# SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi & Affiliated to Pondicherry University)

(Accredited by NBA-AICTE, New Delhi, Accredited by NAAC with "A" Grade)

Madagadipet, Puducherry - 605 107

## Department of Computer Science and Business Systems

## MINUTES OF SIXTH BOS MEETING

**Venue**

Lecture Hall, Department of CSBS
Sri Manakula Vinayagar Engineering College
Madagadipet, Puducherry – 605 107

***Date &Time***

***19.7.23 & 10 A.M.***

2.A.11.01

## Department of Computer Science and Business Systems

## Minutes of Board of Studies

The Board of Studies Sixth meeting of Department of Computer Science and Business Systems (CSBS) was held on 19th Jul 2023 at 10:00 A.M in the Staff Room, Department of CSBS, Sri Manakula Vinayagar Engineering College with the Head of the Department in the Chair.

The following members were present for the BOS meeting

| Sl.No | Name of the Member with Designation and official Address | Members as Per UGC Norms |
|---|---|---|
| 1 | **Dr. N.Danapaquiame**<br>Professor and Head,<br>Department of CSBS,<br>SMVEC<br>Puducherry | Chairman |
| 2 | **Dr.T. Chithralekha, M.Tech., Ph.D**<br>Professor,<br>School of Engineering and Technology,<br>Pondicherry University,<br>R.V.Nagar,<br>Kalapet,<br>Puducherry | Subject Expert<br>(University Nominee) |
| 3 | **Dr. K.Devaki, M.E., Ph.D.,**<br>Professor,<br>Department of Computer Science and Engineering,<br>Rajalakshmi Engineering College,<br>Chennai. | Subject Expert<br>(Academic Council Nominee) |
| 4 | **Dr. M.Chinnadurai, M.E., Ph.D.,**<br>Professor,<br>Department of Computer Science and Engineering,<br>Controller of Examination,<br>E.G.S Pillay Engineering College,<br>Nagapattinam,<br>Tamil Nadu | Subject Expert<br>(Academic Council Nominee) |



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| 5 | **Mr. Asoke Das Sarma**<br>BPO Transformation Lead,<br>Tata Consultancy Services,<br>Kolkata. | Representative from Industry |
| 6 | **Mr. B. Mageshwaran**<br>Tata Consultancy Services ,<br>Region head, Academic Interface Program<br>Bengaluru. | Representative from Industry |
| 6 | **Dr. P. Victer Paul, M.Tech., Ph.D.,**<br>Assistant Professor,<br>Department of Computer Science and Engineering,<br>Indian Institute of Information Technology, Kottayam - 686635,<br>Kerala. | Postgraduate Alumnus (nominated by the Principal) |
| 7 | **Dr. N.S.N. Cailassame, M.B.A,Ph.D.,**<br>Professor and Head,<br>Department of Management Studies,<br>SMVEC. | Internal Member |
| 8 | **Dr. G. Bala Sendhil Kumar,**<br>Professor,<br>Department of Management Studies,<br>SMVEC. | Internal Member |
| 9 | **Dr.R. Saravanan, M.E., Ph.D,**<br>Associate Professor,<br>Department of Information Technology,<br>SMVEC. | Internal Member |
| 10 | **Mrs.K. Devika, M.E., ,**<br>Assistant Professor,<br>Department of Computer Science and Business Systems,<br>SMVEC. | Internal Member |
| 11 | **Dr.T. Gayathri**<br>Professor and Head,<br>Dept of Mathematics,<br>SMVEC | Internal Member |
| 12 | **Dr.D. Jaichithra**<br>Professor and Head,<br>Dept. of English, | Internal Member |



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| | SMVEC | |
| 13 | **Dr. T. Jayavarthanan**<br>Professor,<br>Dept. of Physics,<br>SMVEC | Internal Member |

| AGENDA | |
|---|---|
| **BOS/2023/CSBS/UG/6.1** | |
| | **Welcome address and confirmation of BOS Fifth meeting Minutes was held on 27th September 2022.** |
| **BOS/2023/CSBS/UG/6.2** | |
| | **To discuss and approve the B.Tech. Degree Regulations (R-2023), Curriculum and syllabi of first and second Semester for the B. Tech Computer Science and Business Systems students to be admitted from the academic year 2023-24** |
| **BOS/2023/CSBS/UG/6.3** | |
| | **To discuss about the uniqueness of the Curriculum (R-2023) and to discuss and approve the Evaluation Systems for R-2023 Regulation** |
| **BOS/2023/CSBS/UG/6.4** | |
| | **To discuss and approve the Honors Degree for R-2023 Regulation** |
| **BOS/2023/CSBS/UG/6.5** | |
| | **To apprise about the Professional Elective / Open Elective / Employability Enhancement Courses / Skill Development Courses under R-2023 for the students admitted from the academic Year 2023-24.** |
| **BOS/2023/CSBS/UG/6.6** | |
| | **To apprise about the Industry Institute Interactions of the department of Computer Science and Business Systems**<br>• **Guest lectures**<br>• **Internship details**<br>• **MOUs**<br>• **Industrial Visits**<br>**Value Added Courses** |
| **BOS/2023/CSBS/UG/6.7** | |
| | **To apprise the End Semester Results of the students admitted in the Academic Year 2020-2021 (V sem), 2021-2022 (III sem), 2022-2023 (I sem) and to discuss about Extra-Curricular and Co-Curricular activities** |



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| **BOS/2023/CSBS/UG/6.8** | |
| | **To apprise the schedule of the End Semester Examination to be conducted in the month of July/August 2023 and to discuss and recommend the panel of examiners to the Academic Council** |
| **BOS/2023/CSBS/UG/6.9** | |
| | **Any other item with the permission of chair** |

## Minutes of the Meeting

Dr. N.Danapaquiame, Chairman, BoS initiated the meeting by welcoming the external members, Industrial Expert, the Alumni and the Internal members and thanked them for the detailed discussions on the agenda items that had been approved by the Chairman.

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|---|---|
| **BOS/2023/CSBS/UG/6.1** | **Welcome address and confirmation of BOS Fifth meeting Minutes was held on 27th September 2022.**<br>Chairman, BoS, apprised the minutes of fifth BoS its implementation and then it is confirmed with the approval in sixth BoS Meeting. |
| **BOS/2023/CSBS/UG/6.2** | **To discuss and approve the B.Tech. Degree Regulations (R-2023), Curriculum and syllabi of first and second Semester for the B.Tech Computer Science and Business Systems students to be admitted from the academic year 2023-24.**<br><br>The Regulation of R-2023 was approved in the meeting.<br>The Curriculum of R-2023 was apprised in the meeting. (Annexure I)<br>The first and second semester syllabi of R-2023 were approved in the meeting. (Annexure II)<br><br>The following suggestions were highlighted<br>➢ Honours degree courses needs to be changed and approved in the meeting (Annexure I)<br>➢ Open Elective Courses needs to be changed and approved in the meeting (Annexure I)<br>➢ Research Methodology course is preferred at PG and Ph.D. level. |
| | |
| **BOS/2023/CSBS/UG/6.3** | |
| | **To discuss about the uniqueness of the Curriculum (R-2023) and to discuss and approve the Evaluation Systems for R-2023 Regulation**<br><br>➢ Multi-disciplinary learning based curriculum<br>➢ Introduction of Theory cum Practical Courses<br>➢ Introduction of Micro projects<br>➢ Introduction to combination of physics and chemistry as physical science for |



2.A.11.05

engineers course and similarly Basics of Electrical and Electronics Engineering

- Awarding of Honours Degree
- Introduction of Design Thinking and Idea Lab
- Ability Enhancement Courses (Skill Enhancement Courses)

The uniqueness of Curriculum was apprised. (Annexure I)

The evaluation scheme for the theory cum practical courses were discussed and apprised.

**BOS/2023/CSBS/UG/6.4**

**To discuss and approve the Honors Degree for R-2023 Regulation**

The honors degree was apprised (Annexure I)

**BOS/2023/CSBS/UG/6.5**

**To apprise about the Professional Elective / Open Elective / Employability Enhancement Courses / Skill Development Courses under R-2023 for the students admitted from the academic Year 2023-24.**

**Professional Elective**

Introduced some courses by TCS in V, VI and VII semesters and the corresponding regular courses moved to professional electives.

| Sl. no | New Course Introduced | Course Code | Year / Sem | Theory/ Practical |
|---|---|---|---|---|
| 1 | Cloud, Microservices & Application | U23CBT509 | III/V | Theory |
| 2 | Cloud, Microservices & Application Laboratory | U23CBP508 | III/V | Practical |
| 3 | Machine Learning | U23CBT510 | III/V | Theory |
| 4 | Natural Language Processing | U23CBT612 | III/VI | Theory |
| 5 | Data Visualization | U23CBT613 | III/VI | Theory |
| 6 | Generative AI | U23CBT614 | III/VII | Theory |
| 7 | Generative AI Laboratory | U23CBP711 | III/VII | Practical |
| 8 | Information Retrieval | U23CBT615 | III/VII | Theory |

**BOS/2023/CSBS/UG/6.6**

**To apprise about the Industry Institute Interactions of the department of Computer Science and Business Systems**

- **Guest lectures**
- **Internship details**
- **MOUs**
- **Industrial Visits**

**Value Added Courses**

The Industry Institute Interaction of B. Tech Computer Science and Business Systems were apprised.

**Guest lectures**

The guest lectures held in the department of Computer Science and Business Systems were apprised.

**Internship details**

Students are undergone internship program from various industries like Exposys Data Labs, Yonity and Encora Innovation Labs Etc.

**MOU Signed**

The MOU signed with the TCS industry was apprised.



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| | **Industrial Visits**<br>The Industrial visit of I, II and III year were apprised. |
| BOS/2023/CSBS/UG/6.7 | **To apprise the End Semester Results of the students admitted in the Academic Year 2020-2021 (V sem), 2021-2022 (III sem), 2022-2023 (I sem) and to discuss about Extra-Curricular and Co-Curricular activities**<br>The End Semester Results of the students admitted in the Academic Year 2020-2021 (V sem), 2021-2022 (III sem), 2022-2023 (I sem) were apprised. |
| BOS/2023/CSBS/UG/6.8 | **To apprise the schedule of the End Semester Examination to be conducted in the month of July/August 2023 and to discuss and recommend the panel of examiners to the Academic Council.**<br>The end semester exam schedule of First, second and Third year was apprised. |
| BOS/2023/CSBS/UG/6.9 | **Any other item with the permission of chair** |



2.A.11.07

The meeting was concluded at 12:00 PM with vote of thanks by **Dr. N. Danapaquiame**, Chairman, Board of Studies, Department of Computer Science and Business Systems.

**Members Present:**

| Sl.No | Name of the Member with Designation and official Address | Responsibility in the BoS | Signature |
|---|---|---|---|
| 1 | **Dr. N.Danapaquiame**<br>Professor and Head,<br>Department of CSBS,<br>SMVEC<br>Puducherry | Chairman | |
| 2 | **Dr.T. Chithralekha, M.Tech., Ph.D**<br>Professor and Dean,<br>School of Engineering and Technology,<br>Pondicherry University,<br>R.V.Nagar, Kalapet,<br>Puducherry | Subject Expert (University Nominee) | |
| 3 | **Dr. K.Devaki, M.E., Ph.D.,**<br>Professor,<br>Department of Computer Science and Engineering,<br>Rajalakshmi Engineering College,<br>Chennai. | Subject Expert (Academic Council Nominee) | |
| 4 | **Dr. M.Chinnadurai, M.E., Ph.D.,**<br>Professor,<br>Department of Computer Science and Engineering,<br>Controller of Examination,<br>E.G.S Pillay Engineering College,<br>Nagapattinam, Tamil Nadu | Subject Expert (Academic Council Nominee) | |
| 5 | **Mr. Asoke Das Sarma**<br>BPO Transformation Lead,<br>Tata Consultancy Services,<br>Kolkata. | Representative from Industry | |
| 6 | **Mr.B.Maheshwaran**<br>Region Head, Academic Interface Program,<br>Tata Consultancy Services,<br>Kolkata. | Representative from Industry | |
| 7 | **Dr. P. Victer Paul, M.Tech., Ph.D.,**<br>Assistant Professor,<br>Department of Computer Science and Engineering,<br>Indian Institute of Information Technology, Kottayam - 686635,<br>Kerala. | Postgraduate Alumnus (nominated by the Principal) | |



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| 8 | **Dr. N.S.N. Cailassame, M.B.A,Ph.D.,**<br>Professor and Head,<br>Department of Management Studies,<br>SMVEC. | Internal Member | |
| 9 | **Dr. G. Bala Sendhil Kumar,**<br>Professor,<br>Department of Management Studies,<br>SMVEC. | Internal Member | |
| 10 | **Dr.R. Saravanan , M.E., Ph.D,**<br>Associate Professor,<br>Department of Information Technology,<br>SMVEC. | Internal Member | |
| 11 | **Mrs.K. Devika , M.E., ,**<br>Assistant Professor,<br>Department of Computer Science and Business Systems,<br>SMVEC. | Internal Member | |
| 12 | **Dr.T. Gayathri**<br>Professor and Head,<br>Dept of Mathematics,<br>SMVEC | Internal Member | T. Gay |
| 13 | **Dr.D. Jaichithra**<br>Professor and Head,<br>Dept. of English,<br>SMVEC | Internal Member | Jaichithra |
| 14 | **Dr. T. Jayavarthanan**<br>Professor,<br>Dept. of Physics,<br>SMVEC | Internal Member | |

**Chairman BoS/ Dept of CSBS**

**Dr.N.Danapaquiame**



2.A.11.09

**Annexure-I**

**Curriculum of**

**B.TECH. COMPUTER SCIENCE AND BUSINESS SYSTEMS**

**Under Regulation 2023**

2.A.11.11

# SRI MANAKULA VINAYAGAR

## ENGINEERING COLLEGE

**(An Autonomous Institution)**

Puducherry

## B.TECH.

## COMPUTER SCIENCE AND BUSINESS SYSTEMS

## ACADEMIC REGULATIONS 2023

## (R-2023)

## CURRICULUM AND SYLLABI

25 years of ACADEMIC EXCELLENCE

2.A.11.12

## COLLEGE VISION AND MISSION

### Vision

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society

### Mission

| | | | |
|---|---|---|---|
| **M1 :** | **Quality Education** | : | To provide comprehensive academic system that amalgamates the cutting-edge technologies with best practices |
| **M2 :** | **Research and Innovation** | : | To foster value-based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues |
| **M3:** | **Employability and Entrepreneurship** | : | To inculcate the employability and entrepreneurial skills through value and skill-based training |
| **M4 :** | **Ethical Values** | : | To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society |

## DEPARTMENT VISION AND MISSION

### Vision

To envision the technology and business trends in this domain and to create technically competent professionals for meeting out the needs globally

### Mission

**M1:** To foster knowledge sharing through contemporary curriculum and creative teaching learning process

**M2:** To impart strong computer and business skills to shine and sustain in the agile IT industry

**M3:** To promote technocrats with rich expertise in innovation and research

**M4:** To instill moral values and ethical responsibilities by empowering graduates to be socially responsible

2.A.11.13

## PROGRAM OUTCOMES (Pos)

**PO1: Engineering knowledge:**

Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2: Problem analysis:**

Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3: Design/development of solutions:**

Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4: 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.

**PO5: Modern tool usage:**

Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO6: The engineer and society:**

Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7: Environment and sustainability:**

Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.

**PO8: Ethics:**

Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9: Individual and team work:**

Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10: Communication:**

Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11:Project management and finance:**

Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12: Life-long learning:**

Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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## PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

**PEO1:** To apply computer science and business concepts to solve the real world problems

**PEO2:** To develop professional skills in contemporary areas of computer science and business systems to obtain employability and pursue higher education

**PEO3:** To reconcile business demands with state-of-the art technologies by providing innovative solutions and insightful decisions

**PEO4:** To ensure ample growth with social and ethical responsibilities

## PROGRAMME SPECIFIC OUTCOMES (PSOs)

**PSO1:** Ability to gain deep knowledge in Computer Science with equal appreciation in humanities, management, sciences and human values.

