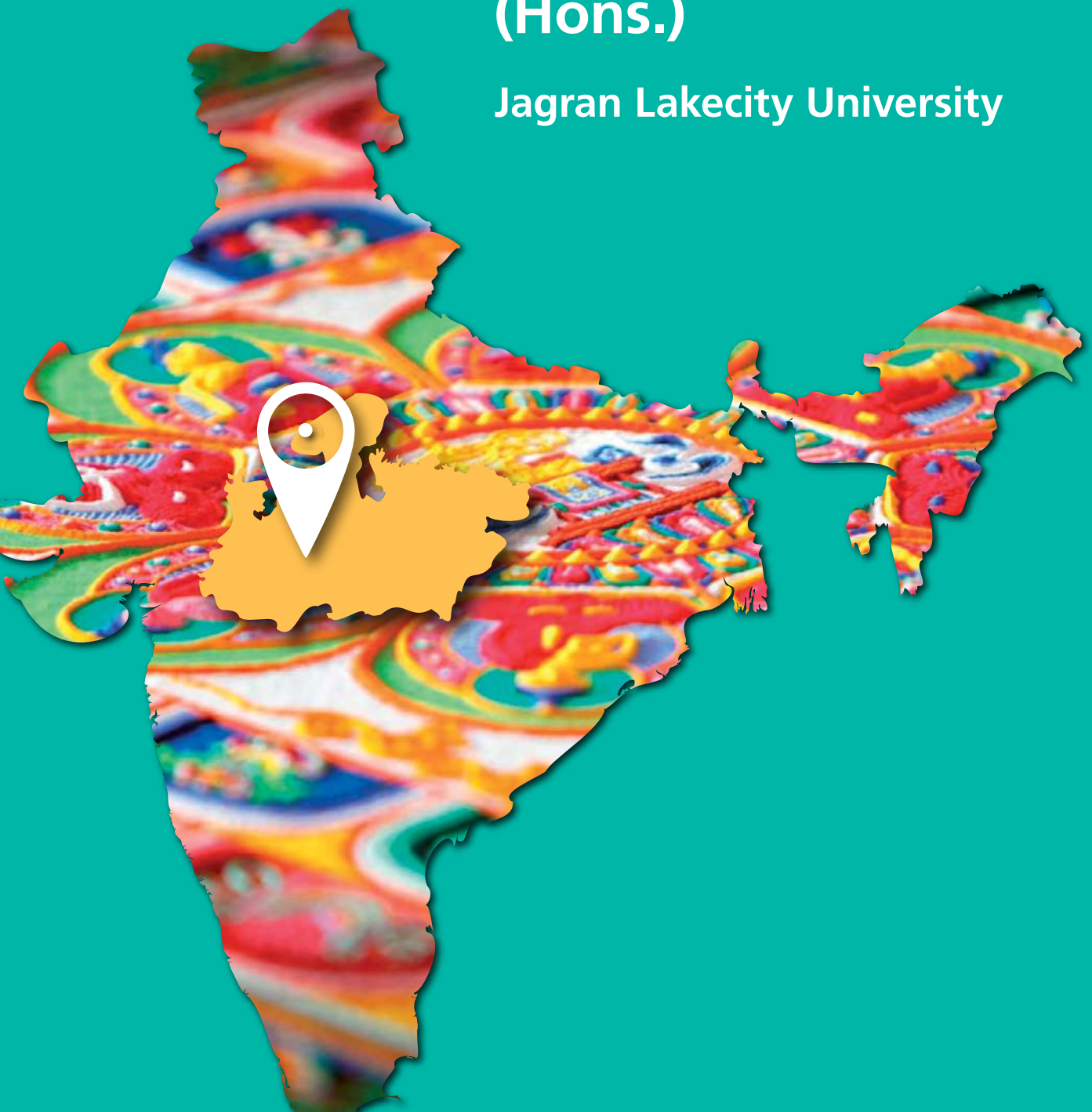
# Tuning

India

## Degree Programme
## Bachelor of Technology (Hons.)

### Jagran Lakecity University



**Degree Programme Bachelor of Technology (Hons.). Jagran Lakecity University**
The degree programme deals with the length, level and definition of the programme in terms of competences and learning outcomes; it also analyses the methodologies for developing the appropriate strategy of teaching, learning and assessing those competences as well as setting up the internal systems for assuring programme quality.

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# Contents

# 1

# Name and level of the programme

## Name

Bachelor of Technology (Hons.) 4 years programme in Computer Science and Engineering with specialization in Artificial Intelligence.

## Level

Undergraduate Level Degree Programme

## Eligibility Criteria

- 10+2 pattern after schooling of 12 years with Physics, Chemistry & Mathematics as compulsory subjects from any recognized board of India and also to qualify either JEE (Main) or the University's entrance test/Personal interview(administered by the University).

## Possible progression to further/ higher education

After successful completion of this programme student can pursue any of the following courses:

- M.S. (Master of Science) or M.Tech. (Master of Technology)- Computer Science and Engineering.
- M.S. (Master of Science) or M.Tech. (Masters of Technology) in any specialization in computer science stream for example:
  - M.S. or M.Tech. (Cyber Security)
  - M.S. or M.Tech. (Big Data & Cloud Computing)

  - M.S. or M.Tech. (Machine Learning)
  - M.S. or M.Tech. (Data Analytics)
- M.B.A. (Master of Business Administration) etc.

# 2

# Social Need for the Programme

This course is designed to acquaint a student with the conceptual and operational parameters of general principles of computer science & engineering and its operation in the industry, business and society. These courses help to understand how computer science helps to solve different kinds of problems. The most important aspect of computer science is problem solving, an essential skill for life. Students study the design, development and analysis of software and hardware used to solve problems in a variety of business, scientific and social contexts. Such inbuilt and coherent features of the programme makes it socially responsible academic programme. To sum up, following characteristics of the programme are important to know:

- Creating quality computer/software engineer who are skilled to provide business solution, implement latest technology in the industries, enhance quality of life of people using advanced technology.
- Compulsory courses like minor and major project are aimed to make students ready for profession and society.
- Internship is a bright feature of the programme which allows students to get exposure of working culture of profession and also involves report writing and presentation of the skill learned during the internship.

The programme was revised subject to following reasons:

- To meet with contemporary requirements of the course, such as introducing chapters/ subject on any new technology introduced or any gap identified by the members of Board of Studies (subject to their vast experience in the field of computer science) while reviewing the course.
- Of course, this year we had the premise of Tuning India Project which we considered during the Board of Studies Meeting. The members (especially the external) were explained about the Project and requested to suggest changes keeping competency development in mind.

The focus was to inculcate ability among the students to be equipped with latest technology when they complete a course. For example; introducing cloud computing and big data, cyber security subjects were aimed to provide latest technological skill to the students.

# 3

# Future fields, sectors of employment/ occupation of graduates

Following description helps student to have clear and realistic idea of future sector of employment after graduating with B.Tech.(CSE-AI) Degree programme.

| | |
|---|---|
| 1 | Entrepreneur |
| 2 | Multi-National Companies/ IT Industries (Cloud Computing Expert, Security Expert, Software Engineer, System Analyst) |
| 3 | Govt. Agency (IT Sector) Software Engineer, Network Manager, Public Sector Undertakings |
| 4 | UPSC Exams |
| 5 | Academics |
| 6 | Indian Air Force/ Army, Navy (Special Duty Officer) |
| 7 | Technical Support in IT industry |
| 8 | Entertainment Industry (Film Industry) |
| 9 | Media and Advertising Industries |
| 10 | Education Consultant |
| 11 | Counsellor |
| 12 | Technical Content Writer, Technical Document Writer etc. |

While revising the B.Tech. Degree programme, we carefully considered the language aspects, so as to make it become understandable to prospective students to meet the growing society expectations for engineering graduates.

A comprehensive list of potential occupations is prepared for the prospective engineers of the B.Tech. programme.

