – Internet Marketing – Digital Marketing Framework – Digital Marketing Mix - E mail Marketing – Online PR

12

UNIT – III   SEARCH ENGINE ADVERTISING
Search Advertisements – Ad Placement – Ad Ranks – Display Marketing – Programmable Digital Marketing – You Tube Marketing

12

UNIT – IV   SOCIAL MEDIA MARKETING
Social Media Strategies Cycle – Social Media Marketing Characteristics – Face Book Marketing – Importance of LinkedIn Marketing

12

UNIT – V   EMERGING PLATFORMS

Instagram and Snapchat – Difference between Instagram and Snapchat – Digital Marketing Strategies through Instagram and Snapchat Marketing – Instagram Marketing.

12

TOTAL: 60

TEXT BOOKS:
1. Rajan Gupta, Supriya Madan, "Digital Marketing", BPB Online, 2023

REFERENCE:
1. Seema Gupta, "Digital Marketing", McGraw Hill Education, 2020.
2. Puneet Bhatia, "Fundamentals of Digital Marketing", 2nd Edition, Pearson Education, 2019.

		L	**T**	**P**	**C**
BDS236AE05B	**ORGANIZATIONAL BEHAVIOR**	**3**	**1**	**0**	**4**

(For Students admitted from 2024 onwards)
Common for B.Sc.(CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber security)

COURSE OBJECTIVES
- To study the nature and scope of Organizational Behavior with different models
- To familiarize the concept of personality, perception and its significance
- To learn various theories of motivation and the formation of attitude.
- To identify the process used in developing communication and resolving conflicts.
- To understand the organizational structure and culture

COURSE OUTCOMES
- Demonstrate the applicability of the concept of OB to analyze the behavior of people in the Organization.
- Able to understand the determinants and attributes influencing for personality and perception.
- Understand the need and importance of motivation and able to apply with different types of organization.
- To develop creative and innovative ideas that could positively shape the organizations and enhance communication skills.
- To accept and embrace in working with different people from different cultural and diverse background in the workplace.

SYLLABUS

UNIT – I   ORGANIZATIONAL BEHAVIOR AND MODELS
Definition - Nature and Scope of Organizational Behavior- Factors Influencing Organizational Behavior – Managerial Implications of Learning Organizational Behavior – Importance of Models of Organizational Behavior - Model of Organizational Behavior (Autocratic, Custodial, Supportive and Collegial Model)

12

UNIT – II   PERSONALITY AND PERCEPTION
Characteristics of Personality – Determinants of Personality – Theories of Personality – Personality Attributes Influencing Organizational Behavior – Characteristics of Perception – Perceptual Process – Factors Influencing Perception

12

UNIT – III   MOTIVATION AND ATTITUDE
Motivation Process – Motivators – Theories of Motivation – Attitude Formation – Factors Influencing Formation of Attitudes

12

UNIT – IV   COMMUNICATION BEHAVIOR

Definition – Communication Process – Functions of Communication – Classification of Communication – Barriers of Communication – Improving Understanding in Communication.

12

UNIT – V   ORGANIZATIONAL STRUCTURE AND CULTURE:

Organizational Structure Meaning – Types of Organization Structure – Significance of Organizational Culture – Dimensions of Organizational Culture – Drivers of Organizational Culture.

12
TOTAL: 60

TEXT BOOKS:
1. Sarma V.S.Veluri – "Organisational Behaviour An Interactive Learning Approach Text and Cases", Jaico Publishing House, 2010

REFERENCES:
1. Fred Luthens, "Organizational Behavior-An Evidence Based Approach", McGraw Hill International Edition, 12th Edition 2011.
2. Stephen P.Robbins, "Essentials of Organizational Behaviour", Prentice Hall -6th Edition, 2000.

BDS236P06	BIG DATA ANALYTICS LAB	L	T	P	C
		0	0	4	2

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES

- To Get familiar with Hadoop distributions, configuring Hadoop and performing File management tasks
- To Experiment MapReduce in Hadoop frameworks
- To Implement MapReduce programs in variety applications
- To Explore MapReduce support for debugging
- To Understand different approaches for building Hadoop MapReduce programs for real-time applications

COURSE OUTCOMES

- Able to Configure Hadoop and perform File Management Tasks.
- Create Map Reduce programs to real time issues like word count, weather dataset etc.,
- Able to analyze huge data set using Hadoop distributed file systems and Map Reduce.
- Able to explore Map Reduce support for debugging.
- Apply different data processing tools like Pig and Hive.

LIST OF EXERCISES

1. Develop a Map Reduce program to calculate the frequency of a given word in a given file.
2. Develop a Map Reduce program to find the maximum temperature in each year.
3. Develop a Map Reduce program to find the grades of student's.
4. Develop a Map Reduce to find the maximum electrical consumption in each year given electrical consumption for each month in each year.
5. Develop a Map Reduce to analyze weather data set and print whether the day is shinny or cool day.
6. XYZ.com is an online music website where users listen to various tracks, the data gets collected which is given below. The data is coming in log files and looks like as shown below.

