# Course Outcomes and Program Outcomes

**Program Outcomes (POs)**

| POs | Statements |
|---|---|
| **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, review research literature, and analyze complex engineering problem researching 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 modelling 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 |

| POs | Statements |
|---|---|
| | 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. |

**Program Specific Outcomes (PSOs)**

| PSOs | Statements |
|---|---|
| **PSO1** | Our Biotech graduates shall possess strong knowledge in the field of biotechnology and applied sciences. |
| **PSO2** | Our Biotech graduates shall be able to design and conduct experiments in biotechnology as well as analyze and interpret data. |
| **PSO3** | Our Biotech graduates shall be able to use current techniques, skills and modern tools necessary for modelling and design of bioprocesses. |

***Course Outcomes (COs)*** ***(05)***

***Course Name: C204 – Basic Industrial Biotechnology***

***Year of Study: 2019-20 (ODD Sem)***

| COs | Statements |
|---|---|
| **C204.1** | Students will be able to learn, define and understand the basics in industrial bioprocess and to explain the steps involved in the production of bioproducts and methods to improve modern biotechnology. |
| **C204.2** | Students will be able to measure and manufacture the primary metabolites of commercial importance and apply basic biotechnological principles, methods and models to solve biotechnological tasks. |
| **C204.3** | Students will be able to measure, manufacture and formulate the secondary metabolites of commercial importance. |
| **C204.4** | Students will be able to isolate, identify, characterize and apply in the production of enzymes and bioproducts. |
| **C204.5** | Students will be able to estimate, evaluate and express the production of therapeutic and diagnostic products and design and deliver useful modern biotechnology products to the Society |

***Course Name: C212 (Molecular Biology)***
***Year of Study: 2019-20 (EVEN Sem)***

| COs | Statements |
|---|---|
| **C212.1** | Understand the basic structure and physicochemical properties of elements in DNA and RNA. |
| **C212.2** | Understand the Central dogma of life and identify the principle and differences between the DNA replication of prokaryotes and eukaryotes. |
| **C212.3** | Gain knowledge about the mechanism behind prokaryotic and eukaryotic transcription. They also additionally understand the basic concepts in RNA world: Ribozymes and RNA processing. |
| **C212.4** | Know how to elucidate the genetic code and understand the mechanism and differences between prokaryotes and eukaryotes translation. |
| **C212.5** | Gain knowledge about gene organization and mechanism of gene expression in various organisms. |

***Course Name: C301 (Mass Transfer Operations)***
***Year of Study: 2020-21 (ODD Sem)***

| COs | Statements |
|---|---|
| **C301.1** | Gas -liquid, vapour- liquid and solid- liquid and liquid–liquid equilibrium. |
| **C301.2** | Classify and use the accurate engineering correlations of diffusion and mass transfer coefficients to model a separation process. |
| **C301.3** | Investigate multi-stage equilibrium separation processes, simultaneous phase equilibrium and mass balances in continuous separation processes |
| **C301.4** | Design and understand operating principles of extraction and leaching |
| **C301.5** | Design and construction with operating principles of process economics of separating equipment (Dryers and Adsorbers) |

***Course Name: C313 (Animal Biotechnology)***
***Year of Study: 2020-2021 (EVEN Sem)***

| COs | Statements |
|---|---|
| **C313.1** | Understand the basic of animal Tissue culture, Maintenance and its preservation along with different culture techniques |
| **C313.2** | Learn various viral and bacterial disease and different molecular biology Techniques. |

| | |
|---|---|
| **C313.3** | Develop vaccines by understanding the Recombinant cytokines and their use in the treatment of animal infections. |
| **C313.4** | Learn about micromanipulation technology of Embryos for the enrichment of X and Y bearing sperms for artificial insemination and embryo transfer |
| **C313.5** | Appreciate the concepts of transgenic animal technology and choose among the strategies for the production of transgenic animals |

***Course Name: C405 (Tissue Engineering)***
***Year of Study: 2021-22 (ODD Sem)***

| COs | Statements |
|---|---|
| **C405.1** | Understand the components of the tissue architecture and fundamental properties of cells and tissues |
| **C405.2** | Gain depth knowledge in wound healing and growth factors |
| **C405.3** | Be Aware about the properties and broad applications of biomaterials |
| **C405.4** | Opportunity to get familiarized with the stem cell characteristics and their relevance in medicine |
| **C405.5** | Overall exposure to the role of tissue engineering and stem cell therapy in Organogenesis |

***Course Name: C409 (Project Work)***
***Year of Study: 2021-22 (EVEN Sem)***

| COs | Statements |
|---|---|
| **C410.1** | Identify their field of interest |
| **C410.2** | Search and think about logical solutions |
| **C410.3** | Formulate and analyze a problem |
| **C410.4** | Plan experiments to find solutions in a logical manner |
| **C410.5** | Analyze the results, interpret and communicate in an effective manner |

**C204 is the fourth course in second year and '.1' to '.5' are the outcomes of this course.**

*CO-PO matrices of courses selected in 3.1.1*

**CO-PO matrices of selected courses**

Note: Correlation levels 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

***CO-PO Matrix for C204 – Basic Industrial Biotechnology***

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **C204.1** | 3 | 0 | 0 | 1 | 2 | 0 | 1 | 0 | 1 | 0 | 1 | 1 |
| **C204.2** | 2 | 2 | 1 | 3 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 2 |
| **C204.3** | 2 | 2 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| **C204.4** | 2 | 2 | 1 | 3 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 2 |
| **C204.5** | 2 | 2 | 2 | 3 | 3 | 2 | 0 | 1 | 0 | 2 | 1 | 2 |
| **Average** | **2.20** | **2.00** | **1.25** | **2.60** | **2.40** | **1.25** | **1.33** | **1.00** | **1.00** | **1.25** | **1.00** | **1.80** |

***CO-PO Matrix for C212– Molecular Biology***

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **C212.1** | 2 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 |
| **C212.2** | 1 | 1 | 3 | 2 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| **C212.3** | 1 | 1 | 2 | 2 | 3 | 1 | 1 | 0 | 1 | 0 | 1 | 1 |
| **C212.4** | 1 | 1 | 2 | 2 | 3 | 1 | 1 | 2 | 1 | 1 | 0 | 1 |
| **C212.5** | 1 | 1 | 2 | 1 | 3 | 2 | 2 | 1 | 2 | 0 | 0 | 1 |
| **Average** | **1.20** | **1.20** | **2.40** | **1.60** | **2.40** | **1.25** | **1.20** | **1.33** | **1.33** | **1.00** | **1.00** | **1.00** |

***CO-PO Matrix for C301–Mass Transfer Operations***

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **C301.1** | 3 | 2 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 2 |
| **C301.2** | 2 | 2 | 3 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| **C301.3** | 3 | 2 | 3 | 2 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| **C301.4** | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| **C301.5** | 3 | 2 | 2 | 3 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| **Average** | **2.60** | **2.00** | **2.80** | **2.20** | **1.00** | **1.00** | **1.00** | **1.00** | **1.00** | **1.00** | **1.00** | **2.00** |

*CO-PO Matrix for C313–Animal Biotechnology*

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **C313.1** | 2 | 1 | 2 | 3 | 3 | 1 | 2 | 1 | 0 | 1 | 1 | 0 |
| **C313.2** | 3 | 1 | 3 | 3 | 3 | 2 | 2 | 0 | 0 | 1 | 1 | 1 |
| **C313.3** | 2 | 1 | 1 | 1 | 3 | 2 | 2 | 1 | 0 | 1 | 1 | 1 |
| **C313.4** | 3 | 1 | 1 | 2 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 |
| **C313.5** | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 |
| **Average** | **2.40** | **1.00** | **1.80** | **2.20** | **3.00** | **2.20** | **2.20** | **1.50** | **1.00** | **1.00** | **1.00** | **1.00** |

