National Assessment and Accreditation Council
AQAR2021-22

NAAC Criteria-2: Teaching- Learning and Evaluation

Key Indicator- 2.6 Student Performance and Learning Outcome Profile

2.6.2	Attainment of Programme outcomes and course outcomes are evaluated by the institution

Criteria-2: Teaching- Learning and Evaluation

Metric No. 2.6.2

Contents

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Nagarjuna

Institute of Engineering, Technology & Management

(AICTE, DTE Approved & Affiliated to RTM Nagpur University Nagpur)
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College Code: 4192

2.6.2 - Attainment of Programme outcomes and course outcomes are evaluated by the institution.

1. Subject teacher maintains the evaluation data of Mid Sessional, Unit tests and pre-university test, on regular basis and is used for assessing the learning outcomes.

2. Subject teacher maintains the evaluation data of assignments, subject seminars and project if any, on regular basis and is used for assessing the learning outcomes.

3. Student performance is evaluated on the basis of performance in academics, extra and co-curricular activities.

4. The University results are analyzed for student performance.

5. The Course End Survey Feedback for each subject is taken from students once in a semester which helps to verify the achievement of learning outcome.

6. The institute collects the data about learning outcomes from students, employers through course end survey feedback.

7. The feedback from parents is collected during parents–teachers meeting and considered for the improvement.

8. Student's placement data is collected by the training & placement department. Data of graduates seeking higher education is collected by teachers and the training & placement department.

9. Participant's feedback on guest lectures, trainings, workshops are collected by faculty in-charge CO-PO-PSO Mapping Methodology–The process of attainment of COs, POs, and PSOs starts from writing appropriate COs for each course in the four-year engineering degree program. The course outcomes are written by the respective faculty member using action verbs of learning levels as suggested by Bloom's Taxonomy. Bloom's Taxonomy promote higher forms of thinking in education, such as analyzing and evaluating concepts, processes, procedures, and principles, rather than just remembering facts (rote learning). It is most often used when designing educational, training, and learning processes. The three Domains of Learning are (1)

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Cognitive: Mental Skills (Knowledge), (2) Affective: growth in feelings or emotional areas (attitude or self) and (3) Psychomotor: manual or physical skills. Then, a correlation is established between COs, POs, and PSOs on the scale of 0 to 3. A mapping matrix of COs-POs - PSOs is prepared in this regard for all courses in the program. Course Outcomes and the CO-PO-PSO mapping matrix for a sample course are discussed below. Direct Assessments are provided through direct examinations or observations of student knowledge or skills against measurable course outcomes. The knowledge and skills described by the course outcomes are mapped to specific problems on University Examination, internal exams and home assignment. Throughout the semester the faculty records the performance of each student on each course outcome.

Average attainment in direct method = University-Examination- (70%) +

Internal Assessment (20%) +

Assignment / Seminar /Viva / Project Work (10%).

Indirect Assessment is implemented by embedding them in Student Exit Survey, Employer Survey and Alumni Survey. Few of the POs are assessed based on relevant developed rubrics. Finally, program outcomes are assessed with above mentioned data and Program Assessment Committee concludes the PO attainment level. Average attainment in indirect method = Average (Alumni survey + Employer survey + Exit survey)

The following scoring function is used to calculate the average attainment of each program outcomes.

PO /PSO Attainment (%) = (Weightage: 80%) x (Average attainment in direct method) + (Weightage: 20%) x (Average attainment in indirect method)

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Programme Educational Objectives (PEOs)

1. To impart science based engineering education to develop professional skills that will prepare the students for immediate employment, as against the model that just prepares them for post-graduate education.

2. To develop an ability to work in teams, innovate, design and evolve project implementing capabilities and skills of Production and Industrial Engineering.

3. To inculcate the ability to prepare scientific reports and technical proposals.

4. To develop and train for employment in engineering profession with active engagement in learning, understanding and applying new ideas and technologies as the field evolves.

5. To develop a global view among students so that they can appreciate diversity in the world and in intellectual pursuits.