UserId	TrackId	Shared	Radio	Skip
111115	222	0	1	0
111113	225	1	0	0
111117	223	0	1	1
111115	225	1	0	0

Write a Map Reduce program to get the following
  i. Number of unique listeners
  ii. Number of times the track was shared with others
  iii. Number of times the track was listened to on the radio
  iv. Number of times the track was listened to in total
  v. Number of times the track was skipped on the radio

7. Develop a Map Reduce program to find the frequency of books published each year and find in which year maximum number of books were published using the following data.

Title	Author	Published year	Author country	Language	No of pages

8. Develop a Map Reduce program to analyze Uber data set to find the days on which each basement has more trips using the following dataset. The Uber dataset consists of four columns they are

Dispatching_base_number	Date	Active_vehicles	Trips

9. Develop a program to calculate the maximum recorded temperature by year wise for the weather dataset in Pig Latin
10. Write queries to sort and aggregate the data in a table using HiveQL.

BDS236P07	SOFTWARE DEVELOPMENT LAB	L	T	P	C
		0	0	4	2

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES

- To provide an idea of decomposing the given problem into Analysis, Design, Implementation, Testing and Maintenance phases.
- To provide an idea of using various process models in the software industry according to given circumstances.
- To understand basic knowledge about data dictionary, Data Flow Diagram, E-R Diagram and so on.
- To understand need and importance of modularity
- To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project

COURSE OUTCOMES

- Understand the software engineering methodologies involved in the phases for project development
- Discuss and Analyses how to develop software requirements specifications for a given problem.
- Students will be able to decompose the given project
- Able to apply latest programming techniques
- Ability to develop product- startups implementing software process models in software engineering methods

LIST OF EXERCISES

A Possible set of applications may be the following
1. Web Based Applications
2. Mobile Based Applications
3. Automation of Banking, Electricity Bill, Departmental Store and so on
4. Online Booking System
5. Security Based Applications
6. IoT /Cloud based/Machine Learning/Artificial Intelligence
7. Block Chain Technologies

BDS237T01	INFORMATION RETRIEVAL TECHNIQUES	L	T	P	C
		3	2	0	4

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES
- To understand the basics of Information Retrieval.
- To learn about modelling and retrieval evaluation
- To understand machine learning techniques for text classification and clustering.
- To understand various search engine system operations.
- To learn different techniques of recommender system.

COURSE OUTCOMES
- Use an open source search engine framework and explore its capabilities
- Able to design various retrieval model.
- Apply appropriate method of classification or clustering.
- Design and implement innovative features in a search engine.
- Design and implement a recommender system.

SYLLABUS

UNIT – I   INTRODUCTION
Information Retrieval – Early Developments – The IR Problem – The User_s Task – Information versus Data Retrieval - The IR System – The Software Architecture of the IR System – The Retrieval and Ranking Processes - The Web – The e-Publishing Era – How the web changed Search – Practical Issues on the Web – How People Search – Search Interfaces Today – Visualization in Search Interfaces.

12

UNIT – II   MODELING AND RETRIEVAL EVALUATION
Basic IR Models - Boolean Model - TF-IDF (Term Frequency/Inverse Document Frequency) Weighting - Vector Model – Probabilistic Model – Latent Semantic Indexing Model – Neural Network Model – Retrieval Evaluation – Retrieval Metrics – Precision and Recall – Reference Collection – User-based Evaluation – Relevance Feedback and Query Expansion – Explicit Relevance Feedback.

12

UNIT – III   TEXT CLASSIFICATION AND CLUSTERING
A Characterization of Text Classification – Unsupervised Algorithms: Clustering – Naïve Text Classification – Supervised Algorithms – Decision Tree – k-NN Classifier – SVM Classifier – Feature Selection or Dimensionality Reduction – Evaluation metrics – Accuracy and Error – Organizing the classes – Indexing and Searching – Inverted Indexes – Sequential Searching – Multi-dimensional Indexing.

12

UNIT – IV   WEB RETRIEVAL AND WEB CRAWLING

The Web – Search Engine Architectures – Cluster based Architecture – Distributed Architectures – Search Engine Ranking – Link based Ranking – Simple Ranking Functions – Learning to Rank – Evaluations -- Search Engine Ranking – Search Engine User Interaction – Browsing – Applications of a Web Crawler – Taxonomy – Architecture and Implementation – Scheduling Algorithms – Evaluation.

12

UNIT – V   RECOMMENDER SYSTEM

Recommender Systems Functions – Data and Knowledge Sources – Recommendation Techniques – Basics of Content-based Recommender Systems – High Level Architecture – Advantages and Drawbacks of Content-based Filtering – Collaborative Filtering – Matrix factorization models – Neighbourhood models.

12
TOTAL: 60

TEXT BOOKS:
1. Ricardo Baeza-Yates and Berthier Ribeiro-Neto, ―Modern Information Retrieval: The Concepts and Technology behind Search, Second Edition, ACM Press Books, 2011.
2. Ricci, F, Rokach, L. Shapira, B.Kantor, ―Recommender Systems Handbook‖, First Edition, 2011.