*CO-PO Matrix for C405– Tissue Engineering*

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **C403.1** | 2 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| **C403.2** | 2 | 2 | 1 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| **C403.3** | 2 | 2 | 2 | 2 | 0 | 1 | 0 | 2 | 0 | 1 | 0 | 1 |
| **C403.4** | 2 | 2 | 2 | 2 | 3 | 1 | 2 | 3 | 2 | 0 | 2 | 1 |
| **C403.5** | 2 | 2 | 2 | 2 | 3 | 1 | 2 | 3 | 2 | 1 | 2 | 2 |
| **Average** | **2.00** | **1.80** | **1.60** | **1.80** | **2.67** | **1.00** | **2.00** | **2.67** | **1.67** | **1.00** | **1.67** | **1.33** |

*CO-PO Matrix for C409–Project Works*

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **C410.1** | 2 | 2 | 2 | 1 | 1 | 2 | 0 | 2 | 1 | 2 | 0 | 2 |
| **C410.2** | 2 | 2 | 2 | 1 | 1 | 2 | 0 | 2 | 2 | 2 | 0 | 2 |
| **C410.3** | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 2 |
| **C410.4** | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 2 | 3 |
| **C410.5** | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 3 |
| **Average** | **2.20** | **1.80** | **2.00** | **1.60** | **1.40** | **1.60** | **1.67** | **2.40** | **2.20** | **2.20** | **1.67** | **2.40** |

**CO-PSO matrices of selected courses**

Note: Correlation levels 1: Slight (Low)2: Moderate (Medium)3: Substantial (High)

***CO-PSO Matrix for C204–Basic Industrial Biotechnology***

| CO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **C204.1** | 1 | 1 | 2 |
| **C204.2** | 2 | 2 | 3 |
| **C204.3** | 2 | 2 | 3 |
| **C204.4** | 2 | 2 | 3 |
| **C204.5** | 2 | 2 | 3 |
| **Average** | **1.80** | **1.80** | **2.80** |

***CO-PSO Matrix for C212–Molecular Biology***

| CO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **C212.1** | 3 | 2 | 1 |
| **C212.2** | 3 | 2 | 1 |
| **C212.3** | 3 | 2 | 1 |
| **C212.4** | 3 | 2 | 1 |
| **C212.5** | 3 | 2 | 1 |
| **Average** | **3.00** | **2.00** | **1.00** |

***CO-PSO Matrix for C301–Mass Transfer Operations***

| CO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **C301.1** | 2 | 2 | 2 |
| **C301.2** | 2 | 2 | 3 |
| **C301.3** | 2 | 3 | 3 |
| **C301.4** | 3 | 3 | 3 |
| **C301.5** | 3 | 3 | 3 |
| **Average** | **2.40** | **2.60** | **2.80** |

**CO-PSO Matrix for C313–Animal Biotechnology**

| CO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **C313.1** | 3 | 2 | 2 |
| **C313.2** | 3 | 3 | 3 |
| **C313.3** | 2 | 3 | 2 |
| **C313.4** | 2 | 3 | 3 |
| **C313.5** | 3 | 2 | 3 |
| **Average** | **2.60** | **2.60** | **2.60** |

***CO-PSO Matrix for C405– Tissue Engineering***

| CO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **C403.1** | 1 | 1 | 1 |
| **C403.2** | 1 | 3 | 1 |
| **C403.3** | 1 | 3 | 2 |
| **C403.4** | 1 | 3 | 2 |
| **C403.5** | 1 | 2 | 2 |
| **Average** | **1.00** | **2.40** | **1.60** |

***CO-PSO Matrix for C409– Project Work***

| CO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **C410.1** | 1 | 1 | 1 |
| **C410.2** | 1 | 3 | 1 |
| **C410.3** | 1 | 3 | 2 |
| **C410.4** | 1 | 3 | 2 |
| **C410.5** | 1 | 2 | 2 |
| **Average** | **1.00** | **2.40** | **1.60** |

**Program level course – CO matrix of all courses including first year courses**

**Subject Details (R-2017)**

| Sl. No. | Course Code | Subject Code | Subject Name |
|---|---|---|---|
| 1. | C101 | HS8151 | Communicative English |
| 2. | C102 | MA8151 | Engineering Mathematics – I |
| 3. | C103 | PH8151 | Engineering Physics |
| 4. | C104 | CY8151 | Engineering Chemistry |
| 5. | C105 | GE8151 | Problem Solving and Python Programming |
| 6. | C106 | GE8152 | Engineering Graphics |
| 7. | C107 | GE8161 | Problem Solving and Python Programming Laboratory |
| 8. | C108 | BS8161 | Physics and Chemistry Laboratory |
| 9. | C109 | HS8251 | Technical English |
| 10. | C110 | MA8251 | Engineering Mathematics II |
| 11. | C111 | PH8254 | Physics of Materials |
| 12. | C112 | BE8252 | Basic Civil and Mechanical Engineering |
| 13. | C113 | BT8291 | Microbiology |
| 14. | C114 | BT8251 | Biochemistry |
| 15. | C115 | GE8261 | Engineering Practice Laboratory |
| 16. | C116 | BT8261 | Biochemistry Laboratory |
| 17. | C201 | MA8353 | Transforms and Partial differential equations |
| 18. | C202 | BT8301 | Stoichiometry |
| 19. | C203 | BT8302 | Applied Thermodynamic for Biotechnologists |
| 20. | C204 | BT8303 | Basic Industrial Biotechnology |
| 21. | C205 | BT8304 | Bioorganic Chemistry |
| 22. | C206 | BT8305 | Cell Biology |
| 23. | C207 | BT8361 | Microbiology Laboratory |
| 24. | C208 | BT8311 | Cell Biology Laboratory |
| 25. | C209 | HS8381 | Interpersonal Skills/Listening and Speaking |
| 26. | C210 | MA8391 | Probability and Statistics |
| 27. | C211 | BT8401 | Fluid Mechanics and Heat Transfer Operations |
| 28. | C212 | BT8402 | Molecular Biology |
| 29. | C213 | BT8403 | Enzyme Technology and Bio-transformations |
| 30. | C214 | BT8404 | Bioprocess Principles |
| 31. | C215 | GE8291 | Environmental Science and Engineering |
| 32. | C216 | BT8411 | Chemical Engineering Laboratory for Biotechnologists |
| 33. | C217 | BT8412 | Molecular Biology Laboratory |

| Sl. No. | Course Code | Subject Code | Subject Name |
|---|---|---|---|
| 34. | C218 | HS8461 | Advanced Reading and Writing |
| 35. | C301 | BT8501 | Mass Transfer Operations |
| 36. | C302 | BT8502 | Analytical Methods & Instrumentation |
| 37. | C303 | BT8503 | Protein Engineering |
| 38. | C304 | BT8591 | Bioprocess Engineering |
| 39. | C305 | BT8003 | Principles of Food Processing |
| 40. | C306 | OAI551 | Environment and Agriculture |
| 41. | C307 | BT8511 | Bioprocess Laboratory I |
| 42. | C308 | BT8512 | Analytical Methods and Instrumentation Laboratory |
| 43. | C309 | HS8581 | Professional Communication |
| 44. | C310 | BT8651 | Bioinformatics |
| 45. | C311 | BT8601 | Genetic Engineering |
| 46. | C312 | BT8691 | Applied Chemical Reaction Engineering |
| 47. | C313 | BT8005 | Animal Biotechnology |
| 48. | C314 | BT8009 | Biopharmaceutical Technology |
| 49. | C315 | BT8014 | Lifestyle diseases |
| 50. | C316 | BT8611 | Bioprocess Laboratory II |
| 51. | C317 | BT8612 | Genetic Engineering Laboratory |
| 52. | C401 | GE8077 | Total Quality Management |
| 53. | C402 | BT8751 | Downstream Processing |
| 54. | C403 | BT8791 | Immunology |
| 55. | C404 | BT8018 | Plant Biotechnology |
| 56. | C405 | BT8023 | Tissue Engineering |
| 57. | C406 | OBM752 | Hospital Management |
| 58. | C407 | BT8711 | Downstream Processing Laboratory |
| 59. | C408 | BT8712 | Immunology Laboratory |
| 60. | C409 | BT8811 | Project work |