Programme outcomes (Pos)

Engineering Graduates will be able to:

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

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate

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consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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

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

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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

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

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

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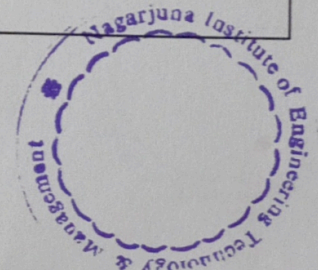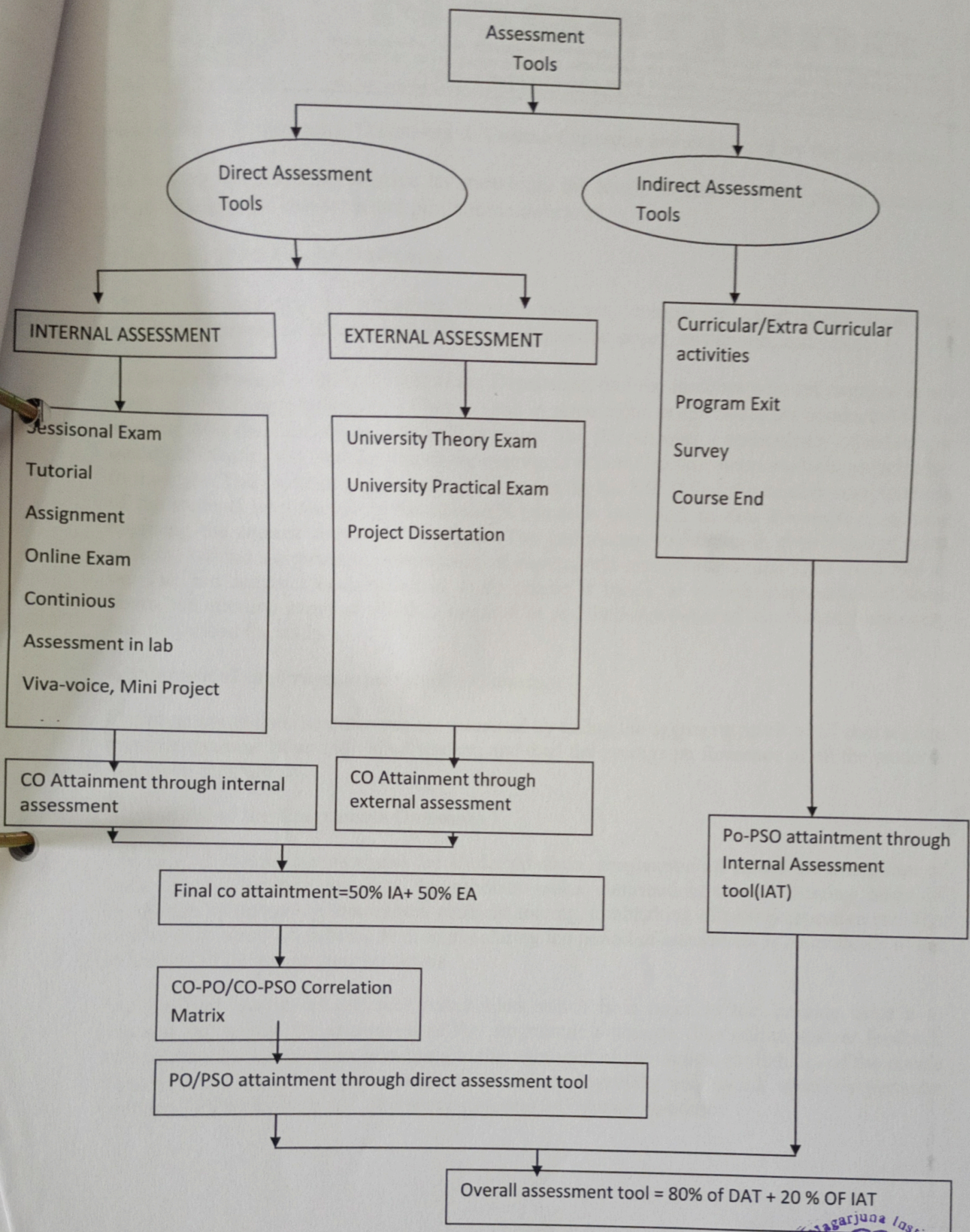
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                        ┌──────────────────┐
                        │   Assessment     │
                        │     Tools        │
                        └──────────────────┘
                  ┌───────────────┴───────────────┐
                  ▼                               ▼
        ⬭ Direct Assessment ⬭          ⬭ Indirect Assessment ⬭
              Tools                           Tools
          ┌──────┴──────┐                       │
          ▼             ▼                       ▼
┌──────────────────┐ ┌──────────────────┐ ┌──────────────────────┐
│INTERNAL ASSESSMENT│ │EXTERNAL ASSESSMENT│ │Curricular/Extra      │
└──────────────────┘ └──────────────────┘ │Curricular activities │
          │             │                  │                      │
          ▼             ▼                  │Program Exit          │
┌──────────────────┐ ┌──────────────────┐ │                      │
│Sessisonal Exam   │ │University Theory  │ │Survey                │
│                  │ │Exam               │ │                      │
│Tutorial          │ │                   │ │Course End            │
│                  │ │University         │ └──────────────────────┘
│Assignment        │ │Practical Exam     │            │
│                  │ │                   │            │
│Online Exam       │ │Project Dissertation│           │
│                  │ │                   │            │
│Continious        │ │                   │            │
│                  │ │                   │            │
│Assessment in lab │ │                   │            │
│                  │ │                   │            │
│Viva-voice, Mini  │ │                   │            │
│Project           │ │                   │            │
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          ▼             ▼                             │
┌──────────────────┐ ┌──────────────────┐            │
│CO Attainment     │ │CO Attainment      │            │
│through internal  │ │through external   │            │
│assessment        │ │assessment         │            │
└──────────────────┘ └──────────────────┘            ▼
          └──────┬──────┘              ┌──────────────────────┐
                 ▼                     │Po-PSO attaintment    │
┌──────────────────────────┐          │through Internal       │
│Final co attaintment=50%  │          │Assessment tool(IAT)   │
│IA+ 50% EA                │          └──────────────────────┘
└──────────────────────────┘                     │
                 │                                │
                 ▼                                │
┌──────────────────────────┐                     │
│CO-PO/CO-PSO Correlation  │                     │
│Matrix                    │                     │
└──────────────────────────┘                     │
                 │                                │
                 ▼                                │
┌──────────────────────────────────┐             │
│PO/PSO attaintment through direct │             │
│assessment tool                   │             │
└──────────────────────────────────┘             │
                 │                                │
                 └────────────────┬──────────────┘
                                  ▼
        ┌──────────────────────────────────────────────┐
        │Overall assessment tool = 80% of DAT + 20 % OF │
        │IAT                                            │
        └──────────────────────────────────────────────┘
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Attainment of Programme Outcomes & Course Outcome are evaluated by the Institution