REFERENCES:

1. C. Manning, P. Raghavan, and H. Schütze, ―Introduction to Information Retrieval, Cambridge University Press, 2008.
2. Stefan Buettcher, Charles L. A. Clarke and Gordon V. Cormack, ―Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.

BDS237TE02A	HEALTH ANALYTICS	L	T	P	C
		3	2	0	4

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES
- To understand the basic sources of healthcare data.
- To perform image analysis and sensor data analysis.
- To derive and evaluate data mining and analysis from social media.
- To frame advanced data analytic models through visual analytics.
- To identify fraud detection in healthcare from different sources of data.

COURSE OUTCOMES
- Understand data sources and concepts
- Able to perform Image analysis and sensor data analysis.
- Able to implement NLP techniques in healthcare data from social media
- Design Predictive and prescriptive models of healthcare data
- Identify Fraud detection in healthcare and Assistive image analysis system

SYLLABUS

UNIT – I
Introduction to Healthcare Data Analytics Electronic Health Records– Components of EHR-Coding Systems- Benefits of HER Barrier to Adopting HER Challenges Phenotyping Algorithms.

12

UNIT – II
Biomedical Image Analysis- Mining of Sensor Data in Healthcare- Biomedical Signal Analysis Genomic Data Analysis for Personalized Medicine.

12

UNIT – III
Natural Language Processing and Data Mining for Clinical Text- Mining the Biomedical Social Media Analytics for Healthcare.

12

UNIT – IV
Advanced Data Analytics for Healthcare– Review of Clinical Prediction Models- Temporal Data Mining for Healthcare Data- Visual Analytics for Healthcare- Predictive 53 Models for Integrating Clinical and Genomic Data Information Retrieval for Healthcare- Data Publishing Methods in Healthcare

12

UNIT – V

Applications and Practical Systems for Healthcare– Data Analytics for Pervasive Health-Fraud Detection in Healthcare- Data Analytics for Pharmaceutical Discoveries Clinical Decision Support Systems- Computer Assisted Medical Image Analysis Systems Mobile Imaging and Analytics for Biomedical Data

12
TOTAL: 60

TEXT BOOKS:
1. Hui Yang and Eva K. Lee, "Healthcare Analytics: From Data to Knowledge to Healthcare Improvement, Wiley, 2016.
2. Tim O'reilly , "How data science is transforming Healthcare", O'reilly, 2022.

REFERENCES:
1. Laura B. Madsen, "Data driven healthcare", Wiley, 2022.
2. Jason Burke, "Health Analytics", Wiley, 2020

BDS237TE02B	NO SQL DATABASES	L	T	P	C
		3	2	0	4

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES
- To understand the principles behind the NoSQL databases.
- To explore knowledge on variety of NoSQL databases.
- To apply architectures and common features of NoSQL databases (key-value stores, document databases, graph databases).
- To analyze the various NoSQL databases.
- To design applications using NoSQL databases

COURSE OUTCOMES
- Design four types of NoSQL Databases (Document-oriented, Key-Value Pairs, and Graph).
- Understand the detailed architecture; define objects, load data, query data and performance tune Key-Value Pair NoSQL databases.
- Understand the detailed architecture, define objects, load data, query data and performance tune Document oriented, Graph NoSQL databases.
- To design and develop NoSQL database applications.
- Evaluate NoSQL database development tools and programming languages.

SYLLABUS

UNIT – I
Overview, and History of NoSQL Databases – Definition of various Types of NoSQL Databases – The Value of Relational Databases – Attack of the Clusters, The Emergence of NoSQL, Key Points.

12

UNIT – II
Distribution Models – Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication – New NoSQL stores, MongoDB, Cassandra, OrientDB use and deployment, Application, NoSQL approach – Key-Value and Document Data Models, Aggregate-Oriented Databases.

12

UNIT – III
PostgresSQL - Relations, CRUD, and Joins - Advanced Queries, Code, and Rules - Full Text and Multidimensions . DynamoDB The "Big Easy" of NoSQL Building a Streaming Data - Pipeline Building an "Internet of Things" - System Around DynamoDB.

UNIT – IV

Cassandra: Features – CQL Data Types – CQLSH – Keyspaces – CRUD Operations – Collections – Using a Counter – Time to Live – Alter Commands – Import and Export – Querying System Tables. ELASTIC SEARCH: Create Index – Adding data in Kibana - Index API – Query DSL.

12

UNIT – V

Orientdb: Basic Concepts – Data Types – Database Commands – Record Commands – Cluster and Class Commands – Property, Vertex, and Edge Commands – Hooks – Caching – Logging.

12
TOTAL: 60

TEXT BOOKS:
1. Shashank Tiwari, "Professional NOSQL", WROX Press, 2011.
2. Sadalage, P. & Fowler, M., "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", 1st Ed., Pearson Education, 2012.
3. Redmond, E. & Wilson, J., "Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement", 1st Ed., 2012.

REFERENCES:
1. Dan MC Creary and Ann Kelly, "Making Sense of NoSQL: A guide for Managers and the Rest of Us", Dreamtech Press, 2013.
2. Adam Fowler, "NoSQL for Dummies", Wiley, 2015.