**PSO2:** Ability to demonstrate the technical and business skills and provide solutions for the societal needs

**PSO3:** Ability to engage lifelong learning and bestow innovative contributions to enhance research in the field of computer science and business system

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## STRUCTURE FOR UNDERGRADUATE ENGINEERING PROGRAMME

| Sl. No. | Course Category | Breakdown of Credits |
|---|---|---|
| 1. | Humanities, Social Sciences and Management Courses (HS) | 28 |
| 2. | Basic Science Courses (BS) | 30 |
| 3. | Engineering Science Courses (ES) | 18 |
| 4. | Professional Core Courses (PC) | 58 |
| 5. | Professional Elective Courses (PE) | 19 |
| 6. | Open Elective Courses (OE) | 9 |
| 7. | Professional Activity Courses (PA) | 13 |
| 8. | Mandatory non-Credit Course (MC) | - |
| 9. | Ability Enhancement Courses (AEC) | - |
| | **Total** | **175** |

## SCHEME OF CREDIT DISTRIBUTION – SUMMARY

| Sl. No. | Course Category | Credits per Semester | | | | | | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| | | I | II | III | IV | V | VI | VII | VIII | |
| 1 | Humanities, Social Sciences and Management Courses (HS) | 5 | 5 | - | 6 | 4 | 2 | 2 | 4 | 28 |
| 2 | Basic Science Courses (BS) | 11 | 9 | 5 | 5 | - | - | - | - | 30 |
| 3 | Engineering Science Courses (ES) | 6 | 8 | - | 4 | - | - | - | - | 18 |
| 4 | Professional Core Courses (PC) | - | 4 | 18 | 8 | 6 | 13 | 9 | - | 58 |
| 5 | Professional Elective Courses (PE) | - | - | - | 3 | 4 | 2 | 4 | 6 | 19 |
| 6 | Open Elective Courses (OE) | - | - | - | - | 3 | 3 | 3 | - | 9 |
| 7 | Professional Activity Courses (PA) | - | - | - | - | 1 | 1 | 3 | 8 | 13 |
| 8 | Mandatory non-Credit Course (MC)* | - | - | - | - | - | - | - | - | - |
| 9 | Ability Enhancement Courses (AEC)* | - | - | - | - | - | - | - | - | - |
| **Total** | | **22** | **26** | **23** | **26** | **18** | **21** | **21** | **18** | **175** |

**** AEC and MC are not included for CGPA calculation***

## HONOURS DEGREE PROGRAMME:

The student is permitted to opt for earning an *honours degree* in the same discipline of engineering in addition to the degree in his/her own discipline. To earn an honours degree the student is required to earn an additional 18 - 20 credits (over and above the total 170 credits prescribed in the curriculum) starting from fourth semester onwards by completing 5 additional courses offered in respective semesters. A student is eligible to exercise this option if he/she has passed all the courses offered upto third semester in the first attempt itself and has earned a CGPA / GPA* (*for lateral entry) of not less than 8.0. The prescribed courses offered for Honours degree are given in **Annexure V**.

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| SEMESTER-I | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U23MAT101 | Discrete Mathematics | BS | 3 | 1 | 0 | 4 | 25 | 75 | 100 |
| 2 | U23MAT102 | Introductory Topics in Statistics and Probability | BS | 3 | 1 | 0 | 4 | 25 | 75 | 100 |
| 3 | U23BSTC01 | Physical science for Engineers | BS | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 4 | U23CBT101 | Fundamentals of Computer Science | ES | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 5 | U23HSTC01 | Universal Human Values-II | HS | 2 | 0 | 0 | 2 | 25 | 75 | 100 |
| **Theory Cum Practical** | | | | | | | | | | |
| 6 | U23ENB101 | Business Communication & Value Science - I | HS | 2 | 0 | 2 | 3 | 50 | 50 | 100 |
| **Practical** | | | | | | | | | | |
| 7 | U23CBP101 | Fundamentals of Computer Science Laboratory | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 8 | U23ESPC02 | Design Thinking and IDEA Lab | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 9 | U23ESPC03 | Engineering Graphics using AutoCAD | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Ability Enhancement Course** | | | | | | | | | | |
| 10 | U23CBC1XX | Certification Course-I ** | AEC | 0 | 0 | 4 | - | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 11 | U23CBM101 | Induction Programming | MC | 2 Weeks | | | - | - | - | - |
| | | | | | | | 22 | 425 | 575 | 1000 |

| SEMESTER-II | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U23MAT203 | Statistical Methods and Modelling | BS | 3 | 1 | 0 | 4 | 25 | 75 | 100 |
| 2 | U23MAT204 | Linear Algebra | BS | 3 | 1 | 0 | 4 | 25 | 75 | 100 |
| 3 | U23HST201 | Fundamentals of Economics | HS | 2 | 0 | 0 | 2 | 25 | 75 | 100 |
| 4 | U23ESTC03 | Basics of Electrical and Electronics Engineering | ES | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 5 | U23ADTC01 | Programing in Python | ES | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 6 | U23CBT202 | Data Structures & Algorithms | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Theory Cum Practical** | | | | | | | | | | |
| 7 | U23ENB202 | Business Communication & Value Science – II | HS | 2 | 0 | 2 | 3 | 50 | 50 | 100 |
| **Practical** | | | | | | | | | | |
| 8 | U23MAP201 | Statistical Methods and Modelling Laboratory | BS | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 9 | U23ESPC01 | Basics of Electrical and Electronics Engineering Laboratory | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 10 | U23ADPC01 | Programing in Python Laboratory | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 11 | U23CBP202 | Data Structures & Algorithms Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Ability Enhancement Course** | | | | | | | | | | |
| 12 | U23CBC2XX | Certification Course - II** | AEC | 0 | 0 | 4 | - | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 13 | U23CBM202 | Sports Yoga and NSS | MC | 0 | 0 | 2 | - | 100 | - | 100 |
| | | | | | | | 26 | 600 | 700 | 1300 |

***** Certification Courses are to be selected from the list given in Annexure II***

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| SEMESTER-III | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U23MAT305 | Computational Statistics | BS | 3 | 1 | 0 | 4 | 25 | 75 | 100 |
| 2 | U23CBT303 | Computer Organization & Architecture | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U23CBT304 | Object Oriented Programming in C++ | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 4 | U23CBT305 | Principles of Operating Systems | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 5 | U23CBT306 | Advanced Database Systems | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Theory Cum Practical** | | | | | | | | | | |
| 6 | U23CBB301 | Formal Language and Automata Theory | PC | 2 | 0 | 2 | 3 | 50 | 50 | 100 |
| **Practical** | | | | | | | | | | |
| 7 | U23MAP302 | Computational Statistics Laboratory | BS | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 8 | U23CBP303 | Object Oriented Programming in C++ Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 9 | U23CBP304 | Principles of Operating Systems Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 10 | U23CBP305 | Advanced Database Systems Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Ability Enhancement Course** | | | | | | | | | | |
| 11 | U23CBC3XX | Certification Course - III** | AEC | 0 | 0 | 4 | - | 100 | - | 100 |
| 12 | U23CBS301 | Skill Enhancement Course 1- R Programming* | AEC | 0 | 0 | 2 | - | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 13 | U23CBM303 | Climate Change | MC | 2 | 0 | 0 | - | 100 | - | 100 |
| | | | | | | | **23** | **675** | **625** | **1300** |

| SEMESTER-IV | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U23MAT406 | Operations Research | BS | 3 | 1 | 0 | 4 | 25 | 75 | 100 |
| 2 | U23HST402 | Introduction to Innovation, IP Management & Entrepreneurship | HS | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U23ITTC03 | Programming in JAVA | ES | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 4 | U23CBT407 | Algorithm Design and Applications | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 5 | U23CBT408 | Software Engineering & Applications | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 6 | U23CBE4XX | Professional Elective I# | PE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Theory Cum Practical** | | | | | | | | | | |
| 7 | U23ENB403 | Business Communication & Value Science – III | HS | 2 | 0 | 2 | 3 | 50 | 50 | 100 |
| **Practical** | | | | | | | | | | |
| 8 | U23MAP403 | Operations Research Laboratory | BS | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 9 | U23ITPC03 | Programming in JAVA Laboratory | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 10 | U23CBP406 | Algorithm Design and Applications Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 11 | U23CBP407 | Software Engineering & Applications Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Ability Enhancement Course** | | | | | | | | | | |
| 12 | U23CBC4XX | Certification Course - IV** | AEC | 0 | 0 | 4 | - | 100 | - | 100 |
| 13 | U23CBS402 | Skill Enhancement Course 2- Presentation Tools using ICT* | AEC | 0 | 0 | 2 | - | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 14 | U23CBM404 | Right to Information and Good Governance | MC | 2 | 0 | 0 | - | 100 | - | 100 |
| | | | | | | | **26** | **700** | **700** | **1400** |

***#Professional Electives are to be selected from the list given in Annexure I***
***** Certification Courses are to be selected from the list given in Annexure II***
**** Skill Development Courses (1 and 2) are to be selected from the list given in Annexure III***

2.A.11.18

| SEMESTER-V | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U23HST503 | Fundamentals of Management Science | HS | 2 | 0 | 0 | 2 | 25 | 75 | 100 |
| 2 | U23CBT509 | Cloud, Microservices & Application | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U23CBT510 | Machine Learning | PC | 2 | 0 | 0 | 2 | 25 | 75 | 100 |
| 4 | U23HSTC02 | Research Methodology | HS | 2 | 0 | 0 | 2 | 25 | 75 | 100 |
| 5 | U23CBE5XX | Professional Elective II# | PE | 2 | 1 | 0 | 3 | 25 | 75 | 100 |
| 6 | U23CBOCXX | Open Elective I$ | OE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Practical** | | | | | | | | | | |
| 7 | U23ENP501 | Business Communication & Value Science – IV | HS | 0 | 0 | 2 | 0 | 100 | - | 100 |
| 8 | U23CBP508 | Cloud, Microservices & Application Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 9 | U23CBEP5X | Professional Elective II# Laboratory | PE | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 10 | U23CBW501 | Micro Project | PA | 0 | 0 | 2 | 1 | 100 | - | 100 |
| **Ability Enhancement Course** | | | | | | | | | | |
| 11 | U23CBC5XX | Certification Course-V** | AEC | 0 | 0 | 4 | - | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 12 | U23CBM505 | Essence of Indian Traditional Knowledge | MC | 2 | 0 | 0 | - | 100 | - | 100 |
| | | | | | | | **18** | **650** | **550** | **1200** |

| SEMESTER-VI | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U23HST604 | Financial and Cost Accounting | HS | 2 | 0 | 0 | 2 | 25 | 75 | 100 |
| 2 | U23CBT611 | Computer Networks Architectures and Protocols | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U23CBT612 | Natural Language Processing | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 4 | U23CBT613 | Data Visualization | PC | 2 | 0 | 0 | 2 | 25 | 75 | 100 |
| 5 | U23CBE6XX | Professional Elective III# | PE | 2 | 0 | 0 | 2 | 25 | 75 | 100 |
| 6 | U23CBOCXX | Open Elective II$ | OE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Theory Cum Practical** | | | | | | | | | | |
| 7 | U23CBB602 | Information Security | PC | 2 | 0 | 2 | 3 | 50 | 50 | 100 |
| **Practical** | | | | | | | | | | |
| 8 | U23CBP609 | Computer Networks Architectures and Protocols Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 9 | U23CBP610 | Artificial Intelligence & Applications Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 10 | U23CBW602 | Mini Project | PA | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Ability Enhancement Course** | | | | | | | | | | |
| 11 | U23CBC6XX | Certification Course - VI** | AEC | 0 | 0 | 4 | - | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 12 | U23CBM606 | Gender Equality | MC | 2 | 0 | 0 | - | 100 | - | 100 |
| | | | | | | | **21** | **550** | **650** | **1200** |

***#Professional Electives are to be selected from the list given in Annexure I***
***$ Open Electives are to be selected from the list given in Annexure IV***
***** Certification Courses are to be selected from the list given in Annexure II***

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| SEMESTER-VII | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No. | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U23HST705 | Financial Management | HS | 2 | 0 | 0 | 2 | 25 | 75 | 100 |
| 2 | U23CBT614 | Generative AI | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U23CBT615 | Information Retrieval | PC | 2 | 0 | 0 | 2 | 25 | 75 | 100 |
| 4 | U23CBT616 | IT Workshop Scilab / Matlab | PC | 2 | 0 | 0 | 2 | 25 | 75 | 100 |
| 5 | U23CBE7XX | Professional Elective IV# | PE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 6 | U23CBOCXX | Open Elective III$ | OE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Practical** | | | | | | | | | | |
| 7 | U23CBP711 | Generative AI Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 8 | U23CBP712 | IT Workshop Scilab / Matlab Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 9 | U23CBEP7X | Professional Elective IV# Laboratory | PE | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Project Work** | | | | | | | | | | |
| 10 | U23CBW703 | Project Phase I | PA | 0 | 0 | 4 | 2 | 50 | 50 | 100 |
| 11 | U23CBW704 | Internship/ Industrial | PA | 0 | 0 | 2 | 1 | 100 | - | 100 |
| | | | | | | | **21** | **450** | **650** | **1100** |

| SEMESTER-VIII | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No. | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U23HST806 | IT Project Management | HS | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 2 | U23CBE8XX | Professional Elective V# | PE | 2 | 0 | 0 | 2 | 25 | 75 | 100 |
| 3 | U23CBE8XX | Professional Elective VI# | PE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Practical** | | | | | | | | | | |
| 4 | U23HSP801 | IT Project Management Laboratory | HS | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 5 | U23CBEP8X | Professional Elective VI# Laboratory | PE | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Project Work** | | | | | | | | | | |
| 6 | U23CBW805 | Project Phase II | PA | 0 | 0 | 16 | 8 | 50 | 100 | 150 |
| | | | | | | | **18** | **225** | **485** | **650** |

***#Professional Electives are to be selected from the list given in Annexure I***
***$ Open Electives are to be selected from the list given in Annexure IV***

2.A.11.20

## ANNEXURE I

## PROFESSIONAL ELECTIVE COURSES (18 CREDITS)

| Professional Elective – I (Offered in Semester IV) | | |
|---|---|---|
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U23CBE401 | Business Strategies |
| 2 | U23CBE402 | Design thinking and its applications |
| 3 | U23CBE403 | Compiler Design |
| 4 | **U23CBEC01** | **Business Intelligence and Applications (CSBS-CCE, AIDS, IT)** |
| 5 | U23CBE404 | Business Process |
| **Professional Elective – II (Offered in Semester V)** | | |
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U23CBE505 | Robotics and Embedded Systems |
| 2 | U23CBE506 | Modern Web Applications |
| 3 | U23CBE507 | Data Mining and Analytics |
| 4 | U23CBE508 | E- Commerce and E- Payment Systems |
| 5 | U23CBE509 | Software Design with UML |
| **Professional Elective – III (Offered in Semester VI)** | | |
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U23CBE610 | Human Resource Management |
| 2 | U23CBE611 | Cognitive Science & Analytics |
| 3 | U23CBE612 | Cryptology |
| 4 | U23CBE613 | SAP Intelligent Robotic Process Automation |
| 5 | U23CBE614 | Digital Marketing |
| **Professional Elective – IV (Offered in Semester VII)** | | |
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U23CBE715 | Quantum Computation & Quantum Information |
| 2 | U23CBE716 | Advanced Social, Text and Media Analytics |
| 3 | U23CBE717 | Usability Design of Software Applications |
| 4 | U23CBE718 | Introduction to IoT |
| 5 | U23CBEC02 | Virtual Reality (CSBS-AIDS) |

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| Professional Elective – V (Offered in Semester VIII) | | |
|---|---|---|
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U23CBE819 | Behavioral Economics |
| 2 | U23CBE820 | Computational Finance & Modeling |
| 3 | U23CBE821 | Psychology |
| 4 | U23CBE822 | Marketing Research & Marketing Management |
| 5 | U23CBE823 | Smart Systems |
| **Professional Elective – VI (Offered in Semester VIII)** | | |
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U23CBE824 | Enterprise Systems |
| 2 | U23CBE825 | Services Science and Service Operational Management |
| 3 | U23CBE826 | Image Processing and Pattern Recognition |
| 4 | U23CBE827 | Block chain and Applications |
| 5 | **U23CBEC03** | **Augmented Reality (CSBS-AIDS)** |

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## PROFESSIONAL ELECTIVE PRACTICAL COURSES (3 CREDITS)

| Professional Elective – II (Offered in Semester V) | | |
|---|---|---|
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U23CBEP51 | Robotics and Embedded Systems Laboratory |
| 2 | U23CBEP52 | Modern Web Applications Laboratory |
| 3 | U23CBEP53 | Data Mining and Analytics Laboratory |
| 4 | U23CBEP54 | E- Commerce and E- Payment Systems Laboratory |
| 5 | U23CBEP55 | Software Design with UML Laboratory |

| Professional Elective – IV (Offered in Semester VII) | | |
|---|---|---|
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U23CBEP71 | Quantum Computation & Quantum Information Laboratory |
| 2 | U23CBEP72 | Advanced Social, Text and Media Analytics Laboratory |
| 3 | U23CBEP73 | Usability Design of Software Applications Laboratory |
| 4 | U23CBEP74 | Introduction to IoT Laboratory |
| 5 | U23CBEP75 | Virtual Reality Laboratory |

| Professional Elective –VI (Offered in Semester VIII) | | |
|---|---|---|
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U23CBEP81 | Enterprise Systems Laboratory |
| 2 | U23CBEP82 | Services Science & Service Operational Management Laboratory |
| 3 | U23CBEP83 | Image Processing and Pattern Recognition Laboratory |
| 4 | U23CBEP84 | Block chain and Applications Laboratory |
| 5 | U23CBEP85 | Augmented Reality Laboratory |