# 4

# Description of the degree profile in terms of generic and subject-specific competences

| Clusters of competences | Type | Definition | Programme Level Learning outcomes (PLO) |
|---|---|---|---|
| I. Knowledge & Theoretical Concepts | Subject specific | Developing a mindset to apply computer science concepts to solve real life problems. | 1. Knowing the relevant principles, concepts & methods from mathematics, Computer Science, statistics and other allied disciplines and their applications to solve real life practical problems by developing suitable solutions.<br>2. Training students of Computer Science and Engineering to pursue relevant research work in specialized areas. |
| II. Analysis, Problem Solving & Design | Subject specific | Developing the ability to apply the knowledge already acquired to formulate, analyze and model the solution for practical problems. | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. |
| III. Development, Deployment & Maintenance | Subject specific | Developing, deploying and maintaining the ICT systems focused at satisfying customer requirement in an innovative manner so as to guarantee efficient resource utilization and information security. | 4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. |
| IV. Communication | Generic | Communicating effectively with customers and an expert of the industry. | 6. Documenting a substantial technical report/ document and to communicate effectively with diverse range of audience. |
| V. Teamwork, Interpersonal & Management skills | Generic | Learning professionalism through managing time, resources and technology. | 7. Adopting management practices/principles for handling project under various barriers/ constraints. |
| VI. Professional Ethics & Societal Responsibilities | Generic | Promoting and preserving ethical practice. | 8. Coding of conduct and ethical integrity in line with the profession. |
| VII. Lifelong learning | Generic | Developing curiosity for research with an objective of finding innovative solution of real life problems. | 9. Training students of Computer Science and Engineering to adapt with situations demanding self-driven continuous learning. |

# 5

# Link of competences (degree profile) to the agreed meta-profile

| Course Code | Course Name | Meta Profile Competence | Specific Competence | Generic Competence |
|---|---|---|---|---|
| BTF101 | Mathematics-I | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTF102 | Engineering Physics | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTF103 | Principles of Environmental Studies | VI. Professional Ethics & Societal Responsibilities<br>VII. Lifelong learning | | 8. Coding of conduct and ethical integrity in line with the profession.<br>9. Training students of Computer Science and Engineering to adapt with situations demanding self-driven continuous learning. |
| BTF104 | Computer Fundamentals And Programming in C | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |

| Course Code | Course Name | Meta Profile Competence | Specific Competence | Generic Competence |
|---|---|---|---|---|
| BTF105 | Engineering Graphics | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTF106 | Skill for Engineers-I | IV. Communication<br>V. Teamwork, Interpersonal & Management skills<br>VII. Lifelong learning | | 7. Adopting management practices/principles for handling project under various barriers/constraints.<br>9. Training students of Computer Science and Engineering to adapt with situations demanding self-driven continuous learning. |
| BTF107 | Engineering Physics Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance<br>V. Teamwork, Interpersonal & Management skills | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | 7. Adopting management practices/principles for handling project under various barriers/constraints. |
| BTF108 | Computer Fundamentals and Programming in C Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance<br>V. Teamwork, Interpersonal & Management skills | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | 7. Adopting management practices/principles for handling project under various barriers/constraints. |

| Course Code | Course Name | Meta Profile Competence | Specific Competence | Generic Competence |
|---|---|---|---|---|
| BTF109 | Engineering Graphics Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance<br>V. Teamwork, Interpersonal & Management skills | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | 7. Adopting management practices/principles for handling project under various barriers/constraints. |
| BTF110 | Skill for Engineers-I Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |
| BTF201 | Mathematics–II | I. Knowledge & Theoretical Concepts | 1. Knowing the relevant principles, concepts & methods from mathematics, Computer Science, statistics and other allied disciplines and their applications to solve real life practical problems by developing suitable solutions. | |
| BTF202 | Engineering Chemistry | I. Knowledge & Theoretical Concepts | 1. Knowing the relevant principles, concepts & methods from mathematics, Computer Science, statistics and other allied disciplines and their applications to solve real life practical problems by developing suitable solutions. | |
| BTF203 | Basic Electrical & Electronics Engineering | I. Knowledge & Theoretical Concepts | 1. Knowing the relevant principles, concepts & methods from mathematics, Computer Science, statistics and other allied disciplines and their applications to solve real life practical problems by developing suitable solutions. | |

| Course Code | Course Name | Meta Profile Competence | Specific Competence | Generic Competence |
|---|---|---|---|---|
| BTF204 | Basic Civil &Engineering Mechanics | I. Knowledge & Theoretical Concepts | 1. Knowing the relevant principles, concepts & methods from mathematics, Computer Science, statistics and other allied disciplines and their applications to solve real life practical problems by developing suitable solutions. | |
| BTF205 | Basic Mechanical Engineering | I. Knowledge & Theoretical Concepts | 1. Knowing the relevant principles, concepts & methods from mathematics, Computer Science, statistics and other allied disciplines and their applications to solve real life practical problems by developing suitable solutions. | |
| BTF206 | Skill for Engineers–II | I. Knowledge & Theoretical Concepts | 1. Knowing the relevant principles, concepts & methods from mathematics, Computer Science, statistics and other allied disciplines and their applications to solve real life practical problems by developing suitable solutions. | |
| BTF207 | Engineering Chemistry Lab | III. Development, Deployment & Maintenance | 4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |
| BTF208 | Basic Electrical & Electronics Engineering lab | III. Development, Deployment & Maintenance | 4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |

| Course Code | Course Name | Meta Profile Competence | Specific Competence | Generic Competence |
|---|---|---|---|---|
| BTF209 | Basic Civil &Engineering Mechanics Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |
| BTF210 | Basic Mechanical Engineering Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |
| BTF211 | Workshop Practice | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |

| Course Code | Course Name | Meta Profile Competence | Specific Competence | Generic Competence |
|---|---|---|---|---|
| BTF212 | Skill for Engineers-II Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance<br>V. Teamwork, Interpersonal & Management skills | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | 7. Adopting management practices/principles for handling project under various barriers/constraints. |
| BTF301 | Mathematics-III | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIC302 | Object Oriented Programming Using C++ | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |
| BTAIC303 | Discrete Mathematics VJ | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIC304 | Data Structures RN | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIC305 | Digital Computer Fundamentals | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |

| Course Code | Course Name | Meta Profile Competence | Specific Competence | Generic Competence |
|---|---|---|---|---|
| BTF306 | Skills for Engineers III | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design<br>IV. Communication<br>VI. Professional Ethics & Societal Responsibilities<br>VII. Lifelong learning | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | 6. Documenting a substantial technical report/document and to communicate effectively with diverse range of audience.<br>8. Coding of conduct and ethical integrity in line with the profession.<br>9. Training students of Computer Science and Engineering to adapt with situations demanding self-driven continuous learning. |
| BTF307 | Skills for Engineers III Lab | IV. Communication<br>VI. Professional Ethics & Societal Responsibilities<br>VII. Lifelong learning | | 6. Documenting a substantial technical report/document and to communicate effectively with diverse range of audience.<br>8. Coding of conduct and ethical integrity in line with the profession.<br>9. Training students of Computer Science and Engineering to adapt with situations demanding self-driven continuous learning. |
| BTAIC308 | Object Oriented Programming Using C++ Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |

| Course Code | Course Name | Meta Profile Competence | Specific Competence | Generic Competence |
|---|---|---|---|---|
| BTAIC309 | Data Structures Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |
| BTAIC310 | Dot Net Framework and C# Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |
| BTAIC311 | Java Technology Lab | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |
| BTAIC401 | Operating Systems | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |

| Course Code | Course Name | Meta Profile Competence | Specific Competence | Generic Competence |
|---|---|---|---|---|
| BTAIC402 | Analysis and Design of Algorithms | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIC403 | Computer Networks | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIC404 | Computer Organization and Architecture | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIC405 | Software Engineering | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTF406 | Skills for Engineers IV | IV. Communication<br>V. Teamwork, Interpersonal & Management skills<br>VII. Lifelong learning | | 7. Adopting management practices/principles for handling project under various barriers/constraints.<br>9. Training students of Computer Science and Engineering to adapt with situations demanding self-driven continuous learning. |
| BTF407 | Skills for Engineers IV Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance<br>V. Teamwork, Interpersonal & Management skills | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | 7. Adopting management practices/principles for handling project under various barriers/constraints. |

| Course Code | Course Name | Meta Profile Competence | Specific Competence | Generic Competence |
|---|---|---|---|---|
| BTAIC408 | Analysis and Design of Algorithms Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIC409 | Computer Networks Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |
| BTAIC410 | Software Engineering Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |
| BTAIC411 | Operating Systems Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |

| Course Code | Course Name | Meta Profile Competence | Specific Competence | Generic Competence |
|---|---|---|---|---|
| BTAIC412 | Python Lab | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |
| BTAIS501 | Artificial Intelligence: Principles and Techniques | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIS502 | Soft Computing Techniques | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIS503 | Optimization Techniques | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIS504 | Automata and Formal Languages | I. Knowledge & Theoretical Concepts | 1. Knowing the relevant principles, concepts & methods from mathematics, Computer Science, statistics and other allied disciplines and their applications to solve real life practical problems by developing suitable solutions. | |
| BTAIS505 | Database Management Systems | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIS506 | Skills for Engineers V | IV. Communication<br>V. Teamwork, Interpersonal & Management skills<br>VII. Lifelong learning | | 7. Adopting management practices/principles for handling project under various barriers/constraints.<br>9. Training students of Computer Science and Engineering to adapt with situations demanding self-driven continuous learning. |

| Course Code | Course Name | Meta Profile Competence | Specific Competence | Generic Competence |
|---|---|---|---|---|
| BTAIS507 | Artificial Intelligence: Principles and Techniques Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |
| BTAIS508 | Soft Computing Techniques Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |
| BTAIS509 | Database Management Systems Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |

| Course Code | Course Name | Meta Profile Competence | Specific Competence | Generic Competence |
|---|---|---|---|---|
| BTAIS510 | Scripting Languages Lab | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |
| BTAIS511 | International Training and Education Program | IV. Communication | | 6. Documenting a substantial technical report/document and to communicate effectively with diverse range of audience. |
| BTAIS512 | Skills for Engineers V Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations.<br>5. Training students of Computer Science and Engineering to meet the ongoing industry needs of practicing professionals within India and abroad. | |
| BTAIS601 | Machine Learning | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIS602 | Digital Image Processing | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |

| Course Code | Course Name | Meta Profile Competence | Specific Competence | Generic Competence |
|---|---|---|---|---|
| BTAIS603 | Secured Software Development and Testing | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.<br>4. Developing new system and maintain them in compliance with industry specifications, standards and recommendations. | |
| BTAIS604 | Microprocessor & Microcontrollers | I. Knowledge & Theoretical Concepts | 1. Knowing the relevant principles, concepts & methods from mathematics, Computer Science, statistics and other allied disciplines and their applications to solve real life practical problems by developing suitable solutions. | |
| BTAIS605 | Skills for Engineers VI | IV. Communication<br>V. Teamwork, Interpersonal & Management skills<br>VII. Lifelong learning | | 7. Adopting management practices/principles for handling project under various barriers/constraints.<br>9. Training students of Computer Science and Engineering to adapt with situations demanding self-driven continuous learning. |
| BTAIS606 | Machine Learning Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIS607 | Digital Image Processing Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIS608 | Secured Software Development and Testing Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIS609 | Microprocessor & Microcontrollers Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |

| Course Code | Course Name | Meta Profile Competence | Specific Competence | Generic Competence |
|---|---|---|---|---|
| BTAIS610 | Minor Project | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance<br>V. Teamwork, Interpersonal & Management skills | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | 7. Adopting management practices/principles for handling project under various barriers/constraints. |
| BTAIS611 | Skills for Engineers VI Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIS701 | Information Retrieval and Web Search | I. Knowledge & Theoretical Concepts | 1. Knowing the relevant principles, concepts & methods from mathematics, Computer Science, statistics and other allied disciplines and their applications to solve real life practical problems by developing suitable solutions.<br>2. Training students of Computer Science and Engineering to pursue relevant research work in specialized areas. | |
| BTAIS702 | Natural Language Processing | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIS703 | Data Warehousing & Mining | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIS704 | Managing Big Data | I. Knowledge & Theoretical Concepts<br>II. Analysis, Problem Solving & Design | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIS705 | Information Retrieval and Web Search Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |

| Course Code | Course Name | Meta Profile Competence | Specific Competence | Generic Competence |
|---|---|---|---|---|
| BTAIS706 | Data Warehousing & Mining Lab | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | |
| BTAIS707 | Industrial Internship | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance<br>VII. Lifelong learning | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | 9. Training students of Computer Science and Engineering to adapt with situations demanding self-driven continuous learning. |
| BTAIC801 | Industrial Training | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance<br>VII. Lifelong learning | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | 9. Training students of Computer Science and Engineering to adapt with situations demanding self-driven continuous learning. |
| BTAIC802 | Industrial Training Report & Viva Voce | II. Analysis, Problem Solving & Design<br>VII. Lifelong learning | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | 9. Training students of Computer Science and Engineering to adapt with situations demanding self-driven continuous learning. |
| BTAIC803 | Major Project | II. Analysis, Problem Solving & Design<br>III. Development, Deployment & Maintenance<br>V. Teamwork, Interpersonal & Management skills<br>VII. Lifelong learning | 3. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | 7. Adopting management practices/principles for handling project under various barriers/constraints.<br>9. Training students of Computer Science and Engineering to adapt with situations demanding self-driven continuous learning. |

# 6

# Structure of the programme: units/ courses/modules with their learning outcomes and learning, teaching and assessment strategies

| Course/paper (name and code) | Course/paper learning outcomes (CLO) | Learning and teaching activities related to each course/paper learning outcome | Assessment activities (formative and summative) related to each course/paper learning outcome |
|---|---|---|---|
| BTF101 Mathematics-I | CLO1-To understand advanced matrix knowledge to Engineering problems, applications of differential equations.<br>CLO2-To improve their ability in analyzing and solving in Integral problems. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTF102 Engineering Physics | CLO3-To understand and apply the general scientific concepts of modern physics for technical applications. | Class Room interactive lectures and tutorials using blended learning techniques, assignments, presentation, online quiz. Open resources. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTF103 Principles of Environmental Studies | CLO4-To impart basic knowledge about environmental science, laws, waste management, biodiversity and its allied problems. | Class Room interactive lectures and tutorials using blended learning techniques, assignments, presentations and open resources. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |

| Course/paper (name and code) | Course/paper learning outcomes (CLO) | Learning and teaching activities related to each course/paper learning outcome | Assessment activities (formative and summative) related to each course/paper learning outcome |
|---|---|---|---|
| BTF104 Computer Fundamentals And Programming in C | CLO5-To acquire knowledge about computers and programming languages (C programming).<br>CLO6-To design, code, debug and document programs using techniques of good programming style. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTF105 Engineering Graphics | CLO7-To familiarize with the construction of geometrical figures, projection of plane and solid elements.<br>CLO8-To familiarize drafting using AUTOCAD software. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTF106 Skill for Engineers-I | CLO9-Helps in self awareness and acquiring social skills that allows effective business writing, reading and interpretation of text and enhances public speaking skills. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>**Summative**<br>End Semester Exam |
| BTF107 Engineering Physics Lab | CLO10-To gain knowledge of scientific methods and learn the process of measuring different Physical quantities and variables. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>**Summative**<br>Practical Viva |
| BTF108 Computer Fundamentals and Programming in C Lab | CLO11- To analyze the problem and draw flowchart and write pseudo code.<br>CLO12- To implement the concepts of C language in Programming. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>**Summative**<br>Practical Viva |
| BTF109 Engineering Graphics Lab | CLO13-To draw and interpret various projections of 1D, 2D and 3D objects.<br>CLO14-To prepare and interpret the drawings understanding for the Engineering brain. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>**Summative**<br>Practical Viva |

| Course/paper (name and code) | Course/paper learning outcomes (CLO) | Learning and teaching activities related to each course/paper learning outcome | Assessment activities (formative and summative) related to each course/paper learning outcome |
|---|---|---|---|
| BTF110<br>Skill for Engineers-I Lab | CLO15- Reflects the practical implication of social and business skills required for successful career in their preferredindustry/ profession in a domestic/international setting. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>**Summative**<br>Practical Viva |
| BTF201<br>Mathematics–II | CLO16-To have knowledge in Differential equation using Laplace transform and familiarize with Complex integration& vector analysis. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTF202<br>Engineering Chemistry | CLO17-To understand the classification of polymers, different types of polymerizations, preparation, properties and applications of important polymers and FRPs. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTF203<br>Basic Electrical & Electronics Engineering | CLO18-To explain the working principle, construction, applications of DC machines, AC machines & measuring instruments so that students can utilize in the field of engineering problems.<br>CLO19-To understand the significance of semiconductors in the field of engineering and technology. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTF204<br>Basic Civil &Engineering Mechanics | CLO20-To understand the civil engineering material, surveying, positioning and building components.<br>CLO21-To understand the concept of rigid body, particles in static and dynamic condition. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |

| Course/paper (name and code) | Course/paper learning outcomes (CLO) | Learning and teaching activities related to each course/paper learning outcome | Assessment activities (formative and summative) related to each course/paper learning outcome |
|---|---|---|---|
| BTF205<br>Basic Mechanical Engineering | CLO22-To Understand basics of thermodynamics, IC engines and basics of fluid properties and their behavior.<br>CLO23- To identify engineering materials and their properties. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | Mid Semester Test<br>/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTF206<br>Skill for Engineers–II | CLO24-To understand and apply the concept of emotional intelligence, dynamics of persuasion, team work, value of giving and receiving feedbacks and negotiationin real life situations. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTF207<br>Engineering Chemistry Lab | CLO25- To apply the concepts of chemistry and develop analytical skills for applications in engineering. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>**Summative**<br>Practical Viva |
| BTF208<br>Basic Electrical & Electronics Engineering lab | CLO26- To measure different electrical quantities using measuring instruments like Ammeter, voltmeter, multi-meter etc.<br>CLO27- To understand the operation and applications ofelectronic devices. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>**Summative**<br>Practical Viva |
| BTF209<br>Basic Civil &Engineering Mechanics Lab | CLO28-Toapply the concept of rigid body, particles in static and dynamic condition in real life situation. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>**Summative**<br>Practical Viva |
| BTF210<br>Basic Mechanical Engineering Lab | CLO29- To demonstrate the working principal of boilers and IC engines using models.<br>CLO30-To measurethe pressure, temperature, torque and flow rate. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>**Summative**<br>Practical Viva |

| Course/paper (name and code) | Course/paper learning outcomes (CLO) | Learning and teaching activities related to each course/paper learning outcome | Assessment activities (formative and summative) related to each course/paper learning outcome |
|---|---|---|---|
| BTF211 Workshop Practice | CLO31- To provide hands on experience on different trades ofEngineering like fitting, carpentry, machining, welding and sheet metal. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>**Summative**<br>Practical Viva |
| BTF212 Skill for Engineers-II Lab | CLO32-To understand the dynamics of effective teamwork and undertake tasks in effective teams. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>**Summative**<br>Practical Viva |
| BTF301 Mathematics-III | CLO33-To comprehend numerical methods skill setto solve thevarious mathematical problems. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Quiz/Assignments<br>Unit Test<br>Tutorials<br>Rubrics<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTAIC302 Object Oriented Programming Using C++ | CLO34-To understand and design the solution to a problem using object-oriented programming concepts. (C1,C2)<br>CLO35-To understand and implement the features of C++ including templates, exceptions and file handling for providing programmed solutions to complex problems. (C3)<br>CLO36-To reuse the code with extensible class types, user-defined operators and function overloading and inheritance. (C3) | Class Room interactive lectures and tutorials using blended learning techniques, assignments, tutorials, role play. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Practical Training<br>Power point Presentation<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTAIC303 Discrete Mathematics | CLO37-To be skillful in expressing mathematical properties formally via the formal language of propositional logic and predicate logic.<br>CLO38- To be able to specify and manipulate basic mathematical objects such as sets, functions, and relations and will also be able to verify simple mathematical properties that these objects possess. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |

| Course/paper (name and code) | Course/paper learning outcomes (CLO) | Learning and teaching activities related to each course/paper learning outcome | Assessment activities (formative and summative) related to each course/paper learning outcome |
|---|---|---|---|
| BTAIC304<br>Data Structures | CLO39-To understand linear and non linear data structures such as stacks, queues, linked lists, tree and graph.<br>CLO40-To analyze the data structure concept to solve various problems. | • Interactive lectures | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Tutorials<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTAIC305<br>Digital Computer Fundamentals | CLO41-To design and develop basic logic circuitsand implement various digital systems.(C2, C3) | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTF306<br>Skills for EngineersIII | CLO42-To understand the dynamics of persuasion, negotiationsand usefulness of networking in diversework environment. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Demo<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTF307<br>Skills for Engineers III Lab | CLO43-To present and defend the logical evidence based argument, singly or with other that produces an effective negotiation. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test<br>**Summative**<br>Practical Viva |
| BTAIC308<br>Object Oriented Programming Using C++ Lab | CLO44-To design the solution to a problem using object-oriented-programming concepts. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test<br>**Summative**<br>Practical Viva |
| BTAIC309<br>Data Structures Lab | CLO45-To develop programs to implement linear data structures such as stacks, queues, linked lists, etc.<br>CLO46-To apply data structures to solve various problems. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test<br>**Summative**<br>Practical Viva |

| Course/paper (name and code) | Course/paper learning outcomes (CLO) | Learning and teaching activities related to each course/paper learning outcome | Assessment activities (formative and summative) related to each course/paper learning outcome |
|---|---|---|---|
| BTAIC310 Dot Net Framework and C# Lab | CLO47- To understand the basic concepts of object oriented programming using the features of Dot Net Framework along with the features of C# to develop the application software, web based application and to create database using C#. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test<br>Workshop<br>**Summative**<br>Practical Viva |
| BTAIC311 Java Technology Lab | CLO48- To understand and apply the Object Oriented features of Java for programming.<br>CLO49-To demonstrate the systematic knowledge of backend and front end by developing an appropriate application in java with various class hierarchy and API's. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Test<br>Lab experiments<br>Workshop<br>**Summative**<br>Practical Viva |
| BTAIC401 Operating Systems | CLO50-To understand the principles of Operating Systems concepts that includes CPU scheduling, Mutual exclusion algorithms, deadlock detection algorithms and memory management.<br>CLO51- To implement CPU scheduling, deadlock avoidance and memory management algorithm. | Class Room interactive lectures and tutorials using blended learning techniques, assignments, tutorials, role play and case study. | **Formative**<br>Unit Test<br>Case based MCQs<br>Assignment<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTAIC402 Analysis and Design of Algorithms | CLO52-To analyze the time and space complexities of the designed algorithms.<br>CL053-To implement the algorithms of Greedy strategy, dynamic programming and complexity theory. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTAIC403 Computer Networks | CLO54-To enumerate the layers of the OSI model and TCP/IP, and also the comparative study between both the models.<br>CLO55- To understand and building the skills to understand the concept of IP addressing and routing mechanisms. | Class Room interactive lectures and tutorials using blended learning techniques, assignments, tutorials, role play. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |

| Course/paper (name and code) | Course/paper learning outcomes (CLO) | Learning and teaching activities related to each course/paper learning outcome | Assessment activities (formative and summative) related to each course/paper learning outcome |
|---|---|---|---|
| BTAIC404 Computer Organization and Architecture | CLO56-to understand the architecture of modern computer and how a computer performs arithmetic operation and arithmetic and logic operations.<br>CLO57-To understand the control unit operations. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Power point Presentation<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTAIC405 Software Engineering | CLO58-To develop software projects using software modeling.<br>CLO59-To acquire the knowledge of software cost estimation and software quality metrics and assuring software quality. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Power point Presentation<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTF406 Skills for Engineers IV | CLO60- To understand the elements of an effective resume and successful interview.<br>CLO61- To understand the different behavior trait and leadership style. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Presentation Skills<br>Lab exercise<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTF407 Skills for Engineers IV Lab | CLO62-To get hands on experience of resume building, mock interviewand case based discussions. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Lab Practical Training<br>**Summative**<br>Practical Viva |
| BTAIC408 Analysis and Design of Algorithms Lab | CLO63- To develop the new algorithms and evaluate their time and space complexity. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test<br>**Summative**<br>Practical Viva |
| BTAIC409 Computer Networks Lab | CLO64-To implement the flow control techniques and effective routing algorithm while transmitting data over network. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Minor Test<br>Lab Experiments<br>Major Test<br>**Summative**<br>Practical Viva |

| Course/paper (name and code) | Course/paper learning outcomes (CLO) | Learning and teaching activities related to each course/paper learning outcome | Assessment activities (formative and summative) related to each course/paper learning outcome |
|---|---|---|---|
| BTAIC410 Software Engineering Lab | CLO65-To design UML diagram for developing software projects using software practices.<br>CLO66-To acquire knowledge of software cost estimation and software quality metrics. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test<br>Lab Experiments<br>**Summative**<br>Practical Viva |
| BTAIC411 Operating Systems Lab | CLO67-To implement CPU scheduling algorithms, process synchronization, inter- process communication and file system. | Class Room interactive lectures and tutorials using blended learning techniques, assignments, tutorials, role play. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test<br>Lab Experiments<br>**Summative**<br>Practical Viva |
| BTAIC412 Python Lab | CLO68-To write, test, and debug simple Python programs.<br>CLO69-To develop Python programs step-wise by defining functions and calling them. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test with Viva<br>Workshop<br>**Summative**<br>Practical Viva |
| BTAIS501 Artificial Intelligence: Principles and Techniques | CLO70-To understand the search through the solution space to provide the best result.<br>CLO71-To apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning. | Class Room interactive lectures and tutorials using blended learning techniques, assignments, case study. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTAIS502 Soft Computing Techniques | CLO72- To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations.<br>CLO73-To understand the concepts of fuzzy sets, knowledge representation using fuzzy rules; approximate reasoning, fuzzy inference systems, and fuzzy logic.<br>CLO74- To understand various optimization techniques for real world problems. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |

| Course/paper (name and code) | Course/paper learning outcomes (CLO) | Learning and teaching activities related to each course/paper learning outcome | Assessment activities (formative and summative) related to each course/paper learning outcome |
|---|---|---|---|
| BTAIS503 Optimization Techniques | CLO75-To learn about linear optimization theory and its applications.<br>CLO76- To model a problem as a linear programming problem and to apply the appropriate method in order to find an optimal solution.<br>CLO77- To learn nonlinear program includes at least one nonlinear function, which could be the objective function, or some or all of the constraints. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTAIC504 Automata and Formal Languages | CLO78- To construct and interpretation of finite state machine.<br>CLO79-To design grammars and recognizers for different formal languages.<br>CLO80-To determine the decidability and intractability of computational problems. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTAIC505 Database Management Systems | CLO81- To understand various data modeling techniques and its graphical view using data modeling diagrams.<br>CLO82-To design the database schema and clean the database using various normalization techniques. | Class Room interactive lectures and tutorials using blended learning techniques, assignments, tutorials, case study. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTAIS506 Skills for Engineers V | CLO83-To identify different leadership styles and their impact on an organization, using creativity in problem solving and make decisions ethically. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Soft Skill Training<br>Mock Presentations<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTAIS507 Artificial Intelligence: Principles and Techniques Lab | CLO84-To identify the problem that can be solved by Artificial Intelligence.<br>CLO85-To formulatethe given problem in the AI methods such as search problem, constraint satisfaction problem or planning problem. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test with Viva<br>**Summative**<br>Practical Viva |

| Course/paper (name and code) | Course/paper learning outcomes (CLO) | Learning and teaching activities related to each course/paper learning outcome | Assessment activities (formative and summative) related to each course/paper learning outcome |
|---|---|---|---|
| BTAIS508 Soft Computing Techniques Lab | CLO86-To understand different soft computing technique and their combinations.<br>CLO87-To design and implement algorithms for solving engineering and real life problems. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test<br>**Summative**<br>Practical Viva |
| BTAIC509 Database Management Systems Lab | CLO88- To built database using various database tools and apply queries on the data stored inside databases. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test<br>Project<br>**Summative**<br>Practical Viva |
| BTAIS510 Scripting Languages Lab | CLO89-To develop programs in JavaScript and PHP.<br>CLO90-To develop and implement one's own scripting language. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test<br>Workshop<br>**Summative**<br>Practical Viva |
| BTAIC511 International Training and Education Program | CLO91-To experience a different culture, new perspectives and develop a cross-cultural awareness which widen student's horizon and broaden mind. | Organize international training outside the country | **Formative**<br>Training Report<br>Seminar<br>Presentation<br>**Summative**<br>Practical Viva |
| BTAIC512 Skills for Engineers V Lab | CLO92-To install, configure and use various servers.<br>CLO93-To use the remote management techniques. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test<br>**Summative**<br>Practical Viva |
| BTAIS601 Machine Learning | CLO94-To understand two main areas of Machine Learning: supervised and unsupervised.<br>CLO95-To understand different dimensionality reduction approaches. | Class Room interactive lectures and tutorials using blended learning techniques, assignments, case study. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |

| Course/paper (name and code) | Course/paper learning outcomes (CLO) | Learning and teaching activities related to each course/paper learning outcome | Assessment activities (formative and summative) related to each course/paper learning outcome |
|---|---|---|---|
| BTAIS602 Digital Image Processing | CLO96-To understand basic fundamental of digital image processing and applying various image enhancement and restoration techniques.<br>CLO97-To represent image features by using various image compression and segmentation techniques. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTAIS603 Secure Software Development and Testing | CLO98- To incorporate requirements into secured software development process and test software for security vulnerability.<br>CLO99- To apply modern software testing processes in relation to software development and project management. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTAIC604 Microprocessor & Microcontrollers | CLO100-To acquire knowledge of architecture of basic microprocessors and microcontrollers.<br>CLO101-To build a microprocessor and microcontrollers based system for practical applications. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTAIC605 Skills for Engineers VI | CLO102-To develop aptitude and logical reasoning and goal setting to compete in the job market.<br>CLO103-To polish resume writing and interview skills. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTAIS606 Machine Learning Lab | CLO104-To implement different types of machine learning algorithms based on supervised and unsupervised learning. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test<br>**Summative**<br>Practical Viva |
| BTAIS607 Digital Image Processing Lab | CLO105-To use the digital image fundamental techniques using MatLab or python.<br>CLO106- To demonstrate image feature representation. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test<br>**Summative**<br>Practical Viva |

| Course/paper (name and code) | Course/paper learning outcomes (CLO) | Learning and teaching activities related to each course/paper learning outcome | Assessment activities (formative and summative) related to each course/paper learning outcome |
|---|---|---|---|
| BTAIS608 Secure Software Development and Testing Lab | CLO107-To understand terms used in secured software development and life cycle process.<br>CLO108-To incorporate requirements into secured software development process and test software for security vulnerability. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test<br>**Summative**<br>Practical Viva |
| BTAIS609 Microprocessor& Microcontrollers Lab | CLO109-To acquire knowledge about the hardware architectures and the functional blocks of the microprocessors and microcontrollers.<br>CLO110-To gain the practical development of applications using microprocessors and microcontrollers. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Lab Experiment<br>**Summative**<br>Practical Viva |
| BTAIS610 Minor Project | CLO111-To design and develop software as per industry requirement. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Progress Report<br>Presentation<br>Project Report Presentation<br>**Summative**<br>Practical Viva |
| BTAIC611 Skills for Engineers VI Lab | CLO112-To use the various Unix utilities and tools for the administration. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test<br>**Summative**<br>Practical Viva |
| BTAIS701 Information Retrieval and Web Search | CLO113-To understand the theoretical basis behind the standard models of Information Retrieval.<br>CLO114-To implement and evaluatethe standard Information Retrieval system. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTAIS702 Natural Language Processing | CLO115-To understand the semantics, computational properties, NLP models and algorithms of natural language processing. | Class Room interactive lectures and tutorials using blended learning techniques, assignments, tutorials, role play, case study. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |

| Course/paper (name and code) | Course/paper learning outcomes (CLO) | Learning and teaching activities related to each course/paper learning outcome | Assessment activities (formative and summative) related to each course/paper learning outcome |
|---|---|---|---|
| BTAIS703 Data Warehousing and Data Mining | CLO116-To understand the principles and architecture of data Mining and Data warehousing for real time applications.<br>CLO117-To understand the data Mining and Predictive modeling classifications. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>Mid Semester Test<br>**Summative**<br>End Semester Exam |
| BTAIS704 Managing Big Data | CLO118-To understand big data and use cases from selected business domains.<br>CLO119-To install, configure and run Hadoop and HDFS also use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics. | Class Room interactive lectures and tutorials using blended learning techniques, assignments, tutorials. | **Formative**<br>Minor Test<br>Quiz/Assignments<br>Major Test<br>MST<br>**Summative**<br>End Semester Exam |
| BTAIS705 Information Retrieval and Web Search Lab | CLO120-To implement various classification and Clustering algorithm on text.<br>CLO121-To implement standard methods of Web indexing and retrieval. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test<br>**Summative**<br>Practical Viva |
| BTAIS706 Data Warehousing & Mining Lab | CLO122-To implement Classification and Clustering of data through weka tool. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Practical Demo<br>Exercises<br>Practical Test<br>**Summative**<br>Practical Viva |
| BTAIC707 Industrial Internship | CLO123-To explore the opportunity to test their interest in a particular career before permanent-commitments are made. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Internship Report<br>Presentation<br>**Summative**<br>Practical Viva |
| BTAIC801 Industrial Training | CLO124-To expose the real work of environment experience and at the same time, to gain the knowledge through hands on observation andjob execution. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Report on learning during training<br>Presentation<br>**Summative**<br>Practical Viva |
| BTAIC802 Industrial Training Report & Viva Voce | CLO125-To acquire knowledge to write report in technical works/ projects. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Industrial Training ReportPresentation<br>**Summative**<br>Practical Viva |

| Course/paper (name and code) | Course/paper learning outcomes (CLO) | Learning and teaching activities related to each course/paper learning outcome | Assessment activities (formative and summative) related to each course/paper learning outcome |
|---|---|---|---|
| BTAIC803<br>Major Project | CLO126-To identify and analyze the requirements for the real world problems.<br>CLO127-To demonstrate and build the project successfully by software and hardware requirements, coding, emulating and testing. | Class Room interactive lectures and tutorials using blended learning techniques, assignments. | **Formative**<br>Progress Report<br>Presentation<br>Project Report Presentation<br>**Summative**<br>Practical Viva |

# 7

# Length of the programme and student workload

| Year | Semester | Course Code | Course | Students' Workload, hours | | | Total Students' Workload (F+G+H), hours | ECTS Credits (I/30) |
|---|---|---|---|---|---|---|---|---|
| | | | | Contact hours (Guided Learning, face to face activities, lectures, labs, tutorials, etc) | Independent work (self-learning, non face-to-face activities, revision, homework, etc) | Others: Continuous Assessment (Test, Quiz, Final Exam) | | |
| 1 | 1 | BTF101 | Mathematics-I | 48 | 48 | 6 | 102 | 4 |
| 1 | 1 | BTF102 | Engineering Physics | 48 | 36 | 6 | 90 | 4 |
| 1 | 1 | BTF103 | Principles of Environmental Studies | 36 | 24 | 6 | 66 | 3 |
| 1 | 1 | BTF104 | Computer Fundamentals And Programming in C | 36 | 36 | 6 | 78 | 3 |
| 1 | 1 | BTF105 | Engineering Graphics | 50 | 24 | 6 | 80 | 5 |
| 1 | 1 | BTF106 | Skill for Engineers-I | 24 | 24 | 6 | 54 | 2 |
| 1 | 1 | BTF107 | Engineering Physics Lab | 24 | 24 | 3 | 51 | 2 |
| 1 | 1 | BTF108 | Computer Fundamentals and Programming in C Lab | 30 | 48 | 3 | 81 | 2 |
| 1 | 1 | BTF109 | Engineering Graphics Lab | 24 | 24 | 3 | 51 | 2 |
| 1 | 1 | BTF110 | Skill for Engineers-I Lab | 24 | 24 | 3 | 51 | 2 |
| 1 | 2 | BTF201 | Mathematics–II | 48 | 48 | 6 | 102 | 4 |
| 1 | 2 | BTF202 | Engineering Chemistry | 36 | 24 | 6 | 66 | 3 |
| 1 | 2 | BTF203 | Basic Electrical & Electronics Engineering | 36 | 24 | 6 | 66 | 3 |
| 1 | 2 | BTF204 | Basic Civil &Engineering Mechanics | 48 | 24 | 6 | 78 | 4 |
| 1 | 2 | BTF205 | Basic Mechanical Engineering | 48 | 24 | 6 | 78 | 4 |
| 1 | 2 | BTF206 | Skill for Engineers–II | 24 | 24 | 6 | 54 | 2 |
| 1 | 2 | BTF207 | Engineering Chemistry Lab | 24 | 24 | 3 | 51 | 2 |