		L	**T**	**P**	**C**
BDS237TE03A	**DATA SECURITY AND PRIVACY**	**3**	**2**	**0**	**4**

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES

- To a definitive guide to approach anonymization of various data formats.
- To understand multidimensional, longitudinal, time-series, transaction, and graph data.
- To emphasize on the protection of confidential data.
- To provide a guideline as to how this can be implemented for a wide range of data at the enterprise level.
- To elaborate on the security and privacy aspect of the enterprise data.

COURSE OUTCOMES

- Demonstrate techniques in Data privacy
- Summarize static Data Anonymization
- Illustrate data mining techniques for privacy preserving
- Identify various synthetic data generation method
- Recall different types of acts for privacy preserving

SYLLABUS

UNIT – I   INTRODUCTION TO DATA PRIVACY

Data Privacy and it is importance – Use Cases: Need for Sharing Data –Methods of Protecting Data – Importance of Balancing Data Privacy and Utility –Introduction to Anonymization Design Principles – Nature of Data in the Enterprise.

12

UNIT – II   STATIC DATA ANONYMIZATION

Introduction – Classification of Privacy Preserving Methods – Classification of Data in a Multidimensional Dataset – Group Based Anonymization – Threats to Anonymized Data – Threats to Data Structure – Threats by Anonymization Techniques.

12

UNIT – III   PRIVACY PRESERVING DATA MINING

Data Mining: Key Functional Areas of Multidimensional Data – Associate rule Mining– Clustering – Test Data Fundamentals – Utility of Test Data – Privacy Preservation ofTest Data – Protecting Explicit Identifier – Protecting Quasi Identifier – Quality of TestData – Anonymization Design

12

UNIT – IV   SYNTHETIC DATA GENERATION

Synthetic Data and Their Use – Privacy and Utility in Synthetic Data – Explicit Identifier– Quasi Identifier – Sensitive Data – How safe are synthetic Data – Testing – Error and Exception Data – Scaling – Regression Testing

12

UNIT – V   DYNAMIC DATA PROTECTION AND PRIVACY REGULATION

Bayesian Networks - Learning Naive Bayes classifiers-Markov Models – Hidden Markov Models Sampling – Basic sampling methods – Monte Carlo -Reinforcement Learning.

12
TOTAL: 60

TEXT BOOKS:
1. Nataraj Venkataramanan and Ashwin Shriram, "Data Privacy - Principles and Practice", Chapman and Hall, 1st Edition, 2017.

REFERENCES:
1. Chuck Ballard, Cindy Compert, Tom Jesionowski, Ivan Milman, Bill Plants, Barry Rosen, Harald Smith, "Information Governance Principles and Practices for a Big Data Landscape",
2. Sebastian Raschka, "Python Machine Learning", Packt Publishing, 2015.

BDS237TE03B	TECHNIQUES AND TOOLS FOR DATA SCIENCE	L	T	P	C
		3	2	0	4

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES
- To gain knowledge on preprocessing the data using WEKA and Excel.
- To understand how to model a system using Scikit and TensorFlow.
- To find the solutions using the NLTK tool.
- To create visualization using Matplotlib and Tableau.
- To solve the real time problems of data science

COURSE OUTCOMES
- Cleaning and preprocessing the data using WEKA and Excel.
- Modeling a system using Scikit and TensorFlow.
- Find the solutions using NLTK tool.
- Create visualization using Matplotlib and Tableau.
- Solve the real time problems of data science.

SYLLABUS

UNIT I: Cleaning and preprocessing Introduction- Preprocessing Data -File Conversion - Opening File from A Local File System -Opening File from A Web Site - Reading Data from a Database - Preprocessing Window-Building Classifier, Cluster, Association-Attribute Selection-Data Visualization.

12

UNIT II: Modeling- Introduction to Scikit learn – Installation basics – fitting and predicting (estimator basics) - Transformers and pre-processors - Pipelines: chaining pre-processors and estimator - Model evaluation – Automatic parameter searches.

12

UNIT III: NLTK Tool - Introduction about jupyter notebook-Notebook Basics-Running Code- Markdown cells-Importing Jupyter Notebook as moduleconnecting to an existing Ipython kernel using Qt Console.

12

UNIT IV: TensorFlow Fundamentals- basic computation - Installation of TensorFlow - Tensors and NumPy - Loading and Preprocessing data - Linear and Logistic regression with TensorFlow - Training convolutional neural network in TensorFlow - deploying model.

12

UNIT V: Visualization with Matplotlib- Figures and Subplots- Colors, Line Styles, Ticks, Labels, and Legends - Saving Plots to File - Line Plots, Scatter Plots, Density and Contour Plots, Histograms, Three- Dimensional Plotting and Geographic Data with Basemap.

12
TOTAL: 60

TEXT BOOKS:
1. Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow"O'Reilly, 2017.
2. Bharath Ramsundar, Reza Bosagh Zadeh (2018). "TensorFlow for Deep Learning", O'Reilly, 2018.
3. Statistical Analysis with Excel for Dummies,Joseph Schmuller , John Wiley & Sons, Inc, 2013.