**CO-PO mapping matrix for all courses including first year courses**

| Course Code | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **C101** | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.8 | - | 2.6 | 2.6 | 2.6 | 2.6 |
| **C102** | 2.6 | 2.6 | 2.6 | 2.6 | 2.8 | 2.6 | - | - | - | - | 2.6 | 2.6 |
| **C103** | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 |
| **C104** | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| **C105** | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | - | - | 2.8 | 2.8 | 2.8 | 2.8 |
| **C106** | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | - | - | - | - | 2.6 | - | 2.6 |
| **C107** | 3 | 3 | 3 | - | 3 | - | - | 3 | 3 | 3 | 3 | 3 |
| **C108** | 3 | 3 | 3 | 3 | 3 | 3 | 3 | - | 3 | 3 | 3 | 3 |
| **C109** | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.8 | - | 2.6 | 2.6 | 2.6 | 2.6 |
| **C110** | 3 | 3 | 3 | 3 | 3 | 3 | - | - | 3 | 3 | 3 | 3 |
| **C111** | 2 | 2 | 2 | 2 | 2 | 2 | - | - | 2 | 1.8 | 2 | 2 |
| **C112** | - | 2.2 | 2.2 | 2.2 | 2.2 | - | 2.2 | - | 2 | 2.2 | - | - |
| **C113** | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | - | - | - | - |
| **C114** | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | - | - | - | - |
| **C115** | 3 | 3 | 3 | 3 | - | - | - | - | - | 3 | - | 3 |
| **C116** | 3 | - | 3 | - | 3 | 3 | - | 3 | - | - | - | - |
| **C201** | 3.00 | 2.80 | 1.80 | 2.00 | 1.00 | 1.33 | 1.25 | 1.00 | 1.50 | 1.00 | 2.20 | 1.00 |
| **C202** | 3.00 | 2.00 | 1.60 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| **C203** | 2.20 | 2.00 | - | 2.40 | 1.00 | 1.60 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| **C204** | 2.20 | 2.00 | 1.25 | 2.60 | 2.40 | 1.25 | 1.33 | 1.00 | 1.00 | 1.25 | 1.00 | 1.80 |
| **C205** | 2.20 | 1.60 | 1.00 | 1.00 | 1.00 | 1.20 | 1.00 | 1.60 | 1.00 | 1.00 | 1.00 | 2.00 |
| **C206** | 3.00 | 1.00 | 1.60 | 2.00 | 1.00 | 1.00 | 1.00 | 1.60 | 1.00 | 1.00 | 1.00 | 2.00 |
| **C207** | 1.80 | 2.00 | 2.20 | 2.40 | 1.60 | 1.20 | 1.67 | 1.00 | 1.00 | 1.00 | 1.00 | 1.60 |
| **C208** | 3.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.20 | 1.67 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 |
| **C209** | 1.00 | 1.00 | 1.50 | 1.00 | 1.25 | 1.00 | 1.00 | 1.00 | 1.75 | 2.75 | 1.50 | 1.00 |
| **C210** | 3.00 | 3.00 | 2.20 | 2.80 | 2.20 | 1.60 | 1.00 | - | - | - | 1.40 | 1.40 |
| **C211** | 2.00 | 2.00 | 1.50 | 1.60 | 1.40 | 1.25 | 1.25 | 1.33 | 1.33 | 1.25 | 1.75 | 2.00 |
| **C212** | 1.20 | 1.20 | 2.40 | 1.60 | 2.40 | 1.25 | 1.20 | 1.33 | 1.33 | 1.00 | 1.00 | 1.00 |
| **C213** | 1.20 | 1.60 | 2.80 | 2.80 | 3.00 | 1.75 | 1.75 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| **C214** | 1.60 | 2.00 | 2.60 | 2.75 | 1.80 | 1.75 | 1.75 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| **C215** | 3.00 | 2.40 | 2.60 | 2.60 | 2.40 | 2.80 | 2.80 | 2.60 | 2.00 | 2.00 | 1.80 | 2.80 |
| **C216** | 2.00 | 1.80 | 1.80 | 1.80 | 1.00 | 1.00 | 1.75 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 |

| Course Code | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **C217** | 2.00 | 3.00 | 1.00 | 3.00 | 2.00 | 1.50 | 1.50 | 2.50 | 1.00 | 2.00 | 1.00 | 1.00 |
| **C218** | 1.00 | 1.50 | 1.00 | 2.00 | 1.25 | 1.00 | 1.25 | 1.25 | 1.00 | 1.50 | 1.00 | 1.25 |
| **C301** | 2.60 | 2.00 | 2.80 | 2.20 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 |
| **C302** | 3.00 | 1.00 | 1.80 | 1.20 | 3.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.60 |
| **C303** | 1.00 | 1.75 | 2.00 | 2.25 | 1.50 | 1.50 | 2.00 | 2.00 | 1.00 | 1.00 | 1.80 | 1.00 |
| **C304** | 1.80 | 1.80 | 2.00 | 2.20 | 2.00 | 1.80 | 1.60 | 1.40 | 1.60 | 1.80 | 2.00 | 1.80 |
| **C305** | 1.00 | 1.00 | 2.00 | 3.00 | 1.67 | 1.80 | 1.80 | 1.50 | 2.00 | 2.00 | 1.67 | 1.50 |
| **C306** | 2.60 | 1.40 | 2.20 | 1.00 | 2.00 | 2.20 | 2.20 | 1.00 | 2.00 | 1.00 | 1.00 | 2.20 |
| **C307** | 1.80 | 1.60 | 2.60 | 1.33 | 1.60 | 1.20 | 1.33 | 1.50 | 1.00 | 1.00 | 1.40 | 1.00 |
| **C308** | 3.00 | 1.00 | 1.00 | 1.00 | 3.00 | 1.00 | 1.00 | 2.00 | 1.00 | 1.00 | 1.00 | 2.00 |
| **C309** | 1.00 | 1.00 | 1.50 | 1.00 | 1.25 | 1.00 | 1.00 | 1.00 | 1.75 | 2.75 | 1.50 | 1.00 |
| **C310** | 2.20 | 2.20 | 2.60 | 2.40 | 2.40 | 2.00 | 1.00 | 1.40 | 1.80 | 2.00 | 1.40 | 1.00 |
| **C311** | 2.20 | 1.67 | 2.20 | 1.00 | 2.80 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| **C312** | 1.40 | 2.00 | 2.60 | 3.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.25 | 1.00 |
| **C313** | 2.40 | 1.00 | 1.80 | 2.20 | 3.00 | 2.20 | 2.20 | 1.50 | 1.00 | 1.00 | 1.00 | 1.00 |
| **C314** | 1.20 | 1.00 | 1.40 | 1.00 | 2.50 | 1.20 | 1.00 | 1.20 | 1.00 | 1.00 | 1.00 | 1.00 |
| **C315** | 1.80 | 1.00 | 1.00 | 1.00 | 1.60 | 1.00 | 1.00 | 1.40 | 1.00 | 1.00 | 1.00 | 1.40 |
| **C316** | 1.00 | 1.00 | 1.67 | 1.67 | 1.33 | 2.00 | 1.33 | 2.00 | 1.67 | 1.00 | 1.00 | 1.00 |
| **C317** | 2.00 | 1.00 | 2.00 | 2.00 | 3.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.67 | 1.00 |
| **C401** | 1.00 | 1.67 | 2.50 | 1.33 | 2.00 | 1.75 | 1.00 | 1.40 | 2.00 | 1.25 | 1.80 | 1.60 |
| **C402** | 1.50 | 2.00 | 2.40 | 1.60 | 1.80 | 1.80 | 1.00 | 1.00 | 1.00 | 1.00 | 1.40 | 1.67 |
| **C403** | 1.00 | 2.00 | 2.00 | 2.00 | 1.67 | 1.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.40 | 1.67 |
| **C404** | 1.80 | 2.20 | 2.80 | 2.60 | 3.00 | 2.00 | 2.40 | 1.80 | 1.67 | 1.00 | 1.67 | 1.25 |
| **C405** | 2.00 | 1.80 | 1.60 | 1.80 | 2.67 | 1.00 | 2.00 | 2.67 | 1.67 | 1.00 | 1.67 | 1.33 |
| **C406** | 1.00 | 1.60 | 1.80 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.60 | 2.00 | 2.60 | 1.20 |
| **C407** | 1.00 | 1.00 | 1.40 | 2.20 | 2.00 | 1.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.40 | 1.67 |
| **C408** | 1.00 | 1.00 | 1.80 | 1.67 | 2.40 | 1.50 | 1.50 | 1.80 | 1.00 | 1.00 | 1.00 | 1.00 |
| **C409** | 2.20 | 1.80 | 2.00 | 1.60 | 1.40 | 1.60 | 1.67 | 2.40 | 2.20 | 2.20 | 1.67 | 2.40 |

