OUTCOME BASED ASSESSMENT MANUAL







TGPCET'S OUTCOME BASED ASSESSMENT MANUAL 2022 (TOBAM)





by

Tulsiramji Gaikwad-Patil College of Engineering and Technology, Nagpur-441108

Accredited by NAAC with A+ grade, An autonomous Institute affiliated to RTMNU

Gaikwad-Patil Group of Institutions

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Vision-Mission of the institute



To emerge as a learning Center of Excellence in the National Ethos in domains of Science, Technology and Management.



- M1- To strive for rearing standard and stature of the students by practicing high standards of professional ethics, transparency and accountability.
- M2- To provide facilities and services to meet the challenges of Industry and Society
- M3- To facilitate socially responsive research, innovation and entrepreneurship
- M4- To ascertain holistic development of the students and staff members by inculcating knowledge and profession as work practices.

Preface

Engineering and Technology education in India is changing from a traditional Teaching-Learning process to Outcome Based Education (OBE). It becomes important with respect to globalization and Washington Accord.

Accreditation agencies like NAAC and NBA are also emphasizing on OBE in engineering education to enhance the quality of education and make the learner globally competent and locally relevant.

Tulsiramji Gaikwad-Patil College of Engineering & Technology, in its Vision and Mission statement enthuse on quality assurance and quality enhancement process, that enable improvement in student engagement, experience and learning terms through OBE.

In view of quality in education and to achieve the desire outcome indicators, a systematic approach for implementations of OBE /OBLT is highly required.

This booklet is a guiding light for proper implement of OBE through its five different chapters.

It is hoped that this booklet will be of immense use to TGPCET stakeholder in successful implementation of OBE · philosophy.

The cooperation received from all the stakeholder and advisors in writing this booklet is gratefully acknowledged.

-Prof. (Dr) Geeta Gaikwad-Padole
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CHAPTER-1

TULSIRAMJI GAIKWAD-PATIL COLLEGE OF ENGINEERING AND TECHNOLOGY, NAGPUR, AN INTRODUCTION

After reading this chapter, reader will come to know

- 1. Background of TGPCET, its location and courses run by institute
- 2. The apex bodies governing the institute
- 3. Brief information about each of these governing bodies

1.1 HISTORY

The society, Vidarbha Bahu-Uddeshiya Shikshan Sanstha (VBSS) provides education in various sectors such as Engineering & Technology, Science, Management, Architecture and also runs International School. Tulsiramji Gaikwad-Patil College of Engineering and Technology (TGPCET) is flagship institute of VBSS and one of the premium engineering colleges approved by AICTE, New Delhi and DTE, Maharashtra. The college is accredited by NAAC Bangaluru with A+ grade (3.32 CGPA) and conferd autonomous status by University Grants Commission (UGC).

The college is offering following Under Graduate (UG) courses, B. Tech. in:

- 1. Aeronautical Engineering
- 2. Biotechnology
- 3. Computer Science and Engineering
- 4. Information Technology
- 5. Civil Engineering
- 6. Mechanical Engineering
- 7. Electrical Engineering
- 8. Electronics & Communication Engineering



The college offers the Post Graduate(PG) courses, M. Tech. in:

- 1. Computer Science and Engineering
- 2. Electronics & Communication Engineering
- 3. Integrated Power System
- 4. Structural Engineering
- 5. AI & ML

The college offers following Post Graduate(PG) courses in Management and Computer Application:

- 1. Master of Business Administration,
- 2. Master of Computer Applications,

The college also runs following Diploma Polytechnic Courses:

- 1. Diploma in Mechanical Engineering,
- 2. Diploma in Civil Engineering,
- 3. Diploma in Electrical Engineering,
- 4. Diploma in Computer Science and Engineering.

1.2 GEOGRAPHICAL LOCATION OF NAGPUR

Nagpur is the third largest city and the winter capital of the Indian state of Maharashtra. Nagpur stood first in Maharashtra state and second in India. Known as the "Orange City", Nagpur has officially become the greenest, safest, and technologically developed city in the Maharashtra state. The latitude of Nagpur, India is 21.146633, and the longitude is 79.088860. Nagpur, India is located at India country in the Cities place category with the GPS coordinates of 21° 8' 47.8788" N and 79° 5' 19.8960" E.



Figure 1.1 Location of TGPCET



1.3 TULSIRAMJI GAIKWAD-PATIL COLLEGE OF ENGINEERING AND TECHNOLOGY, NAGPUR CAMPUS

Tulsiramji Gaikwad-Patil College of Engineering and Technology, Nagpur is situated on National Highway 7, Mohgaon, Wardha Road, Nagpur, 2 km distance from Butibori railway station (on Nagpur-Wardha road) and 2 km distance from Butibori bus station, 10 km from Nagpur Air port.



Figure 1.2 Arial view of TGPCET Campus



1.4 HOSTEL FACILITIES

Tulsiramji Gaikwad-Patil College of Engineering and Technology, provides hostel facilities for their students. The college has separate Girls and Boys hostel. A free bus facility is provided to hostellers for reaching to college. The girls hostel is named as "**Matru Achanl**" and boys hostel is named as "**Arise**"



Boy's Hostel: "Arise"

Girl's Hostel: "Matru Aachal"

Figure 1.3 Hostel Facilities

1.5 BODIES RESPONSIBLE FOR TECHNICAL EDUCATION IN TULSIRAMJI GAIKWAD-PATIL COLLEGE OF ENGINEERING AND TECHNOLOGY (TGPCET), NAGPUR.

The higher education in India is categorized into General Education, Professional Education and Vocational Education. In India is the undergraduate level category of professional Education. It is mandatory for Technical Education in Tulsiramji Gaikwad-Patil College of Engineering and Technology (TGPCET), Nagpur to follow the guidelines framed by the various bodies responsible for technical education, which are as follows:



1.5.1 MINISTRY OF EDUCATION (INDIA)

The Ministry of Education (MoE), formerly the Department of Higher Education, MHRD, is a ministry of the Government of India, responsible for the implementation of the National Policy on Education. MoE is responsible for the overall development of the basic infrastructure of Higher Education sector, both in terms of policy and planning in India. Under a planned development process, the Department looks after expansion of access and qualitative improvement in the Higher Education, through world class Universities, Colleges, and other Institutions.

1.5.2 ALL INDIA COUNCIL FOR TECHNICAL EDUCATION (AICTE)

The All India Council for Technical Education (AICTE) has been in existence since November 1945 as a national level Apex Advisory Body. AICTE became a statutory body through an act of Parliament 52, in 1987. AICTE was established with a view to the proper planning and co-ordinate development of the technical education system throughout the country, the promotion of qualitative improvement of such education in relation to planned quantitative growth and the regulation and proper maintenance of norms and standards in the technical education system for matters connected therewith. One of the major functions of AICTE is to lay down norms and standards for courses, curricula, physical and instructional facilities, staff pattern, staff qualifications, quality instructions, assessment and examinations.

1.5.3 UNIVERSITY GRAND COMMISSION (UGC)

The UGC, however, was formally established only in November 1956 as a statutory body of the Government of India through an Act of Parliament for the coordination, determination and maintenance of standards of university education in India.

1.5.4 ALL INDIA SURVEY ON HIGHER EDUCATION (AISHE)

The status of higher education in the country, Ministry of Education has endeavored to conduct an annual web-based All India Survey on Higher Education (AISHE). The survey covers all the Institutions in the country engaged in imparting of higher education. Data is being collected on several parameters such as teachers, student enrolment, programmes, examination results, education finance, and infrastructure. Indicators of educational development such as Institution Density, Gross Enrolment Ratio, Pupil-teacher ratio, Gender Parity Index, Per Student



Expenditure will also be calculated from the data collected through AISHE. These are useful in making informed policy decisions and research for development of education sector.

1.5.5 HIGHER AND TECHNICAL EDUCATION, GOVERNMENT OF MAHARASHTRA

It is the apex authority responsible for steering and supporting the development and growth of quality Higher and Technical Education that meets educational and social objectives of the state. This department is highly committed towards inclusive education and realizes the importance of quality of education and has undertaken numerous initiatives for achieving highest quality standards in the field of education. Accreditation and Re-accreditation of the Universities and Institutes of higher learning has been made mandatory to ensure the quality of institutions.

1.5.6 DIRECTORATE OF TECHNICAL EDUCATION (DTE), GOVERNMENT OF MAHARASHTRA

The role of the Directorate is to maintain, enhance the standard, quality of technical education by laying the policies, establishing developing Govt. Institutions, guiding supervising the aided, private institutions, interacting with industry and national level institutions, coordinating with other departments of State Government, Government of India Statutory Organisations and to contribute to the development of industry society at large.

1.5.7 RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY (RTMNU), NAGPUR, MAHARASHTRA.

Rashtrasant Tukadoji Maharaj Nagpur University (RTMNU), formerly Nagpur University, is a public state university located in Nagpur, Maharashtra. In India, state universities are run and funded by the state government of each of the states of India. UGC Act of the Constitution of India in 1950, education became a state responsibility. Following a constitutional change in 1976, it became a joint responsibility of the states and the central government. Tulsiramji Gaikwad-Patil College of Engineering and Technology (TGPCET) is affiliated to RTMNU. The RTMNU shall monitor all academic and examination related activities of the Institutions such as curriculum, teaching examination scheme, teaching hours, academic schedule, eligibility of candidate to appear for the examination, etc.

1.5.8 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION (MSBTE)

Maharashtra State Board for Technical Education (MSBTE) was established with the enactment of the Maharashtra State Board of Technical Education Act 1997 to regulate the



matters pertaining to diploma level technical education in the state of Maharashtra. Tulsiramji Gaikwad-Patil College of Engineering and Technology (TGPCET) is affiliated to MSBTE. The MSBTE shall monitor all academic and examination related activities of the Institutions such as curriculum, teaching examination scheme, teaching hours, academic schedule, eligibility of candidate to appear for the examination, etc.