REFERENCES:
1. Alexander Loth, "Visual Analytics with Tableau", Wiley Publisher, First Edition, 2019.
2. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly, 2017.

BDS237TE04A	INTERNET OF THINGS (IoT)	L	T	P	C
		3	2	0	4

(For Students admitted from 2024 onwards)
Common for B.Sc.(CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber security)

COURSE OBJECTIVES
- To understand the concepts of Internet of Things
- To identify the various elements of an IoT System.
- To understand the various means of communication from Node / Gateway to Cloud Platforms.
- To transfer data from IoT devices to various cloud providers.
- To make students aware of various domain specific applications and challenges while implementing IoT solutions.

COURSE OUTCOMES
- Understand general concepts of Internet of Things (IoT)
- Recognize various devices, sensors and applications
- Apply design concept as IoT solutions
- Analyze various M2M and IoT architectures
- Evaluate design issues in IoT applications

SYLLABUS

UNIT–I   INTRODUCTION TO IoT
Introduction to IoT, Current technological trends and future prospects- Evolution of IoT - IoT Devices - IoT Devices vs. Computers - Trends in the Adoption of IoT - Societal Benefits of IoT.

12

UNIT–II   ELEMENTS OF IoT
Application Sensors & Actuators - Edge Networking (WSN) Gateways - IoT Communication Model WPAN & LPWA, Overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex

12

UNIT – III   COMMUNICATION AND CONNECTIVE TECHNOLOGIES
IoT Communication Model - Wireless medium access issues - Data aggregation & dissemination. Communication technologies, Long-ran ge Wireless Protocols: LoRa WAN, Ingenu

12

UNIT – IV   IoT AND CLOUD
Interoperability in IoT - Introduction to Arduino Programming - Integration of Sensors and Actuators with Arduino – Cloud computing in IoT, IoT in cloud architecture.

UNIT – V   DOMAIN SPECIFIC APPLICATIONS OF IoT

Home automation, Industry applications, Surveillance applications, Other IoT applications - Introduction to different IoT tools, developing applications through IoT tools

12
TOTAL: 60

TEXT BOOKS:
1. Boswarthick, OmarElloumi., The Internet of Things: Applications and Protocols, Wiley publications., 2012
2. Dieter Uckelmann, Mark Harrison, Florian Michahelles., Architecting the Internet of Things, Springerpublications.2011.

REFERENCES:
1. Marco Schwatrz Internet of Things with Arduino Cookbook, Packt Publications.
2. Peter Waher, "Learning Internet of Things", PACKT publishing, Birmingham, Mumbai, 2005.

BDS237TE04B	BUSINESS ANALYTICS	L	T	P	C
		3	2	0	4

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES
- To understand the role of business analytics within an organization
- To analyze data using statistical and data mining techniques
- To gain an understanding of how managers use business analytics to formulate and solve business problems.
- To become familiar with processes needed to develop, report, and analyze business data.
- To use decision-making tools/Operations research techniques

COURSE OUTCOMES
- Demonstrate knowledge of data analytics.
- Think critically in making decisions based on data and deep analytics.
- Use technical skills in predicative and prescriptive modeling.
- Translate data into clear, actionable insights.
- Make decisions using various tools.

SYLLABUS

UNIT – I   INTRODUCTION

Business analytics: Overview of Business analytics– Scope of Business analytics– Business Analytics Process– Relationship of Business Analytics Process and organization – competitive advantages of Business Analytics.

12

UNIT – II   REGRESSION AND VISUALIZATION

Trendiness and Regression Analysis: Modelling Relationships and Trends in Data– simple Linear Regression. – Important Resources– Business Analytics Personnel.

12

UNIT – III   ANALYTICAL MODELS

Organization Structures of Business analytics–Team management–Management Issues– Designing Information Policy– Outsourcing– Ensuring Data Quality– Measuring contribution of Business analytics– Managing Changes. Descriptive Analytics– predictive analytics– predicative Modelling.

12

UNIT – IV   FORECASTING TECHNIQUES

Qualitative and Judgmental Forecasting– Statistical Forecasting Models– Forecasting Models for Stationary Time Series– Forecasting Models for Time Series with a Linear Trend– Forecasting Time Series with Seasonality– Regression Forecasting with Casual Variables.

12

UNIT – V   DECISION ANALYSIS

Decision Analysis: Formulating Decision Problems– Decision Strategies with the without Outcome Probabilities– Decision Trees– The Value of Information, Utility and Decision Making.

12
TOTAL: 60

TEXT BOOKS:

1. Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, "Business analytics Principles, Concepts, and Applications", Pearson FT Press, 2014.

REFERENCES:

1. James R Evans, "Business Analytics", Pearson's Education, 2016.

BDS237AE05A	STATISTICAL INFERENCE FOR DATA SCIENCE	L	T	P	C
		3	2	0	4

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES
- To understand the theory of estimation
- To know about confidence intervals and confidence limits.
- To acquire knowledge about non-parametric methods
- To understand multiple and partial correlation and regression
- To analyze the validity of the given data by different factors.