2.A.11.23

## Annexure – II

## ABILITY ENHANCEMENT COURSES – (A). CERTIFICATION COURSES

| S. No | Course Code | Course Title | Certified By |
|---|---|---|---|
| 1 | U23XXCX01 | Adobe Photoshop | Adobe |
| 2 | U23XXCX02 | Adobe Animate | Adobe |
| 3 | U23XXCX03 | Adobe Dreamweaver | Adobe |
| 4 | U23XXCX04 | Adobe After Effects | Adobe |
| 5 | U23XXCX05 | Adobe Illustrator | Adobe |
| 6 | U23XXCX06 | Adobe InDesign | Adobe |
| 7 | U23XXCX07 | Autodesk AutoCAD -ACU | Autodesk |
| 8 | U23XXCX08 | Autodesk Inventor - ACU | Autodesk |
| 9 | U23XXCX09 | Autodesk Revit - ACU | Autodesk |
| 10 | U23XXCX10 | Autodesk Fusion 360 - ACU | Autodesk |
| 11 | U23XXCX11 | Autodesk 3ds Max - ACU | Autodesk |
| 12 | U23XXCX12 | Autodesk Maya - ACU | Autodesk |
| 13 | U23XXCX13 | Cloud Security Foundations | AWS |
| 14 | U23XXCX14 | Cloud Computing Architecture | AWS |
| 15 | U23XXCX15 | Cloud Foundation | AWS |
| 16 | U23XXCX16 | Cloud Practitioner | AWS |
| 17 | U23XXCX17 | Cloud Solution Architect | AWS |
| 18 | U23XXCX18 | Data Engineering | AWS |
| 19 | U23XXCX19 | Machine Learning Foundation | AWS |
| 20 | U23XXCX20 | Robotic Process Automation / Medical Robotics | Blue Prism |
| 21 | U23XXCX21 | Advance Programming Using C | CISCO |
| 22 | U23XXCX22 | Advance Programming Using C ++ | CISCO |
| 23 | U23XXCX23 | C Programming | CISCO |
| 24 | U23XXCX24 | C++ Programming | CISCO |
| 25 | U23XXCX25 | CCNP Enterprise: Advanced Routing | CISCO |
| 26 | U23XXCX26 | CCNP Enterprise: Core Networking | CISCO |
| 27 | U23XXCX27 | Cisco Certified Network Associate - Level 2 | CISCO |
| 28 | U23XXCX28 | Cisco Certified Network Associate- Level 1 | CISCO |

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| | | | |
|---|---|---|---|
| 29 | U23XXCX29 | Cisco Certified Network Associate- Level 3 | CISCO |
| 30 | U23XXCX30 | Fundamentals Of Internet of Things | CISCO |
| 31 | U23XXCX31 | Internet Of Things / Solar and Smart Energy System with IoT | CISCO |
| 32 | U23XXCX32 | Java Script Programming | CISCO |
| 33 | U23XXCX33 | NGD Linux Essentials | CISCO |
| 34 | U23XXCX34 | NGD Linux I | CISCO |
| 35 | U23XXCX35 | NGD Linux II | CISCO |
| 36 | U23XXCX36 | Advance Java Programming | Ethnotech |
| 37 | U23XXCX37 | Android Programming / Android Medical App Development | Ethnotech |
| 38 | U23XXCX38 | Angular JS | Ethnotech |
| 39 | U23XXCX39 | Catia | Ethnotech |
| 40 | U23XXCX40 | Communication Skills for Business | Ethnotech |
| 41 | U23XXCX41 | Coral Draw | Ethnotech |
| 42 | U23XXCX42 | Data Science Using R | Ethnotech |
| 43 | U23XXCX43 | Digital Marketing | Ethnotech |
| 44 | U23XXCX44 | Embedded System Using C | Ethnotech |
| 45 | U23XXCX45 | Embedded System with IOT / Arduino | Ethnotech |
| 46 | U23XXCX46 | English For IT | Ethnotech |
| 47 | U23XXCX47 | Plaxis | Ethnotech |
| 48 | U23XXCX48 | Sketch Up | Ethnotech |
| 49 | U23XXCX49 | Financial Planning, Banking and Investment Management | Ethnotech |
| 50 | U23XXCX50 | Foundation Of Stock Market Investing | Ethnotech |
| 51 | U23XXCX51 | Machine Learning / Machine Learning for Medical Diagnosis | Ethnotech |
| 52 | U23XXCX52 | IOT Using Python | Ethnotech |
| 53 | U23XXCX53 | Creo (Modelling & Simulation) | Ethnotech |
| 54 | U23XXCX54 | Soft Skills, Verbal, Aptitude | Ethnotech |
| 55 | U23XXCX55 | Software Testing | Ethnotech |
| 56 | U23XXCX56 | MX-Road | Ethnotech |
| 57 | U23XXCX57 | CLO 3D | Ethnotech |
| 58 | U23XXCX58 | Solid works | Ethnotech |
| 59 | U23XXCX59 | Staad Pro | Ethnotech |
| 60 | U23XXCX60 | Total Station | Ethnotech |

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| | | | |
|---|---|---|---|
| 61 | U23XXCX61 | Hydraulic Automation | Festo |
| 62 | U23XXCX62 | Industrial Automation | Festo |
| 63 | U23XXCX63 | Pneumatics Automation | Festo |
| 64 | U23XXCX64 | Agile Methodologies | IBM |
| 65 | U23XXCX65 | Block Chain | IBM |
| 66 | U23XXCX66 | Devops | IBM |
| 67 | U23XXCX67 | Artificial Intelligence | ITS |
| 68 | U23XXCX68 | Cloud Computing | ITS |
| 69 | U23XXCX69 | Computational Thinking | ITS |
| 70 | U23XXCX70 | Cyber Security | ITS |
| 71 | U23XXCX71 | Data Analytics | ITS |
| 72 | U23XXCX72 | Databases | ITS |
| 73 | U23XXCX73 | Java Programming | ITS |
| 74 | U23XXCX74 | Networking | ITS |
| 75 | U23XXCX75 | Python Programming | ITS |
| 76 | U23XXCX76 | Web Application Development (HTML, CSS, JS) | ITS |
| 77 | U23XXCX77 | Network Security | ITS & Palo alto |
| 78 | U23XXCX78 | MATLAB | MathWorks |
| 79 | U23XXCX79 | Azure Fundamentals | Microsoft |
| 80 | U23XXCX80 | Azure AI (AI-900) | Microsoft |
| 81 | U23XXCX81 | Azure Data (DP -900) | Microsoft |
| 82 | U23XXCX82 | Microsoft 365 Fundamentals (SS-900) | Microsoft |
| 83 | U23XXCX83 | Microsoft Security, Compliance and Identity (SC-900) | Microsoft |
| 84 | U23XXCX84 | Microsoft Power Platform (PI-900) | Microsoft |
| 85 | U23XXCX85 | Microsoft Dynamics Fundamentals 365 – CRM | Microsoft |
| 86 | U23XXCX86 | Microsoft Excel | Microsoft |
| 87 | U23XXCX87 | Microsoft Excel Expert | Microsoft |
| 88 | U23XXCX88 | Securities Market Foundation | NISM |
| 89 | U23XXCX89 | Derivatives Equinity | NISM |
| 90 | U23XXCX90 | Research Analyst | NISM |
| 91 | U23XXCX91 | Portfolio Management Services | NISM |

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| | | | |
|---|---|---|---|
| 92 | U23XXCX92 | Cyber Security | Palo alto |
| 93 | U23XXCX93 | Cloud Security | Palo alto |
| 94 | U23XXCX94 | PMI – Ready | PMI |
| 95 | U23XXCX95 | Tally – GST & TDS | Tally |
| 96 | U23XXCX96 | Advance Tally | Tally |
| 97 | U23XXCX97 | Associate Artist | Unity |
| 98 | U23XXCX98 | Certified Unity Programming | Unity |
| 99 | U23XXCX99 | VR Development | Unity |

## ANNEXURE-III

## ABILITY ENHANCEMENT COURSES-(B) SKILL DEVELOPMENT COURSES

| Sl. No. | Course Code | Course Title |
|---|---|---|
| 1. | U23CBS301 | Skill Enhancement Course 1: R Programming |
| 2. | U23CBS402 | Skill Enhancement Course 2: Presentation Tools using ICT |

2.A.11.28

## ANNEXURE IV

## OPEN ELECTIVE COURSES (9 CREDITS)

| S. No | Course Code | Course Title | Offering Department | Permitted Departments |
|---|---|---|---|---|
| **Open Elective – I / II (Offered in Semester V/VI)** | | | | |
| 1 | U23CBOC01 | Business Applications of Game Theory | CSBS | EEE, ECE, MECH, CIVIL, ICE, Mechatronics, BME, CCE |
| 2 | U23CBOC02 | Cryptology and Analysis | CSBS | EEE, MECH, CIVIL, ICE, Mechatronics, BME |
| **Open Elective – III (Offered in Semester VII)** | | | | |
| 1 | U23CBOC03 | Engineering Economics | CSBS | EEE, ECE, CSE, IT, MECH, CIVIL, ICE, Mechatronics, BME, AIDS, CCE, FT |
| 2 | U23CBOC04 | Conversational AI | CSBS | EEE, ECE, MECH, CIVIL, ICE, Mechatronics, BME |

2.A.11.29

2.A.11.30

## Annexure – V

## Honours Programme - Computer Science and Business Intelligence

| COURSE DETAILS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No. | Semester | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | | |
| 1 | IV | U23CBH401 | Business Analytics and Data Mining | PC | 3 | 1 | 0 | 4 | 25 | 75 | 100 |
| 2 | V | U23CBH502 | Digital Technology | PC | 3 | 1 | 0 | 4 | 25 | 75 | 100 |
| 3 | VI | U23CBH603 | Neural Network for Data Analysis | PC | 3 | 1 | 0 | 4 | 25 | 75 | 100 |
| 4 | VII | U23CBH704 | Enterprise Blockchain Frameworks | PC | 3 | 1 | 0 | 4 | 25 | 75 | 100 |
| 5 | VIII | U23CBH805 | Macroeconomic Environment of Business | PC | 3 | 1 | 0 | 4 | 25 | 75 | 100 |
| | **Total** | | | | | | | **20** | **125** | **375** | **500** |
| **Equivalent NPTEL courses##** | | | | | | | | | | | |
| 1 | IV To VIII | U23CBHN01 | E-Business | | | | | **3** | **12 Weeks Course** | | |
| 2 | | | Business Development from start to scale | | | | | **3** | | | |
| 3 | | | Deep Learning for computer vision | | | | | **3** | | | |
| 4 | | | Blockchain and its Applications | | | | | **3** | | | |
| 5 | | | Organizational Behavior | | | | | **3** | | | |

## The student shall be given an option to earn 3 credits through one equivalent 12 weeks NPTEL course instead of any one course listed for honours degree programme that should be completed before the commencement of eighth semester. The equivalent courses are subject to change based on its availability as per NPTEL course list.

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**Annexure-II**

**Syllabus of**

# B.TECH. COMPUTER SCIENCE AND BUSINESS SYSTEMS

**Under Regulation 2023**

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2.A.11.34

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Department | **Mathematics** | | Programme: **B.Tech.** | | | | | |
| Semester | **I** | | Course Category: **BS** | | | *End Semester Exam Type: **TE** | | |
| Course Code | **U23MAT101** | | Periods / Week | | | Credit | Maximum Marks | |
| | | | L | T | P | C | CAM | ESE | TM |
| Course Name | **Discrete Mathematics** | | 3 | 1 | 0 | 4 | 25 | 75 | 100 |

| | | |
|---|---|---|
| Course Objectives | 1) | To understand the concepts and significance of Boolean algebra. |
| | 2) | To know the fundamental concepts of Group theory. |
| | 3) | To understand the basic concepts of combinatorics and graph theory. |
| | 4) | To learn the basic of graph theory. |
| | 5) | To extend student's ability to deal with logics and connectives. |

| | | | |
|---|---|---|---|
| Course Outcome | **On completion of the course, the students will be able to** | | BT Mapping (Highest Level) |
| | CO1 | Understand the basic concepts of Boolean algebra. | K2 |
| | CO2 | Recall the basic concepts of sets, groups, ring and field. | K2 |
| | CO3 | Understand and apply the basic concepts of mathematical induction. | K3 |
| | CO4 | Determine the different types of graphs. | K3 |
| | CO5 | Gain knowledge of the concepts needed to test the logic of a program. | K2 |

| | | | |
|---|---|---|---|
| **UNIT-I** | **Boolean Algebra** | **(9 Hrs)** | |
| Introduction of Boolean algebra, truth table, basic logic gate, basic postulates of Boolean algebra, principle of duality, canonical form, Karnaugh map. | | | **CO1** |
| **UNIT-II** | **Abstract Algebra** | **(9 Hrs)** | |
| Set: Definition, simple problems, Relation: types, simple problems, Group: monoid, semigroup, group, Abelian group, simple problems Ring: Definition, simple problems Field: Definition, simple problems. | | | **CO2** |
| **UNIT-III** | **Combinatorics** | **(9Hrs)** | |
| Basic counting, balls and bins problems, generating functions, recurrence relations. Proof techniques, principle of mathematical induction, pigeonhole principle. | | | **CO3** |
| **UNIT- IV** | **Graph Theory** | **(9Hrs)** | |
| Graphs and digraphs, complement, isomorphism, connectedness and reachability, adjacency matrix, Eulerian paths and circuits in graphs and digraphs, Hamiltonian paths and circuits in graphs and tournaments, trees; Planar graphs, Euler's formula, dual of a planer graph, independence number and clique number, chromatic number, statement of Four-color theorem. | | | **CO4** |
| **UNIT- V** | **Logic** | **(9Hrs)** | |
| Propositional calculus - propositions and connectives, syntax; Semantics – truth assignments and truth tables, validity and satisfiability tautology; Adequate set of connectives; Equivalence and normal forms; Compactness and resolution; Formal reducibility - natura deduction system and axiom system; Soundness and completeness. | | | **CO5** |

| | | | |
|---|---|---|---|
| **Lecture Periods: 60** | **Tutorial Periods: -** | **Practical Periods: -** | **Total Periods: 60** |

**Text Books**


1. I. N. Herstein, John Wiley and Sons, "Topics in Algebra".
2. M. Morris Mano," Digital Logic & Computer Design", Pearson. January 2014
3. C. L. LiuMcGraw Hill, "Elements of Discrete Mathematics", (Second Edition) New Delhi.
4. J. A. Bondy and U. S. R. Murty, "Graph Theory with Applications", Macmillan Press, London.
5. L. Zhongwan, "Mathematical Logic for Computer Science", World Scientific, Singapore


**Reference Books**


1. Gilbert Strang, "Introduction to linear algebra".5th Edition,2016
2. R. A. Brualdi, "Introductory Combinatorics", 5th Edition,North-Holland, New York,2016.
3. N. Deo, Prentice Hall, Englewood Cliffs, "Graph Theory with Applications to Engineering and Computer Science" Dover Publications Inc.; 1stEdition,2016.
4. E. Mendelsohn, Van-Nostrand, "Introduction to Mathematical Logic", (Second Edition), London.


**Web References**

1. https://youtu.be/0Dx7r0PFyUM
2. https://youtu.be/rs5S0Ehp3s8
3. https://youtu.be/aUjq6o0PmjY

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4. https://youtu.be/fZqfkJ-cb28
5. https://youtu.be/oaOm2pnKkyY

* TE – Theory Exam, LE – Lab Exam

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 2 | 1 | 1 |
| 2 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 2 | 1 | 1 |
| 3 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | 1 | 2 | 1 | - |
| 4 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | 1 | 2 | - | 1 |
| 5 | 2 | 1 | - | - | - | - | - | - | - | - | - | 1 | 2 | 1 | 1 |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Method**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 10 | | 5 | 5 | 5 | 75 | 100 |

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Department | **Mathematics** | Programme: **B.Tech.** | | | | | | |
| Semester | **I** | Course Category: BS | | | | *End Semester Exam Type: **TE** | | |
| Course Code | **U23MAT102** | Periods / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **INTRODUCTORY TOPICS IN STATISTICS AND PROBABILITY** | **3** | **1** | **0** | **4** | **25** | **75** | **100** |

| | | |
|---|---|---|
| FCourse Objectives | 1) | To learn the concepts of evaluation using statistical analysis |
| | 2) | To Know the central tendency like mean, median, mode etc. |
| | 3) | To study the basic probability concepts |
| | 4) | To introduce knowledge of standard discrete distributions. |
| | 5) | To acquire knowledge on probability continuous distributions |

| | | | |
|---|---|---|---|
| Course Outcome | **On completion of the course, the students will be able to** | | BT Mapping (Highest Level) |
| | **CO1** | Understand the types of data and graphical representation in statistics. | **K2** |
| | **CO2** | Apply the concepts of central tendency. | **K2** |
| | **CO3** | Recall the concepts of basic probability. | **K2** |
| | **CO4** | Apply the basic rules of discrete random variables. | **K3** |
| | **CO5** | Apply the fundamentals of probability theory and random processes. | **K3** |

| | | | |
|---|---|---|---|
| **UNIT-I** | **Introduction To Statistics** | **(9Hrs)** | |
| Definition of Statistics. Basic objectives. Applications in various branches of science with examples. Collection of Data: Internal and external data, Primary and secondary Data. Population and sample, Representative sample | | | **CO1** |
| **UNIT-II** | **Descriptive Statistics** | **(9Hrs)** | |
| Classification and tabulation of univariate data, graphical representation, Frequency curves. Descriptive measures - central tendency and dispersion. Bivariate data. Summarization, marginal and conditional frequency distribution. | | | **CO2** |
| **UNIT-III** | **Basics Of Probability** | **(9Hrs)** | |
| Concept of experiments, sample space, event. Definition of Combinatorial Probability. Conditional Probability, Bayes Theorem. . | | | **CO3** |
| **UNIT- IV** | **Discrete Probability Distributions** | **(9Hrs)** | |
| Discrete Distributions: Probability mass function – Probability density function- Distribution functions, Binomial, Geometric, Negative Binomial, Poisson. | | | **CO4** |
| **UNIT- V** | **Continuous Probability Distributions** | **(9Hrs)** | |
| Continuous Distributions: Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties – Functions of a random variable. | | | **CO5** |

| | | | |
|---|---|---|---|
| **Lecture Periods: 60** | **Tutorial Periods: -** | **Practical Periods: -** | **Total Periods: 60** |

**Text Books**


1. S.M. Ross, "Introduction of Probability Models", Academic Press, N.Y.
2. A. Goon, M. Gupta and B. Dasgupta, "Fundamentals of Statistics", vol. I & II, World Press.
3. Bali N.P. and Dr. Manish Goyal, "Engineering Mathematics", Lakshmi Publications Pvt. Ltd., New Delhi, 9th Edition, 2015
4. T. Veerarajan," Probability and Statistics, Random Process and Queuing Theory", McGraw Hill Education, 2018.
5. **P. Sivaramakrishna Das, C. Vijayakumari**, "Probability and Queuing Theory", Pearson Education, 6th Edition, 2019.
6. G. Balaji, "Probability and Queuing Theory", Balaji Publication, Revised Edition 2017.