| Year | Semester | Course Code | Course | Students' Workload, hours | | | Total Students' Workload (F+G+H), hours | ECTS Credits (I/30) |
|---|---|---|---|---|---|---|---|---|
| | | | | Contact hours (Guided Learning, face to face activities, lectures, labs, tutorials, etc) | Independent work (self-learning, non face-to-face activities, revision, homework, etc) | Others: Continuous Assessment (Test, Quiz, Final Exam) | | |
| 1 | 2 | BTF208 | Basic Electrical & Electronics Engineering lab | 24 | 24 | 3 | 51 | 2 |
| 1 | 2 | BTF209 | Basic Civil &Engineering Mechanics Lab | 24 | 24 | 3 | 51 | 2 |
| 1 | 2 | BTF210 | Basic Mechanical Engineering Lab | 24 | 24 | 3 | 51 | 2 |
| 1 | 2 | BTF211 | Workshop Practice | 36 | 24 | 3 | 63 | 3 |
| 1 | 2 | BTF212 | Skill for Engineers-II Lab | 24 | 24 | 6 | 54 | 2 |
| 2 | 3 | BTF301 | Mathematics - III | 50 | 36 | 6 | 92 | 5 |
| 2 | 3 | BTAIC302 | Object Oriented Programming using C++ | 48 | 36 | 6 | 90 | 4 |
| 2 | 3 | BTAIC303 | Discrete Mathematics | 36 | 24 | 6 | 66 | 3 |
| 2 | 3 | BTAIC304 | Data Structures | 48 | 24 | 6 | 78 | 4 |
| 2 | 3 | BTAIC305 | Digital Computer Fundamentals | 36 | 24 | 6 | 66 | 3 |
| 2 | 3 | BTF306 | Skills for Engineers III | 24 | 24 | 6 | 54 | 2 |
| 2 | 3 | BTF307 | Skills for Engineers III Lab | 24 | 24 | 3 | 51 | 1 |
| 2 | 3 | BTAIC308 | Object Oriented Programming using C++ Lab | 24 | 48 | 3 | 75 | 2 |
| 2 | 3 | BTAIC309 | Data Structures Lab | 24 | 36 | 3 | 63 | 1 |
| 2 | 3 | BTAIC310 | Dot Net Framework and C# Lab | 24 | 48 | 3 | 75 | 2 |
| 2 | 3 | BTAIC311 | Java Technology Lab | 24 | 48 | 3 | 75 | 2 |
| 2 | 4 | BTAIC401 | Operating Systems | 48 | 24 | 6 | 78 | 4 |
| 2 | 4 | BTAIC402 | Analysis and Design of Algorithms | 36 | 24 | 6 | 66 | 3 |
| 2 | 4 | BTAIC403 | Computer Networks | 48 | 24 | 6 | 78 | 4 |
| 2 | 4 | BTAIC404 | Computer Organization and Architecture | 48 | 24 | 6 | 78 | 4 |
| 2 | 4 | BTAIC405 | Software Engineering | 36 | 24 | 6 | 66 | 3 |
| 2 | 4 | BTF406 | Skills for Engineers IV | 24 | 24 | 6 | 54 | 2 |
| 2 | 4 | BTF407 | Skills for Engineers IV Lab | 24 | 24 | 3 | 51 | 1 |
| 2 | 4 | BTAIC408 | Analysis and Design of Algorithms Lab | 24 | 24 | 3 | 51 | 1 |

| Year | Semester | Course Code | Course | Students' Workload, hours | | | Total Students' Workload (F+G+H), hours | ECTS Credits (I/30) |
|---|---|---|---|---|---|---|---|---|
| | | | | Contact hours (Guided Learning, face to face activities, lectures, labs, tutorials, etc) | Independent work (self-learning, non face-to-face activities, revision, homework, etc) | Others: Continuous Assessment (Test, Quiz, Final Exam) | | |
| 2 | 4 | BTAIC409 | Computer Networks Lab | 24 | 24 | 3 | 51 | 1 |
| 2 | 4 | BTAIC410 | Software Engineering Lab | 24 | 36 | 3 | 63 | 1 |
| 2 | 4 | BTAIC411 | Operating System Lab | 24 | 24 | 3 | 51 | 2 |
| 2 | 4 | BTAIC412 | Python Lab | 24 | 48 | 3 | 75 | 2 |
| 3 | 5 | BTAIS501 | Artificial Intelligence: Principles and Techniques | 48 | 24 | 6 | 78 | 4 |
| 3 | 5 | BTAIS502 | Soft Computing Techniques | 48 | 24 | 6 | 78 | 4 |
| 3 | 5 | BTAIS503 | Optimization Techniques | 48 | 24 | 6 | 78 | 4 |
| 3 | 5 | BTAIC504 | Automata and Formal Languages | 36 | 24 | 6 | 66 | 3 |
| 3 | 5 | BTAIC505 | Database Management Systems | 48 | 24 | 6 | 78 | 4 |
| 3 | 5 | BTAIC506 | Skills for Engineers V | 24 | 24 | 6 | 54 | 1 |
| 3 | 5 | BTAIS507 | Artificial Intelligence: Principles and Techniques Lab | 24 | 36 | 3 | 63 | 1 |
| 3 | 5 | BTAIS508 | Soft Computing Techniques Lab | 24 | 36 | 3 | 63 | 2 |
| 3 | 5 | BTAIC509 | Database Management Systems Lab | 24 | 36 | 3 | 63 | 1 |
| 3 | 5 | BTAIS510 | Scripting Languages Lab | 24 | 36 | 3 | 63 | 2 |
| 3 | 5 | BTAIC511 | International Training & Education Program | 0 | 100 | 6 | 106 | 2 |
| 3 | 5 | BTAIC512 | Skills for Engineers V Lab | 24 | 24 | 6 | 54 | 2 |
| 3 | 6 | BTAIS601 | Machine Learning | 48 | 24 | 6 | 78 | 4 |
| 3 | 6 | BTAIS602 | Digital Image Processing | 48 | 24 | 6 | 78 | 4 |
| 3 | 6 | BTAIS603 | Secured Software Development and Testing | 36 | 24 | 6 | 66 | 3 |
| 3 | 6 | BTAIC604 | Microprocessor & Microcontrollers | 36 | 24 | 6 | 66 | 3 |
| 3 | 6 | BTAIC605 | Skills for Engineers VI | 24 | 24 | 6 | 54 | 1 |
| 3 | 6 | BTAIS606 | Machine Learning Lab | 24 | 48 | 3 | 75 | 2 |
| 3 | 6 | BTAIS607 | Digital Image Processing Lab | 24 | 36 | 3 | 63 | 2 |
| 3 | 6 | BTAIS608 | Secured Software Development and Testing Lab | 24 | 48 | 3 | 75 | 1 |

| Year | Semester | Course Code | Course | Students' Workload, hours | | | Total Students' Workload (F+G+H), hours | ECTS Credits (I/30) |
|---|---|---|---|---|---|---|---|---|
| | | | | Contact hours (Guided Learning, face to face activities, lectures, labs, tutorials, etc) | Independent work (self-learning, non face-to-face activities, revision, homework, etc) | Others: Continuous Assessment (Test, Quiz, Final Exam) | | |
| 3 | 6 | BTAIC609 | Microprocessor & Microcon-trollers Lab | 24 | 24 | 3 | 51 | 1 |
| 3 | 6 | BTAIC610 | Minor Project | 36 | 50 | 3 | 89 | 2 |
| 3 | 6 | BTAIC611 | Skills for Engineers VI Lab | 24 | 24 | 3 | 51 | 2 |
| 4 | 7 | BTAIS701 | Information Retrieval and Web Search | 48 | 24 | 6 | 78 | 4 |
| 4 | 7 | BTAIS702 | Natural Language Processing | 48 | 24 | 6 | 78 | 4 |
| 4 | 7 | BTAIS703 | Data Warehousing & Mining | 48 | 24 | 6 | 78 | 4 |
| 4 | 7 | BTAIS704 | Managing Big Data | 48 | 24 | 6 | 78 | 4 |
| 4 | 7 | BTAIS705 | Information Retrieval and Web Search Lab | 24 | 36 | 3 | 63 | 2 |
| 4 | 7 | BTAIS706 | Data Warehousing & Mining Lab | 24 | 36 | 3 | 63 | 2 |
| 4 | 7 | BTAIC707 | Industrial Internship | 0 | 150 | 3 | 153 | 5 |
| 4 | 8 | BTAIC801 | Industrial Training | 0 | 400 | 3 | 403 | 12 |
| 4 | 8 | BTAIC802 | Industrial Training Report & Viva Voce | 0 | 50 | 3 | 53 | 4 |
| 4 | 8 | BTAIC803 | Major Project | 0 | 150 | 3 | 153 | 12 |
| | | | Total | 2446 | 3000 | 360 | 5806 | 227 |