COURSE OUTCOMES
- Find the estimators
- Calculate the confidence intervals and confidence limits
- Use non-parametric methods
- Find coefficient of partial and multiple correlation and regression
- Analyze the variance of different factors in various situations

SYLLABUS

UNIT – I   THEORY OF ESTIMATION - I
Introduction - Characteristics of estimators - Consistency - Unbiasedness - Invariance property of consistent estimators - Sufficient conditions for consistency - Efficient estimators - Most efficient estimator - Sufficiency - Cramer-Raoinequality -Conditions for the equality sign in Cramer-Raoinequality

12

UNIT – II   THEORY OF ESTIMATION - II
Complete family of distributions - MVUE and Blackwellisation- Methods of estimation Method of maximum likelihood estimation - Method of minimum variance - Method of moments - Method of least squares - Confidence intervals and confidence limits - Confidence intervals for large samples

12

UNIT – III   NON-PARAMETRIC METHODS
Non-parametric methods - Advantages and disadvantages of non-parametric methods over parametric methods - Basic distribution - Wald-Wolfowitz run test - Test for randomness - Median test - Sign test - Mann-Whitney-Wilcoxon U-test

12

UNIT – IV   MULTIPLE AND PARTIAL CORRELATION AND REGRESSION ANALYSIS
Introduction - Multiple and partial correlation and regression - Yule's notation - Order of regression coefficients – Coefficient of multiple correlation- Coefficient of partial correlation

12

UNIT – V   DESIGN OF EXPERIMENTS

Introduction - Basic principles of experimental design - Completely randomised design - Analysis of variance for one-way classification - Randomised block design - Analysis of variance for two-factor experiments - Latin square design - Analysis of variance for three-factor experiments - RBD and LSD Comparison (Problems Only)

12

TOTAL: 60

TEXTBOOKS:

1. S.C. Gupta and V.K.Kapoor, Fundamentals of Mathematical Statistics (A Modern Approach), Sultan Chand & Sons, New Delhi.   Unit I - III – Chapters 15, 16
2. S.C. Gupta, Fundamentals of Statistics, Himalaya Publishing House, Mumbai. Unit IV – Chapter 27
3. P.Kandasamy, K.Thilagavathi and K.Gunavathi, Probability, Statistics and Queueing Theory, S.Chand& Company Ltd., New Delhi. Unit - V Chapter8(8.1 – 8.9)

REFERENCES:

1. H.C. Saxena and P.U. Surendran, Statistical Inference, S.Chand Publications, New Delhi.
2. G.S. Monga, Mathematics and Statistics for Economics, Vikas Publishing House.
3. S.P.Gupta, Statistical Methods, Sultan Chand & Sons, Educational Publishers, New Delhi.

		L	**T**	**P**	**C**
BDS237AE05B	**OPERATIONS RESEARCH**	**3**	**2**	**0**	**4**

(For Students admitted from 2024 onwards)
Common for B.Sc.(CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber security)

COURSE OBJECTIVES

- To introduce the mathematical formulation of the problem to serve as tools in the development of science.
- To understand the LPP model and its solution.
- To focus on the transportation models to solve problems.
- To solve assignment problems using algorithms.
- To create network design and the solution on project analysis.

COURSE OUTCOMES

- After completion of the course, students will be able to
- Formulate the LPP mathematically.
- To solve LPP using algorithms and also using graphical method.
- Solve transportation problem and assignment models in Data science.
- Design Network models and the solution on Project analysis.

SYLLABUS

UNIT – I   LINEAR PROGRAMMING PROBLEM
Introduction - Mathematical formulation of a linear programming problem - Graphical solution

12

UNIT – II   LINEAR PROGRAMMING PROBLEM-SIMPLEX METHOD AND BIG M METHOD
Simplex Method: Introduction - The Computational Procedure - Exceptional cases – Artificial variable techniques-Computational procedure

12

UNIT – III   TRANSPORTATION PROBLEM
Introduction- Matrix form of transportation problem -Transportation table - Loops in a transportation table - Finding initial basic feasible solution (NWC, LCM and VAM methods) - Moving towards optimality - Degeneracy in transportation problems- Transportation algorithm (MODI method) - Unbalanced transportation problems.

12

UNIT – IV   ASSIGNMENT AND ROUTING PROBLEMS
Assignment problem – Assignment algorithm - Hungarian assignment method –Unbalanced assignment problem-Routing problems - Travelling salesman problem

UNIT – V   NETWORK MODELS

Introduction-Basic   components - Rules of network construction - Time calculations in networks - Critical path method (CPM) - PERT - PERT calculations - Advantages of a network (PERT/CPM)

TOTAL: 60

TEXT BOOKS:

1. Kanti Swarup, P.K.Gupta and Man Mohan, Operations Research, Eighth Edition, Sultan Chand & Sons, New Delhi, 1999.
   [Unit 1 – Ch 2 (2.1-2.3), Unit 2 – Ch 2 (2.6-2.7), Ch3 (3.3-3.5)
   Unit 3 – Ch 6 (6.1-6.9), Unit 4 – Ch 7(7.1-7.4)Unit 5 – Ch 19 (19.1-19.10)]

REFERENCES:

1. H.A.Taha, Operations Research, Eighth Edition, Pearson Education India, 2008
2. Richard Bronson, Operations Research, (Schaum's Outline Series), Second Edition McGraw Hill Company, 2003.
3. S.Hillier and J.Liebermann, Operations Research, Sixth Edition, Mc Graw Hill Company, 1995.
4. J.K.Sharma, Operation Research (Theory and Applications), First Edition, Mac Millen Ltd., 1997.
5. Barry Render, Ralph M. Stair, Allynan Bacon, Quantitative Analysis for Management, Fifth Edition, Boston, 1994.