**CO-PSO mapping matrix for all courses including first year courses**

| Course Code | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **C101** | 2.8 | - | 2.6 |
| **C102** | 2.6 | 2.6 | 2.6 |
| **C103** | 2.6 | 2.6 | 2.6 |
| **C104** | 2 | 2 | 2 |
| **C105** | 2.8 | - | 2.8 |
| **C106** | 2.6 | 2.6 | - |
| **C107** | 3 | 3 | 3 |
| **C108** | 3 | 3 | 3 |
| **C109** | - | 2.6 | 2.6 |
| **C110** | 3 | 2.8 | 2.8 |
| **C111** | 1.8 | 1.8 | 1.8 |
| **C112** | 2 | 2.2 | 2.2 |
| **C113** | 2.2 | 2.2 | 2.2 |
| **C114** | 1.8 | 1.8 | 1.8 |
| **C115** | 3 | - | - |
| **C116** | 3 | 3 | - |
| **C201** | 1.80 | 1.00 | 1.00 |
| **C202** | 1.80 | 2.20 | 2.20 |
| **C203** | 1.00 | 1.50 | 2.00 |
| **C204** | 1.80 | 1.80 | 2.80 |
| **C205** | 2.20 | 2.20 | 1.67 |
| **C206** | 3.00 | 3.00 | 2.00 |
| **C207** | 3.00 | 2.40 | 1.80 |
| **C208** | 3.00 | 3.00 | 2.00 |
| **C209** | 1.00 | 1.33 | 1.00 |
| **C210** | 1.80 | 1.80 | 1.00 |
| **C211** | 1.67 | 1.40 | 1.25 |
| **C212** | 3.00 | 2.00 | 1.00 |
| **C213** | 3.00 | 3.00 | 2.20 |
| **C214** | 1.40 | 2.80 | 1.60 |
| **C215** | 2.20 | 1.60 | 2.20 |
| **C216** | 1.00 | 2.00 | 1.00 |
| **C217** | 3.00 | 3.00 | 2.50 |
| **C218** | 1.00 | 1.33 | 1.50 |
| **C301** | 2.40 | 2.60 | 2.80 |
| **C302** | 3.00 | 1.80 | 2.20 |
| **C303** | 2.00 | 2.80 | 1.40 |
| **C304** | 2.00 | 2.60 | 2.80 |
| **C305** | 2.00 | 2.00 | 2.80 |

| Course Code | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| **C306** | 2.20 | 2.40 | 2.40 |
| **C307** | 1.80 | 2.00 | 2.80 |
| **C308** | 3.00 | 3.00 | 2.67 |
| **C309** | 1.00 | 1.33 | 1.00 |
| **C310** | 2.00 | 2.20 | 2.60 |
| **C311** | 2.00 | 2.40 | 2.40 |
| **C312** | 1.00 | 2.00 | 2.80 |
| **C313** | 2.60 | 2.60 | 2.60 |
| **C314** | 1.40 | 1.20 | 1.20 |
| **C315** | 1.40 | 1.00 | 1.60 |
| **C316** | 1.00 | 3.00 | 2.00 |
| **C317** | 2.33 | 2.33 | 3.00 |
| **C401** | 1.00 | 1.00 | 1.60 |
| **C402** | 1.67 | 1.50 | 2.50 |
| **C403** | 1.20 | 1.40 | 2.33 |
| **C404** | 2.60 | 2.40 | 2.60 |
| **C405** | 3.00 | 2.20 | 2.20 |
| **C406** | 1.00 | 1.00 | 1.00 |
| **C407** | 1.60 | 3.00 | 2.00 |
| **C408** | 1.60 | 3.00 | 2.00 |
| **C409** | 1.00 | 2.40 | 1.60 |

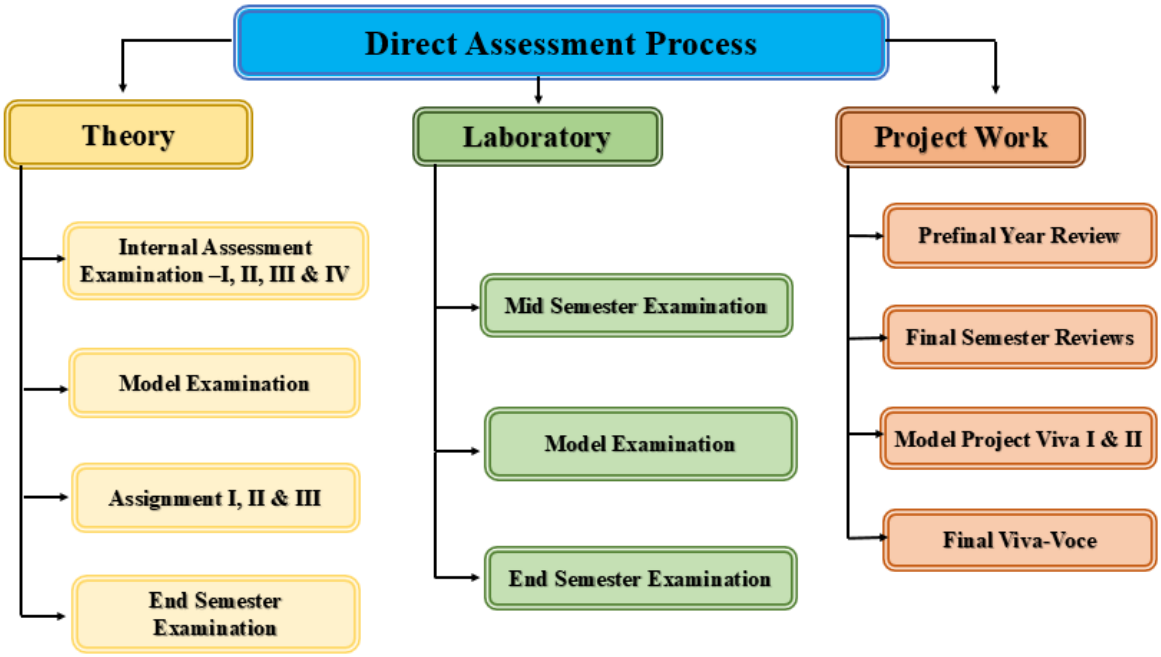
**Attainment of Course Outcomes**

**Describe the assessment processes used to gather the data upon which the evaluation of Course Outcome is based**

**Assessment process for 2018-2022 Batch is presented below.**

| Assessment Process | Evaluation | Frequency |
|---|---|---|
| ***Theory*** | | |
| Internal Assessment Exam | **IAE – I** Units I (CO1 - 50 marks)<br>**IAE – II** Units II (CO2 - 50 marks)<br>**IAE – III** Units III (CO3 - 50 marks)<br>**IAE – IV** Units IV (CO4 - 50 marks)<br>**Model Exam** All 5units<br>(CO1, CO2, CO3, CO4 & CO5– Each 20 marks)<br>*Model exam is conducted for 100 marks for duration of 3hours.* | Once in a semester |
| Assignments | **Assignment – I**–Units I & II<br>(CO1 & CO2 – Each 30 marks)<br>**Assignment – II**– Units III & IV<br>(CO3 & CO4 – Each 30 marks)<br>**Assignment – III**– Unit V<br>(CO5 – 80 marks) | Once in a semester |
| End Semester Examination | Will be conducted as per Anna University schedule | Once in a semester |
| ***Laboratory*** | | |
| Cycle Assessments and Model Exam | **Cycle Assessment – I**<br>(CO1 & CO2 – Each 50 marks)<br>**Cycle Assessment – II**<br>(CO3 & CO4 – Each 50 marks)<br>**Model lab exam**<br>(CO1 to CO5 – Each 20 marks)<br>The assessments and lab model exam will be conducted for 100 marks for a duration of 3 Hrs. | Once in a semester |
| End Semester Examination | Will be conducted as per Anna University schedule | Once in a semester |
| ***Project Work*** | | |

| | | |
|---|---|---|
| Final Year Projects | • Students will be divided into groups.<br>• Every group will be mentored by a faculty.<br>• Initial review conducted during pre-final year.<br>• Periodical reviews will be conducted to monitor and evaluate the progress in their project development during the final semester.<br>• Model project viva-voce will be conducted at the end of the semester before final viva voce examination. | ***Initial Review:*** Pre-final year<br>***Continuous reviews***: During final semester<br>***Model Project viva-voce:*** Conducted twice in the end of the Semester |