**Reference Books**


1. S.M. Ross, "A first course in Probability", Prentice Hall.
2. I.R. Miller, J.E. Freund and R., "Johnson, Probability and Statistics for Engineers",(Fourth Edition), PHI.
3. A.M. Mood, F.A. Graybilland D.C. Boes, "Introduction to the Theory of Statistics", McGraw Hill Education.
4. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, New Delhi, 10th Edition, 2019.
5. Ravish R. Singh and Mukul Bhatt, "Engineering Mathematics", Tata McGraw Hill, 1st Edition, New Delhi, 2016.
6. Ramana B.V.," Higher Engineering Mathematics", Tata Mc Graw Hill, New Delhi 2018


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3. https://youtu.be/Hw8KHNgRaOE

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4. https://youtu.be/2CP3m3EgL1Q
5. https://youtu.be/wo__Vag3yls
6. https://swayam.gov.in/nd1_noc20_ma17/preview

* TE – Theory Exam, LE – Lab Exam

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 2 | 1 | - | - | - | - | - | - | - | - | - | 1 | 2 | 1 | 1 |
| 2 | 2 | 1 | - | - | - | - | - | - | - | - | - | 1 | 2 | - | 1 |
| 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | 1 | 2 | 1 | 1 |
| 4 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | 1 | 2 | 1 | - |
| 5 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | 1 | 2 | 1 | 1 |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Method**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 10 | | 5 | 5 | 5 | 75 | 100 |

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Department | **Physics / Chemistry** | Programme: **B.Tech.** | | | | | | |
| Semester | **I** | Course Category: **BS** | | | | End Semester Exam Type: **TE** | | |
| Course Code | **U23BSTC01** | Periods/Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **PHYSICAL SCIENCE FOR ENGINEERS** | **3** | **0** | **0** | **3** | **25** | **75** | **100** |

(Common to all Branches)

| | | | |
|---|---|---|---|
| Prerequisite | Physics of 12th standard or equivalent / Chemistry of 12th standard or equivalent. | | |
| Course Outcomes | **On completion of the course, the students will be able to** | | BT Mapping (Highest Level) |
| | **CO1** | Understand the basic of properties of magnetic, dielectric and superconductors. | **K2** |
| | **CO2** | Identify the wave nature of the particles, physical significance of wave functions | **K3** |
| | **CO3** | Understand the basic principles of laser and fiber optics communication | **K2** |
| | **CO4** | Understand and familiar with the water treatment. | **K2** |
| | **CO5** | Understand the electrode potential for its feasibility in electrochemical reaction and uses of various batteries. | **K2** |
| | **CO6** | Understand the specific operating condition under which corrosion occurs and suggest a method to control corrosion. | **K2** |

**SECTION A - PHYSICS**

| | | |
|---|---|---|
| **UNIT-I** | **Magnetic, Dielectric and Superconducting Materials** | **Periods: 8** |
| Introduction to magnetic materials, Ferromagnetism- Domain theory-Types of energy-Hysteresis-Hard and Soft magnetic materials-ferrites-Dielectric materials-Types of polarization – Langevin-Debye equation-Frequency effects on polarization-Dielectric breakdown- Ferroelectric materials-Superconducting materials and their properties. | | **CO1** |
| **UNIT-II** | **Quantum Mechanics** | **Periods: 7** |
| Matter Waves - de Broglie Wavelength - Uncertainty Principle –Physical Significance of wave functions - Schrodinger wave Equation - Time Dependent - Time Independent - Application to Particle in a One Dimensional Box - Tunnel Diode. | | **CO2** |
| **UNIT-III** | **Laser and Fiber Optics** | **Periods: 7** |
| Lasers - Principles of Laser - Spontaneous and Stimulated Emissions - Einstein's Coefficients - Population Inversion and Laser Action –components of laser - Types of Lasers - NdYAG, $CO_2$ laser, GaAs Laser Fiber Optics - Principle and Propagation of light in optical fiber - Numerical aperture and acceptance angle - Types of optical fibers (material, refractive index, mode) | | **CO3** |

**SECTION B – CHEMISTRY**

| | | |
|---|---|---|
| **UNIT-IV** | **Water And Its Treatment** | **Periods: 8** |
| Water: Sources and impurities, Water quality parameters: Definition and significance of-color, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD. Desalination of brackish water: Reverse osmosis-disadvantages of using hard water in boiler - Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and Calgon conditioning) and External treatment–Ion exchange demineralization and zeolite process. | | **CO4** |
| **UNIT-V** | **Electrochemical Cells and Storage Devices** | **Periods: 8** |
| Galvanic cells, single electrode potential, standard electrode potential, electrochemical series. EMF of a cell and its measurement. Nernst equation. Electrolyte concentration cell. Reference electrodes-hydrogen, calomel and Ag/AgCl. Batteries and fuel cells: Types of batteries- alkaline battery-lead storage battery- nickel-cadmium battery- fuel cell $H_2$ -$O_2$ fuel cell-applications. | | **CO5** |
| **UNIT-VI** | **Corrosion** | **Periods: 7** |
| Corrosion –Introduction - factors – types – chemical, electrochemical corrosion (galvanic, differential aeration), corrosion control – material selection and design aspects – electrochemical protection – sacrificial anode method and impressed current cathodic method. Uses of inhibitors, metallic coating – anodic coating, cathodic coating. Metal cladding, Electroplating of Copper and electroless plating of nickel. | | **CO6** |

| | | | |
|---|---|---|---|
| **Lecture Periods: 45** | **Tutorial Periods:-** | **Practical Periods:-** | **Total Periods: 45** |

**Text Books**


1. V Rajendran, "Engineering Physics", 2nd Edition, TMH, New Delhi 2011.
2. S.S Dara – "A text book of Engineering Chemistry" - 15th Edition, 2021. S.Chand Publications.
3. C.Jain, Monica Jain, —"Engineering Chemistryll" 17th Ed. Dhanpat Rai Pub. Co., New Delhi, (2015).


**Reference Books**


1. R.Murugeshan, "Modem Physics", S. Chand &Co, New Delhi 2006.
2. William D Callister Jr., "Material Science and Engineering", 6th Edition, John Wiley and sons, 2009.
3. Jain & Jain "Engineering chemistry", 23rd Edition, DhanpatRai Publishing Company. 2022
4. Mars Fontana "Corrosion Engineering", July 2017
5. JinaRedlin, "Handbook of Electrochemistry", March 28, 2005


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2. https://www.acs.org/content/acs/en/careers/college-to-career/chemistry-careers/materials science.html.
3. https://study.com/academy/lesson/semiconductors-superconductors-definition-properties.html
4. https://mechanicalc.com/reference/engineering-materials
5. http://ndl.ethernet.edu.et/bitstream/123456789/89589/1/%5BPerez_N.%5D_Electrochemistry_and_corrosion%28BookZZ.org%29.pdf

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| 2 | 3 | 2 | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| 3 | 3 | 2 | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| 4 | 3 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 5 | 3 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 6 | 3 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 5 | 5 | 5 | 5 | 5 | 75 | 100 |

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Department | **Computer Science and Business Systems** | | Program: **B.Tech.** | | | | | |
| Semester | **I** | | Course Category: ES | | | *End Semester Exam Type: **TE** | | |
| Course Code | **U23CBT101** | | Periods / Week | | | Credit | Maximum Marks | |
| | | | L | T | P | C | CAM | ESE | TM |
| Course Name | **FUNDAMENTALS OF COMPUTER SCIENCE** | | **3** | **0** | **0** | **3** | **25** | **75** | **100** |
| Course Objectives | **1)** | To understand the basic concepts of problem solving concepts. | | | | | | | |
| | **2)** | To gain Knowledge about the syntax and semantics about programming language. | | | | | | | |
| | **3)** | To learn the techniques of Pointers, Arrays and Functions in C. | | | | | | | |
| | **4)** | To be exposed to user defined data types to handle the files. | | | | | | | |
| | **5)** | To develop program using pre-processor directives and files. | | | | | | | |
| Course Outcome | **On completion of the course, the students will be able to** | | | | | | | BT Mapping (Highest Level) | |
| | **CO1** | Recognize the basics of programming concepts. | | | | | | **K1** | |
| | **CO2** | Choose appropriate controls and functions to solve the problems. | | | | | | **K1** | |
| | **CO3** | Develop and Manage memory with Pointers and Arrays. | | | | | | **K3** | |
| | **CO4** | Explore the various Input and Output functions. | | | | | | **K2** | |
| | **CO5** | Create and Manipulate the Files accessing and storage. | | | | | | **K3** | |

| | | |
|---|---|---|
| **UNIT-I** | **Introduction** | **(9Hrs)** |
| Algorithm and Flowchart for problem solving with Sequential Logic Structure- Decisions and Loops. Introduction to imperative language; syntax and constructs of a specific language (ANSI C)- Variable Names-Data Type and Sizes (Little Endian Big Endian)- Constants- Declarations- Arithmetic Operators- Relational Operators-Logical Operators-Type Conversion- Increment Decrement Operator-Bitwise Operators- Assignment Operators and Expressions- Precedence and Order of Evaluation- proper variable naming and Hungarian Notation. | | **CO1** |
| **UNIT-II** | **Control Flow and Functions** | **(9Hrs)** |
| Statements and Blocks- If-Else-If, Switch, Loops – while, do, for, break and continue, goto labels, structured and un- structured programming. Basics of functions- parameter passing and returning type- C main return as integer,-External- Auto- Local- Static- Register Variables- Scope Rules- Block structure- Initialization- Recursion- Pre-processor- Standard Library Functions and return types. | | **CO2** |
| **UNIT-III** | **Pointers, Arrays and Structures** | **(9Hrs)** |
| Pointers and address- Pointers and Function Arguments- Pointers and Arrays- Address Arithmetic- character Pointers and Functions- Pointer Arrays- Pointer to Pointer- Multi-dimensional array and Row/column major formats- Initialization of Pointer Arrays- Command line arguments- Pointer to functions- complicated declarations and how they are evaluated. Basic Structures- Structures and Functions- Array of structures- Pointer of structures- Self-referral structures- Table look up-typedef,-unions- Bit-fields. | | **CO3** |
| **UNIT- IV** | **Input and Output** | **(9Hrs)** |
| Standard I/O, Formatted Output – printf, Formated Input – scanf- Variable length argument list- file access including FILE structure- fopen, stdin, sdtout and stderr,-Error Handling including exit- perror and error.h- Line I/O- related miscellaneous functions. | | **CO4** |
| **UNIT- V** | **Unix System Interface** | **(9Hrs)** |
| File Descriptor- Low level I/O – read and write- open,-create- close and unlink- Random access – lseek- Discussions on Listing Directory- Storage allocator.<br>Programming Method: Debugging, Macro, User Defined Header, User Defined Library Function, makefile utility. | | **CO5** |

**Text Books**


7. B. W. Kernighan and D. M. Ritchi , "The C Programming Language", Second Edition, PHI.
8. B. Gottfried, Schaum ,"Programming in C", Second Edition, Outline Series, 2017
9. E Balagurusamy ,"Programming in ANSI C", Fourth Edition, , TMH, 2007.


**Reference Books**


7. Herbert Schildt ,"C: The Complete Reference", Fourth Edition , McGraw Hill, 2017.
8. Yashavant Kanetkar "Let Us C" , BPB Publications 14th Edition,2019
9. Pradip dey and Manas Ghosh ,"Computer fundamentals and Programming in C" ,Oxford University Press,2013


**Web References**

1. https://codeforwin.org/
2. https://www.geeksforgeeks.org/c-programming-language/
3. http://learn-c.org/
4. https://www.cprogramming.com/
5. https://www.linuxtopia.org/online_books/programming_books/gnu_c_programming_tutorial/ index.html

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* TE – Theory Exam, LE – Lab Exam

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - |
| 2 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - |
| 3 | 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | 3 | 1 | - |
| 4 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 2 | - | - |
| 5 | 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | 3 | 1 | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Method**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 10 | | 5 | 5 | 5 | 75 | 100 |

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Department | **Computer Science and Business Systems** | Programme: **B. Tech.** | | | | | | |
| Semester | **I** | Course Category: **HS** | | | | End Semester Exam Type: **TE** | | |
| Course Code | **U23HSTC01** | Periods / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **UNIVERSAL HUMAN VALUES - II** | **2** | 0 | 0 | **2** | **25** | **75** | **100** |
| | **(Common to all Branch)** | | | | | | | |
| Prerequisite | UHV - I | | | | | | | |

| | | | |
|---|---|---|---|
| Course Outcomes | On completion of the course, the students will be able to | | BT Mapping (Highest Level) |
| | CO1 | Evaluate the significance of value inputs in formal education and start applying them in their life and profession | **K2** |
| | CO2 | Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc. | **K2** |
| | CO3 | Analyze the value of harmonious relationship based on trust and respect in their life and profession | **K2** |
| | CO4 | Examine the role of a human being in ensuring harmony in society and nature. | **K2** |
| | CO5 | Apply the understanding of ethical conduct to formulate the strategy for ethical life and profession. | **K2** |

| | | | |
|---|---|---|---|
| **UNIT - I** | **Introduction To Value Education** | **Periods: 06** | |
| Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) - Understanding Value Education - Self-exploration as the Process for Value Education - Basic Human Aspirations - Happiness and Prosperity - Current Scenario- Method to Fulfil the Basic Human Aspirations | | | **CO1** |
| **UNIT - II** | **Harmony In The Human Being** | **Periods: 06** | |
| Understanding Human being as the Co-existence of the Self and the Body-Distinguishing between the Needs of the Self and the Body-The Body as an Instrument of the Self-Understanding Harmony in the Self-Harmony of the Self with the Body-Programme to ensure self-regulation and Health | | | **CO2** |
| **UNIT - III** | **Harmony In The Family And Society** | **Periods: 06** | |
| Harmony in the Family - Basic Unit of Human Interaction- 'trust' - Foundational Value in Relationship - 'Respect' - as the Right Evaluation - Other Feelings, Justice in Human-to-Human Relationship - Understanding Harmony in the Society-Vision for the Universal Human Order. | | | **CO3** |
| **UNIT - IV** | **Harmony In The Nature / Existence** | **Periods: 06** | |
| Understanding Harmony in the Nature-Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature - Realizing Existence as Co-existence at All Levels - Holistic Perception of Harmony in Existence | | | **CO4** |
| **UNIT - V** | **Implications Of The Holistic Understanding - A Look At Professional Ethics** | **Periods: 06** | |
| Natural Acceptance of Human Values - Definitiveness of (Ethical) Human Conduct - Basis for Humanistic Education, Humanistic Constitution and Universal Human Order-Competence in Professional Ethics-Holistic Technologies, Production Systems and Management Models-Typical Case Studies-Strategies for Transition towards Value - based Life and Profession | | | **CO5** |

| | | | |
|---|---|---|---|
| **Lecture Periods: 30** | **Tutorial Periods: -** | **Practical Periods: -** | **Total Periods: 30** |

**Text Book**


1. R. R. Gaur, R. Asthana, G. P. Bagaria, "A Foundation Course in Human Values and Professional Ethics", Excel Books, 2nd Revised Edition, New Delhi, 2019.


**Reference Books**


1. A Nagraj, Jeevan Vidya Prakashan, Amarkantak, "Jeevan Vidya: EkParichaya", 2013.
2. A.N. Tripathi, "Human Values", New Age International Publishers, New Delhi, 3rd Edition, 2019.
3. Annie Leonard, "The Story of Stuff", Free Press, Reprint Edition, 2011.
4. Mohandas Karam chand Gandhi, "The Story of My Experiments with Truth – Mahatma Gandhi Autobiography", Finger print Publisher, 2009.
5. E. F Schumacher, "Small is Beautiful", Vintage Publisher, 1993.
6. Cecile Andrews, "Slow is Beautiful", New Society Publishers, 2006.
7. J C Kumarappa, "Economy of Permanence", Sarva Seva Sangh Prakashan, 2017.
8. Pandit Sunderlal, "Bharat Mein Angreji Raj", Prabhat Prakashan Publisher, 2021.
9. Dharampal, "Rediscovering India", Stosius Inc/Advent Books Division Publisher, 1983.
10. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule", Gyan Publishing House, 2023.
11. Maulana Abdul Kalam Azad, "India Wins Freedom", Orient BlackSwan Publisher, 1st Edition, 1988.