1.5.9 NATIONAL BOARD OF ACCREDITATION (NBA)

The National Board of Accreditation (NBA), India was initially established by AICTE (All India Council of Technical Education) under section 10(u) of AICTE act, in the year 1994, for periodic evaluations of technical institutions & programmes basis according to specified norms and standards as recommended by AICTE council. NBA in its present form came into existence as an autonomous body with effect from 7th January 2010, with the objective of Assurance of Quality and Relevance of Education, especially of the programmes in professional and technical disciplines, i.e., Engineering and Technology, Management, Architecture, Pharmacy and Hospitality, through the mechanism of accreditation of programs offered by technical institutions. NBA has introduced a new process, parameters and criteria for accreditation. These are in line with the best international practices and oriented to assess the outcomes of the programme. NBA adopted Outcome Based Education (OBE) model for accreditation of all engineering programs in India from 2013.

1.5.10 NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL (NAAC)

The National Assessment and Accreditation Council (NAAC) conducts assessment and accreditation of Higher Educational Institutions (HEI) such as colleges, universities or other recognized institutions to derive an understanding of the 'Quality Status' of the institution. NAAC evaluates the institutions for its conformance to the standards of quality in terms of its performance related to the educational processes and outcomes, curriculum coverage, teachinglearning processes, faculty, research, infrastructure, learning resources, organisation, governance, financial well being and student services.

CHAPTER-2

OUTCOME BASED EDUCATION PHILOSOPHY

After reading this chapter, reader will come to know

- 1. Essence of Outcome Based Education
- 2. Curriculum design aspects in view of OBE
- 3. Outcome based learning and assessment

University Grant Commission (UGC), New Delhi has implemented Output Based Education (OBE) System as it has become mandatory for all the engineering colleges to implement OBE system in order to get accreditation since 2013. As per the new education system OBE is based on 'Student Centric' rather than 'Teacher Centric'.

Outcome Based Education (OBE) is an educational approach that aims towards graduate attributes or outcomes after finishing an Academic Program. Outcome based approach means implementing and executing various steps in order to achieve required output.

Some Benefits of OBE are-

- ✓ More directed and clear curriculum.
- ✓ Graduates (students) will be more "relevant" to industry and other stakeholders.
- ✓ The framework required for implementing OBE is as shown in Figure 1.1.







It consists of:-

Outcome Based Curriculum (OBC): What is expected from the institute to develop GAs? Outcome Based Teaching learning (OBTL): Process for achieving Learning-Teaching Outcomes.

Outcome Based Assessment (OBA): Measuring Tools for the student's assessment.

Outcome Based Curriculum (OBC)

An outcomes-based curriculum (OBC) model provides proper direction and guidelines for students in order to acquire the knowledge. This enables students to define their learning needs and objectives. It also enables teachers to identify the areas which are to be covered during the dissemination of the knowledge. It also creates a strong platform for the assessment process.

2.1 OUTCOME BASED LEARNING TEACHING (OBLT)

An outcome based learning teaching (OBTL) is a student-centric approach for the delivery of contents from the curriculum. The curriculum topics in courses are expressed clearly as the intended outcomes for students to achieve. Teaching is then planned in order to facilitate students to achieve those outcomes. Assessment tasks address what students are supposed to learn and achieve as well. In this approach, teachers act as facilitators, and students should take responsibility and participate actively.

Outcome Based Assessment (OBA)

Outcome Based Assessment is the process of developing the appropriate assessment for the learning outcomes as well as conducting some necessary activities to make the assessments transparent, valid, and reliable. OBA plays a critical role in OBE since without the presence of transparent, valid, reliable assessments, it would not be possible to tell what and how the students have achieved with respect to the pre- determined learning outcomes.

2.2 KEY CONSTITUENTS OF OBE

The outcome based education (OBE) aims to achieve the pre decided vision. For this the OBE consists of various key constituents. Figure 2.2 shows the key constituent of OBE. Course outcomes are to designed and mapped with Program outcomes. The programme outcomes shall map with programme educational objectives. Programme educational objectives are to be attained using mission statement of the institute, which in turn achieves vision of the institute.





Figure 2.2 Key Constituents of OBE

2.2.1 VISION

Vision is a picture of the future, which seek to create and described in the present tense, as if it is happening at present. It shows a future path and predicts the outcome after system implementation.

2.2.2 MISSION

Mission statement defines what an institution is, why the institution exists, reason for its existence. It defines what we are here to do together.

2.2.3 VISION VS MISSION

Mission	Vision
A mission statement is what an	A vision statement is what the
Institute is all about.	Institute wants to acquire.
A mission statement explains what the	A vision statement describes how the
Institute does, for whom and who will be	future will look if the Institute achieves
benefited.	the mission.
A mission statement gives the overall purpose	A vision statement describes a
of an Institute.	picture of the "preferred future".



2.2.4 GRADUATE ATTRIBUTES (GA'S)

Graduate attributes are the qualities, skills and understandings a university community agrees its students should develop during their time with the institution. These attributes include but go beyond the disciplinary expertise or technical knowledge that has traditionally formed the core of most university courses. WA (Washington Accord) defines 12 GA's for Engineering Graduates.

GRADUATE ATTRIBUTES (GA'S) AS PER WA

- **1. (KB) Engineering Knowledge:** A knowledge base for engineering: Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.
- 2. (PA) Problem analysis: An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions
- **3.** (Inv.) Investigation: An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data and synthesis of information in order to reach valid conclusions.
- 4. (Des.) Design: An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
- **5.** (**Tools**) **Use of engineering tools:** An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.
- **6.** (**Team**) **Individual and teamwork:** An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.
- **7.** (**Comm.**) **Communication skills:** An ability to communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.

- 8. (Prof.) Professionalism: An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.
- **9.** (Impacts) Impact of engineering on society and the environment: An ability to analyze social and environmental aspects of engineering activities. Such ability includes an understanding of the interactions that engineering has with the economic, social, health, safety, legal, and cultural aspects of society, the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.
- **10. (Ethics) Ethics and equity:** An ability to apply professional ethics, accountability, and equity.
- **11. (Econ.) Economics and project management:** An ability to appropriately incorporate economics and business practices including project, risk, and change management into the practice of engineering and to understand their limitations.
- **12. (LL) Life-long learning:** An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge

2.3 PROGRAM OUTCOMES (PO'S)

Programme Outcomes (POs) describe what students should know and be able to do at the end of the programme. They are to be in line with the graduate attributes (GAs) of NBA. PO's are to be specific, measurable and achievable. POs transform the PEOs into specific student performance and behaviors that demonstrate student learning and skill development.

2.3.1 POS (FOR B. TECH. PROGRAMME) GIVEN BY NBA ARE:

Program Outcomes (PO) as defined by NBA.

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.

- 3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. **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 modeling 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.



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.

2.3.2 POS (FOR M. TECH. PROGRAMME) AS DEFINED BY NBA

NBA has defined the following three POs for a graduate of PG Engineering Programme are:.

Post Graduate Engineering students will be able to:

- 1. An ability to independently carry out research /investigation and development work to solve practical problems.
- 2. An ability to write and present a substantial technical report/document.
- 3. Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program

2.3.3 POS (FOR MBA PROGRAMME)

- 1. Apply knowledge of management theories and practices to solve business problems
- 2. Foster Analytical and Critical thinking abilities for data-based decision making
- 3. Ability to develop Value Based Leadership ability
- 4. Ability to understand, analyze and communicate global, economic, legal, and ethical areas of business
- 5. Ability to lead themselves and others in the achievement of organizational goals, contributing effectively to a team environment.

2.3.4 POS (FOR MCA PROGRAMME) ARE:

1. Computational Knowledge: Apply knowledge of computing fundamentals, computing specialisation, mathematics, and domain knowledge appropriate for the computing

- 2. **Problem Analysis:** Identify, formulate, research literature, and solve *complex* computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.
- **3. Design /Development of Solutions:** Design and evaluate solutions for *complex* computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
- **4. Conduct investigations of complex Computing 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, adapt and apply appropriate techniques, resources, and modern computing tools to *complex* computing activities, with an understanding of the limitations.
- **6. Professional Ethics:** Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.
- **7. Life-long Learning:** Recognise the need, and have the ability, to engage in independent learning for continual development as a computing professional.
- 8. Project management and finance: Demonstrate knowledge and understanding of the computing 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.
- **9.** Communication Efficacy: Communicate effectively with the computing community, and with society at large, about *complex* computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
- **10. Societal and Environmental Concern:** Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices.
- **11. Individual and Team Work:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.



2.4 PROGRAM EDUCATIONAL OBJECTIVES (PEO'S)

The Program Educational Objectives (PEOs) are broad statements that describe the career and professional fulfillments that the programme is preparing fresh graduates. PEOs should be measurable, appropriate, realistic, time bound and achievable.

The program specific objectives are defined by each program in order to give broader vision to the specific program. They also specify the intention and reason for studying various engineering programs.

2.5 COURSE OUTCOMES (CO'S)

Course Outcomes (COs) are clear statements of what a student should be able to demonstrate upon completion of a course. They should be assessable and measurable knowledge, skills, abilities or attitudes that students attain by the end of the course. It is generally a good idea to identify between four and seven. All courses in a programme would have their own course outcomes. These course outcomes are designed based on the requirement of the programme outcomes (POs). Each course outcomes are mapped to a relevant POs and they are mapped to the programme educational objectives (PEOs). The teaching learning process and assessment methods are to be designed in such a way to achieve the COs. It is important to ensure that the student can acquire the knowledge or skill required.