**Process Flow Diagram for Direct Assessment Process**

### 3.2.2. Record the attainment of Course Outcomes of all courses with respect to set Attainment levels (40)

**Table 3.2.2.1: CO Target vs Attainment**

| Course Code | CO Target (%) | CO Attainment | | | | |
|---|---|---|---|---|---|---|
| | | CO1 | CO2 | CO3 | CO4 | CO5 |
| C101 | 65 | 2.4 | 2.8 | 2.6 | 2.6 | 3 |
| C102 | 65 | 2.6 | 2.8 | 2.8 | 2.8 | 3 |
| C103 | 65 | 2.8 | 2.6 | 2.8 | 2.8 | 2.6 |
| C104 | 60 | 2 | 2 | 2 | 1.8 | 2.2 |
| C105 | 70 | 2.8 | 2.8 | 2.8 | 2.6 | 2.6 |
| C106 | 65 | 2 | 2 | 2 | 2 | 2 |
| C107 | 65 | 3 | 3 | 3 | 3 | 3 |
| C108 | 60 | 3 | 3 | 3 | 3 | 3 |
| C109 | 65 | 2.4 | 2.6 | 2.6 | 2.6 | 3 |
| C110 | 65 | 2.6 | 2.6 | 2.8 | 2.6 | 3 |
| C111 | 60 | 2.6 | 2.8 | 2.4 | 2.6 | 2.6 |
| C112 | 50 | 3 | 2.8 | 3 | 2.8 | 3 |
| C113 | 65 | 3 | 2.6 | 2.8 | 3 | 3 |
| C114 | 70 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 |
| C115 | 70 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| C116 | 75 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| C201 | 60 | 2.4 | 2.6 | 3 | 2.4 | 2.4 |
| C202 | 55 | 2.6 | 2.8 | 2.6 | 2.8 | 2.6 |
| C203 | 60 | 2.8 | 2.6 | 2.6 | 2.8 | 2.8 |
| C204 | 60 | 3 | 2.8 | 2.8 | 2.6 | 2.6 |
| C205 | 60 | 2.6 | 2.6 | 2.8 | 2.6 | 2.6 |
| C206 | 50 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| C207 | 65 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| C208 | 80 | 3 | 3 | 3 | 3 | 3 |
| C209 | 65 | 3 | 3 | 3 | 3 | 3 |
| C210 | 60 | 2.8 | 2.8 | 2.6 | 2.8 | 2.6 |
| C211 | 65 | 2.6 | 2.6 | 2.8 | 2.8 | 2.6 |
| C212 | 50 | 3 | 3 | 3 | 3 | 3 |
| C213 | 60 | 3 | 2.4 | 2.6 | 2.6 | 2.6 |
| C214 | 60 | 2.8 | 2.8 | 2.8 | 2.6 | 2.8 |

| Course Code | CO Target (%) | CO Attainment | | | | |
|---|---|---|---|---|---|---|
| | | CO1 | CO2 | CO3 | CO4 | CO5 |
| C215 | 60 | 2.8 | 2.8 | 3 | 2.8 | 2.8 |
| C216 | 90 | 3 | 3 | 3 | 3 | 3 |
| C217 | 80 | 3 | 3 | 3 | 3 | 3 |
| C218 | 60 | 3 | 3 | 3 | 3 | 3 |
| C301 | 85 | 3 | 3 | 3 | 3 | 3 |
| C302 | 90 | 3 | 3 | 3 | 3 | 3 |
| C303 | 90 | 3 | 3 | 3 | 3 | 3 |
| C304 | 90 | 3 | 3 | 3 | 3 | 3 |
| C305 | 90 | 3 | 3 | 3 | 3 | 3 |
| C306 | 90 | 3 | 3 | 3 | 3 | 3 |
| C307 | 95 | 3 | 3 | 3 | 3 | 3 |
| C308 | 95 | 3 | 3 | 3 | 3 | 3 |
| C309 | 95 | 3 | 3 | 3 | 3 | 3 |
| C310 | 85 | 3 | 3 | 3 | 3 | 3 |
| C311 | 90 | 3 | 3 | 3 | 3 | 3 |
| C312 | 85 | 3 | 3 | 3 | 3 | 3 |
| C313 | 90 | 3 | 3 | 3 | 3 | 3 |
| C314 | 90 | 3 | 3 | 3 | 3 | 3 |
| C315 | 90 | 3 | 3 | 3 | 3 | 3 |
| C316 | 100 | 3 | 3 | 3 | 3 | 3 |
| C317 | 100 | 3 | 3 | 3 | 3 | 3 |
| C401 | 90 | 3 | 3 | 3 | 3 | 3 |
| C402 | 90 | 3 | 3 | 3 | 3 | 3 |
| C403 | 90 | 3 | 3 | 3 | 3 | 3 |
| C404 | 90 | 3 | 3 | 3 | 3 | 3 |
| C405 | 90 | 3 | 3 | 3 | 3 | 3 |
| C406 | 90 | 3 | 3 | 3 | 3 | 3 |
| C407 | 100 | 3 | 3 | 3 | 3 | 3 |
| C408 | 100 | 3 | 3 | 3 | 3 | 3 |
| C409 | 100 | 3 | 3 | 3 | 3 | 3 |

**Table 3.2.2.2: Target vs Attainment level for Internal Assessment**

*Target has been arrived based on the percentage of students who scored more than the class average marks of the previous three academic years*

| % of students scoring above the class average mark in the internal assessment exams | | | |
|---|---|---|---|
| Target | Attainment | | |
| | Level 1 | Level 2 | Level 3 |
| | Above - Less than | Above - Less than | Above |
| 50 | 40 - 45 | 45 - 50 | 50 |
| 55 | 45 - 50 | 50 - 55 | 55 |
| 60 | 50 - 55 | 55 - 60 | 60 |
| 65 | 50 - 60 | 60 - 65 | 65 |
| 70 | 55 - 60 | 60 - 70 | 70 |
| 75 | 60 - 65 | 65 - 75 | 75 |
| 80 | 65 - 70 | 70 - 80 | 80 |
| 90 | 70 - 80 | 80 - 90 | 90 |
| 95 | 75 - 85 | 85 - 90 | 90 |
| 100 | 85 - 90 | 90 - 100 | 100 |

**Table 3.2.2.3: Target vs Attainment level for University Examinations**

| % of students scoring above the class average mark in the university exams | | | |
|---|---|---|---|
| Target | Attainment | | |
| | Level 1 | Level 2 | Level 3 |
| | Above - Less than | Above - Less than | Above |
| 50 | 40 - 45 | 45 - 50 | 50 |
| 55 | 45 - 50 | 50 - 55 | 55 |
| 60 | 50 - 55 | 55 - 60 | 60 |
| 65 | 50 - 60 | 60 - 65 | 65 |
| 70 | 55 - 60 | 60 - 70 | 70 |
| 75 | 60 - 65 | 65 - 75 | 75 |
| 80 | 65 - 70 | 70 - 80 | 80 |
| 90 | 70 - 80 | 80 - 90 | 90 |
| 95 | 75 - 85 | 85 - 90 | 90 |
| 100 | 85 - 90 | 90 - 100 | 100 |