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12. Life of Vivekananda, "Romain Rolland (English)", Advaita Ashrama Publisher, India, 4th Edition, 2010.
13. Mahatma Gandhi, "Romain Rolland (English)", Srishti Publishers & Distributors, 2020.

**Web References**

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2. http://www.storyofstuff.com
3. https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw
4. https://fdp-si.aicte-india.org/8dayUHV_download.php
5. https://www.youtube.com/watch?v=8ovkLRYXIjE

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | - | - | - | - | - | 2 | 3 | 2 | 2 | - | - | 3 | - | - | - |
| 2 | - | - | - | - | - | 2 | 3 | 2 | 2 | - | - | 3 | - | - | - |
| 3 | - | - | - | - | - | 3 | 3 | 2 | 2 | - | - | 3 | - | - | - |
| 4 | - | - | - | - | - | 2 | 3 | 2 | 2 | - | - | 3 | - | - | - |
| 5 | - | - | - | - | - | 2 | 3 | 2 | 2 | - | - | 3 | - | - | - |

**Correlation Level: 1 – Low, 2 – Medium, 3 – High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 10 | | 5 | 5 | 5 | 75 | 100 |

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Department | **English** | | Programme: **B.Tech** | | | | | |
| Semester | **I** | | Course Category: HS | | | | *End Semester Exam Type: **TE** | |
| Course Code | **U23ENB101** | | Periods/Week | | | Credit | Maximum Marks | |
| | | | L | T | P | C | CAM | ESE | TM |
| Course Name | **Business Communication & Value Science -I** | | **2** | **0** | **2** | **3** | **50** | **50** | **100** |
| Prerequisite | Basics of English Language | | | | | | | | |
| Course Outcome | **On completion of the course, the students will be able to** | | | | | | | BT Mapping (Highest Level) | |
| | **CO1** | Apply the knowledge of grammar in oral and written communication | | | | | | **K3** | |
| | **CO2** | Understand the basic tenets of communication | | | | | | **K2** | |
| | **CO3** | Build strong technical communication skills to meet out the organizational anticipation | | | | | | **K3** | |
| | **CO4** | Identify own strengths and opportunities | | | | | | **K2** | |
| | **CO5** | Develop the multivariate skills requisites for life | | | | | | **K3** | |

| | | | |
|---|---|---|---|
| **UNIT-I** | **Grammar** | **Periods:10** | |
| Essential Grammar: Parts of Speech – Tenses - Applications of tenses on Functional Grammar -Sentence formation -(General and Technical) - Common Errors-Voices -Sentence Sequence | | | **CO1** |
| **UNIT-II** | **Fundamentals in Communication** | **Periods:10** | |
| Types of communication: Verbal and Non – verbal – Role-play -Importance of Questioning - Listening Skills: Importance - Difference between listening and hearing - Types of listening - Expressing self – connecting with emotions - visualization and experience - Skit based on communication skills - Evaluation on Listening skills | | | **CO2** |
| **UNIT-III** | **Organizational Communication** | **Periods:10** | |
| Email writing: Formal and informal -Verbal communication: Pronunciation - clarity - brevity of speech- Vocabulary Enrichment: General Service List (GSL), Academic word list (AWL) technical terms, phrases, idioms, significant abbreviations, formal business vocabulary - GD - Written Communication -Narrative writing – creating CV –Life skill - Stress management and teamwork | | | **CO3** |
| **UNIT- IV** | **People Skills and Self-introspection** | **Periods:15** | |
| **List of Exercises**<br>**Listening**<br>Listen to recording and answer questions, Record conversation between a celebrity and an interviewer- Self-awareness – identity, body awareness - stress management.<br>**Speaking**<br>• Presentation on favourite cricket captain-skills and values they demonstrate<br>• Interviewing a maid- watchman – sweeper- cabdriver- beggar- narrate values<br>**Reading**<br>• Over viewing business communication<br>**Writing**<br>• Newspaper Report – football- hockey | | | **CO4** |
| **UNIT-V** | **Incorporating Life Skills with Values** | **Periods:15** | |
| **List of Exercises**<br>**Listening**<br>Life Skills: Movie based learning – identifying skills and values - Critical life skills - Multiple Intelligences Values: Leadership, Teamwork, Managing Stress, Motivation, and Creativity<br>**Speaking**<br>Work with an NGO and makes a presentation, Table Topics speech<br>**Reading**<br>, Reading Newspapers - Magazine - Journal<br>**Writing**<br>Accident report - current political scenario<br>**Project:** Create a podcast on a topic | | | **CO5** |

| | | | |
|---|---|---|---|
| **LecturePeriods:30** | **Tutorial Periods:-** | **Practical Periods:30** | **TotalPeriods:60** |

**Text Books**

1. Wren & Martin, "High School English Grammar and Composition", S Chandh &Co. Ltd, 2015.

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2. Comfort, Jeremy,etal., "Speaking Effectively: Developing Speaking Skills for Business English", Cambridge University Press,Cambridge, Reprint 2011.
3. Boove, Courtland L, "Business Communication Today", Pearson Education, New Delhi,2002.

**Reference Books**

1. English vocabulary in use – Alan Mc'carthy and O'dell
2. APAART: Speak Well 1 (English language and communication)
3. APAART: Speak Well 2 (Soft Skills)
4. Business Communication – Dr.SarojHiremath
5. Wren, Percival Christopher, and Wren Martin. "High School English Grammar and Composition". S Chand, 2005

**Web References**

1. Train your mind to perform under pressure- Simon sinek
https://curiosity.com/videos/simon-sinek-on-training-your-mind-to-perform-under-pressure-capture-your-flag/
2. Brilliant way one CEO rallied his team in the middle of layoffs
https://www.inc.com/video/simon-sinek-explains-why-you-should-put-people-before-numbers.html
3. Will Smith's Top Ten rules for success
https://www.youtube.com/watch?v=bBsT9omTeh0
4. https://www.coursera.org/learn/learning-how-to-learn
5. https://www.coursera.org/specializations/effective-business-communication

* TE – Theory Exam, LE – Lab Exam

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 1 | - | - | - | - | - | - | 1 | - | 3 | - | 1 | 1 | - | - |
| 2 | 1 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | - | - |
| 3 | 1 | - | - | - | - | - | - | 1 | - | 3 | - | 1 | 1 | - | - |
| 4 | 1 | - | - | - | - | - | - | 1 | - | 3 | - | 1 | 1 | - | - |
| 5 | 1 | - | - | - | - | - | - | 1 | - | 3 | - | 1 | 1 | - | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Method**

| Assessment | Continuous Assessment Marks (CAM) | | | | | | | | | End Semester Examination (ESE) Marks (Practical – Internal Evaluation) | End Semester Examination (ESE) Marks (Theory) | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Continuous Assessment (Theory) | | | | | Continuous Assessment (Practical) | | | | | | |
| | CAT 1 | CAT 2 | Model | Attendance | Total | Conduction of Practical | Report | Viva | Total | | | |
| Marks | 5 | 5 | 5 | 5 | 20* | 15 | 10 | 5 | 30* | 30 | 75** | - |
| *To be weighted for 10 Marks | | | | | 10 | *To be weighted for 10 Marks | | | 10 | | *To be weighted for 50 Marks | 100 |

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|---|---|---|---|---|---|---|---|---|
| Department | **Computer Science and Business Systems** | Programme: **B.Tech.** | | | | | | |
| Semester | **I** | Course Category: **ES** | | | | *End Semester Exam Type: **LE** | | |
| Course Code | **U23CBP101** | Periods / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **FUNDAMENTALS OF COMPUTER SCIENCE LABORATORY** | **0** | **0** | **2** | **1** | **50** | **50** | **100** |

| | |
|---|---|
| Course Objectives | • To understand the basic concepts of problem solving concepts. |
| | • To gain Knowledge about the syntax and semantics about programming language. |
| | • To learn the techniques of Pointers, Arrays and Functions in C. |
| | • To be exposed to user defined data types to handle the files. |
| | • To develop program using pre-processor directives and files. |

| | | | |
|---|---|---|---|
| Course Outcome | **On completion of the course, the students will be able to** | | BT Mapping (Highest Level) |
| | **CO1** | Develop Algorithm and Flowcharts. | **K3** |
| | **CO2** | Develop program using tricky codes and parameter passing | **K3** |
| | **CO3** | **Analyze problems and implement those using functions** | **K3** |
| | **CO4** | Design applications using Files concepts | **K3** |
| | **CO5** | Analyze and discover searching programs | **K3** |

**List of Experiments:**

1. Algorithm and flowcharts of small problems like GCD
2. Develop a Small but tricky codes
3. Develop a program with Proper parameter passing
4. Write a C program using Command line Arguments
5. Write a Program to understand about Variable parameter
6. Develop a program to illustrate the use of Pointer to functions
7. Write a program to explain the concept of User defined header
8. Write a program to analyze the importance of Make file utility
9. Develop a program to elucidate Multi file program and user defined libraries
10. Develop a program with Interesting substring matching / searching programs
11. Write programs with Parsing related assignments

| | | | |
|---|---|---|---|
| **Lecture Periods: -** | **Tutorial Periods: -** | **Practical Periods: 3 0** | **Total Periods: 30** |

**Text Books**


1. B. W. Kernighan and D. M. Ritchi , "The C Programming Language", Second Edition, PHI.
2. B. Gottfried, Schaum ,"Programming in C", Second Edition, Outline Series, 2017
3. E Balagurusamy ,"Programming in ANSI C", Fourth Edition, , TMH, 2007


**Reference Books**


1. Herbert Schildt ,"C: The Complete Reference", Fourth Edition , McGraw Hill, 2017.
2. Yashavant Kanetkar "Let Us C" , BPB Publications 14th Edition,2019
3. Pradip dey and Manas Ghosh ,"Computer fundamentals and Programming in C" ,Oxford University Press,2013


**Web References**

1. https://codeforwin.org/
2. https://www.geeksforgeeks.org/c-programming-language/
3. http://learn-c.org/
4. https://www.cprogramming.com/
5. http://cse02-iiith.vlabs.ac.in

* TE – Theory Exam, LE – Lab Exam

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**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | 1 | - |
| 2 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | 1 | - |
| 3 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | 1 | - |
| 4 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | 1 | - |
| 5 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | 1 | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Method**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | Performance in practical classes | | | Model Practical Examination | Attendance | | |
| | Conduction of practical | Record work | viva | | | | |
| Marks | 15 | 5 | 5 | 15 | 10 | 50 | 100 |

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|---|---|---|---|---|---|---|---|---|
| Department | **Mechanical Engineering** | | Programme : **B.Tech.** | | | | | |
| Semester | **I** | | Course Category: **ES** | | | End Semester Exam Type: **LE** | | |
| Course Code | **U23ESPC02** | | Periods/Week | | | Credit | Maximum Marks | |
| | | | L | T | P | C | CAM | ESE | TM |
| Course Name | **DESIGN THINKING AND IDEA LAB** | | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| (Common to ALL Branches) | | | | | | | | | |
| Prerequisite | Basic Knowledge of Science | | | | | | | | |
| Course Outcomes | **On completion of the course, the students will be able to** | | | | | | | | BT Mapping (Highest Level) |
| | **CO1** | Demonstrate a comprehensive understanding of the tools and inventory associated with the IDEA Lab. | | | | | | | **K2** |
| | **CO2** | Develop proficiency in ideation techniques to generate creative and innovative solutions for various design challenges and problems | | | | | | | **K3** |
| | **CO3** | Acquire practical knowledge of mechanical and electronic fabrication processes, including hands-on experience with machinery, tools, and techniques used in the manufacturing and assembly of physical components. | | | | | | | **K3** |
| | **CO4** | Cultivate the skills necessary for developing innovative and desirable products, including the ability to integrate user needs, market trends, and technological advancements into the design process. | | | | | | | **K4** |
| | **CO5** | Apply iterative design methodologies to refine and improve solutions based on feedback, user testing, and evaluation of functional, aesthetic, and usability aspects | | | | | | | **K4** |

**Design process:** Traditional design, Design thinking, Existing sample design projects, Study on designs around us, Compositions/structure of a design, Innovative design: Breaking of patterns, Reframe existing design problems, Principles of creativity Empathy: Customer Needs, Insight-leaving from the lives of others/standing on the shoes of others, Observation

**Design team-Team formation, Conceptualization:** Visual thinking, Drawing/sketching, New concept thinking, Patents and Intellectual Property, Concept Generation Methodologies, Concept Selection, Concept Testing, Opportunity identification Prototyping: Principles of prototyping, Prototyping technologies, Prototype using simple things, Wooden model, Clay model, 3D printing; Experimenting/testing.

Sustainable product design, Ergonomics, Semantics, Entrepreneurship/business ideas, Product Data Specification, Establishing target specifications, Setting the final specifications. Design projects for teams.

**List of Lab Activities and Experiments**

1. Schematic and PCB layout design of a suitable circuit, fabrication and testing of the circuit.
2. Machining of 3D geometry on soft material such as softwood or modelling wax.
3. 3D scanning of computer mouse geometry surface. 3D printing of scanned geometry using FDM or SLA printer.
4. 2D profile cutting of press fit box/casing in acrylic (3 or 6 mm thickness)/cardboard, MDF (2 mm) board using laser cutter & engraver.
5. 2D profile cutting on plywood /MDF (6-12 mm) for press fit designs.
6. Familiarity and use of welding equipment.
7. Familiarity and use of normal and wood lathe.
8. Embedded programming using Arduino and/or Raspberry Pi.
9. Design and implementation of a capstone project involving embedded hardware, software and machined or 3D printed enclosure.
10. Discussion and implementation of a mini project.
11. Documentation of the mini project (Report and video).

| | | | |
|---|---|---|---|
| **Lecture Periods: -** | **Tutorial Periods: -** | **Practical Periods: 30** | **Total Periods: 30** |

**Text Books**

1. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, HarperCollins Publishers Ltd
2. Workshop / Manufacturing Practices (with Lab Manual), Khanna Book Publishing.

**Reference Books**

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1. Ulrich and Eppinger, Product Design and Development, 3rd Edition, McGraw Hill, 2004
2. The Big Book of Maker Skills: Tools & Techniques for Building Great Tech Projects. Chris Hackett. Weldon Owen; 2018.
3. The Total Inventors Manual (Popular Science): Transform Your Idea into a Top-Selling Product. Sean Michael Ragan, Weldon Owen; 2017.
4. The Art of Electronics. 3rd edition. Paul Horowitz and Winfield Hill. Cambridge University Press.
5. Practical Electronics for Inventors. 4th edition. Paul Sherz and Simon Monk. McGraw Hill.
6. Make Your Own PCBs with EAGLE: From Schematic Designs to Finished Boards. Simon Monk and Duncan Amos. McGraw Hill Education.
7. Programming Arduino: Getting Started with Sketches. 2nd edition. Simon Monk. McGraw Hill.
8. Venuvinod, PK., MA. W., Rapid Prototyping – Laser Based and Other Technologies, Kluwer
9. Chapman W.A.J, "Workshop Technology", Volume I, II, III, CBS Publishers and Distributors, 5th Edition,2002.