2.5.1 COURSE OBJECTIVES VS COURSE OUTCOMES

Following table clarifies the difference between Course Objectives Vs CourseOutcomes

Course Objectives	Course Outcomes
Describe what a teacher needs to teach,	Describe what students should demonstrate
and what needs to be planned to teach.	upon the completion of a course.



Example-

Example-At the end of the course, students will

understand the types of wiring system.

At the end of the course, students will be able to choose a suitable wiring system for particular installation.

Characteristics of Course Outcomes:

- The course outcomes must state the major knowledge, skills, attitude, or ability that students will acquire.
- Course outcomes should be expressed in terms of measurable and/or observable • behaviors
- Course Outcomes should be agreed upon by the faculty in a program and should • drive program outcomes.
- Course outcomes should begin with an action verb (e.g., write, install, solve, and • apply).
- It would be better to map the course outcomes to the learning domain in Blooms or • other Taxonomy.
- All courses having Five to Six course outcomes (COs) having action verbs according . to Educational Taxonomy in-
 - \triangleright Cognitive domain: Cognitive domain- defining knowledge classification.
 - Affective domain: Defining behaviors that correspond to attitude andvalues.
 - \geq Psychomotor domain: Defining physical skills or task classification.

2.5.2 COURSE OUTCOMES EXAMPLE OF COURSE: DIGITAL SIGNAL PROCESSING (DSP).

Course Outcomes (COs)	Domains of Learning
1. Apply laws governing the operation of the Processor	Cognitive
2. Evaluate different signal parameters under different Conditions for digital filters.	Cognitive
3. Recommend DSP processor for specific application.	Cognitive
4. Perform various modes of operation of a DSP processor	Affective



5. Operate DSP processor with various conditions	Psychomotor
6. Prepare a IIR and FIR filter for specific application	Psychomotor

2.6 SPECIFIC LEARNING OUTCOMES (SLO'S) OR LEARNING OUTCOMES (LO'S)

Learning outcomes (LO's) or Specific Learning Outcomes (SLO's) are "statements of what is expected from the student which will be able to do as a result of learning the activity". (Jenkins and Unwin, 2001); i.e. at the end of each unit or chapter. SLO's should also be assessable and measurable knowledge, skills, abilities or attitudes that students attain by the end of the unit.



OUTCOME BASED CURRICULUM IMPLEMENTATION PHILOSOPHY

After reading this chapter, reader will come to know

- 1. Implementation of OBE curriculum
- 2. Process of implementation of OBE curriculum
- 3. Suggestions to various stake holders for effective implementation of OBE

Curriculum Implementation represents one of the important phases of curriculum development. It starts after curriculum design and curriculum development. As it converts a blueprint in the form of a curriculum into reality, hence any institute should handle it seriously. It is said that a good design and bad execution leads to a disaster. This chapter covers the detailed philosophy to ensure right kind of curriculum implementation of outcome-based curriculum.

The curriculum Implementation and Assessment procedure are prepared by the institution and it is approved by Academic Council (AC) and Governing Body (GB) of the institution. These norms are referred as TGPCET B. Tech. R21 CBCS Regulation for UG programmes and TGPCET M. Tech. R21 CBCS, TGPCET MBA R21 CBCS, TGPCET MCA R21 CBCS for M. Tech., MBA and MCA programme respectively.

3.1 STRUCTURE OF CURRICULUM IMPLEMENTATION MECHANISM

Quality Policy Forum (QPF) is responsible for institutional planning, monitoring curriculum implementation. Fig. 3.1 shows the structure of QPF which consists of followings.

The structure of QPF will comprise of the following officials -

- 1. Principal Ex-officio Chairman
- 2. Vice-Principal Ex-officio Member
- 3. Dean Academics Ex-officio Member



- 4. Dean R and D Ex-officio Member
- 4. IQAC Coordinator Ex-officio Member Secretary
- 5. Controller of Examination (CoE) Ex-officio Member
- 5. Heads of Department (HODs) (01 from each programme) Ex-officio Member
- 6. Representatives of institute teaching staff -Member- 02 (To be nominated by Principal)
- 5. Students Representatives Member 02 (One female and one male, to be nominated by Principal)
- 6. Parent representative- Member 1(To be nominated by Principal).



Figure 3.1 Organization of Quality Forum



3.2 INSTRUCTIONS FOR PEOPLES INVOLVED IN CURRICULUM IMPLEMENTATION

Following are clear and precise instructions to different class of people involved in curriculum implementation:

3.2.1 INSTRUCTIONS TO PROGRAMME/DEPARTMENT HEADS

Being a chief coordinator of a whole Learning Teaching Process (LTP) at a programme level in implementing term curricula and the Programme curriculum, which comprise of curricula of many courses, Programme Heads have especially important role to play. It is to canalize efforts of all course's faculty members not only of the programme but also those of other programmes/departments. By doing so shall ensure achievement of predetermined PEOs, POs, PSOs and COs. In that case Programme Heads are required to establish formal dialogue with all course faculty members and in-charge/Heads of the other departments/programmes, whose faculty member's input, is equally important in successful curriculum implementation. Programme Heads are expected to do following in order to achieve that: -

- Prepare a programme/department plan and submit it to the Dean Academics based on institute academic calendar.
- Identify senior faculty and allocate him/her the portfolio of curriculum implementation and monitoring.
- Organize pre-term commencement meeting of all faculty members.
- Guide faculties in preparing an integrated course plan of the course(s) they are going to teach considering five experiences viz. Classroom, laboratory, library, field, and experts lectures.
- Take term budget of consumables for implementing curricula of various courses.
- Monitor curriculum implementation though Department Quality Assurance Committee (DQAC) internal mechanism.
- Form guidance and counseling mechanism at programme level (along with TG scheme) to address academically weak students; prepare and implement strategic plan for the same.
- Collect feedback from student, Exit Survey, Parent, Faculty, Alumni, and Management ones in a year.



- Analyze the PEOs, POs, and PSOs of the program and take corrective measures/actions.
- Ensure that faculties follow outcome-based learning teaching process and academic regulation of the institution.

3.2.2 INSTRUCTIONS TO COURSE COORDINATOR

Course faculty members have an especially important role of converting curriculum into predetermined outcomes. Course faculty is an important person behind achieving PEOs, POs, PSOs and COs. For that course faculties are required to do following things: -

- Read and comprehend Vision, Mission, Program Educational Objectives (PEOs), Program Outcomes (POs) and Program Specific Outcomes (PSOs) of the program.
- Read & comprehend Course Outcomes (COs) of the course(s).
- Provide the authentic copy of curriculum to the students (having seal of TGPCET) and discus the curriculum with the students in first class.
- Prepare course file separate for each course in advance before the start of academic session to implement the course curriculum effectively. Course file comprises of the following documents with necessary data.

Sr. No.	Contents	
Part-A	Vision and Mission (Institute and Department), POs, PSOs, PEOs	
Part-B	Course Specific Check List	
1	Academic Calendar (Institute, Department)	
2	Syllabus (Course) with Objectives and Outcomes	
3	Mapping of COs with POs and PSOs	
4	Course Plan (Design, Delivery, Assessment, and Evaluation)	
5	List of Students Enrolled	
6	Time-Table (Department and Individual)	
7	Higher Cognitive Level Assignments (preferably group wise)	
8	Tutorial (preferably batch wise)	
9	Case Studies	
10	Class Test-1 Question Paper with Model Solution	
11	Class Test-2 Question Paper with Model Solution	
12	Sample Copies of Evaluated Answer Sheet (Highest, Average, and Marginal) for CT-1 and CT-2	

Table 3.1 Index for Course file



Table 3.1 continued...

Sr. No.	Contents
13	Teacher Assessment Sheet-1 and 2
14	Sample Copies of Evaluated Sheet (Highest, Average, and Marginal) for TA-1 and TA-2
15	Performance Analysis and Remedial Input Sheet
16	Identification of Slow and Advance Learner
17	Course Notes (Unit wise)
18	Power Point Presentation of Course
19	Game Pedagogy Used
20	Faculty Video Lectures with Link
21	Question Bank in the form of MCQs Unit Wise
22	Question Bank Unit Wise
23	End Semester Question Papers of Last 3 Years with Model Solution
24	Advance Topic other than Syllabus/ Website to be Referred
25	Journals Concerned with the Course
26	CO-PO Attainment of the Course
27	Recorded Attendance
28	End Semester Result Analysis of Previous Years
29	Course End Survey
30	Students' Feedback
31	List of Text Book and Reference Book

G

CHAPTER 4

OUTCOME BASED LEARNING TEACHING PROCESS

After reading this chapter, reader will come to know

- 1. Various domains of learning
- 2. Selection of assessment tools
- 3. Effective Learning-Teaching methodologies

Outcome-based education is an educational model in which curriculum and pedagogy and assessment are all focused on student learning. Learning Teaching process is equally or more important to accomplish learning outcomes. Domains of learning and learning teaching process are described in this chapter.

4.1 LEARNING

Learning is a relatively permanent change in behavior potentiality that results from reinforced practice or experience. Benjamin Bloom (1948) developed classifications of intellectual behavior and learning in order to identify and measure progressively sophisticated learning. Bloom's taxonomy is especially important in higher education where outcomes need to address the student ability to use information, not just recall and regurgitate concepts. Lower levels of learning are easier to assess but do not adequately display what the student can do with the knowledge. However, learning is not a purely cognitive function; learning occurs differently when it entails performing a skill or reevaluating behavior. This approach is based on biological structure of human being as shown in figure 4.1. Important elements of this approach which form basics of learning are explained below.



Domains of Learning		Mode of Learning	Example Abilities
Ő	Cognitive	Thoughts/	Memorizing,
	Domain	Thinking	Reasoning etc.
20	Affective	Emotions/	Appreciation,
	Domain	Feeling	Motivation etc.
8	Psychomotor	Actions/	Typing,
	Domain	Doing	Playing etc.