BDS237P06	MINI PROJECT	L	T	P	C
		0	0	6	2

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES
- To provide insights to the process of software development
- To enable student analytical and practical exposure by giving hands on experience with learned knowledge through different courses.
- To make the students to set the industrial exposure
- To implement the knowledge, technology, innovational ideas for solving the industrial problems
- To understand methodologies and professional way of documentation and communication.

COURSE OUTCOMES
- Able to apply and develop modules using latest technologies.
- Able to apply and develop latest technologies
- Exercise team work in developing and integrating into a single project.
- Analyze the system for its productivity and feasibility.
- Exercise team work in developing and integrating into a single project.
- Prepare report on the application of emerging technologies in the selected industry

SYLLABUS

A Possible set of applications may be the following
1. Automation of Departmental Store, E-Seva, Banking, Hospital Industry etc.,
2. Web applications using PHP MVC
3. Web applications using Angular, Node JS / React JS
4. Web applications using Java Frameworks like Hibernate, Struts or Spring
5. Web applications using MVC, C# and .NET Programming
6. Machine Learning / Deep Learning using Python
7. Android using Java or Kotlin
8. Cryptography using C# or JAVA or GO or PHP etc.,
9. Data Analytics using Python, R etc.,
10. Digital Image Processing using Java or Python, MATLAB etc.,
11. Natural Language Processing using Java, Python, R and so on
12. Networking using Java, GO, Python and so on

		L	T	P	C
BDS238T01	**DEEP LEARNING**	**3**	**2**	**0**	**4**

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES
- To introduce students the basic concepts and techniques of deep learning
- To understand the theoretical foundations, algorithms and methodologies of Neural Network
- To design and develop an application using specific deep learning models
- To provide the practical knowledge in handling and analysing real world applications.
- To understand the different models in deep learning.

COURSE OUTCOMES
- Recognize the characteristics of deep learning models that are useful to solve real-world problems.
- Understand different methodologies to create application using deep nets.
- Identify and apply appropriate deep learning algorithms for analyzing the data for variety of problems.
- Implement different deep learning algorithms
- Design the test procedures to assess the efficacy of the developed model

SYLLABUS

UNIT – I   DEEP LEARNING INTRODUCTION
The Neural Network-Limits of Traditional Computing-Machine Learning- Introduction to Neurons-Feed Forward Neural Networks-Types of Neurons-Softmax Output layers.

12

UNIT – II   DEEP LEARNING MODELS
Introduction to deep learning models with keras-Creating a Keras Model-Understanding data-Specifying a model-compiling and fitting a model-Fitting the model-Classification Models.

12

UNIT – III   CONVOLUTION NEURAL NETWORK
Convolution Neural Networks-Feature Selection-Max Pooling-Filters and Feature Maps-Convolution Layer-Applications.

12

UNIT – IV   RECURRENT NEURAL NETWORK
Recurrent Neural Network-Memory Cells-Sequence Analysis-Word2rec-LSTM-Memory augmented Neural Networks.

12

UNIT – V   REINFORCEMENT LEARNING
Introduction to Reinforcement Learning, Introduction to Markov Decision Process.

12
TOTAL: 60

TEXT BOOK:

1. Deep Learning from Scratch: Building with Python from First Principles (Greyscale Indian Edition) by Seith Weidman, Sept 2019.

REFERENCES:

1. Ian Good fellow, YoshuaBengio, Aaron Courville, Deep Learning (Adaptive computation and Machine Learning Series, MITPRESS, 2017.

BDS238AE02A	HUMAN VALUES AND PROFESSIONAL ETHICS	L	T	P	C
		3	1	0	4

(For Students admitted from 2024 onwards)
(Common to B.C.A. / B.Sc. (Computer Science / B.Sc. (DS) / B.Sc. (Cyber Security)

COURSE OBJECTIVES

- To describe the significance of value inputs in a classroom and applying them in their life and profession.
- To learn about values and skills, happiness and accumulation of physical facilities.
- To enable the students to understand the value of harmonious relationship.
- To enable the students to know the role of human being in society and nature.
- To provide the theoretical idea about ethical and unethical practices.