**Web References**

1. https://onlinecourses.nptel.ac.in/noc23_mg72

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 2 | 2 | 2 | 2 | 2 | - | - | 2 | - | 3 | 2 | - | - | - |
| 2 | 3 | 3 | 3 | 2 | 2 | 2 | - | - | 2 | - | 3 | 2 | - | - | - |
| 3 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | 2 | - | 3 | 2 | - | - | - |
| 4 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | 2 | - | 3 | 2 | - | - | - |
| 5 | 3 | 3 | 3 | 2 | 3 | 2 | - | - | 2 | - | 3 | 2 | - | - | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | Performance in practical classes | | | Model Practical Examination | Attendance | | |
| | Conduction of practical | Record work | viva | | | | |
| Marks | 15 | 5 | 5 | 15 | 10 | 50 | 100 |

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|---|---|---|---|---|---|---|---|---|
| Department | **Mechanical Engineering** | Programme: **B.Tech.** | | | | | | |
| Semester | **I** | Course Category: **ES** | | | | End Semester Exam Type: **LE** | | |
| Course Code | **U23ESPC03** | Periods/Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **ENGINEERING GRAPHICS USING AUTOCAD** | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| (Common to all Branches) | | | | | | | | |
| Prerequisite | Nil | | | | | | | |

| Course Outcomes | On completion of the course, the students will be able to | BT Mapping (Highest Level) |
|---|---|---|
| CO1 | Familiarize with the fundamentals and standards of engineering graphics. | K3 |
| CO2 | Perform drawing of basic geometrical constructions and multiple views of objects. | K2 |
| CO3 | Visualize the isometric and perspective sections of simple solids. | K3 |
| CO4 | Connect side view associate on front view. | K4 |
| CO5 | Correlate sectional views and lateral surface developments of various solids. | K4 |

**List of Experiments**

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing a Title Block with necessary text and projection symbol.
3. Drawing 2D sketch by applying modify tools like fillet, mirror, array, etc.,
4. Drawing front view and top view of simple solids like prism, pyramid, cylinder, cone, etc., and Dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. Simple stool, V-block, Mixie Base).
6. Drawing a plan of residential building (Two bed rooms, kitchen, hall, etc.)
7. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
8. Drawing lateral surface development of prism, pyramid, cylinder, cone, etc,
9. Drawing isometric projection of simple objects.
10. Creating 3D model of simple object and obtaining 2D multi-view drawings.
11. Note: Plotting of drawings must be made for each exercise and attached to the records written by Students.

| Lecture Periods: - | Tutorial Periods: - | Practical Periods: 30 | Total Periods: 30 |
|---|---|---|---|

**Reference Books**


1. James D. Bethune, Engineering Graphics with AutoCAD A Spectrum book 1st Edition, Macromedia Press, Pearson, 2020.
2. NS Parthasarathy and Vela Murali, Engineering Drawing, Oxford university press, 2015.
3. M.B Shah, Engineering Graphics, ITL Education Solutions Limited, Pearson **Education** Publication, 2011.
4. Bhatt N.D and Panchal V.M, Engineering Drawing: Plane and Solid Geometry, Charotar Publishing House, 2017.
5. Jeyapoovan T, Engineering Drawing and Graphics Using AutoCAD, Vikas Publishing House Pvt Ltd., 7th Edition, New Delhi, 2016.
6. C M Agrawal, Basant Agrawal, Engineering Graphics, McGraw Hill, 2012.
7. Dhananjay A. Jolhe, Engineering Drawing: With An Introduction To CAD McGraw Hill, 2016.
8. James Leach, AutoCAD 2017 Instructor, SDC Publications, 2016.


**Web References**

1. http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/egraphics_lab/labs/index.php
2. http://www.nptelvideos.in/2012/12/computer-aided-design.html
3. https://mech.iitm.ac.in/meiitm/course/cad-in-manufacturing/
4. https://autocadtutorials.com
5. https://dwgmodels.com

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**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 1 | - | - | 3 | - | - | - | 3 | - | - | 2 | 3 | 3 | 3 |
| 2 | 3 | 1 | - | - | 3 | - | - | - | 3 | - | - | 3 | 3 | 3 | 3 |
| 3 | 3 | 1 | - | - | 3 | - | - | - | 3 | - | - | 3 | 3 | 3 | 3 |
| 4 | 3 | 1 | - | - | 3 | - | - | - | 3 | - | - | 2 | 3 | 3 | 3 |
| 5 | 3 | 1 | - | - | 3 | - | - | - | 3 | - | - | 3 | 3 | 3 | 3 |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Method**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | Performance in practical classes | | | Model Practical Examination | Attendance | | |
| | Conduction of practical | Record work | viva | | | | |
| Marks | 15 | 5 | 5 | 15 | 10 | 50 | 100 |

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| Department | Computer Science and Business Systems | Programme: **B.Tech.** | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Semester | I | Course Category: **MC** | | | | End Semester Exam Type: - | | |
| Course Code | **U23CBM101** | Periods / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **Induction Programming** | - | - | - | Non-Credit | - | - | - |
| **Prerequisite** | - | | | | | | | |

| **Course Outcomes** | **On completion of the course, the students will be able to** | BT Mapping (Highest Level) |
|---|---|---|
| CO1 | Develop holistic attitude and harmony in the individual, family, and Society | **K2** |
| CO2 | Acquire grammar skills and capable to write and speak English confidently | **K2** |
| CO3 | Understand the basic concepts in Mathematics and Programming | **K2** |
| CO4 | Know about the art and culture, language and literature of this vast secular nation | **K2** |
| CO5 | Identify the inherent talent and develop it professionally | **K3** |

| **UNIT-I** | **Universal Human Values** | **Periods: 12** |
|---|---|---|
| Welcome and Introductions - Getting to know each other, Aspirations and Concerns - Individual Academic and Career, Expectations of Family, Peers, Society, Nation, Fixing one's Goals, Self-Management - Self-confidence, Peer Pressure, Time Management, Anger, Stress Personality Development, Self-improvement, Health - Health issues, Healthy diet, Healthy lifestyle, Hostel life, Relationships - Home sickness, Gratitude towards Parents, Teachers and others Ragging and interaction, Competition and Cooperation, Peer Pressure, Society - Participation in Society, Natural Environment - Participation in Nature, Sum Up - Role of Education, Need for a Holistic Perspective, Self-evaluation and Closure - Sharing and feedback. | | **CO1** |

| **UNIT-II** | **Proficiency in English** | **Periods: 12** |
|---|---|---|
| Communication skills - Prognostic test on Grammar - Synonyms, Antonyms, Tenses, Sentence Completion, Idioms and Phrases, One-word Substitution, Homophones, Homonyms, Use of Prepositions, Subject-verb Agreement - Writing - Paragraph writing, Letter writing, Essay writing, Story Development. | | **CO2** |

| **UNIT-III** | **Bridge Course in Mathematics and C Programming** | **Periods: 12** |
|---|---|---|
| **Mathematics:**<br>Fundamentals of differential and integral calculus: Theory and Practice, Limit of function - Fundamental results on limits - Continuity of a function - Concept of differentiation - Concept of derivative - Slope of a curve -Differentiation Techniques - Derivatives of elementary functions from first principle - Derivatives of inverse functions - Logarithmic differentiation - Method of substitution - Differentiation of parametric functions -Differentiation of implicit functions - Higher order derivatives. Integrals of functions containing linear functions -Method of integration (Decomposition method, method of substitution, integration by parts) - Definite integrals. Simple definite integrals - Properties of Definite integrals - Reduction formulae - Area and volume - Length of curve - surface area of a solid.<br>**C Programming:**<br>Features of C and its basic Structure - Keywords - constants - variables - operators - Data types - Formatted input and output statements - Control and Looping statement - Arrays - Functions - Strings - writing simple C programs. | | **CO3** |

| **UNIT-IV** | **Literary Activities** | **Periods: 12** |
|---|---|---|
| Team building activities - Quiz - Oral Exercises - Group discussion, Debate, Extempore, Role play, *சிறப்பு சொற்பொழிவு - தமிழர் மரபு மற்றும் தமிழர் தொழில்நுட்பம்.* | | **CO4** |

| **UNIT-V** | **Creative Arts** | **Periods: 12** |
|---|---|---|
| Introduction to painting and renowned artworks - Documentary and Short films - Music - Vocal, Instrumental - Dance - Classical, Cinematic - Mimicry - Mime. | | **CO5** |

| **Lecture Periods: 60** | **Tutorial Periods: -** | **Practical Periods: -** | **Total Periods: 60** |
|---|---|---|---|

**Reference Books**


1. R.R Gaur, R. Asthana, G.P. Bagaria," A Foundation Course in Human Values and Professional Ethics", Excel Books, New Delhi, 2nd Revised Edition, 2019.
2. Kumar Mohan R, "English Grammar for all (Functional and Applied Grammar)", Unicare Academy, 2022.
3. Seely, John," Oxford A-Z of Grammar and Punctuation, Oxford Publication, 2013.
4. B.V. Ramana," Higher Engineering Mathematics", Tata McGraw – Hill, New Delhi, 6th Edition, 2018.
5. Dr. A. Singaravelu, "Engineering Mathematics - I", Meenakshi publications, Tamil Nadu, 2019.
6. E. Balagurusamy, "PROGRAMMING IN ANSI C", Mc Graw Hill, 8th Edition, 2019.
7. Dr.K.K.Pillay,"Social Life of Tamils", A joint publication of TNTB & ESC and RMRL
8. R.Balakrishnan, "Journey of Civilization",Roja muthiah research publishers, 1st Edition 2019
9. தமிழக வரலாறு - மக்களும் பண்பாடும், பிள்ளை, கே. கே. , சென்னை : உலகத் தமிழாராய்ச்சி நிறுவனம் , 2002.
10. கணினித்தமிழ் - முனைவர் இல.சுந்தரம், விகடன் பிரசுரம்.


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11. கீழடி - வைகை நதிக்கரையில் சங்க கால நகர நாகரிகம், தமிழக தொல்லியல் துறை

**Web References**

1. http://www.newsociety.com/Books/S/Slow-isBeautiful
2. https://www.aplustopper.com/formal-letter/
3. https://www.javatpoint.com/c-programming-language-tutorial
4. http://www.math.cum.edu/~wn0g/2ch6a.pdf
5. https://education.nsw.gov.au/teaching-and-learning/curriculum/creative-arts

**Evaluation methods**

| Assessment | Continuous Assessment Marks (CAM) | | | Total Marks |
|---|---|---|---|---|
| | Attendance | MCQ Test | Presentation / Activity / Assignment | |
| Marks | 10 | 30 | 60 | 100 |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Department | **Mathematics** | Programme: **B.Tech.** | | | | | | |
| Semester | **II** | Course Category: BS | | | | *End Semester Exam Type: **TE** | | |
| Course Code | **U23MAT203** | Periods / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **STATISTICAL METHODS AND MODELLING** | **3** | **1** | **0** | **4** | **25** | **75** | **100** |

| | | |
|---|---|---|
| Course Objectives | 1) | To learn basic concepts of a few statistical and give procedures for solving numerically different kinds of problems occurring in engineering and technology. |
| | 2) | It is framed to address the issues and the principles of estimation theory. |
| | 3) | To learn the concept of testing of hypothesis using statistical analysis. |
| | 4) | Identify the direction and strength of a linear correlation between two factors. |
| | 5) | Analyze the data on agriculture field experiments using various types of designs they learned |

| | | | |
|---|---|---|---|
| Course Outcome | **On completion of the course, the students will be able to** | | BT Mapping (Highest Level) |
| | **CO1** | Understand the basic concepts of Statistics | **K2** |
| | **CO2** | Consistency, efficiency and unbiased ness of estimators, method of maximum likelihood estimation and Central Limit Theorem. | **K3** |
| | **CO3** | Apply the concept of testing of hypothesis for small and large samples in real life problems. | **K2** |
| | **CO4** | Concept of linear regression, correlation, and its applications. | **K3** |
| | **CO5** | List the guidelines for designing experiments and recognize the key historical figures in Design of Experiments. | **K3** |

| | | | |
|---|---|---|---|
| **UNIT-I** | **Measures of Dispersion** | **(9Hrs)** | |
| Standard Deviation – Mean Deviation – Quartile Deviation – Range –Measures of Skewness and Pearson's coefficient of skewness– Moments about the arbitrary origin and moments based on measures of skewness and kurtosis. | | | **CO1** |
| **UNIT-II** | **Estimation Theory** | **(9Hrs)** | |
| Estimators: Unbiasedness, Consistency, Efficiency and sufficiency – Maximum likelihood estimation – Method of moments. | | | **CO2** |
| **UNIT-III** | **Testing of Hypothesis** | **(9Hrs)** | |
| Sampling distributions – Small and large samples –Tests based on Normal, t, Chi square, and F distributions for testing of means, variance and proportions — Contingency table (test for independent) Goodness of fit. | | | **CO3** |
| **UNIT- IV** | **Correlation and Regression** | **(9Hrs)** | |
| Correlation –Rank correlation– Regression –Multiple and partial correlation – Method of least squares – Plane of regression – Coefficient of multiple correlation – Coefficient of partial correlation. | | | **CO4** |
| **UNIT- V** | **Design of Experiments** | **(9Hrs)** | |
| Analysis of variance – One way and two-way classifications – Completely randomized design – Randomized block design – Latin square design - $2^2$ Factorial design. | | | **CO5** |

**Text Books**


1. Richard A. Johnson, Irwin Miller and John E. Freund, "Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2018.
2. Murray R. Spegel, Larry J. Stephens, "Schaum's Outlines- Statistics" Mc. Graw Hill Education, 6th Edition ,2017.
3. Gupta. S. C., and Kapoor, V.K., "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, 11th Edition, 2002.
4. Mood, A.M., Graybill, A.M. and Boes, D.C. (1974): "Introduction to theory of Statistics", McGraw Hill.
5. Johnson, R.A. and Wichern, D. W. "Applied Multivariate Statistical Analysis", Pearson Education, Asia, 6th Edition, 2007.


**Reference Books**


1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, New Delhi,10th Edition, 2019.
2. Grewal. B.S. and Grewal. J.S., "Numerical Methods in Engineering and Science ", 10th Edition, Khanna Publishers, New Delhi, 2015.
3. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
4. Dr. G. Balaji "Statistics and Numerical methods" Balaji publication, 11th Edition, 2017.


**Web References**

1. 1. ://nptel.ac.in/courses/110/105/110105087/
2. https https://nptel.ac.in/courses/111/105/111105077/
3. https://www.coursera.org/learn/basic-statistics
4. https://www.youtube.com/watch?v=k3lUo0XYG3E

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* TE – Theory Exam, LE – Lab Exam

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | 1 | - |
| 2 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | - | 2 | 1 | 1 |
| 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | - | - |
| 4 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | - | 2 | 1 | 1 |
| 5 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | - | 2 | - | 1 |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Method**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 10 | | 5 | 5 | 5 | 75 | 100 |

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Department | **Mathematics** | Programme: **B.Tech.** | | | | | | |
| Semester | **II** | Course Category: BS | | | | *End Semester Exam Type: **TE** | | |
| Course Code | **U23MAT204** | Periods / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **LINEAR ALGEBRA** | **3** | **1** | **0** | **4** | **25** | **75** | **100** |

| | | |
|---|---|---|
| FCourse Objectives | 1) | To familiarize the concept of Linear algebra. |
| | 2) | To know determinant of a matrix and the solution of simultaneous linear equations. |
| | 3) | To learn linear dependence and linear independence in vector space. |
| | 4) | Understand the characteristics of matrices. |
| | 5) | To acquaint with the concepts of differential and integral calculus |

| | | | |
|---|---|---|---|
| Course Outcome | **On completion of the course, the students will be able to** | | BT Mapping (Highest Level) |
| | **CO1** | Analyze the concepts of Linear Algebra. | **K2** |
| | **CO2** | Solve systems of linear equations. | **K3** |
| | **CO3** | Recognize and use basic properties of subspaces and vector spaces, Identify the dimension of a vector space. | **K2** |
| | **CO4** | Find Eigen values and eigen vectors, diagonalization of a matrix, Symmetric matrices, Positive definite and similar matrices. | **K3** |
| | **CO5** | Evaluate double integral and triple integral. | **K2** |

| | | | |
|---|---|---|---|
| **UNIT-I** | **Matrices** | **(9Hrs)** | |
| Introduction to Matrices and Determinants; Solution of Linear Equations; Cramer's rule; Inverse of a Matrix. | | | **CO1** |
| **UNIT-II** | **Vectors** | **(9Hrs)** | |
| Vectors and linear combinations; Rank of a matrix; Gaussian elimination; LU Decomposition; Solving Systems of Linear Equations using the tools of Matrices. | | | **CO2** |
| **UNIT-III** | **Vector Space** | **(9Hrs)** | |
| Vector space, Subspace, Dimension, Geometric interpretations, Linearly independent. Basis, Orthogonality. | | | **CO3** |
| **UNIT- IV** | **Eigen Values and Eigen Vectors** | **(9Hrs)** | |
| Eigenvalues and Eigenvectors; Positive definite matrices; Linear transformations; Hermitian and unitary matrices. | | | **CO4** |
| **UNIT- V** | **Calculus** | **(9Hrs)** | |
| Basic concepts of Differential and integral calculus, application of double and triple integral. | | | **CO5** |

**Text Books**


1. B. S. Grewal, Khanna Publishers, "Higher Engineering Mathematics", Khanna Publication, Delhi 4th Edition,2015
2. Gregory Hartman, "Fundamentals of Matrix Algebra", Virginia Military Institute, APEX Calculus, Copyright Year: 2011
3. G. Balaji, "Linear Algebra and Partial Differential Equations: Balaji Publisher,3rd Edition 2017


**Reference Books**


1. Peter V. O'Neil, "Advanced Engineering Mathematics", (Seventh Edition), Cengage Learning,7th Edition 2011.
2. Michael. D. Greenberg, "Advanced Engineering Mathematics", Pearson, 2nd Edition 2013.
3. Gilbert Strang, "Introduction to linear algebra", (Fifth Edition), Wellesley-Cambridge Press,2016
4. P. N. Wartikar & J. N. Wartikar, "Applied Mathematics" (Vol. I & II), Pune Vidyarthi GrihaPrakashan, 2010.
5. M. D. Greenberg," Advanced Engineering Mathematics", Pearson Education, (Second Edition).