Figure 4.1 Human Being and Domains of Learning

4.2 DOMAINS OF LEARNING

Learning is a process by which students develop relatively permanent change in mental associations through experience. This is how learning is defined by cognitive psychologists. Behavioral; psychologists define learning as a relatively permanent change in behavior. However, learning is not a purely cognitive function; learning occurs differently when it entails performing a skill or re-evaluating behavior.

There are following domains of learning:

- A: Cognitive Domain relates to intellectual skills or abilities
- B: Affective Domain relates to emotions, feelings, likes, dislikes etc.
- C: Psychomotor Domain relates to manipulative skills of hands, legs. Eye-hand coordination

In Engineering & Technology courses, endeavor is made to design curriculum with a focus on development of cognitive skills through classroom teaching, whereas manipulative (psychomotor) skills are developed in workshops, laboratories & seminars where students work individually or in a group. Development of affective skills attitudes and value is supposed to be acquired through projects and co-curricular activities. These are also developed from the work culture or institutions.

How far a student has developed these abilities/skills especially from cognitive and psychomotor domains is assessed based on suitable examinations. When classroom and laboratory teaching is viewed in this light, evaluation becomes an integral part of teaching – learning process.



Dr. Benjamin Bloom (1956) analyzed questions asked in various examinations in American situation and proposed a hierarchical arrangement of instructional objectives (Intellectual abilities) tested by these questions. The lowest level of cognitive learning achieved by a student is demonstrated by the recall of information that the student retrieves from his longterm memory. So, the storage and retrieval of specific facts, concepts, principles, laws, definitions, properties, procedures etc. directly from memory was classified as a knowledge level objective. Thus, questions testing memory of students were treated as at the lowest level of the hierarchy of intellectual abilities. The other levels of hierarchy proposed by Dr. Bloom in 1956 relate to the degree of information processing required in the brain needed to provide answer to a question. The various levels in the cognitive hierarchy proposed by Dr. Bloom in 1956 and further revised in 2001 are shown in figure 4.2



Figure 4.2 Revised Cognitive hierarchy levels



Cognitive Domain Levels	Behavior descriptions	Action Verbs
Remember	Recall or recognize information	Define, Duplicate, List, Name, Identify, Recall, Reproduce, Recognize, Retrieve
Understand	Understand meaning, re-state data in one's own words, interpret, extrapolate, translate	Calculate, Categorize, Clarify, Classify, Compare, Conclude, Contrast, Describe, Exemplify, Expand, Illustrate, Infer, Interpret, Locate, Paraphrase, Predict, Report, Restate, Summarize, Translate
Apply	Use or apply knowledge, put theory into practice, use knowledge in response to real circumstances	Carry out, Classify, Demonstrate, Execute, Illustrate, Implement, Practice, Solve, Use, Utilize
Analyze	Interpret elements, organizational principles, structure, construction, internal relationships; quality, reliability of individual components	Appraise,Attribute,Compare,Contrast,Deconstruct,Detect,Differentiate,Discriminate,Distinguish,Examine,Formulate,Infer,Integrate,Organize,Parse,Relate,Select,Sequence,Structure,Test
Evaluate	Assess effectiveness of whole concepts, in relation to values, outputs, efficacy, viability; critical thinking, strategic comparison and review; judgment relating to external criteria	Appraise, Check, Coordinate, Critique, Defend, Detect, Dispute, Judge, Monitor, Prioritize, Rate, Reconstruct, Select, Support, Verify

Table 4.1 Cognitive Domain Levels Action Verbs

C



		Change, Combine, Compile,
Create	Develop new unique structures,	Compose, Construct, Create, Design,
	systems, models, approaches,	Formulate, Generate, Hypothesize,
	ideas; creative thinking, operations	Improve, Invent, Plan, Predict,
		Produce

4.2.2 PSYCHOMOTOR DOMAIN

The Psychomotor Domain (RH Dave's version, 1970) was established to address skills development relating to the physical dimensions of accomplishing a task. Because, 'motor' skills extend beyond the originally traditionally imagined manual and physical skills, always consider using this domain, even if you think your environment is covered adequately by the Cognitive and Affective Domains. Whatever the situation, it is likely that the Psychomotor Domain is significant.






Psychomotor	Behavior descriptions	Action Verbs		
Domain Levels	Denuvior descriptions			
Imitation/ observation	Copy action of another; observe and replicate	Copy, follow, replicate, repeat, adhere, attempt, reproduce, organize, sketch, duplicate		
Manipulation	Reproduce activity from instruction or memory	Re-create, build, perform, execute, implement, acquire, conduct, operate		
Precision/ competent	Execute skill reliably, independent of help, activity is quick, smooth, and accurate	Demonstrate, complete, show, perfect, calibrate, control, achieve, accomplish, master, refine		
Articulation/ consolidation	Adapt and integrate expertise to satisfy a new context or task	Solve, adapt, combine, coordinate, revise, integrate, adapt, develop, formulate, modify, master		
Naturalization & Mastery	Instinctive, effortless, unconscious mastery of activity and related skills at strategic level	Construct, compose, create, design, specify, manage, invent, project- manage, originate		
Manipulation	Reproduce activity from instruction or memory	Re-create, build, perform, execute, implement, acquire, conduct, operate		

4.2.3 AFFECTIVE DOMAIN

Affective Domain, was detailed by Bloom, Krathwhol and Masia (1964, *Taxonomy of Educational Objectives: Vol. II, The Affective Domain.*) Bloom's theory advocates this structure and sequence for developing attitude - also now commonly expressed in the modern field of personal development as 'beliefs'. As with the other domains, the Affective Domain detail provides a framework for teaching, training, assessing and evaluating the effectiveness of training and lesson design and delivery, and also the retention by and affect upon the learner or trainee.



Figure 4.4 Affective Domain hierarchy levels

Table 4.3 Affective Domain I	Levels Action Verbs
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Affective Domain Levels	Behavior descriptions	Action Verbs				
Receiving	Open to experience, willing to hear	Ask, listen, focus, attend, take part, acknowledge, hear, be open to, retain, follow, concentrate, read, do, feel				
Responding	React and participate actively	React, respond, interpret, clarify, contribute, question, present, cite, write, perform				
Valuing	Attach values and express personal opinions	Argue, challenge, debate, refute, confront, justify, persuade, criticize,				
Organizing or Conceptualizing	Reconcile internal conflicts; develop value system	Build, develop, formulate, defend, modify, relate, prioritize, reconcile, contrast, arrange, compare				
Internalizing Values	Adopt belief system and philosophy	Act, display, influence, solve, practice				



Program Outcomes (POs) framed by NBA for engineering students are the specific characteristics required by the stake holders in the students. There is definite relation between these outcomes with the three different domains of learning. In some cases, POs may have relation with two or three domains of learning.

4.3 LEARNING – TEACHING PROCESS

OBE is focused on student centric learning, so teacher has less direct control over what and how students learn. The prerequisite knowledge skills must be assessed before storing L-T process. The course outcomes must be explained to them so that they will come to know what they have to achieve. Students are encouraged to think more for learning on their own. Teacher has important role of facilitator of learning process by engaging them with content in curriculum. Student should be helped to work their learning contents to other subjects a periodical progress of learning can be assessed by teacher to know mastery of outcomes. Teacher has plan teaching and learning methods for the program and course by different methods. Faculty should focus on learning rather than teaching.

The traditional methods of teaching-learning are lecture, lecture with discussion and use of multimedia. In OBE learning based innovative method are to be adopted such as:

- 1. Problem based learning.
- 2. Cooperative learning.
- 3. Project based learning.
- 4. Small group teaching other than traditional methods, Tutorials, seminar, workshop and lab classes.
 - a. Focused discussion
 - b. Problem based learning.
 - c. Student led seminar.
 - d. Role Play.
- 5. Inquiry based learning.
- 6. Discovery learning.
- 7. Authentic learning.



Faculties should adopt the best suited learning process for attainment of their course outcomes and program outcomes.

CHAPTER 5

OUTCOME BASED ASSESSMENT (OBA)

After reading this chapter, reader will come to know

- 1. Assessment methods
- 2. Tools for direct and indirect assessment
- 3. Mapping of tools with POs
- 4. Attainment method for COs-POs and PSO

Assessment and evaluation are the tools for taking proper steps for improvement. Assessment and evaluation of students should be in tune with Program Outcomes (POs) and Course Outcomes (COs) of program. COs and POs are to be mapped for every individual course. Any program consists of different learning experiences spread over different sites viz. classroom, laboratory, library, field, MOOCS, Industry and other relevant sites. The achievements of students' learning outcomes are measured through well-defined assessment whose purpose is to assess and provide feedback on students learning so that the student can improve his performance. The continuous feedback will be useful to the learner and to the faculty so that faculty can change the methodology to ensure learning of students.

The Evaluation scheme is mentioned in the individual course curriculum. In this section norms for conduct of evaluation and assessment of various heads are given.

5.1 ASSESSMENT PATTERN

- Assessment Pattern for all Instruments is based on the Educational Taxonomy levels.
- Taxonomy levels of cognitive domains considered are Remember (R), Understand (U) and Apply/analyze (A). Percentages levels of cognitive domains are indicated in individual course curriculum document.
- Taxonomy levels of psychomotor domain and affective domains are defined by the action verbs in individual curriculum.



5.2 METHODS OF ASSESSMENT

Assessment methods are used to provide adequate feedback to the program to identify strengths and weaknesses. There are basically two types of assessment methods to gather evidence of student learning. The assessment should be done through direct and indirect method as given below.

5.2.1 DIRECT ASSESSMENT

A direct assessment method is based on a sample of actual student work. Direct assessment consisting of following heads.