The Institute has a system in place for measuring the levels of attainment of course outcomes, programme specific outcomes and programme outcomes.

Attainment of the Course Outcomes

The course outcomes are measured through syllabus, completion of syllabus, continuous evaluation (internal evaluation) and setting up of question paper, evaluation, and result.

At the Departmental level the Heads of the Department and the teachers who are engaged in any class strive to complete the courses in time and in some cases extra classes are conducted for the students who they identify as relatively average. The 75 percent of compulsory attendance to qualify for writing the examination of the courses is adhered to, to ensure students participation in the class. The attendance is also tied with marks. In the NIETM of the teacher complete data of the students who are taking that teacher's course is provided, so that the teacher can keep apprising the student about their progress. The continuous evaluation is done through tests, quizzes, written assignments, presentation of papers, oral presentations, and field work and so on. The end semester examination of every course is based on written examination of three hours, the question paper of which is required to test the knowledge of the student from every unit prescribed for study.

Attainment of the Programme Specific Outcomes

The programme specific outcomes are measured by taking the aggregate result of all courses in a given programme of an individual student, and then the average performance of all the students in a given programme.

Attainment of the Programme Outcomes

The general programme outcomes for Under graduate programme all across the disciplines of study in the institute are that the scholars make contribution to the existing body of knowledge by discovery, innovation, problem solving, establishing of new perspective etc. The number of students completed their degree during the period of assessment is an evidence of the attainment of the programme outcomes.

The feedback system of different stakeholders which is in place in the Institute helps it to measure and reckon the attainment of the programme outcomes. The online student feedback system provides information pertaining to the relevance of the course, availability of the course material, and course's importance in terms of employability and so on which is pertinent questions and which help the University measures its learning outcomes

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