**Web References**

1. https://machinelearningmastery.com/introduction-matrices-machine-learning/
2. https://nptel.ac.in/courses/108/104/108104112/
3. https://nptel.ac.in/courses/111108098/
4. https://youtu.be/wo - Vag3yls

* TE – Theory Exam, LE – Lab Exam

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**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | - | - |
| 2 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | - | 2 | - | - |
| 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | - | 1 |
| 4 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | 1 |
| 5 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 2 | 1 | 1 |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Method**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 10 | | 5 | 5 | 5 | 75 | 100 |

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Department | **Master of Business Administration** | Program: **B.Tech.** | | | | | | |
| Semester | **II** | Course Category: HS | | | | *End Semester Exam Type: **TE** | | |
| Course Code | **U23HST201** | Periods / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **FUNDAMENTALS OF ECONOMICS** | **2** | **0** | **0** | **2** | **25** | **75** | **100** |

| | | |
|---|---|---|
| Course Objectives | 1) | To develop an understanding of the framework that economists use to analyse choices made by individuals in response to incentives and consider how these choices can also serve the social interest. |
| | 2) | To Measure how changes in price and income affect the behaviour of buyers and sellers |
| | 3) | To analyze how buyers and sellers interact in a free and competitive market to determine prices and quantities of goods |
| | 4) | To evaluate macro-economic performance using indicators that include output measures and unemployment |
| | 5) | To understand the strengths and weakness of fiscal and monetary policy to determine an appropriate stabilization policy for a given macroeconomic situation |

| | | | |
|---|---|---|---|
| Course Outcome | **On completion of the course, the students will be able to** | | BT Mapping (Highest Level) |
| | **CO1** | Infer how competitive markets organize the allocation of scarce resources and the distribution of goods and services. | **K1** |
| | **CO2** | Relate the basic economic theory and principles to current microeconomic issues and evaluate related public policy. | **K2** |
| | **CO3** | Analyze the various types of markets and compare their efficiency. | **K2** |
| | **CO4** | Determine the major economic indicators used to assess the state of the macro economy. | **K3** |
| | **CO5** | Choose an appropriate fiscal and monetary policy for a given state of the economy. | **K1** |

| | | | |
|---|---|---|---|
| **UNIT-I** | **Demand and Supply** | **(9Hrs)** | |
| Principles of Demand and Supply- Supply Curves of Firms - Elasticity of Supply; Demand Curves of Households- Elasticity of Demand; Equilibrium and Comparative Statics (Shift of a Curve and Movement along the Curve). | | | **CO1** |
| **UNIT-II** | **Welfare Analysis and Consumer Behaviour** | **(9Hrs)** | |
| Consumers' and Producers' Surplus - Price Ceilings and Price Floors; Consumer Behaviour- Axioms of Choice - Budget Constraints and Indifference Curves; Consumer's Equilibrium- Effects of a Price Change, Income and Substitution Effects -Derivation of a Demand Curve; Applications- Tax and Subsidies -Intertemporal Consumption - Suppliers' Income Effect. | | | **CO2** |
| **UNIT-III** | **Production Concept and Cost Concept** | **(9Hrs)** | |
| Theory of Production - Production Function and Iso-quants - Cost Minimization; Cost Curves- Total, Average and Marginal Costs - Long Run and Short Run Costs; Equilibrium of a Firm Under Perfect Competition; Monopoly and Monopolistic Competition. | | | **CO3** |
| **UNIT- IV** | **Macroeconomic Measures of Performance** | **(9Hrs)** | |
| National Income and its Components- GNP, NNP, GDP, NDP; Consumption Function; Investment; Simple Keynesian Model of Income Determination and the Keynesian Multiplier; Government Sector- Taxes and Subsidies; External Sector- Exports and Imports. | | | **CO4** |
| **UNIT- V** | **Stabilization Policy** | **(9Hrs)** | |
| Money- Definitions; Demand for Money-Transactionary and Speculative Demand; Supply of Money- Bank's Credit Creation Multiplier; Integrating Money and Commodity Markets- IS, LM Model; Business Cycles and Stabilization- Monetary and Fiscal Policy - Central Bank and the Government; The Classical Paradigm- Price and Wage Rigidities - Voluntary and Involuntary Unemployment. | | | **CO5** |

**Text Books**


4. Pindyck, Robert S., and Daniel L. Rubinfeld, "Microeconomics", Pearson, Eigth Edition, 2012.
5. Dornbusch, Fischer and Startz, "Macroeconomics", Tata McGraw Hill, Twelfth Edition, 2018.
6. Paul Anthony Samuelson, William D. Nordhaus, "Economics", Tata McGraw Hill, Nineteenth Edition, 2010


**Reference Books**


1. Hal R, Varian, "Intermediate Microeconomics: A Modern Approach", W.W. Norton & Company, Eighth Edition, 2010.
2. N. Gregory Mankiw, Principles of Macroeconomics, Cengage, Eighth Edition, 2015.
3. Case, Karl E., and Ray C. Fair, "Principles of microeconomics", Pearson Education, Thirteenth Edition, 2020.
4. Koutsoyiannis, Anna. Modern microeconomics. Springer, Second Edition, 1975.
5. McConnell, Campbell R., Stanley L. Brue, and Sean Masaki Flynn, "Economics: Principles, problems, and policies", Boston McGraw-Hill/Irwin, 21st Edition, 2018.
6. Froyen, Richard T., and Stephen J. Perez, "Macroeconomics: Theories and policies", Macmillan, 1990.
7. Goodwin, Neva, et al, "Macroeconomics in context", ME Sharpe, Third Edition, 2013.


**Web References**

1. http://economics.mit.edu/
2. http://hbswk.hbs.edu/
3. http://www.cbsnews.com/moneywatch/

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4. http://mruniversity.com/
5. http://www.economist.com/
6. http://www.bloomberg.com/
7. http://www.moneyweek.com/

* TE – Theory Exam, LE – Lab Exam

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 1 | - | - | - | - | - | 1 | - | - | - | - | - | 1 | 1 | - |
| 2 | 1 | - | - | - | - | - | 1 | - | - | - | - | - | 1 | - | - |
| 3 | 1 | - | - | - | - | - | 1 | - | - | - | - | - | 1 | 1 | - |
| 4 | 1 | - | - | - | - | - | 1 | - | - | - | - | - | 1 | - | - |
| 5 | 1 | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Method**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 10 | | 5 | 5 | 5 | 75 | 100 |

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Department | EEE and ECE | Programme: **B.Tech.** | | | | | | |
| Semester | II | Course Category: **ES** | | | | End Semester Exam Type: **TE** | | |
| Course Code | **U23ESTC03** | Periods/Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **Basics of Electrical and Electronics Engineering** | **3** | **0** | **0** | **3** | **25** | **75** | **100** |

**(Common to CSE, IT, MECH, CIVIL, MCTR, CCE, AI&DS, FT and CSBS Branches)**

| | | | |
|---|---|---|---|
| Prerequisite | **Mathematics and Physics** | | |
| Course Outcomes | **On completion of the course, the students will be able to** | | BT Mapping (Highest Level) |
| | **CO1** | Apply the basic concepts and various laws in DC circuits. | **K3** |
| | **CO2** | Analyze the AC circuits and develop resonance conditions for transmitter and receiver circuits. | **K3** |
| | **CO3** | Gain the knowledge of power system components, importance of electrical safety measures and real time applications of transformer and motor. | **K2** |
| | **CO4** | Understand the operator of semiconductor diode and its applications. | **K2** |
| | **CO5** | Explain the characteristics and operation of BJT and FET. | **K2** |
| | **CO6** | Relate and Explain Different Communication Systems. | **K2** |

**Section A – Electrical Engineering**

| | | | |
|---|---|---|---|
| **UNIT - I** | **DC Circuits** | **Periods: 8** | |
| Concept of Potential Difference, Current, Resistance, Inductance and Capacitance, Work, Power, Energy, Current and Voltage sources - ideal and practical sources - concept of dependent and independent sources, Ohm's law, Kirchhoff's law, Series parallel combination of R, L, C components, Voltage Divider and Current Divider Rules, Mesh and Nodal analysis, Star/Delta transformation, Network Theorems - Superposition, Thevenin, Norton and Maximum Power Transfer. | | | **CO1** |
| **UNIT - II** | **AC Circuits** | **Periods: 8** | |
| AC waveform definitions - form factor, peak factor, R-L, R-C, RLC series circuit, R-L-C parallel circuit, phasor representation in polar and rectangular form, concept of impedance, admittance, active, reactive, apparent and complex power, power factor, Resonance in series and parallel circuits, band-width and quality factor, Three Phase balanced AC Circuits (Y-Δ and Y-Y) - Power Measurement – Two Wattmeter method. | | | **CO2** |
| **UNIT - III** | **Electrical Safety and Electrical Machines** | **Periods: 7** | |
| Layout of electrical power system and its functions, Wiring Accessories, Types of domestic wiring, Necessity of earthing, insulators and cables, Safety devices - fuse, relay and circuit breaker - Sensors and its types.<br>Faraday's Law of electromagnetic induction, Fleming's Right and Left hand rule - DC Generator and DC Motor - construction, principle, load test and performance characteristics - Auto transformer, Single phase transformer- construction, principle, load test - Single phase capacitor start and run induction motor – Load test. | | | **CO3** |

**Section B – Electronics Engineering**

| | | | |
|---|---|---|---|
| **UNIT - IV** | **Semiconductor Diodes And Applications** | **Periods: 7** | |
| Introduction semiconductor materials – Doping - Intrinsic and Extrinsic Semiconductor – PN junction diode, structure, characteristics - diffusion and depletion capacitance - Rectifier, Half wave and Full wave rectifier - zener diode characteristics - zener diode as regulator – Light Emitting Diode (LED) - Solar Cell. | | | **CO4** |
| **UNIT - V** | **Transistors** | **Periods: 7** | |
| Bipolar Junction Transistor - construction – operation - Common Base, Common Emitter, Common collector Configuration – characteristics – Biasing - numerical application. Junction Field Effect Transistor (JFET), Metal oxide semiconductor Field Effect Transistor, EMOSFET-DMOSFET operation characteristics - Numerical application. | | | **CO5** |
| **UNIT - VI** | **Communication Systems** | **Periods: 8** | |
| Need for Modulation – Block diagram of analog communication System - AM, FM, PM Definitions and Waveforms – Comparison of digital and analog communication system- Block diagram of digital communication system – Electromagnetic Spectrum. Wired and wireless Channel – Block diagram of communication systems – satellite communication – Cellular Mobile Communication – Fibre Optical Communication System. | | | **CO6** |

| | | | |
|---|---|---|---|
| **Lecture Periods: 45** | **Tutorial Periods:-** | **Practical Periods:-** | **Total Periods: 45** |

**Text Books**


1. R. K. Rajput, "Basic Electrical and Electronics Engineering", University Science Press, 2nd Edition, 2017.
2. Dr. R. Saravanakumar, Dr.V. Jegathesan, Dr. K. Vinoth Kumar, Dr. K. Kowsalya, "Basic Electrical and Electronics Engineering", Wiley Publisher, 2nd Edition, 2022.
3. R. Muthusubramaniam, S. Salivahanan and K. A. Mureleedharan, "Basic Electrical Electronics and Computer Engineering", Tata McGraw Hill, 2018.


**Reference Books**


1. A. Sudhakar and S. P. Shyam Mohan, "Circuits and Networks: Analysis and Synthesis", Tata McGraw Hill Publishing Company Ltd., New Delhi, 4th Edition, 2017.
2. D. P. Kothari and I. J. Nagrath, "Electric Machines", Tata McGraw Hill, New Delhi, 5th Edition, 2017.


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3. B. L. Theraja, A. K. Theraja, "A Textbook of Electrical Technology – Volume - II", S Chand & Co. Ltd., New Delhi, 23rd Edition, 2009.
4. David. A. Bell, "Electronic Devices and Circuits", PHI Learning Private Ltd, India, 4th Edition, 2020
5. Wayne Tomasi, "Electronic Communication Systems- Fundamentals Theory Advanced", Pearson Education, 6th Edition, 2018.

**Web References**

1. https://nptel.ac.in/courses/108/108/108108076/
2. https://www.electrical4u.com/
3. https://nptel.ac.in/courses/108/102/108102146/
4. https://onlinecourses.nptel.ac.in/noc21_ee55/
5. https://nptel.ac.in/courses/117/102/117102059

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 3 | 3 | - | 2 | - | - | - | - | - | - | 1 | 3 | 2 | - |
| 2 | 3 | 3 | 3 | - | 2 | - | - | - | - | - | - | 1 | 3 | 2 | - |
| 3 | 3 | 3 | 3 | - | 2 | - | - | - | - | - | - | 1 | 3 | 2 | - |
| 4 | 3 | 3 | 3 | - | 2 | - | - | - | - | - | - | 1 | 3 | 2 | - |
| 5 | 3 | 3 | 3 | - | 2 | - | - | - | - | - | - | 1 | 3 | 2 | - |
| 6 | 3 | 3 | 3 | - | 2 | - | - | - | - | - | - | 1 | 3 | 2 | - |

**Correlation Level: 1 – Low, 2 – Medium, 3 – High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 5 | 5 | 5 | 5 | 5 | 75 | 100 |

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Department | **Artificial Intelligence and Data Science** | Programme: **B.Tech** | | | | | | |
| Semester | **II** | Course Category: **ES** | | | | End Semester Exam Type: **TE** | | |
| Course Code | **U23ADTC01** | Periods / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **Programming In Python** | **3** | **0** | **0** | **3** | **25** | **75** | **100** |
| | (Common to All Branches) | | | | | | | |
| Prerequisite | NIL | | | | | | | |

| | | | |
|---|---|---|---|
| Course Outcome | **On completion of the course, the students will be able to** | | BT Mapping (Highest Level) |
| | **CO1** | Interpret the basic concepts of Python programs. | **K2** |
| | **CO2** | Articulate the concepts of Sets, Dictionaries and Object-Oriented concepts. | **K2** |
| | **CO3** | Experiment with Numpy package. | **K3** |
| | **CO4** | Apply and analyze Data Manipulation with Pandas. | **K3** |
| | **CO5** | Illustrate programming concept for Visualization with Matplotlib. | **K3** |

| | | | |
|---|---|---|---|
| **UNIT-I** | **Introduction To Python** | **Periods: 09** | |
| Structure of Python Program – Underlying mechanism of Module Execution – Branching and Looping – Problem Solving Using Branches and Loops – Functions – Lambda Functions – Lists and Mutability – Problem Solving Using Lists and Functions. | | | **CO1** |
| **UNIT-II** | **Sequence Datatypes and Object-Oriented Programming** | **Periods: 09** | |
| Sequences – Mapping and Sets – Dictionaries. Classes: Classes and Instances – Inheritance – Exception Handling – Introduction to Regular Expressions using "re" module. | | | **CO2** |
| **UNIT-III** | **Using Numpy** | **Periods: 09** | |
| Basics of NumPy – Computation on NumPy – Aggregations – Computation on Arrays – Comparisons – Masks and Boolean Arrays – Fancy Indexing – Sorting Arrays – Structured Data: NumPy's Structured Array. | | | **CO3** |
| **UNIT-IV** | **Data Manipulation with Pandas** | **Periods: 09** | |
| Introduction to Pandas Objects – Data indexing and Selection – Operating on Data in Pandas – Handling Missing Data – Hierarchical Indexing – Combining Data Sets. Aggregation and Grouping – Pivot Tables –Vectorized String Operations – Working with Time Series – High Performance Pandas – eval() and query(). | | | **CO4** |
| **UNIT-V** | **Visualization with Matplotlib** | **Periods: 09** | |
| Basic functions of Matplotlib – Simple Line Plot – Scatter Plot – Density and Contour Plots – Histograms – Binnings and Density – Customizing Plot Legends – Colour Bars – Three-Dimensional Plotting in Matplotlib. | | | **CO5** |

| | | | |
|---|---|---|---|
| **Lecture Periods: 45** | **Tutorial Periods:** | **Practical Periods: -** | **Total Periods: 45** |

**Text Books**


1. Jake VanderPlas, "Python Data Science Handbook - Essential Tools for Working with Data", O'Reily Media Inc, 2016.
2. Zhang.Y, "An Introduction to Python and Computer Programming", Springer Publications, 2016.
3. Wesley J Chun, "Core Python Programming", Pearson Education, 2nd Edition, 2006.


**Reference Books**


1. John Paul Mueller, Luca Massaron, "Python for Data Science for Dummies", 2nd Edition, John Wiley& Sons, 2019.
2. Jesus Rogel-Salazar, "Data Science and Analytics with Python", CRC Press Taylor and Francis Group, 2017.
3. Brian Draper, "Python Programming A Complete Guide for Beginners to Master and Become an Expert in Python Programming Language", CreateSpace Independent Publishing Platform, 2016.
4. Mark Lutz, Laura Lewin, Frank Willison, "Programming Python", O'Reilly Media, 3rd Edition, 2006.
5. Gowrishankar S, Veena A, "Introduction to Python Programming", CRC Press, 2018.