- 1. Theory
 - End Semester Examination (ESE)
 - Internal Assessment (IA) consist of Class tests I, II, Class Assessment and Micro project
- 2. Practical
 - End Semester Examination (ESE)
 - Continuous Assessment /Assignment/Sheet/ Job/ Project etc.

5.2.2 INDIRECT ASSESSMENT

A indirect assessment is based upon a report of perceived student learning. Following feedbacks are used for indirect assessment.

- 1. FormNo1_Course Feedback
- 2. FormNo2_Teaching Feedback
- 3. FormNo3_Guest LectureFeedBack
- 4. FormNo4_IndustryVisitFeedback
- 5. FormNo5_NSSFeedback
- 6. FormNo6_Exit Survey
- 7. FormNo7_ParentsFeedback
- 8. FormNo8_AlumniFeedback
- 9. FormNo9_Employerfeedback



5.3 PROGRAM OUTCOMES AND DIRECT ASSESSMENT TOOLS

Program Outcomes(PO) (Graduate Attributes GA) as defined by National Board of Accreditation (NBA) for undergraduate engineering programs are as follows. It is expected that after the graduation student will be able to:

- **PO-1 Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO-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.
- **PO-3 Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO-4** 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.
- **PO-5** Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO-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.
- **PO-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.
- **PO-8** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO-9** Individual And Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO-10 Communication: Communicate effectively on complex engineering activities with the



- **PO-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.
- **PO-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.

5.4 RUBRICS FOR ASSESSMENT

Rubrics plays important role in evaluation of Outcome Based Education. The example of rubrics is shown in appendix D.

A rubric is defined as marking guide, consisting of specific pre-defined performance criteria, used in evaluating students work on performance assessments. Rubric is typically the specific form of marking criteria used when evaluating student performances or products resulting from a performance task.

5.4.1 NECESSITY OF RUBRICS

- o Rubrics help students to understand teachers' expectations
- o Rubrics make marking more accurate, unbiased, and consistent.
- Rubrics make marking easier and faster.
- Rubrics reduce arguments with students.
- Rubrics help to measure higher-order skills or evaluate complex tasks.
- Rubrics help to clarify vague, fuzzy goals.
- Rubrics help students to self-improve.
- Rubrics can inspire better student performance.
- o Rubrics improve feedback to students.
- Rubrics improve feedback to faculty and staff.



Program Outcome	Keywords	1	2	3	4	
PO-1	Engineering Knowledge	Theory Examination: Questions in exams on application/ analyze level (BT- Level 1,2,3)	Micro projects that involve problem analysis. (BT- Level 1,2,3)	Project and Poster Design in various courses (BT- Level 1,2,3)	Participation in Internship/ Sponsored / Consultancy Project, Product Development (BT- Level 1 to 6)	
PO-2	Problem analysis	Theory Examination: Questions in exams on application/ analyze level (BT- Level 1,2,3)	ParticipationinSponsoredprojects,ConsultancyProject,Micro projects(BT- Level 1 to 6)	Article in Technical Magazine (BT- Level 1,2,3)	Participation in Internship/ Sponsored / Consultancy Project, Product Development (BT- Level 1 to 6)	
РО-3	Design/Developme nt of Solutions	Theory Examination: Questions in exams on application/ analyze level (BT- Level 1,2,3)	ParticipationinSponsoredprojects,ConsultancyProject,Micro projects(BT- Level 1,2,3)	Article in Technical Magazine (BT- Level 1,2,3)	Internship Project/ Consultancy Project, Product Development (BT- Level 1 to 6)	
PO-4	Investigations Of Complex Problems	Theory Examination: Questions in exams on application/ analyze level (BT- Level 1,2,3)	ParticipationinSponsoredprojects,ConsultancyProject,Micro projects,(BT- Level 1,2,3)	Participation in Technical Magazine (BT- Level 1,2,3)	Additional facility created and used for better laboratory experience (BT- Level 1 to 6)	
PO-5	Modern Tool Usage	Lab and field tools assessed by faculty and industry experts. Projects that assess student ability to appropriately apply tools. (BT- Level 3,4,5)	Assignments on specific analysis problems. Project and Design projects in various courses (BT- Level 3,4,5)	Assignments that include analysis software, Drafting Software, STADD Pro, Online Open Source Tools etc (BT- Level 3,4,5)	Use of Innovative methods in Learning- Teaching Process (BT- Level 3,4,5)	

Table 5.1 Assessment Tools for attainment of POs



Program Outcome	Keywords	1	2	3	4
PO-6	Engineer and Society	Development of technical skill towards societal aspects (BT- Level 3,4,5,6)	Participation in activities under professional society chapter (BT- Level 3,4,5)	Through Seminar/ Quiz Entrepreneurship activity (BT- Level 3,4,5,6)	Industrial and/or Site visits, Consultancy Project (BT- Level 3,4,5)
PO-7	Environment and Sustainability	Design of eco-friendly projects and it's (BT- Level 3,4,5)	Complementary study courses (BT- Level 2,3,4)	Reports and testing based on case studies. (BT- Level 1,2,3)	Participation in NSS activities, (BT- Level 1,2,3,4)
PO-8	Ethic	Technical writing skill with uniqueness more than 75% (BT- Level 3,4,5,6)	Events on Personality Development (BT- Level 1,2,3)	Observation during Extra Curricular activities, Sports etc (BT- Level 1,2,3	Participation in Technical Magazine, Professional society chapter (BT- Level 2,3,4)
PO-9	Individual and Team Work	Project that involves group work. Group Discussion (BT- Level 2,3,4,5)	Quiz based on listening the video lecture (BT- Level 1,2,3)	Feedback during industrial interaction. (BT- Level 1,2,3)	Participation in inter institute technical event/ professional society chapter (BT- Level 2,3,4,5)
PO-10	Communication	Technical Paper writing, Presentation, Writing Article in Technical Magazine (BT-Level 1,2,3,4)	Formal and informal letter writing and emails Interaction with Industry experts.(BT- Level 1,2,3)	Conducting physical Survey, Presentation of Performing arts (BT- Level 2,3,4)	MockInterviews,Extempore session(BT- Level 1,2,3)
PO-11	Project Management and Finance	Lab reports and design projects that involve group work. (BT- Level 1 to 6)	Member of product development team. (BT- Level 1 to 6)	Design of Instructional Material, Model Chart, Monogram etc (BT- Level 1 to 6)	Organizing event in annual function, professional society chapter (BT- Level 1 to 6)
PO-12	Life-Long Learning	MOOCs Courses Certification. Self-study Assignments (BT- Level 1 to 6)	Industry internship Projects, Live projects Participation in inter institute technical event. (BT- Level 1 to 6)	Extra Curricular, Co- curricular Activities, NSS, Sports, Students Annual Function (BT- Level 1 to 6)	ParticipationinEntrepreneurship,IncubationandStartupActivities.(BT- Level 1 to 6)



5.4.2 USE OF RUBRICS

Rubrics are used to assess followings.

- o Article in Technical Magazine, Research paper
- o Participation internship Projects /Consultancy Projects
- o Product Development /IPR Activities
- o Use of Modern tools for Experimentation
- o Micro Project/ Case Studies/ Surveys
- o Interaction with industrial expert
- o Mapping Test after the event
- o Presentations /seminars
- o Organizing event (Technical/ Non-Technical)
- o Internship
- Exam questions
- o Participation in Professional Chapter activities
- o Participation in inter Institute event/ Prize Winner
- o Participation in Co-Curricular/Extra-curricular activities, NSS

5.4.3 TYPES OF RUBRICS

1. Holistic Rubric

In holistic rubric all criteria are assessed as a single score. Holistic rubrics are good for evaluating overall performance on a task. Because only one score is given, holistic rubrics tend to be easier to score. However, holistic rubrics do not provide detailed information on student performance for each criterion; the levels of performance are treated.

2. Analytical Rubric

In analytical rubric each criterion is assessed separately, using different descriptive ratings. Each criterion receives a separate score. Analytical rubrics take more time to score but provide more detailed feedback.



5.4.4 ELEMENTS OF A RUBRIC

The four basic elements of rubrics are

- a) Criteria
- b) Levels of performance
- c) Scores
- d) Descriptors

1. Criteria

Criteria identify the trait, feature or dimension which is to be measured and include a definition and example to clarify the meaning of each trait being assessed. Each assignment or performance will determine the number of criteria to be scored. Criteria are derived from assignments, checklists, grading sheets or colleagues.

Criteria examples:

- a. Introduction
- b. Thesis
- c. Arguments/analysis
- d. Grammar and punctuation
- e. Spelling
- f. Internal citations
- g. Conclusion
- h. References

2. Levels of performance

Levels of performance are often labeled as adjectives which describe the performance levels. Levels of performance determine the degree of performance which has bee n met and will provide for consistent and objective assessment and better feedback to students. These levels tell students what they are expected to do. Levels of performance can be used without descriptors, but descriptors help in achieving objectivity. Words used for levels of performance could influence a student's interpretation of performance level (such as superior, moderate, poor or above or below average).



Levels of performance example:

- Excellent, Good, Fair, Poor
- Master, Apprentice, Beginner
- Exemplary, Accomplished, Developing, Beginning, Undeveloped
- Complete, Incomplete
- Yes, No

3. Scores

Scores make up the system of numbers or values used to rate each criterion and often are combined with levels of performance. Begin by asking how many points are needed to adequately describe the range of performance you expect to see in students' work. Consider the range of possible performance level.

Score example: 1, 2, 3, 4, 5 or 2, 4, 6, 8 etc.

4. Descriptors

Descriptors are explicit descriptions of the performance and show how the score is derived and what is expected of the students. Descriptors spell out each level (gradation) of performance for each criterion and describe what performance at a particular level looks like. Descriptors describe how well students' work is distinguished from the work of their peers and will help you to distinguish between each student's work.