**Table 3.2.2.4: Attainment of Course Outcomes**

| Course Code | Attainment through Internal Assessment | Attainment through University Examination | Total Attainment | %of Attainment |
|---|---|---|---|---|
| --- | A | B | $C = 0.2A + 0.8B$ | $\left[\frac{C}{3}\right] X\ 100$ |
| C101 | 1.4 | 3 | 2.68 | 89.33 |
| C102 | 2 | 3 | 2.8 | 93.33 |
| C103 | 1.6 | 3 | 2.72 | 90.67 |
| C104 | 2 | 2 | 2 | 66.67 |
| C105 | 1.6 | 3 | 2.72 | 90.67 |
| C106 | 2 | 2 | 2 | 66.67 |
| C107 | 3 | 3 | 3 | 100 |
| C108 | 3 | 3 | 3 | 100 |
| C109 | 1.2 | 3 | 2.64 | 88 |
| C110 | 1.6 | 3 | 2.72 | 90.67 |
| C111 | 1 | 3 | 2.6 | 86.67 |
| C112 | 2.6 | 3 | 2.92 | 97.33 |
| C113 | 2.4 | 3 | 2.88 | 96 |
| C114 | 1 | 3 | 2.6 | 86.67 |
| C115 | 3 | 3 | 2.2 | 73.33 |
| C116 | 3 | 2 | 2.2 | 73.33 |
| C201 | 0.8 | 3 | 2.56 | 85.33 |
| C202 | 1.4 | 3 | 2.68 | 89.33 |
| C203 | 1.6 | 3 | 2.72 | 90.67 |
| C204 | 1.8 | 3 | 2.76 | 92.00 |
| C205 | 1.2 | 3 | 2.64 | 88.00 |
| C206 | 3 | 2 | 2.2 | 73.33 |
| C207 | 3 | 2 | 2.2 | 73.33 |
| C208 | 3 | 3 | 3 | 100.00 |
| C209 | 3 | 3 | 3 | 100.00 |
| C210 | 1.6 | 3 | 2.72 | 90.67 |
| C211 | 1.4 | 3 | 2.68 | 89.33 |
| C212 | 3 | 3 | 3 | 100 |
| C213 | 1.2 | 3 | 2.64 | 88 |
| C214 | 1.8 | 3 | 2.76 | 92 |
| C215 | 2.2 | 3 | 2.84 | 94.67 |
| C216 | 3 | 3 | 3 | 100 |
| C217 | 3 | 3 | 3 | 100 |

| Course Code | Attainment through Internal Assessment | Attainment through University Examination | Total Attainment | %of Attainment |
|---|---|---|---|---|
| --- | A | B | $C = 0.2A + 0.8B$ | $\left[\frac{C}{3}\right] X\ 100$ |
| C218 | 3 | 3 | 3 | 100 |
| C301 | 3 | 3 | 3 | 100 |
| C302 | 3 | 3 | 3 | 100 |
| C303 | 3 | 3 | 3 | 100 |
| C304 | 3 | 3 | 3 | 100 |
| C305 | 3 | 3 | 3 | 100 |
| C306 | 3 | 3 | 3 | 100 |
| C307 | 3 | 3 | 3 | 100 |
| C308 | 3 | 3 | 3 | 100 |
| C309 | 3 | 3 | 3 | 100 |
| C310 | 3 | 3 | 3 | 100 |
| C311 | 3 | 3 | 3 | 100 |
| C312 | 3 | 3 | 3 | 100 |
| C313 | 3 | 3 | 3 | 100 |
| C314 | 3 | 3 | 3 | 100 |
| C315 | 3 | 3 | 3 | 100 |
| C316 | 3 | 3 | 3 | 100 |
| C317 | 3 | 3 | 3 | 100 |
| C401 | 3 | 3 | 3 | 100 |
| C402 | 3 | 3 | 3 | 100 |
| C403 | 3 | 3 | 3 | 100 |
| C404 | 3 | 3 | 3 | 100 |
| C405 | 3 | 3 | 3 | 100 |
| C406 | 3 | 3 | 3 | 100 |
| C407 | 3 | 3 | 3 | 100 |
| C408 | 3 | 3 | 3 | 100 |
| C409 | 3 | 3 | 3 | 100 |

### 3.3. Attainment of Program Outcomes and Program Specific Outcomes (50)

**3.3.1. Describe assessment tools and processes used for measuring the attainment of each of the Program Outcomes and Program Specific Outcomes (10)**

**Assessment process for 2018-2022 Batch is presented below.**

| Assessment Process | Evaluation | Frequency |
|---|---|---|
| ***Theory*** | | |
| Internal Assessment Exam | **IAE – I** Units I (CO1 - 50 marks)<br>**IAE – II** Units II (CO2 - 50 marks)<br>**IAE – III** Units III (CO3 - 50 marks)<br>**IAE – IV** Units IV (CO4 - 50 marks)<br>**Model Exam** All 5units<br>(CO1, CO2, CO3, CO4 & CO5– Each 20 marks)<br>*Model exam is conducted for 100 marks for duration of 3hours.* | Once in a semester |
| Assignments | **Assignment – I**–Units I & II<br>(CO1 & CO2 – Each 30 marks)<br>**Assignment – II**– Units III & IV<br>(CO3 & CO4 – Each 30 marks)<br>**Assignment – III**– Unit V<br>(CO5 – 80 marks) | Once in a semester |
| End Semester Examination | Will be conducted as per Anna University schedule | Once in a semester |
| ***Laboratory*** | | |
| Cycle Assessments and Model Exam | **Cycle Assessment – I**<br>(CO1 & CO2 – Each 50 marks)<br>**Cycle Assessment – II**<br>(CO3 & CO4 – Each 50 marks)<br>**Model lab exam**<br>(CO1 to CO5 – Each 20 marks)<br>The assessments and lab model exam will be conducted for 100 marks for a duration of 3 Hrs. | Once in a semester |

| | | |
|---|---|---|
| End Semester Examination | Will be conducted as per Anna University schedule | Once in a semester |
| ***Project Work*** | | |
| Final Year Projects | • Students will be divided into groups.<br>• Every group will be mentored by a faculty.<br>• Initial review conducted during pre-final year.<br>• Periodical reviews will be conducted to monitor and evaluate the progress in their project development during the final semester.<br>• Model project viva-voce will be conducted at the end of the semester before final viva voce examination. | ***Initial Review:*** Pre-final year<br>***Continuous reviews***: During final semester<br>***Model Project viva-voce:*** Conducted twice in the end of the Semester |

| ***Indirect Assessment*** | | | |
|---|---|---|---|
| ***Assessment Process*** | | ***Frequency*** | ***Relevance of POs/PSOs*** |
| **Publications** | Students with their faculty supervisor can carry out project and publish their work in any conference or journal | During the course | PO 4, PO 10<br>PSO 3 |
| **Workshops Attended** | Students participate in internal/external workshops conducted | During the course | PO 9<br>PSO 1 |
| **Conferences Attended** | Students participate in internal/external Conferences conducted | During the course | PO 9<br>PSO 2 |
| **Industrial Visits** | Students participate in industrial visits organized by the department<br>Feedback about industries visited was collected from the students | Once in a semester | PO 9, PO 12 |
| **Seminars** | Each Student will be a technical topic will be assigned of his choice, presentation of the same is done and reviewed by two faculty. | Once in a week | PO 10 |
| **Placement and soft skill training** | Training is conducted during each semester. Placement orientation programme (POP) will be conducted twice for all the students. BEC classes were organized for all the students and the tests were conducted.<br>Feedback about placement training was collected from the students | POP- Twice in the course of study.<br><br>BEC – Once in the course of study. | PO 10, PO 12 |
| **Online tests** | The students should take up online tests on different topics for placement preparation. The tests will be conducted after college hours for hostel students in college labs. Day scholars can take the | 7 to 10 online tests during $3^{rd}$& $4^{th}$year | PO 12 |