**Web References**


1. https://nptel.ac.in/courses/106/106/106106212/
2. https://www.geeksforgeeks.org/data-analysis-visualization-python/
3. https://www.coursera.org/learn/python-data-analysis
4. https://www.python.org/
5. https://www.programiz.com/python-programming


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**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 2 | 1 | - | - | 3 | - | - | - | - | - | - | - | 3 | - | 3 |
| 2 | 2 | 2 | 1 | 3 | - | - | - | - | - | - | - | 2 | 2 | 2 | 3 |
| 2 | 3 | 2 | 2 | 3 | - | - | - | - | - | - | - | 2 | 3 | 2 | 3 |
| 3 | 3 | 3 | 2 | 3 | - | - | - | - | - | - | - | 3 | 3 | 3 | 3 |
| 2 | 3 | 3 | 2 | 3 | - | - | - | - | - | - | - | 2 | 3 | 3 | 3 |
| 3 | 3 | 3 | 2 | 3 | - | - | - | - | - | - | - | 3 | 3 | 3 | 3 |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Methods**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 5 | 5 | 5 | 5 | 5 | 75 | 100 |

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Department | **Computer Science and Business Systems** | Programme: **B.Tech.** | | | | | | |
| Semester | **II** | Course Category: PC | | | | *End Semester Exam Type: **TE** | | |
| Course Code | **U23CBT202** | Periods / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **DATA STRUCTURES & ALGORITHMS** | **3** | **0** | **0** | **3** | **25** | **75** | **100** |

| | | |
|---|---|---|
| Course Objectives | 1) | To understand performance analysis of an algorithm |
| | 2) | To learn linear data structures |
| | 3) | To learn non-linear data structures |
| | 4) | To understand sorting, searching and hashing algorithms |
| | 5) | To learn file organization and accessing methods |

| | | | |
|---|---|---|---|
| Course Outcome | **On completion of the course, the students will be able to** | | BT Mapping (Highest Level) |
| | **CO1** | Understand the usage and analysis of algorithms in computing. | **K1** |
| | **CO2** | Implement and apply linear data structures to solve various problems | **K3** |
| | **CO3** | Represent and apply non-linear data structures to solve real time problems | **K2** |
| | **CO4** | Develop and analyse algorithms for sorting and searching data organized in linear and non-Linear data structures. | **K3** |
| | **CO5** | Understand various file organization and accessing methods | **K2** |

| | | | |
|---|---|---|---|
| **UNIT-I** | **Concepts of Algorithm and Data Organisation** | **(9Hrs)** | |
| Algorithm specification – Recursion - Performance analysis - Asymptotic Notation - The Big-O - Omega and Theta notation - Programming Style - Refinement of Coding - Time-Space Trade Off – Testing - Data Abstraction | | | **CO1** |
| **UNIT-II** | **Linear Data Structure** | **(9Hrs)** | |
| Array - Stack - Queue - Linked-list and its types - Various Representations - Operations & Applications of Linear Data Structures. | | | **CO2** |
| **UNIT-III** | **Non-Linear Data Structure** | **(9Hrs)** | |
| Trees - Binary Tree - Threaded Binary Tree - Binary Search Tree – B-Tree - B+ Tree - AVL Tree - Splay Tree. Graphs: Basic Terminologies - Directed – Undirected - Various Representations - Operations - Graph search and traversal algorithms - complexity analysis - Applications of Non-Linear Data Structures. | | | **CO3** |
| **UNIT- IV** | **Searching And Sorting On Various Data Structures** | **(9Hrs)** | |
| Sequential Search - Binary Search - Comparison Trees - Breadth First Search - Depth First Search Insertion Sort - Selection Sort - Shell Sort - Divide and Conquer Sort - Merge Sort - Quick Sort- Heapsort - Introduction to Hashing | | | **CO4** |
| **UNIT- V** | **File Concepts** | **(9Hrs)** | |
| File Organisation – Sequential – Direct - Indexed Sequential - Hashed and various types of accessing schemes. | | | **CO5** |

**Text Books**


7. E. Horowitz, S. Sahni, S. A-Freed, "Fundamentals of Data Structures", Universities Press, Second Edition, 2008.
8. A. V. Aho, J. E. Hopperoft, J. D. Ullman, "Data Structures and Algorithms", Pearson, First Edition, 2003.
9. Gregory L. Heilman, Data Structures, Algorithms and Object Oriented Programming, Tata Mcgraw-Hill, New Delhi, 2002.
10. Jean-Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications, Second Edition, Tata McGraw-Hill, New Delhi, 1991.
11. Alfred V. Aho, John E. Hopcroft and Jeffry D. Ullman, Data Structures & Algorithms, Pearson Education, New Delhi, 2006


**Reference Books**


6. Donald E. Knuth, "The Art of Computer Programming: Volume 1: Fundamental Algorithms", Third Edition, Dorling Kindersley Pvt Ltd, Third Edition, 1997.
7. Thomas, H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", The MIT Press,Third Edition,2009 .
8. Pat Morin, "Open Data Structures: An Introduction (Open Paths to Enriched Learning)", UBC Press, Thirty First Edition, 2013.


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**Web References**

1. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
2. https://nptel.ac.in/courses/106/102/106102064/
3. https://www.geeksforgeeks.org/data-structures/
4. https://www.javatpoint.com/data-structure-tutorial

* TE – Theory Exam, LE – Lab Exam

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - |
| 2 | 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | 2 | 1 | - |
| 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 2 | 1 | - |
| 4 | 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | 3 | 2 | - |
| 5 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | 1 | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Method**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | CAT 1 | CAT 2 | Model Exam | Assignment* | Attendance | | |
| Marks | 10 | | 5 | 5 | 5 | 75 | 100 |

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

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|---|---|---|---|---|---|---|---|---|
| Department | **English** | Programme: **B.Tech.** | | | | | | |
| Semester | **II** | Course Category: **HS** | | | | *End Semester Exam Type:**TE** | | |
| Course Code | **U23ENB202** | Periods/Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **BUSINESS COMMUNICATION & VALUE SCIENCE - II** | **2** | **0** | **2** | **3** | **50** | **50** | **100** |
| (Common to ALL Branches except CSBS) | | | | | | | | |
| Prerequisite | Basics of Communication Skills | | | | | | | |

| Course Outcome | **On completion of the course, the students will be able to** | | BT Mapping (Highest Level) |
|---|---|---|---|
| | **CO1** | Understand tools of structured written communication | **K2** |
| | **CO2** | Apply the mechanics of creative writing with precision and clarity | **K3** |
| | **CO3** | Acquire the skill to work in team and professionally groom the overall personality | **K3** |
| | **CO4** | Develop the art of reviewing and giving feedback | **K3** |
| | **CO5** | Understands varied effective communication skills and express the ideas with clarity and focus | **K2** |

| **UNIT-I** | **Societal Needs and Expertise Writing** | **Periods:10** |
|---|---|---|
| Individual identification of social issues - Theory to introduce the participant - Class discussion: Good and Bad Writing - Common errors, punctuation rules, and use of technical words. Refer Catherine Morris and Joanie McMahon's writing techniques-. The personal take away acquired from GD, | | **CO1** |
| **UNIT-II** | **Innovative Designing Skills** | **Periods:10** |
| Each group will form an NGO. Create Vision, Mission, Value statement, tagline and Design a logo. Introduction to basic presentation skills & ORAI app. Skimming and Scanning. | | **CO2** |
| **UNIT-III** | **Interpersonal Skills** | **Periods:10** |
| Ad campaign- Brain storming, , Intro of Dr. Meredith Belbin and his research on team work, Belbin's 8 Team Roles and Lindgren's Big 5 personality traits. Team Falcon Practical to identify individual personality traits with Belbin's 8 team player styles. Design a skit, and Enact the play on interpersonal skills | | **CO3** |
| **UNIT-IV** | **Reviewing** | **Periods:15** |
| **List of Exercises**<br>**Listening:** Awareness related to "Join Hands Movement', A short film on diversity<br>**Speaking:** Debriefing of the Practical.- Film: "The fish and I" by Babak Habibifar" (1.37mins),<br>**Reading:** Research on a book, incident or film based on the topic of your respective NGO and give feedback.<br>**Writing:** Groups to create a story – 10 minutes of a person's life affected by the social issue groups are working on | | **CO4** |
| **UNIT-V** | **Diversified Communication Skills** | **Periods:15** |
| **List of Exercises**<br>**Listening:** Teams to video record interviews of people from diverse groups. Share the recordings in FB - -<br>**Speaking:** Debate - Discussion on TCS values<br>**Reading:** Diversity & Inclusion - Different forms of Diversity in society<br>**Writing:** Write a review in a blog on the topics they are covering in their research | | **CO5** |

| **LecturePeriods:30** | **Tutorial Periods: -** | **Practical Periods:30** | **Total Periods:60** |
|---|---|---|---|

**Text Books**


1. Dr.Kalam , Abdul .A.P.J & Mahapragya ,Acharya.."The Family and the Nation"; 2015;:
2. Kumar, Sanjay, Pushpalatha," Communication Skills". Oxford University Press, 2018.
3. Raman, Meenakshi&Sangeetha Sharma," Communication Skills", New Delhi: OUP,2018.


**Reference Books**


1. Peter H. Diamandis,Steven Kotler, "Abundance: The Future is Better Than You Think", : Free Press, 21 Feb, 2012
2. Sinek,simon, " Start With Why: How Great Leaders Inspire Everyone to Take Action" Penguin, 6 October 2011
3. Grussendorf, Marion, "E nglish for Presentations". Oxford University Press, Oxford, 2007.
4. Seely John, "The Oxford Guide to Writing and Speaking", Oxford University Press, 2006.
5. Dr.Kalam , Abdul .A.P.J, " Guiding Souls : Dialogues on the purpose of life" , 2005


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| Web References |
|---|
| 1. https://www.indeed.com/career-advice/finding-a-job/how-to-write-an-application-letter<br>2. https://owlcation.com/humanities/Four-Types-of-Writing<br>3. https://targetstudy.com/languages/english/paragraph-writing.html<br>4. https://www.businessnewsdaily.com/8262-email-etiquette-tips.html<br>5. https://www.youtube.com/watch?v=UOceysteljo |

* TE – Theory Exam, LE – Lab Exam

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 1 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | - | - |
| 2 | 1 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | - | - |
| 3 | 1 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | - | - |
| 4 | 1 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | - | - |
| 5 | 1 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | - | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

**Evaluation Method**

| Assessment | Continuous Assessment Marks (CAM) | | | | | | | | | End Semester Examination (ESE) Marks (Practical – Internal Evaluation) | End Semester Examination (ESE) Marks (Theory) | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Continuous Assessment (Theory) | | | | | Continuous Assessment (Practical) | | | | | | |
| | CAT 1 | CAT 2 | Model | Attendance | Total | Conduction of Practical | Report | Viva | Total | | | |
| Marks | 5 | 5 | 5 | 5 | 20* | 15 | 10 | 5 | 30* | 30 | 75** | - |
| *To be weighted for 10 Marks | | | | | 10 | *To be weighted for 10 Marks | | | 10 | | *To be weighted for 50 Marks | 100 |

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|---|---|---|---|---|---|---|---|---|
| Department | **Computer Science and Business Systems** | Programme: **B.Tech.** | | | | | | |
| Semester | **II** | Course Category: **BS** | | | *End Semester Exam Type: **LE** | | | |
| Course Code | **U23MAP201** | Periods / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | **STATISTICAL METHODS AND MODELLING LABORATORY** | **0** | **0** | **2** | **1** | **50** | **50** | **100** |

| | | | |
|---|---|---|---|
| Course Outcome | **On completion of the course, the students will be able to** | | BT Mapping (Highest Level) |
| | **CO1** | Gain knowledge in the concepts of statistical methods and models. | **K2** |
| | **CO2** | Trained for data collection on various fields of survey enabling them to classify them statistically. | **K3** |
| | **CO3** | Familiarized in various statistical software. | **K3** |
| | **CO4** | Find the correlation between two variables. | **K2** |
| | **CO5** | Compute regression lines. | **K3** |

**List of Experiments**

1. Descriptive Statistics
2. Test for Single mean
3. Test for difference of mean
4. Standard Deviation
5. Sampling distributions
6. ANOVA One-way Classification
7. Two-way ANOVA
8. Chi-Square Test
9. Correlation and Regression (Simple and Multiple)
10. Maximum likelihood estimation

| | | | |
|---|---|---|---|
| **Lecture Periods:** | **Tutorial Periods:** | **Practical Periods: 30** | **Total Periods: 30** |

**Web references**

1. https://www.mathworks.com/help/matlab/ref/std.html
2. https://www.mathworks.com/help/stats/mle.html
3. https://wwhw.mathworks.com/help/stats/two-way-anova.html
4. https://youtu.be/ullVTCmQdpI
5. www.youtube.com/watch?v=ullVTCmQdpI

* TE – Theory Exam, LE – Lab Exam

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 2 | 2 | 2 | 1 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| 3 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | - | - | - | - | - |
| 4 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | - | - |
| 5 | 2 | 2 | 1 | 1 | - | - | - | - | - | - | - | - | 1 | 1 | - |
| 1 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Correlation Level: 1 - Low, 2 - Medium, 3 – High**

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**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | 1 | - |
| 2 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | 1 | - |
| 3 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | 1 | - |
| 4 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | 1 | - |
| 5 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | 1 | - |

**Evaluation Method**

| Assessment | Continuous Assessment Marks (CAM) | | | | | End Semester Examination (ESE) Marks | Total Marks |
|---|---|---|---|---|---|---|---|
| | Performance in practical classes | | | Model Practical Examination | Attendance | | |
| | Conduction of practical | Record work | viva | | | | |
| Marks | 15 | 5 | 5 | 15 | 10 | 50 | 100 |

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|---|---|---|---|---|---|---|---|---|
| Department | Computer Science and Business Systems | Programme: B.Tech. | | | | | | |
| Semester | II | Course Category: MC | | | End Semester Exam Type: - | | | |
| Course Code | U23CBM202 | Periods / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CAM | ESE | TM |
| Course Name | Sports Yoga and NSS | 0 | 0 | 2 | Non-Credit | 100 | - | 100 |
| Prerequisite | - | | | | | | | |

| Course Outcomes | On completion of the course, the students will be able to | BT Mapping (Highest Level) |
|---|---|---|
| CO1 | Practice Physical activities and Hatha Yoga focusing on yoga for strength, flexibility and relaxation. | K2 |
| CO2 | Understand basic skills associated with yoga and physical activities including strength and flexibility, balance and coordination. | K2 |
| CO3 | Develop understanding of psychological problems associated with age and lifestyle. | K2 |
| CO4 | Recognize the importance of national service in community development. | K2 |
| CO5 | Convert existing skills into socially relevant life skills. | K2 |

| | | |
|---|---|---|
| **UNIT-I** | **Introduction To Physical Education** | **Periods: 06** |
| Definition, Aims and Objectives of Physical Education - Changing trends in Physical Education<br>**Physical Fitness, Wellness and Lifestyle:** Importance of Physical Fitness and Wellness - Components of Physical fitness - Components of Health related fitness - Components of wellness - Preventing Health Threats through Lifestyle Change - Concept of Positive Lifestyle. | | CO1 |
| **UNIT-II** | **Yoga and Lifestyle** | **Periods: 06** |
| Importance of Yoga - Elements of Yoga - Introduction - Asanas, Pranayama, Meditation and Yogic Kriyas - Yoga for concentration and related Asanas (Sukhasana, Tadasana, Padmasana and Shashankasana) - Relaxation Techniques for improving concentration - Yog-nidra. Asanas as preventive measures – Hypertension – Obesity - Back Pain-Diabetes - Asthema. | | CO2 |
| **UNIT-III** | **Training And Planning In Sports** | **Periods: 06** |
| Training - Warming up and limbering down-Skill, Technique and Style - Objectives of Planning – Tournament - Knock-Out, League/Round Robin and Combination.<br>**Psychology and Sports** - Important of Psychology in Physical Education and Sports - Differentiate Between Growth and Development - Adolescent problems and their Management - Emotion: Concept, Type and Controlling of emotions - Concepts and Types of Aggressions in Sports - Psychological benefits of exercise - Anxiety and Fear and its effects on Sports Performance - Motivation, its type and techniques - Understanding Stress and Coping strategies | | CO3 |
| **UNIT-IV** | **Introduction To National Service Scheme** | **Periods: 06** |
| Orientation of NSS volunteers: History, motto, symbol, awards, structure and activities of NSS - Days of National and International Importance - Sensitizing about the thrust areas and awareness activities - Importance of tree plantation and voluntary blood donation - The role of SHGs and NGOs in community development – CSR - Life skills and youth development-extension activities in HEIs - various clubs and schemes like RRC, ELC, YRC, UBA, SBA, etc., | | CO4 |
| **UNIT-V** | **Community Issues and The Use Of Technology** | **Periods: 06** |
| Common Problems of rural India - Technology development and its suitability – Sustainability - Value addition to agricultural products - Service learning and youth volunteering – Shramdaan - Campus cleaning - Field visit to nearby communities - village survey - Initiatives to clean and green environment - preservation of water bodies in adopted villages. | | CO5 |

| | | | |
|---|---|---|---|
| **Lecture Periods: -** | **Tutorial Periods: -** | **Practical Periods: 30** | **Total Periods: 30** |

**Reference Books**


1. Brar Ajmer Singh, Gill Jagtar Singh, Bains Jagdish, "Modern Textbook of Physical Education Health and Sports- I", Kalyani Publishers , 6th Edition, 2014
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2. http://en.wikipedia.org/wiki/national-service-scheme 19=http://nss.nic.in/adminstruct
3. http://nss.nic. in
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Evaluation methods

| Assessment | Continuous Assessment Marks (CAM) | | | Total Marks |
|---|---|---|---|---|
| | Attendance | MCQ Test | Presentation / Activity / Assignment | |
| Marks | 10 | 30 | 60 | 100 |

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