5.5 NORMS FOR ASSESSMENT

The assessment methods are consisting of various heads. End Semester Examination (ESE) theory, Internal Assessment (IA) theory (which consist of Class Tests I and II, Micro project, Assignment, Case Studies, Participation in technical activities etc.), End Semester Examination (ESE) practical and End Semester Assessment (EA) practical. (Which consists of Experiment/ Assignment/ Sheet/ Job/ Project etc.) Faculty should follow activities as mention in the Table.

5.6 CURRICULUM MAPPING AND COURSE MAPPING

Before calculating attainment, it is necessary to perform curriculum mapping and course mapping. Attainment of POs and PSOS are based on COs-POs/PSOs mapping matrix, which is

G •: :- :• |

described later in this chapter. Curriculum and Course mapping description is given below:

5.6.1 CURRICULUM MAPPING

Curriculum mapping focuses on teaching and aligns instruction with program outcomes. It is used to explore what is taught and how. The course curriculum is first mapped with POs and PSOs. Minimum one PO should be mapped with the course curriculum content.

5.6.2 COURSE MAPPING

Course mapping (Outcome mapping) facilitates the alignment of course outcomes (COs) with program outcomes (POs). It allows faculty to create a visual map of a course. It is also used to explore how students are meeting program-level outcomes at the course level. Course mapping focuses on student learning.

Course mapping has following benefits:

- Identifies, how required courses contribute to achievement of program outcomes.
- Increases student achievement in meeting program outcomes.
- Encourages reflection (can reveal gaps in the curriculum or prompt re- examination of outcomes)
- Makes Outcomes Assessment less cumbersome: explicit linkages reduce the amount of formal outcomes assessment required (focus can shift to program-level assessment projects)

5.7 CO, PO, PEO ATTAINMENT PROCESS

The process of CO, PO and PEO is described in Figure 5.1, PEO, PO and PSO are fixed. COs are decided by the course coordinator. The course coordinator has to decide assessment methods for COs. He should also inform all the students, before the commencement of course, the assessment method and rubrics for the assessment of the COs. The assessment method may have some Direct Assessment Tools as well as Indirect assessment tools so that the entire COs must be attained.

At the end of the course, CO attainment and it's mapping with POs is to be evaluated. If attainment level is not achieved, then the course coordinator shall revise the methods/tools. If



attainment is achieved then he shall set new level of achievement for next batch.

Similar process of PO attainment is to be carried put at programme level and Professional level and corrective actions shall be taken at appropriate level. Over the period of time the scheme and syllabus may be updated periodically as per industry requirement.

5.8 ATTAINMENT OF COURSE OUTCOMES (COS)

- Attainment of COs can be measured directly and indirectly.
- Direct attainment of COs can be determined from the performances of students in all the relevant assessment instruments, Internal assessment of theory: Class test I, II and Micro Project, End Semester Examination of Theory, Continuous Assessment of practical and End Semester Examination of Practical.
- Indirect attainment of COs can be determined from the mapping test conducted after the every event.
- Percentage weightage for computation of direct attainment of COs should be 80% which consist of:
 - ✓ Internal assessment of theory: Class test I, II and Micro Project
 - ✓ End Semester Examination of Theory
 - ✓ Continuous assessment of practical
 - ✓ End Semester Examination of Practical
- Percentage weightage for computation of indirect attainment of COs should be 20% which consist of:
 - \checkmark End of Course survey



Figure 5.1 CO, PO, PEO Attainment Process



5.8.1 METHOD OF DIRECT CO ATTAINMENT

- The Program/Department will have access internal assessment of Theory (Class Tests and Micro project) and continuous assessment of practical. End semester Theory and Practical examination is conducted and evaluated by the institute (Autonomous Program) / RTMNU (Affiliated Program)
- Average percentage of each COs should be calculated for internal assessment of Theory (Class Tests and Micro project) and Continuous assessment of practical.
- Faculty should use software provided by the institute for calculation of CO attainment.

5.8.2 SETTING TARGETS FOR COURSE OUTCOMES AND IDENTIFICATION OF ATTAINMENT GAP

- Targets are set for each COs of a course separately.
- Setting target has the advantage of finding out the difficulty of specific COs.
- Attainment gap is identified by comparing CO attainment and setting target.
- Suitable action is initiated to fill the gap at the course faculty level and the same is documented.
- If the target achieved, higher target is set.

5.8.3 CALCULATION OF DIRECT CO ATTAINMENT

• CO attainment can be measured by following formula:

%
$$CO_i$$
 attainment = $\sum_{e=1}^{n} \frac{\sum_{q=1}^{k} (Average Marks)_i}{\sum_{q=1}^{k} (Total Marks)_i} \times 100$

Where,

i = Number of Course Outcomes (COs)

- e to n = Number of examinations conducted
- q to k = Number of questions related to \mathcal{CO}_i

5.9 ATTAINMENT OF PROGRAM OUTCOMES (POS) AND PROGRAM SPECIFIC OUTCOMES (PSO)

- POs and PSOs are attained through program specific Core Courses.
- Each Course addresses a sub-set of POs and PSOs to varying levels (strengths) (1,2 or 3).
- COs are mentioned in course curriculum to meet the identified POs/PSOs.

5.9.1 STRENGTH OF CO-PO/PSO MAPPING

- Attainment of a PO/PSO depends both on the attainment levels of associated COs and the strength to which it is mapped.
- To determine the level (mapping strength) a particular PO/PSO is addressed by the course.
- Strength of mapping is defined at three levels: Low (1), Medium (2) and Strong(3)

5.9.2 METHOD TO RELATE LEVEL OF PO/PSO

- A following method is to relate the level of PO/PSO with the number of hours devoted to the COs which address the given PO/PSO.
- If > 40% of classroom sessions addressing a particular PO/PSO, it is considered that PO/PSO is addressed at Level 3
- If 25 to 40% of classroom sessions addressing a particular PO/PSO, it is considered that PO/PSO is addressed at Level 2
- If 5 to 25% of classroom sessions addressing a particular PO/PSO, it is considered that PO/PSO is addressed at Level 1
- If < 5% of classroom sessions addressing a particular PO/PSO, it is considered that PO/PSO is considered not-addressed (Means 0 or "-")
- COs-POs and PSOs mapping is done by course teacher in consultation with HOD.
- The example of COs-POs and PSOs mapping is shown in *Appendix E*.

5.9.3 POS/PSOS ATTAINMENT METHOD

• PO/PSO attainment are calculated using following formula-



These computations are approximate but indicative PO/PSO attainment •

of PO/PSO

Evaluations of attainment of POs and PSOs based on Direct and Indirect Methods are combined to arrive at the Final Evaluation.

Х

the particular PO/PSO

Weightage of Weightage of direct attainment indirect attainment Combined Evaluation = +X X Attainment value Attainment value

- Typical values of weight age of direct and indirect attainment are 0.8 and 0.2 respectively.
- Values of indirect attainment are calculated from feedback system as follows: ✓ Student Exist Survey: 10%
 - ✓ Faculty Survey: 5%
 - ✓ Parent Survey: 2.5% and
 - ✓ Management Survey: 2.5%
- Use Software provided by the institute (CO_Attainment_Calculator) for finding PO/PSO attainment.

5.9.4 SETTING OF POS/PSOS ATTAINMENT TARGET LEVEL

- POs/PSOs target should be set depends upon previous attainment level before start of academic term with the consent of faculties in departmental meeting. The levels are as follows:
 - \checkmark Level 1- Attainment between 0 to 0.5
 - \checkmark Level 2- Attainment between 0.51 to 1.0
 - ✓ Level 3- Attainment between 1.01 to 1.5
 - ✓ Level 4- Attainment between 1.51 to 2.0
 - ✓ Level 5- Attainment between 2.01 to 2.5
 - \checkmark Level 6- Attainment between 2.51 to 3.0



- If target achieved, higher target shall be set for next academic year.
- If target is not achieved, proper actions should be taken and recorded for its improvement.

5.10 ATTAINMENT OF PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

POs –PEOs mapping of each program is to be done by individual program. Attainment of PEOs based on attainment of POs and Indirect Methods.

Weightage of		Weightage of
direct attainment		indirect attainment
×	+	×
Attainment value		Attainment value
of POs		from feedback
	Weightage of direct attainment × Attainment value of POs	Weightage of direct attainment × + Attainment value of POs

Typical values of weight age of direct and indirect attainment are 0.8 and 0.2 respectively.

Values of indirect attainment are calculated from feedback system as follows:

- ✓ Industry Survey: 10%
- ✓ Alumni Survey: 10%

Use Software provided by the institute (*CO_Attainment_Calculator*) for finding PO/PSO attainment.



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- Ms. Varsha T. Lokare, Mr. Prakash M. Jadhav, "Course Outcomes Attainment For Data Strstructure Course Using Direct And Indirect Methods", Journal of Engineering Education Transformation, Special Issues. eISSN 2394-1707
- 5. Examination Reforms policy, Novenber 2018, AICTE, New Delhi, India, <u>https://www.aicte-india.org</u>



APPENDIX : FEEDBACK FORMS

- 1. FormNo1_Course Feedback
- 2. FormNo2_Teaching Feedback
- 3. FormNo3_Guest LectureFeedBack
- 4. FormNo4_IndustryVisitFeedback
- 5. FormNo5_NSSFeedback
- 6. FormNo6_Exit Survey
- 7. FormNo7_ParentsFeedback
- 8. FormNo8_AlumniFeedback
- 9. FormNo9_Employerfeedback



C	TULSIRAMJI G App (An Autono	AIKWAD-PATIL Colle Wardha Road, Accredited with proved by AICTE, New D pmous Institution Affiliated	ege of Engineering and Nagpur - 441108 NAAC A+ Grade Delhi, Govt. of Maharash to RTM Nagpur University	Technology tra y, Nagpur)
	1	Department of Session 2	20	_
a		Course Feed	lback Form	
Sem	ester:		Date:	
Sub	ject:		Unit :	
	a) To what extent knowledge?	do you feel that the cour	se taught had improved y	your skills and
0	Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
	b) To what extent for your learning	do you feel that the designg?	gn of the course was appr	ropriate to the goals set
0	Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
	c) To what extent during the cour	do you feel that the teach rse?	ner was able to develop p	problem analysis ability
0	Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
	d) To what extent tools in the cou	do you feel that the teach	ner was able to demonstr	rate the usage of modern
0	Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
	e) Whether the sy	llabus was explained at t	he beginning of the cours	se?
0	Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
	f) Whether the co	ourse was delivered as out	tlined in the syllabus?	
0	Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)







g) Whether the teacher explained the industrial application of the topics covered in the course?