COURSE OUTCOMES

- Understand the significance of value inputs in a classroom and start applying them in their life and profession.
- Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
- Understand the value of harmonious relationship based on trust and respect in their life and profession.
- Understand the role of a human being in ensuring harmony in society and nature.
- Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

SYLLABUS

UNIT – I   INTRODUCTION TO VALUE EDUCATION

Value Education, Definition, Concept and Need for Value Education - The Content and Process of Value Education - Self-Exploration as a means of Value Education -. Happiness and Prosperity as parts of Value Education

12

UNIT – II   HARMONY IN THE HUMAN BEING

Human Being is more than just the Body - Harmony of the Self ($\dot{I}$) with the Body - Understanding Myself as Co-existence of the Self and the Body - Understanding Needs of the Self and the Needs of the Body

12

UNIT – III   HARMONY IN THE FAMILY AND SOCIETY AND HARMONY IN THE NATURE

Family as a basic unit of Human Interaction and Values in Relationships - The Basics for respect and today̕s Crisis - Affection, Care, Guidance, Reverence, Glory, Gratitude and Love - Comprehensive Human Goal : The Five dimensions of Human Endeavour

12

UNIT – IV   SOCIAL ETHICS

The Basics for Ethical Human conduct - Defects in Ethical Human Conduct - Holistic Alternative and Universal order - Universal Human Order and Ethical Conduct

12

UNIT – V   PROFESSIONAL ETHICS

Value Based Life and Profession -. Professional Ethics and Right Understanding - Competence in Professional Ethics - Issues in Professional Ethics – The Current scenario - Vision for Holistic Technologies, Production System and Management Models

12

TOTAL: 60

TEXT BOOKS:

1. A.N.Tripaty, Human Values, New Age International Publishers, 2019.
2. Bajpai.B.L., Indian Ethos and Modern Management, New Royal Book Co., Lucknow, Reprinted, 2004.

REFERENCES:

1. Bertrand Russell, Human Society in Ethics and Politics, 2009.
2. Corliss Lamont, Philosophy of Humanism, 2007.
3. Bhatia, R. & Bhatia, A Role of Ethical Values in Indian Higher Education, 2015

BDS238AE02B	ETHICAL HACKING	L	T	P	C
		3	1	0	4

(For Students admitted from 2024 onwards)
Common for B.Sc.(CS) / BCA / B.Sc. (Data Science) / B.Sc. (Cyber security)

COURSE OBJECTIVES
* To know the theory and practices of finding the vulnerabilities.
* To find the different attacks and then defining the appropriate security policy.
* To take action to detect or prevent the attacks and thus reduce the damages.
* To understand the concept of Web Server Hacking.
* To understand the concept of Firewalls

COURSE OUTCOMES
* To describe the basics of the ethical hacking.
* Ability to learn technical foundations of hacking.
* Able to perform the foot printing and scanning.
* Demonstrate the techniques for system hacking.
* Characterize the malware and their attacks.

SYLLABUS

UNIT – I   INTRODUCTION TO ETHICAL HACKING
Security Fundamental - Security Testing - Hacker and Cracker – Descriptions - Test Plans-keeping it legal - Ethical and Legality- Process - The Ethical Hacker's Process.

12

UNIT – II   FOOTPRINTING AND SCANNING
Information Gathering - Determining the Network Range - Finding Open Ports and Access Points - OS Fingerprinting Services - Mapping the Network Attack Surface.

12

UNIT – III   MALWARE THREATS AND SESSION HIJACKING
Viruses and Worms- Trojans - Covert Communication - Keystroke Logging and Spyware – Malware Counter Measures- Sniffers - Session Hijacking - Denial of Service.

12

UNIT – IV   WEB SERVER HACKING AND ATTACKS
Web Server Hacking - Web Application Hacking - Database Hacking - Wireless Technologies – Mobile Security and Attacks: Wireless Technologies – Wireless LANs.

12

UNIT – V   CASE STUDY
Intrusion Detection Systems - Firewalls - Honeypots - Physical Security - Social Engineering – Case Studies: Intrusion detection Real Secure Tripwire Dragon Snort.

12
TOTAL: 60

TEXT BOOKS:
1. Michael Gregg, ”Certified Ethical Hacker”, Pearson IT Certification, 3rd Edition, 2019.
2. Roger Grimes ,”Hacking the Hacker” , Wiley, 1st Edition, 2017

REFERENCES:
1. Ankit Fadia, “The Unofficial Guide to Ethical Hacking”, Laxmi Publications, 2nd Edition, 2006.
2. Randy Weaver, Dawn Weaver, Dean Farwood, “Guide to Network Defense and Countermeasures”, Cengage Learning, Third edition, 2014.

		L	T	P	C
BDS238P08	**PROJECT**	**0**	**0**	**21**	**12**

(For Students admitted from 2024 onwards)

COURSE OBJECTIVES
- To understand the software engineering methodologies for project development.
- To gain knowledge on recent technologies
- To develop software products in various domains
- To improve their communication and presentation skill
- To get training for testing the software products

COURSE OUTCOMES
- Analyze and design software in an efficient manner
- Understand the features of current technologies
- Implement the applications in various domains
- Create Test Plan and apply various testing methods
- Able to communicate and present the software product

<u>INSTRUCTIONS</u>

1. Students have to do projects in an Industry / Research Organization / In house
2. Students must attend the review meeting as per the guidelines.
3. The software products will be developed and tested in various domains using current Technologies
4. After completion of the Project, students should submit project completions certificate
5. The document related to the Project should be prepared and submitted on time.
6. Students may have to publish the papers base on their project work before submission of the Project Document.