# 8

# Overall consistency of the programme

| Course Code | CLOs | I. Knowledge & Theoretical Concepts | | II. Analysis, Problem Solving & Design | III. Development, Deployment & Maintenance | | IV. Communication | V. Teamwork, Interpersonal & Management skills | VI. Professional Ethics & Societal Responsibilities | VII. Lifelong learning |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PLO1 | PLO2 | PLO3 | PLO4 | PLO5 | PLO6 | PLO7 | PLO8 | PLO9 |
| BTF101 | CLO1 | X | | | | | | | | |
| | CLO2 | | | X | | | | | | |
| BTF102 | CLO3 | X | | X | | | | | | |
| BTF103 | CLO4 | | | | | | | | X | X |
| BTF104 | CLO5 | X | | | | | | | | |
| | CLO6 | | | X | X | X | | | | |
| BTF105 | CLO7 | X | | | | | | | | |
| | CLO8 | | | X | | | | | | |
| BTF106 | CLO9 | | | | | | X | X | | X |
| BTF107 | CLO10 | | | X | X | X | | X | | |
| BTF108 | CLO11 | | | X | | | | X | | |
| | CLO12 | | | | X | X | | X | | |
| BTF109 | CLO13 | | | X | X | X | | X | | |
| | CLO14 | | | X | X | X | | X | | |
| BTF110 | CLO15 | | | X | X | X | | | | |
| BTF201 | CLO16 | X | | | | | | | | |
| BTF202 | CLO17 | X | | | | | | | | |
| BTF203 | CLO18 | X | | | | | | | | |
| | CLO19 | X | | | | | | | | |
| BTF204 | CLO20 | X | | | | | | | | |
| | CLO21 | X | | | | | | | | |
| BTF205 | CLO22 | X | | | | | | | | |
| | CLO23 | X | | | | | | | | |

| Course Code | CLOs | I. Knowledge & Theoretical Concepts | | II. Analysis, Problem Solving & Design | III. Development, Deployment & Maintenance | | IV. Communication | V. Teamwork, Interpersonal & Management skills | VI. Professional Ethics & Societal Responsibilities | VII. Lifelong learning |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PLO1 | PLO2 | PLO3 | PLO4 | PLO5 | PLO6 | PLO7 | PLO8 | PLO9 |
| BTF206 | CLO24 | X | | | | | | | | |
| BTF207 | CLO25 | | | | X | X | | | | |
| BTF208 | CLO26 | | | | X | X | | | | |
| | CLO27 | | | | X | X | | | | |
| BTF209 | CLO28 | | | X | X | X | | | | |
| BTF210 | CLO29 | | | X | X | X | | | | |
| | CLO30 | | | X | X | X | | | | |
| BTF211 | CLO31 | | | X | X | X | | | | |
| BTF212 | CLO32 | | | X | X | X | | X | | |
| BTF301 | CLO33 | X | | X | | | | | | |
| BTAIC302 | CLO34 | X | | X | | | | | | |
| | CLO35 | | | X | | | | | | |
| | CLO36 | | | | X | X | | | | |
| BTAIC303 | CLO37 | X | | | | | | | | |
| | CLO38 | | | X | | | | | | |
| BTAIC304 | CLO39 | X | X | | | | | | | |
| | CLO40 | | | X | | | | | | |
| BTAIC305 | CLO41 | X | | X | | | | | | |
| BTF306 | CLO42 | X | | X | | | X | | X | X |
| BTF307 | CLO43 | | | | | | X | | X | X |
| BTAIC308 | CLO44 | | | X | X | X | | | | |
| BTAIC309 | CLO45 | | | X | | | | | | |
| | CLO46 | | | | X | X | | | | |
| BTAIC310 | CLO47 | | | X | X | X | | | | |
| BTAIC311 | CLO48 | X | | | | | | | | |
| | CLO49 | | | X | X | X | | | | |
| BTAIC401 | CLO50 | X | | | | | | | | |
| | CLO51 | | | X | | | | | | |
| BTAIC402 | CLO52 | X | X | | | | | | | |
| | CLO53 | | | X | | | | | | |

| Course Code | CLOs | I. Knowledge & Theoretical Concepts | | II. Analysis, Problem Solving & Design | III. Development, Deployment & Maintenance | | IV. Communication | V. Teamwork, Interpersonal & Management skills | VI. Professional Ethics & Societal Responsibilities | VII. Lifelong learning |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PLO1 | PLO2 | PLO3 | PLO4 | PLO5 | PLO6 | PLO7 | PLO8 | PLO9 |
| BTAIC403 | CLO54 | X | X | | | | | | | |
| | CLO55 | | | X | | | | | | |
| BTAIC404 | CLO56 | X | | | | | | | | |
| | CLO57 | | | X | | | | | | |
| BTAIC405 | CLO58 | X | | | | | | | | |
| | CLO59 | | | X | | | | | | |
| BTF406 | CLO60 | | | | | | X | | | X |
| | CLO61 | | | | | | | X | | |
| BTAIC407 | CLO62 | | | X | X | X | | X | | |
| BTAIC408 | CLO63 | | | X | X | X | | | | |
| BTAIC409 | CLO64 | | | X | X | X | | | | |
| BTAIC410 | CLO65 | | | X | | | | | | |
| | CLO66 | | | | X | X | | | | |
| BTAIC411 | CLO67 | | | X | X | X | | | | |
| BTAIC412 | CLO68 | X | | | X | X | | | | |
| | CLO69 | | | X | | | | | | |
| BTAIC501 | CLO70 | X | X | | | | | | | |
| | CLO71 | | | X | | | | | | |
| BTAIC502 | CLO72 | X | X | | | | | | | |
| | CLO73 | | | X | | | | | | |
| | CLO74 | X | | | | | | | | |
| BTAIC503 | CLO75 | X | X | | | | | | | |
| | CLO76 | | | X | | | | | | |
| | CLO77 | X | | | | | | | | |
| BTAIC504 | CLO78 | X | | | | | | | | |
| | CLO79 | X | | | | | | | | |
| | CLO80 | X | | | | | | | | |
| BTAIC505 | CLO81 | X | | | | | | | | |
| | CLO82 | | | X | | | | | | |
| BTAIC506 | CLO83 | | | | | | X | X | | X |

| Course Code | CLOs | I. Knowledge & Theoretical Concepts | | II. Analysis, Problem Solving & Design | III. Development, Deployment & Maintenance | | IV. Communication | V. Teamwork, Interpersonal & Management skills | VI. Professional Ethics & Societal Responsibilities | VII. Lifelong learning |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PLO1 | PLO2 | PLO3 | PLO4 | PLO5 | PLO6 | PLO7 | PLO8 | PLO9 |
| BTAIC507 | CLO84 | | | X | | | | | | |
| | CLO85 | | | | X | X | | | | |
| BTAIC508 | CLO86 | | | X | | | | | | |
| | CLO87 | | | | X | X | | | | |
| BTAIC509 | CLO88 | | | X | X | X | | | | |
| BTAIC510 | CLO89 | X | | | X | X | | | | |
| | CLO90 | | | X | | | | | | |
| BTAIC511 | CLO91 | | | | | | X | | | |
| BTAIC512 | CLO92 | | | X | | | | | | |
| | CLO93 | | | | X | X | | | | |
| BTAIC601 | CLO94 | X | X | | | | | | | |
| | CLO95 | | | X | | | | | | |
| BTAIC602 | CLO96 | X | | | | | | | | |
| | CLO97 | | | X | | | | | | |
| BTAIC603 | CLO98 | X | | | | | | | | |
| | CLO99 | | | X | X | X | | | | |
| BTAIC604 | CLO100 | X | | | | | | | | |
| | CLO101 | X | | | | | | | | |
| BTAIC605 | CLO102 | | | | | | X | | | X |
| | CLO103 | | | | | | | X | | |
| BTAIC606 | CLO104 | | | X | X | X | | | | |
| BTAIC607 | CLO105 | | | X | | | | | | |
| | CLO106 | | | | X | X | | | | |
| BTAIC608 | CLO107 | | | X | | | | | | |
| | CLO108 | | | | X | X | | | | |
| BTAIC609 | CLO109 | | | X | | | | | | |
| | CLO110 | | | | X | X | | | | |
| BTAIC610 | CLO111 | | | X | X | X | | X | | |
| BTAIC611 | CLO112 | | | X | X | X | | | | |

| Course Code | CLOs | I. Knowledge & Theoretical Concepts | | II. Analysis, Problem Solving & Design | III. Development, Deployment & Maintenance | | IV. Communication | V. Teamwork, Interpersonal & Management skills | VI. Professional Ethics & Societal Responsibilities | VII. Lifelong learning |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PLO1 | PLO2 | PLO3 | PLO4 | PLO5 | PLO6 | PLO7 | PLO8 | PLO9 |
| BTAIC701 | CLO113 | X | X | | | | | | | |
| | CLO114 | | X | | | | | | | |
| BTAIC702 | CLO115 | X | X | X | | | | | | |
| BTAIC703 | CLO116 | X | X | | | | | | | |
| | CLO117 | | | X | | | | | | |
| BTAIC704 | CLO118 | X | X | | | | | | | |
| | CLO119 | | | X | | | | | | |
| BTAIC705 | CLO120 | | | X | | | | | | |
| | CLO121 | | | | X | X | | | | |
| BTAIC706 | CLO122 | | | X | X | X | | | | |
| BTAIC707 | CLO123 | | | X | X | X | | | | X |
| BTAIC801 | CLO124 | | | X | X | X | | | | X |
| BTAIC802 | CLO125 | | | X | | | | | | X |
| BTAIC803 | CLO126 | | | X | | | | X | | X |
| | CLO127 | | | | X | X | | | | |

# 9

# Internal Quality Control/Enhancement

JLU School of Engineering and Technology is committed to ensuring Quality in its all the UG programmes offerings and services. The School management is highly concerned for Quality Control and is ensured both internally and externally.