0	Not Applicable	1 Slight (L	.ow) 2	Moderate (Medium)	3 Substantial (High)					
	h) Whether the exams conducted helps in the course learning outcomes?									
0	Not Applicable	1 Slight (L	.ow) 2	Moderate (Medium)	3 Substantial (High)					
i) To what extent do you feel that the assignments are related to the course learning outcomes?										
0	Not Applicable	1 Slight (L	.ow) 2	Moderate (Medium)	3 Substantial (High)					
	j) To what extent d	o you feel that	the project could	l be made from the	course taught?					
0	Not Applicable	1 Slight (L	.ow) 2	Moderate (Medium)	3 Substantial (High)					
	k) To what extent the second sec	ne societal issu	es could be solve	ed by the course tau	ght?					
0	Not Applicable	1 Slight (L	.ow) 2	Moderate (Medium)	3 Substantial (High)					
1) Whether the course enabled the need for lifelong learning?										
0	Not Applicable	1 Slight (L	.ow) 2	Moderate (Medium)	3 Substantial (High)					

Any suggestions for enhancing the learning outcome of the course:







FORMAT FOR EVALUATION OF FACULTY BY STUDENTS: THEORY COURSES

Date:	Class:				
Your percentage in the lower Class examination	Above 70%	Between 60% to 70%	Between 60% to 50%	Below 50%	

S No.	Name of the Theory Course	Name of the Teacher
CR1		
CR2		
CR3		
CR4		
CR5		
CR6		

Your Responses below are for purpose of Evaluation										
5-Al	ways	4-Mostly	3-Quite Often	2	-At Tin	nes	1-Hare	dly	0-Nev	er
Please respond to Items below by writing 5/4/3/2/1/0					CR1	CR2	CR3	CR4	CR5	CR6
1	Whether th organized?	e lectures were (PO8)	well prepared &							
2	Whether th (PO3)	e course materi	al is well structured	?						
3	Were the le fundamenta	ectures delivered al concepts? (PO	d with emphasis on D1)							
4	Were the lectures delivered with illustrative examples? (PO3)									
5	Whether th	e Teacher enga	ges classes?Po8							
6	Whether th class? (PO8	e Teacher main 8)	tains the discipline	in						
7	Whether di adequate at	fficult topics w tention and eas	ere taught with e? Po4							
8	Did the Fac and has cor	culty provide yo nmand over the	ou new knowledge subject? (PO2)							
9	Was the instructor enthusiastic about teaching? (PO8)									
10	Was the teacher able to deliver lectures with good communication skills? (PO10)									
11	Were you e make lectur	encouraged to a res interactive a	sk Questions, to nd lively? (PO2)							
12	Did the cou concepts, p you to think	urse improve yo rinciples in this k and learn? (Po	ur understanding of field and motivated D1)	f d						







13 Were the unit tests/examinations challenging? Was the evaluation fair and Impartial? Did it 14 help you to improve? (PO8) Did teacher give additional technical / nontechnical inputs by referring to INTERNET / 15 additional books? (PO5) Whether teacher was always accessible to the 16 students for counseling, guidance and solving queries off the classroom hours. (PO8) **TOTAL SCORE / INDEX (MAX. 80) Converted to Percentage (%)** What is your overall impression about the teacher? (Write your choice O/E/V/G/S/N in the appropriate boxes) (**O**) Outstanding / (**E**) Excellent / (V) Very good / (G) Good / (S) Satisfactory / (N) Not satisfactory Your percentage of attendance in the subject (to be filled by department)

FORMAT FOR EVALUATION OF FACULTY BY STUDENTS: PRACTICAL COURSES

Your percentage in the lower Class	Above	Between 60% to	Between 50% to	Below
examination	70%	70%	60%	50%

S No.	Name of the Practical Course	Name of the Teacher	S No.	Name of the Practical Course	Name of the Teacher
PR1			PR3		
PR2			PR4		

You	Ir Responses below are for purpose of Evaluation. 5-Alwaya	s 4-	Mostly	3-Q	uite
Oft	en 2-At Times 1-Hardly 0-Never				
Ple	ase respond to Items below by writing 5/4/3/2/1/0	PR1	PR2	PR3	PR4
1	Was the selection of experiment commensurate with the theory?				
2	Performance of the experiment:				
	a) Was the experiment leading towards proper conclusions /				
	interpretations? (PO3)				
	b) Whether teacher helped you in understanding the experimental				
	observations. Outcome and explaining the difficulties raised				
	while performing the experiment? (PO2, PO3)				
	c) Whether the experiments trigger you for any creative idea?				
	(PO6)				





	d) Whether experimental set-up was well maintained, fully		
	operational & adequate? (PO4)		
3	Submission of Experiment:		
	a) Whether precise, updated & self-explanatory lab manuals were		
	provided? (PO1)		
	b) Whether submission of experimental write-up was routine &		
	repetitive?		
	c) Whether teacher does assessment of experiment regularly and		
	gives feedback?		
1	Whether the entire lab session was useful in clarifying you		
4	knowledge of the theory? (PO2)		
5	Whether you are confident with the use of the concepts,		
5	instruments and their application in further studies? (PO12)		
6	Whether teacher made you aware about application of the		
U	experiment in industry?		
7	Whether the teacher has implemented continuous evaluation		
/	system for practical record?		
Q	Was the teacher fair & impartial while award of the grade during		
o	practical? (PO8)		
9	Whether the teacher offered you new experiment/module? (PO5)		
	TOTAL SCORE / INDEX (MAX. 70)		
	Converted to Percentage (%)		
	What is your overall impression about the teacher? (Write your		
	choice O/E/V/G/S/N in the appropriate boxes) (O) Outstanding /		
	(E) Excellent / (V) Very good / (G) Good / (S) Satisfactory / (N)		
	Not satisfactory		
	Your percentage of attendance in practical (to be filled by		
	department)		

FORMAT FOR EVALUATION OF FACILITIES IN COLLEGE BY STUDENTS

Your Responses below are for purpose of Evaluation4- Excellent3- Very Good2- Good1- Average0- Poor

	Please respond to Items below by writing 4/3/2/1/0							
1	The prescribed books/reading materials are available in the library.	11	Sports facility available in the college.					
2	Reading room and common room are available in the faculty/college building.	12	Transportation facility in the college.					
3	Available reading space in library is satisfactory.	13	Canteen facility in the college.					
4	The library staff are cooperative and helpful.	14	Health care centre facility in the college.					
5	Photocopying facility in the	15	Clean drinking water is available in					





	library/Department is available and			the department and in the car	npus.	
	satisfactory.					
6	Online educational resources are		16	Toilets/washrooms are hygier	nic and	
U	available and accessible.		10	properly maintained.		
-	Computer Center facility in college		17	Grievances/problems are		
/	Computer Center facility in conege		1/	redressed/solved well in time.	.	
0	B Heat 1 feetility of college 10 Equipment in the lab(s)) are in	
ð	Hoster facility of college	working condition.				
•	Wi-fi/Internet facilities are available The campus is green ar				nd eco	
9	in the department.		19	friendly.		
10	The campus has adequate power		20	The classrooms are clean and	ł well	
10	supply.		20	maintained.		
	TOTAL SCORE of Twenty Points	/ INDE	X (N	IAX. 80 Marks)		
	Converted to Perc	centage	(%)			
W	What is your overall impression about the facilities? (Write your choice					
O /	O/E/V/G/S/N in the appropriate boxes) (O) Outstanding / (E) Excellent / (V)					
Ve	ry good / (G) Good / (S) Satisfactory / (N) Not	satisf	actory		

P







	Department of Session 2 Feedbacl	20 k Form	
Topic : Guest Lect Semester:	ure on		Date:
a) At what level this science, and engined	Guest Lecture/Worksho ering fundamentals?	p helps in applying kno	owledge of mathematics,
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
b) At what extent thi problems?	s activity helps to iden	tify, formulate, and sol	lve complex engineering
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
c) At what extent this and interpret data?	activity helps to design	and conduct experiment	nts, as well as to analyze
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
d) What is the opinio tools necessary for e	n about the techniques, engineering practices are	skills and modern engi addressed?	neering & computational
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
e) Whether this activit	y is useful in integrating	engineering and society	?
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
f) Whether this activi sustainable develop	ity demonstrates the kn ment?	owledge and need for	environmental issues for
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)







g) Do the norms of ethic	cal p	ractices are addresse	d by tl	his activity?		
0	Not Applicable	1	Slight (Low)	2	Moderate (Medium)	3	Substantial (High)
			1] (8/
h) Whether this activity	is us	seful in building tean	ı?			
0	Not Applicable	1	Slight (Low)	2	Moderate (Medium)	3	Substantial (High)
		<u></u>	1	<u></u>			
i)	Whether this activity	dem	onstrated to develop	comm	nunication skill?		
0	Not Applicable	1	Slight (Low)	2	Moderate (Medium)	3	Substantial (High)
j)	Do you feel that the	unde	rstanding of this activ	vity he	elps to manage pro	jects	2
0	Not Applicable	1	Slight (Low)	2	Moderate (Medium)	3	Substantial (High)
k) Whether it enabled a	nd ha	ad recognized the nee	ed for	lifelong learning?		
0	Not Applicable	1	Slight (Low)	2	Moderate (Medium)	3	Substantial (High)