| | | | |
|---|---|---|---|
| | test from anywhere by logging in to college portal. Online tests were conducted by prestigious companies like AMCAT, Vista Mind, etc. | | |
| **Mock Interview** | During $6^{th}$&$7^{th}$ semester, the students will attend mock interviews conducted by our faculty and industry executives on different subjects for placement preparation. | 2 mock interviews during $6^{th}$&$7^{th}$ semester | PO 10, PO 12 |
| **Guest Lecture** | Feedback about guest lecture was collected from the students | Once in a semester | PSO 3 |
| **In-plant Training/Internship** | Feedback about In-plant Training/Internship undergone was collected from the students | During the course | PSO2, PSO 3 |
| **BEC Training** | Feedback about BEC training was collected from the students | Once during the course | PO 10 |
| **Value Added Courses** | Feedback about Value Added Courses was collected from the students | During the course | PO 9 PSO2, PSO 3 |
| **Professional Societies** | Feedback from members of various Technical Chapters was collected. | During the course | PO 7, PO 8 |
| **Student Exit Survey** | The feedback from the students were collected after their course completion for the betterment of the department | Once at the end of the course completion | |
| **Parent Feedback** | The feedback from the parents during the orientation programme was collected for the improvement of the student performance and conduct. | Once during the orientation and after course completion | |
| **Alumni Survey** | The feedback from the Alumni was collected for the improvement of Infrastructure, library facilities, placement activities and industry-institute interaction. | Once after course completion | |
| **Employer Feedback** | The feedback from the employer was obtained to know the gaps to be filled to improve our students' skill and placement count. | Once after course completion | PO 10, PO 12 |
| **Internationally/ Nationally normed exams** | Various examinations (national and international level) like GATE, NET, CAT, GRE, IELTS, and TOEFL are taken into consideration for students' performance and evaluation. | As per respective exam schedule | PO 9, PO 11 |
| **Participation in the project Competitions** | Based on the novelty and societal impact, a minimum of one project will be recommended for best project | Throughout the year | PO 9 |

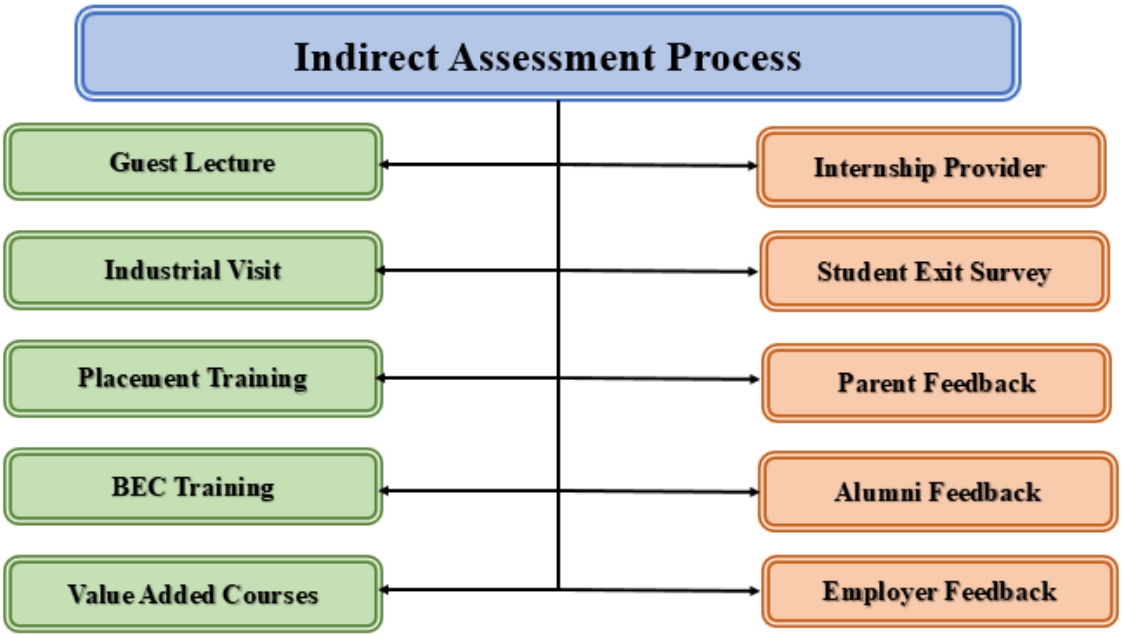



**Figure 3.3.1: Process Flow Diagram for Indirect Assessment Process**

**3.3.2. Provide results of evaluation of each PO & PSO (40)**

*Attainment levels are calculated from the direct assessment and indirect assessment of student performance.*