- **Board of Studies:** For Curriculum development, Board of Studies (BOS) is constituted comprising of renowned experts from various academic institutions, senior faculty members, including external members representing the school industry. The BOS is arranged every year to revise the syllabus and the programme structure, keeping in view the changing demands of the work. The BOS guides and provide strategic advice and guidance to implement the pedagogical changes in the syllabus.
- **Students Feedback:** JLU School of Engineering and Technology collects the Semester-wise students' feedback on suggestions for improvement and ideas for more effective implementation of the curriculum. While obtaining the feedback from the students, the University is maintaining absolute anonymity. The analyzed feedback is provided to Schools for brining the required changes for quality improvement and internal checks.
- **Internal Quality Assurance:** University has an Internal Quality Assurance Cell (IQAC) which is making sure implementation of major academic programmes defined by various leading Accreditation bodies.
- **Class Representative Meeting:** Once in a month Director, JLU School of Engineering and Technology conducts a meeting with Class Representatives to keep check on Academic Progress, Learning Experience, Student Grievances, etc. Later the decision taken and the minutes of the same are shared with Programme Leaders who then work in collaboration with other colleagues in order to rectify issues, if any.
- **Faculty Meeting:** Once in every fortnight a faculty meeting is conducted which is chaired by the Director, JLU School of Law. The meeting consists of discussion on academic progress, planning of curricular and extracurricular activities, student related issues, and other regular discussions.
- **Mode of Communication:** English is the language of communication. JLU School of Engineering and Technology provides special guidance for enhancing the language competency and proficiency.

- **Hands on Experience:** JLU School of Engineering and Technology arranges and provides practical training cum exposure for the students through field trips (industrial visit) and three months of internship in various recognized and reputed industries of the India.
- **Analysis of Evaluated sheets**: After every semester examination, students are given the opportunity to analyze their evaluated answer sheets.
- **Seminars and Workshops**: JLU School of Engineering and Technologyorganizes seminars and workshops on various emerging areas and topics related to computer technology.
- **Expert Lectures**: JLU School of Engineering and Technology organizes Special lectures on various current topics related to curriculum to help students get in depth knowledge of the subject. The leading Experts from industry, higher education, policy makers are invited from time to time.
- **Ignited Mind Lecture Series:** JLU School of Engineering and Technology organizes ignited mind lecture series on various emerging areas and topics related to computer technology by re-known personalities of the area.

# 10

# Other relevant aspects

JLU School of Engineering and Technology mainly focus on an output-driven education model rather than input-based system to improve quality. Some of the important aspects of our programme include the following aspects.

## Emphasis on Life-skills

JLU School of Engineering and Technologyencourages activity based learning to its students to develop life-skills and global competencies required for success in the professional life. It tries to sensitize the students towards realities in the IT sector and prepare them for addressing the challenges of IT industry.

## Inculcating Professional Values

JLU School of Engineering and Technologyis committed to develop the professional values by providing opportunities to participate in various co-curricular and curricular activities.

## Promote Education Research

In addition, the school encourages undertaking researches in emerging technologies. This help to contribute their knowledge to the society.

## Use of ICT

With the advancement of ICT technology has opened new avenues for self-learning. JLU School of Engineering and Technology encourage and promotes its teachers and students to use ICT for effective teaching-learning. The school provides opportunity to develop digital instructional resources using ICT technology.

# 11

# Example of Students' Learning Guide

## JAGRAN LAKECITY UNIVERSITY BHOPAL

### Students' Learning Guide

## I. Introduction to the Subject

1.1. *Lecturer's contact details*

Dr Dileep Kumar Singh, Director/Head, School of Engineering and Technology, JLU, Bhopal (M.P.)-India

Contact Hours: Monday 2:50-3:40, Wednesday 10:50-11:40 AM, Friday 10:00-10:50 AM, Saturday 10:00-10:50 AM.

Email: dileep.singh@jlu.edu.in

Phone: 0755 661 1101

1.2. *Contribution to the degree profile*

To understand the principles of Operating Systems concepts that includes CPU scheduling, mutual exclusion algorithms, deadlock detection algorithms and memory management. And also to implement CPU scheduling, deadlock avoidance and memory management algorithm.

1.3. *Competences to be developed*

Specific Competences

**SC1**. Knowing the relevant principles, concepts & methods from mathematics, Computer Science, statistics and other allied disciplines and their applications to solve real life practical problems by developing suitable solutions.

**SC3**. Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem.

## II. Student Work Plan

2.1. *Distribution of activities and workload*

| Competence | Contents | Activities-Resources-Documentation | Estimated work time | | Completion and/or submission deadlines |
|---|---|---|---|---|---|
| | | | Contact hours | Independent work | |
| **SC1**. Knowing the relevant principles, concepts & methods from mathematics, Computer Science, statistics and other allied disciplines and their applications to solve real life practical problems by developing suitable solutions. | **UNIT-I** Basic concepts of operating system, evolution of operating systems, process concept and scheduling. | Introduction Content Explanation Exercises in class Reading and study of the book | **10H** | **5H** | **3.5 Weeks** |
| **SC3.** Designing, evaluate and/or criticize improved/ new technologies and analyze them to decide the best possible solution to a real life problem. | **UNIT-II** Process Synchronization: Peterson's solution, Bakery algorithm, hardware-based solutions and semaphores. | Content Explanation Exercises in class Reading and study of the book | **10H** | **5H** | **3.5 Weeks** |
| **SC1.** Knowing the relevant principles, concepts & methods from mathematics, Computer Science, statistics and other allied disciplines and their applications to solve real life practical problems by developing suitable solutions. | **UNIT-III** Deadlocks: System model, deadlock characterization, prevention, avoidance and detection. | Content Explanation Exercises in class Reading and study of the book | **10H** | **5H** | **3 Weeks** |
| **SC1.** Knowing the relevant principles, concepts & methods from mathematics, Computer Science, statistics and other allied disciplines and their applications to solve real life practical problems by developing suitable solutions. | **UNIT-IV** Memory Management-Memory hierarchy, concepts of memory management, logical and physical address space and memory allocation strategies. | Content Explanation Exercises in class Reading and study of the book | **10H** | **5H** | **3 Weeks** |
| **SC1.** Knowing the relevant principles, concepts & methods from mathematics, Computer Science, statistics and other allied disciplines and their applications to solve real life practical problems by developing suitable solutions. | **UNIT-V** Input/ Output Management & Disk Scheduling, buffering, operating system Design issues, File concepts, file organization and access mechanism. | Content Explanation Exercises in class Reading and study of the book | **8H** | **4H** | **3 Weeks** |
| **Total** | | | 48H (66.6%) | 24H (33.3%) | **16W** |

2.2. *Summary*

| Type of activities | Contact hours | Independent work | Total |
|---|---|---|---|
| Theoretical learning | **48H** | **24H** | **72H** |
| Practical activities and assessment | **24H** | **24H** | **48H** |
| **Total** | **72H (60%)** | **48H (40%)** | **120H** |

## III. Assessment System

3.1. *Table of assessment*

| Competence | Assessment technique | Grade |
|---|---|---|
| **Specific Competence 1**<br>(Knowledge & Theoretical Concepts)<br>Developing a mindset to apply computer science concepts to solve real life problems.<br>**Learning Outcomes**<br>• LO1-To understand the principles of Operating Systems concepts that includes CPU scheduling, mutual exclusion algorithms, deadlock detection algorithms and memory management. | Unit Test<br>Case based MCQs<br>Assignment<br>Mid Semester Test<br>End Semester Exam | 80 marks |
| **Specific Competence 2**<br>(Analysis, Problem Solving & Design)<br>Developing the ability to apply the knowledge already acquired to formulate, analyze and model the solution for practical problems.<br>**Learning Outcomes**<br>• LO2-To implement CPU scheduling, deadlock avoidance and memory management algorithm. | Unit Test<br>Case based MCQs<br>Assignment<br>Mid Semester Test<br>End Semester Exam<br>Lab experiments | 120 Marks |

3.2. *Observations of assessment*

All the modules will be covered by unit test, case based MCQs, assignments, mid semester test, end semester test and lab experiments.

- Understanding of concepts about the subject of each students is assessed by unit test, case based MCQs, assignment, mid semester test and end semester test.
- Ability to apply the knowledge to analyze, design and develop the solution for practical problem is assessed by the performance of the student in lab experiments.

3.3. *Summary of assessment*

| Competence | Continuous assessment | Final assessment | Total |
|---|---|---|---|
| Specific competence 1 | 20 (Unit Test<br>Case based MCQs<br>Assignment<br>Mid Semester Test) | 50 (End Semester Exam) | **70** |
| Specific competence 2 | 10 (Unit Test<br>Case based MCQs<br>Assignment<br>Mid Semester Test<br>Lab experiments) | 20 (End Semester Exam, Practical Viva) | **30** |
| **Total** | **30%** | **70%** | **100%** |

Grade A - 90% and above

Grade B - 75 % - 89%

Grade C - 60% - 74%

Grade D- 45% - 59%

Grade E- 35% - 44%

Grade F- 34% and below

Completion certificates with grades specified will be awarded to students securing Grade A-Grade E.

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