Q	TULSIRAMJ A (An Auto	I GAIKWAD-PATIL C Wardha Road Accredited wit pproved by AICTE, New nomous Institution Affiliate	College of Engineering a d, Nagpur - 441108 th NAAC A+ Grade Delhi, Govt. of Mahara ed to RTM Nagpur Univer	and Technology
	D	epartment of		
		Session 2 Industry Visit I	W Feedback form	
Sem Nan	ester : ne of Student:			Date:
a) engin) Whether this visit is eering?	s helpful to upgrade your	knowledge in the area o	f science and
0	Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
b)	At what extent this	visit helped to solve the c	complex engineering pro	oblems?
0	Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
c)	Whether this indust	trial visit is helpful to give	e exposure about moder	n engineering tool?
0	Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
d)	Whether this indust	trial visit is helpful to sati	sfy societal and environ	mental issues?
0	Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
e)	Do the norms of eth	nical practices are address	sed in this visit?	
0	Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
f)	Whether this indust	trial visit is useful in Tear	n building activity?	
0	Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
g)	Whether this indust	trial visit demonstrated to	develop communication	n skills?
0	Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)







h) Do you feel that visiting and understanding the work culture of industry helps to manage projects?



Student's Signature



TULSIRAMJI GAIKWAD-PATIL College of Engineering and Technology





			NSS Feedb	oack fo	rm		
Sem	ester :					D	ate:
Nam	ne of Student:						
a)	Whether the NSS a	activity	v develops you as a	professi	ional engineer to	help the society	/?
0	Not Applicable	1	Slight (Low)	2	Moderate (Medium)	3 Substat (High)	ntial
b) Whether these activ	vities e	enable you to funct	ion effec	ctively as a lead	er in diverse tear	ns?
0	Not Applicable	1	Slight (Low)	2	Moderate (Medium)	3 Substan (High)	ntial
c)	Whether these act practices?	ivities	develop you to ap	oply eth	ical principles a	and norms of en	gineering
0	Not Applicable	1	Slight (Low)	2	Moderate (Medium)	3 Substan (High)	ntial
d) To what extent the issues and need for	nese ao r sustai	ctivities demonstra inability developme	te and ent?	understand the	impact of envir	ronmental
0	Not Applicable	1	Slight (Low)	2	Moderate (Medium)	3 Substat (High)	ntial
e)	At what extent the community and so	is activ ciety?	vity resulted you t	o comn	nunicate effectiv	vely with the en	gineering
0	Not Applicable	1	Slight (Low)	2	Moderate (Medium)	3 Substat (High)	ntial
f)	At what extend multidisciplinary e	this a nviron	ctivity demonstrat	te you	to manage pro	ojects and fina	nce in a
0	Not Applicable	1	Slight (Low)	2	Moderate (Medium)	3 Substat (High)	ntial
g) Do you feel that the changes?	his act	ivity recognized th	e need	for lifelong lear	ning due to tech	nological
0	Not Applicable	1	Slight (Low)	2	Moderate (Medium)	3 Substat (High)	ntial







h	h) Whether the college has green and clean environment?						
0	Not Applicable	1 Slight (Low)	2	Moderate (Medium)	3	Substantial (High)	
i)	Does the engineering	talent developed during	g this a	ctivity satisfy the ne	eeds o	of the society?	
0	Not Applicable	1 Slight (Low)	2	Moderate (Medium)	3	Substantial (High)	
Suga	estions if any						
Jugg	<u> </u>						

Student Signature





	Sessior	n 20 20	••••
	Ex	it Survey	
ame of Final Year Stu	dent:		
ate:			
a) Do you feel this p	rogram adequately prepa	red you for the next step	in your career?
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
b) Whether the Instit	tute organizes various act	ivities for overall develo	pment of students?
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
c) Whether there is s	sufficient scope for resear	ch?	
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
d) Whether adequate	e laboratories and equipm	ents are available for pra	ctical exposure?
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
e) Give rating for the	e education offered to hel	p the society?	
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
f) Have the knowl development?	edge gained helps you	i in conserving enviro	onmental and sustair
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
 g) Rank your feeling issues. 	s that the education prov	ided gives you insight ab	out social and ethical
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)







b) Are the students set	afied with student's ani	avanaa maahaniam?	
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
i) Is the communication	on effective between stu	dents, staff and faculty m	embers?
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
j) Whether project guides have a good exposure of their respective technical fields?			
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
k) Whether faculty me	mbers are easily accessi	ble?	
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
l) Do you have efficient	nt Teacher Guardian sch	neme for guidance?	
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
m) Rank the following facilities and services in your department.			
i. Seminar Hal	1		
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
ii. Class room o	and Laboratory ambian	ce	
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
iii. Department	Library facility		
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)








First Aid iv. Moderate **Substantial** Slight (Low) 0 Not Applicable 1 2 3 (Medium) (High) Counseling services v. Substantial Moderate Slight (Low) 2 0 Not Applicable 3 1 (Medium) (High) n) Does necessary funds are provided for participation in conferences or workshops? **Substantial** Moderate Slight (Low) 2 3 0 Not Applicable 1 (High) (Medium) o) Has T & P Cell provides ample Campus placement opportunities? Moderate **Substantial** 0 Not Applicable 1 Slight (Low) 2 3 (Medium) (High)

Most Memorable moment at the Institute:

Suggestion for improvements:

Signature of Students







(An Autonomous Institution Affiliated to RTM Nagpur University, Nagpur)			
	Department of		
	Session	20	
	Parent-Teacher M	eet Feedback form	
Semester :			Date:
Name of Student:			Dutt
Name of Parent :			
a) Whether the academ Engineering?	ic system adopted devel	ops the foundation of basic	c sciences and
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
b) Whether teaching le	earning environment is e	effective?	
	Slight (Low)	Moderate	Substantial
0 Not Applicable		² (Medium)	³ (High)
c) What is feedback a	bout Competence & Cor	nmitment of Faculty mem	bers?
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
d) Give rating about the system of monitoring of the student's progress?			
0 Not Applicable	1 Slight (Low)	2 Moderate	2 Substantial
0 Not Applicable	1 Slight (Low)	² (Medium)	³ (High)
e) Whether the environment grooms the student's overall personality?			
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
f) Whether value based education is provided?			
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial
			(****5**/
g) Whether college pr	ovides opportunities to c	levelop ethical and social j	practices?
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)







h) Whether college takes initiatives for environmental and sustainable development? Moderate **Substantial** Not Applicable Slight (Low) 2 3 0 1 (Medium) (High) i) Whether the college has adequate facilities & ambience? Moderate **Substantial** 0 Not Applicable 1 Slight (Low) 2 3 (Medium) (High) j) Does the engineering talent developed satisfy the needs of the society? Moderate **Substantial** Not Applicable Slight (Low) 3 0 2 1 (Medium) (High) Suggestions if any:

Parent's Signature







Department of ______ Alumni Feedback Form

Alumni Name	
Date of Birth (DD/MM/YY)	
Permanent Address	
E-mail ID	
Designation and Present Location	
Father's Name	
Department and Year of Passing	
Contact No.	
Present Organization	
Designation	

a) Do you feel proud to be associated with TGPCET as Alumni?

0	Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
b) Whether the Institute organizes various activities for overall development of students?				
0	Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
c) Are the students satisfied with student's grievance mechanism?				
0	Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
d) Whether adequate laboratories and equipments are available for practical exposure?				
0	Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)

e) Give rating about the education offered about the relevancy in executing present job?



1	-
1	
2	1



0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
f) Have the knowled	ge gained both in theory a	and practical is sufficient?	
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
g) Has T & P Cell pro	ovides ample Campus pla	cement opportunities?	
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
h) How do you rate the student-teacher relationship at the institute?			
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
i) What is your rating on hostel facilities?			
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
j) Is Institute providing information about the institutional overall progress regularly?			
0 Not Applicable	1 Slight (Low)	2 Moderate (Medium)	3 Substantial (High)
Most Memorable moment at the Institute:			
Suggestion for improvements:			

Name and Signature of Alumni







Department of Session 20....-

Date:

Dear Employer,

Many graduates of Information Technology Department are already employed in your esteem organization. We are thankful to you for providing them employment with your prestigious Company/Organization. We shall very much appreciate and be grateful to you if you can spare some of your valuable time to fill up this feedback form. It will help us to improve the quality of education and to provide better employees in future.

How satisfied are you with the Ex-Student work performance in each of these areas:	1.Slight (Low)	2.Moderate (Medium)	3.Substantial (High)
1. Has aptitude in planning and organizing technical knowledge / skills			
2. Developing practical solutions to the problems			
3. Working as part of a team			
4. Creative in response to workplace environment			
5. General communication skills and the attitude to face challenges in the dynamic environment			
6.Self-motivated and takes appropriate level of responsibility			
7. Open to ideas to learn new techniques			
8. Efficient in using technology and workplace equipment			
9. Ability to contribute to the goal of the organization			
10. Has tendency to gain lifelong technical skills			
11. Ability to manage and demonstrate leadership qualities			







12. Engineering Innovativeness and creativity in product development to satisfy societal needs	
13. Relationship with seniors/peers/subordinates	
14. Involvement in social activities	
15.Ability to take up extra responsibility and accountability	
16. Obligation to work beyond schedule if required	
17.Overall impression about their performance	
18.Maintains professional ethics	
19. Ability to complete project on schedule	
20.Has concern about the green environment	

Name and Signature of Employer