*The attainment levels have been briefed in the tables 3.3.2.1 and 3.3.2.2*

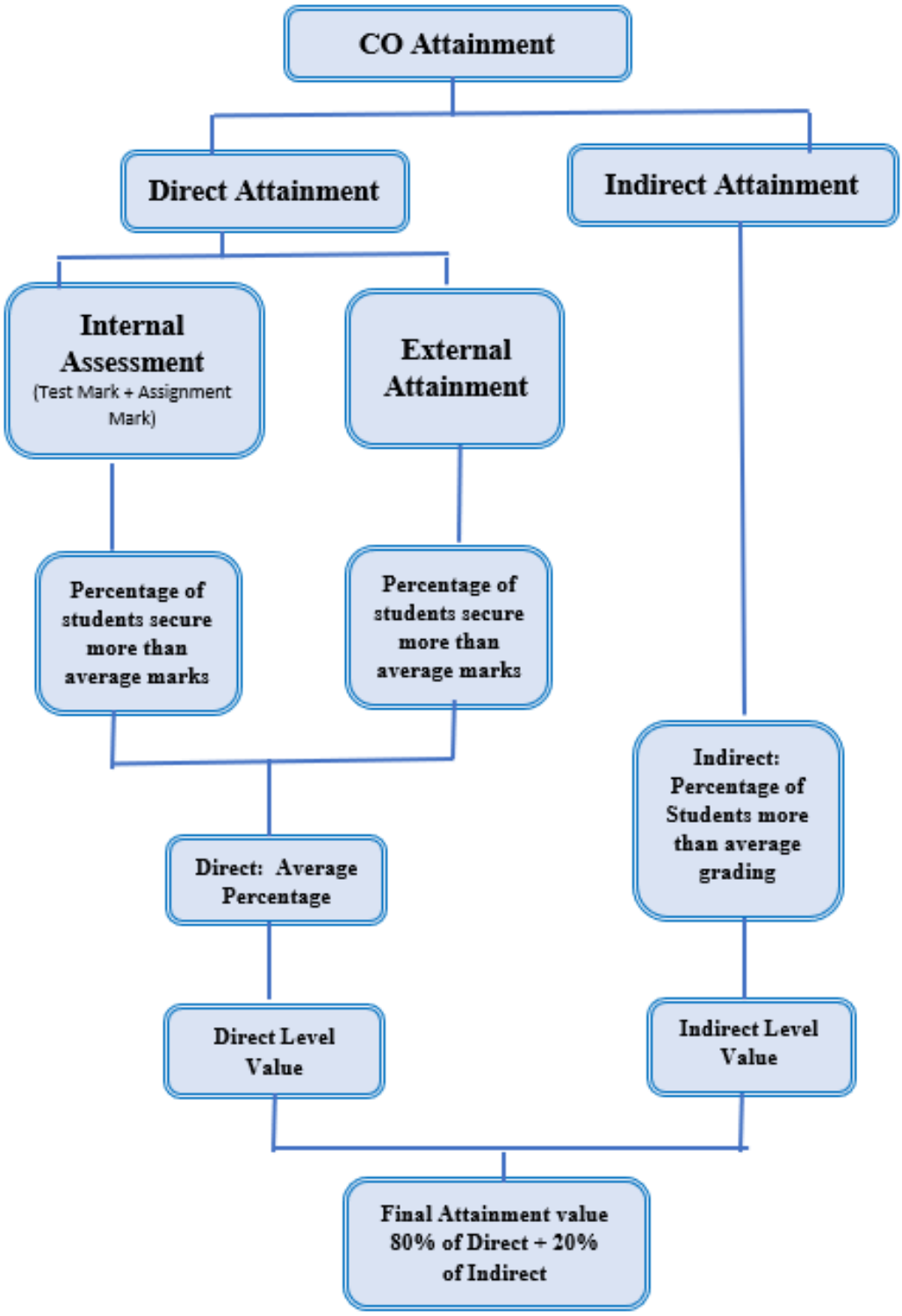



**Figure 3.3.2.1 Flow chart of PO and PSO attainment**

**Table 3.3.2.1: Attainment of Program Outcomes**

| Course Code | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C101 | - | 3 | 3 | 2.8 | 3 | - | 3 | - | 2.6 | 2.8 | - | - |
| C102 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | - | - | 2.6 | 2.6 | 2.8 | 2.8 |
| C103 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 |
| C104 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| C105 | 2.6 | 2.6 | 2.6 | - | 2.6 | - | - | 2.6 | 2.6 | 2.6 | - | 2.6 |
| C106 | 2 | 2 | 2 | 2 | 2 | 2 | - | - | 2 | 2 | 2 | 2 |
| C107 | 3 | 3 | 3 | - | 3 | - | - | 3 | 3 | 3 | - | 3 |
| C108 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| C109 | - | 3 | 3 | 2.8 | 3 | - | - | - | 2.4 | 2.8 | - | - |
| C110 | 2.8 | 2.8 | 2.8 | 2.8 | 2.6 | 2.6 | - | 2.8 | - | - | 2.8 | 2.6 |
| C111 | 2.6 | 2.6 | 2.6 | 2.4 | 2.4 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.4 |
| C112 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| C113 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | - | 2.6 | 2.6 | 2.6 | 2.6 |
| C114 | 2.6 | 2.6 | - | 2.6 | 2.6 | - | - | - | - | 2.6 | - | 2.6 |
| C115 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| C116 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| C201 | 2.6 | 2.6 | 2.6 | 2.6 | 2.4 | 2.6 | 2.4 | 2.4 | 2.6 | 2.4 | 2.4 | 0 |
| C202 | 2.6 | 2.6 | 2.6 | 2.6 | 2.8 | 2.8 | 0 | 0 | 0 | 0 | 0 | 0 |
| C203 | 2.8 | 2.8 | 0 | 2.8 | 2.8 | 2.8 | 0 | 0 | 0 | 0 | 0 | 0 |
| C204 | 2.8 | 2.6 | 2.6 | 2.8 | 2.8 | 2.6 | 2.6 | 2.6 | 0 | 2.6 | 2.8 | 2.8 |
| C205 | 2.6 | 2.6 | 2.8 | 2.6 | 2.6 | 2.6 | 2.8 | 2.6 | 2.6 | 0 | 2.6 | 2.6 |
| C206 | 2.2 | 2.2 | 0 | 2.2 | 2.2 | 0 | 0 | 0 | 0 | 2.2 | 0 | 2.2 |
| C207 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 0 | 0 | 2.2 |
| C208 | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 3 | 0 | 3 | 3 |
| C209 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

| Course Code | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C210 | 2.8 | 2.8 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 0 | 0 | 0 | 2.6 | 2.6 |
| C211 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.6 | 2.8 | 2.8 | 2.6 | 2.6 | 2.8 |
| C212 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 3 | 0 | 3 |
| C213 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 0 | 0 | 0 | 2.6 |
| C214 | 2.8 | 2.6 | 2.8 | 2.6 | 2.8 | 0 | 2.8 | 0 | 0 | 0 | 0 | 2.8 |
| C215 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 |
| C216 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| C217 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 3 | 0 | 0 |
| C218 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| C301 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| C302 | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| C303 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 3 |
| C304 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| C305 | 3 | 3 | 0 | 3 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 |
| C306 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 3 | 3 |
| C307 | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C308 | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| C309 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| C310 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| C311 | 3 | 3 | 3 | 3 | 3 | 0 | 3 | 3 | 0 | 0 | 0 | 0 |
| C312 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| C313 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 3 |
| C314 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 3 | 3 |
| C315 | 3 | 3 | 0 | 3 | 0 | 3 | 0 | 3 | 0 | 3 | 0 | 3 |
| C316 | 0 | 0 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 |
| C317 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 |
| C401 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

| Course Code | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C402 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 3 | 0 | 3 | 3 |
| C403 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| C404 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| C405 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 3 |
| C406 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| C407 | 0 | 0 | 3 | 3 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| C408 | 3 | 0 | 3 | 3 | 3 | 3 | 0 | 3 | 3 | 0 | 0 | 3 |
| C409 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| **Direct Attainment** | 2.81 | 2.80 | 2.72 | 2.81 | 2.81 | 2.81 | 2.82 | 2.82 | 2.65 | 2.64 | 2.75 | 2.77 |
| **Indirect Attainment** | 2.91 | 2.91 | 2.91 | 2.76 | 2.84 | 2.83 | 2.83 | 2.83 | 2.82 | 2.82 | 2.76 | 2.74 |
| **Attainment levels of POs** | **2.83** | **2.82** | **2.76** | **2.80** | **2.82** | **2.81** | **2.82** | **2.82** | **2.68** | **2.68** | **2.75** | **2.76** |

**Table 3.3.2.2: Attainment of Program Specific Outcomes**

| Course Code | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| C101 | 2.8 | 0 | 2.8 |
| C102 | 2.8 | 2.8 | 2.8 |
| C103 | 2.6 | 2.6 | 2.6 |
| C104 | 2 | 2 | 2 |
| C105 | 2.6 | 2.6 | 2.6 |
| C106 | 2 | 2 | 2 |
| C107 | 3 | 3 | 3 |
| C108 | 3 | 3 | 3 |
| C109 | 2.6 | - | 2.8 |
| C110 | 2.6 | 2.8 | 2.6 |
| C111 | 2.6 | 2.4 | 2.6 |
| C112 | 3 | 3 | 3 |
| C113 | 2.6 | 2.6 | 2.6 |
| C114 | 2.6 | 2.6 | 2.6 |
| C115 | 2.2 | 2.2 | 2.2 |
| C116 | 2.2 | 2.2 | 2.2 |
| C201 | 2.6 | 2.6 | 2.6 |
| C202 | 2.6 | 2.6 | 2.6 |
| C203 | 2.6 | 2.8 | 2.8 |
| C204 | 2.8 | 2.8 | 2.8 |
| C205 | 2.6 | 2.6 | 2.6 |
| C206 | 2.2 | 2.2 | 2.2 |
| C207 | 2.2 | 2.2 | 2.2 |
| C208 | 3 | 3 | 3 |
| C209 | 3 | 3 | 3 |
| C210 | 2.6 | 2.6 | 2.8 |
| C211 | 2.6 | 2.8 | 2.6 |
| C212 | 3 | 3 | 3 |
| C213 | 2.6 | 2.6 | 2.6 |
| C214 | 2.8 | 2.6 | 2.8 |
| C215 | 2.8 | 2.8 | 2.8 |
| C216 | 3 | 3 | 3 |
| C217 | 3 | 3 | 3 |

| Course Code | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| C218 | 3 | 3 | 3 |
| C301 | 3 | 3 | 3 |
| C302 | 3 | 3 | 3 |
| C303 | 3 | 3 | 3 |
| C304 | 3 | 3 | 3 |
| C305 | 3 | 3 | 3 |
| C306 | 3 | 3 | 3 |
| C307 | 3 | 3 | 3 |
| C308 | 3 | 3 | 3 |
| C309 | 3 | 3 | 3 |
| C310 | 3 | 3 | 3 |
| C311 | 3 | 3 | 3 |
| C312 | 3 | 3 | 3 |
| C313 | 3 | 3 | 3 |
| C314 | 3 | 3 | 3 |
| C315 | 3 | 0 | 3 |
| C316 | 0 | 3 | 3 |
| C317 | 3 | 3 | 3 |
| C401 | 3 | 3 | 3 |
| C402 | 3 | 3 | 3 |
| C403 | 3 | 3 | 3 |
| C404 | 3 | 3 | 3 |
| C405 | 3 | 3 | 3 |
| C406 | 3 | 3 | 3 |
| C407 | 0 | 3 | 3 |
| C408 | 3 | 3 | 3 |
| C409 | 3 | 3 | 3 |
| **Direct Attainment** | 2.48 | 2.45 | 2.45 |
| **Indirect Attainment** | 2.91 | 2.76 | 2.81 |
| **Attainment levels of PSOs** | **2.77** | **2.75** | **2.76** |

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