

GOVERNMENT POLYTECHNIC :: RAJAMPETA

Andhra Pradesh

Established 2008

Affiliated to SBTET, Andhra Pradesh

OUTCOME-BASED EDUCATION (OBE) MANUAL

Diploma in Civil Engineering | Diploma in Mechanical Engineering

Effective from Academic Year 2024-25

Institute	Government Polytechnic, Rajampeta (Estd. 2008)
Programmes Offered	Diploma in Civil Engineering (Intake: 60) Diploma in Mechanical Engineering (Intake: 60)
Document	Outcome-Based Education (OBE) Manual
Applicable Academic Year	2024-25 and onwards

Proposed by the Academic Committee:

- Dr. P. Sujatha, Head of Civil Engineering Section (HCES) — Committee Head
- Sri M. Venkatanarayana, Head of Mechanical Engineering Section (HMES)
- Smt. K. Padmavathamma, Head of General Section (HGS)

Date of Committee Meeting: 10th February 2024

Forwarded by: Dr. P. Sujatha, IQAC Coordinator, on 14th April 2024

Approved by: Dr. Y. Sudhakar, Principal, on 28th April 2024

Effective from: Academic Year 2024-25

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1. PREAMBLE AND APPROVAL OF THE MANUAL

1.1 Purpose of the Manual

This Outcome-Based Education (OBE) Manual has been prepared for Government Polytechnic, Rajampeta to formally document the institutional framework for implementing Outcome-Based Education across both the Diploma in Civil Engineering and Diploma in Mechanical Engineering programmes. The manual defines the Vision and Mission of the Institute and of each Department, the Programme Educational Objectives (PEOs), Programme Outcomes (POs), Programme Specific Outcomes (PSOs), and the systematic process of Course Outcome (CO) formulation, mapping, attainment computation, and Continuous Quality Improvement (CQI).

The framework ensures that all academic processes — curriculum delivery, assessment, and feedback — are aligned to measurable outcomes, in accordance with the guidelines of the National Board of Accreditation (NBA) and the State Board of Technical Education and Training, Andhra Pradesh (SBTET AP).

1.2 Constitution of the Academic Committee

An Academic Committee was constituted by the Institute for the purpose of reviewing, formulating, and proposing the Vision, Mission, Programme Educational Objectives and the overall OBE framework for the Institute. The Committee comprised the following members:

S.No	Name	Designation	Role in Committee
1	Dr. P. Sujatha	Head of Civil Engineering Section (HCES)	Committee Head
2	Sri M. Venkatanarayana	Head of Mechanical Engineering Section (HMES)	Member
3	Smt. K. Padmavathamma	Head of General Section (HGS)	Member

The Academic Committee deliberated upon the Institute's Vision and Mission, the Vision and Mission of each Department, and the Programme Educational Objectives of both Diploma programmes, in its meeting held on 10th February 2024.

1.3 Approval and Implementation Process

Stage	Activity	Responsible Authority	Date
1	Proposal of OBE Framework (Vision, Mission, PEOs)	Academic Committee (Dr. P. Sujatha — Head; Sri M. Venkatanarayana; Smt. K. Padmavathamma)	10-02-2024
2	Forwarding of the proposed framework for institutional ratification	Dr. P. Sujatha, IQAC Coordinator	14-04-2024
3	Final approval and authorization for implementation	Dr. Y. Sudhakar, Principal	28-04-2024

Stage	Activity	Responsible Authority	Date
4	Effective implementation across both Diploma programmes	Institute (Civil & Mechanical Engineering Sections)	From AY 2024-25

This document is, therefore, the officially approved OBE Manual of Government Polytechnic, Rajampeta, applicable with effect from the Academic Year 2024-25 to the Diploma in Civil Engineering and Diploma in Mechanical Engineering programmes.

1.4 Institute Profile

Particular	Details
Name of the Institute	Government Polytechnic, Rajampeta
Year of Establishment	2008
Affiliating Board	State Board of Technical Education and Training, Andhra Pradesh (SBTET AP)
Programmes Offered	Diploma in Civil Engineering; Diploma in Mechanical Engineering
Sanctioned Intake	60 (Civil Engineering); 60 (Mechanical Engineering)
Programme Duration	3 Years (6 Semesters)
Website	www.govtpolyrajampeta.ac.in

2. VISION, MISSION AND INSTITUTIONAL ALIGNMENT

2.1 Institutional Alignment Philosophy

The Vision and Mission of Government Polytechnic, Rajampeta form the foundational basis from which the Vision and Mission of each Department, the Programme Educational Objectives (PEOs), Programme Outcomes (POs), and ultimately the Course Outcomes (COs) are derived. This top-down alignment ensures that every educational activity of the Institute — from classroom teaching to laboratory practice and industrial training — contributes towards the realization of the Institute's broader vision for the socio-economic development of the region.

2.2 Vision of the Institute

To be a Center of excellence that produces globally competent technocrats through quality technical education, skills, and values, uplifting the socially and economically backward Rayalaseema region.

2.3 Mission of the Institute

Core Value	Mission Statement
Professionalism	Educate and train students as professional technocrats for middle-level management in Engineering and Technology.
Perseverance	Instill lifelong learning skills and motivate higher education and career excellence.
Empowerment	Equip students with 21st-century competencies — collaboration, digital literacy, critical thinking, problem-solving, career guidance, and team spirit.
Entrepreneurship	Provide industry exposure to nurture entrepreneurship.
Sustainability	Inculcate ethics, human values, life skills, environmental responsibility, and resilience to face challenges.

“Technical education is the bridge between knowledge and skills, empowering learners to turn ideas into innovation and progress into prosperity.”

2.4 Vision of the Department of Mechanical Engineering

Striving continuously in pursuit of excellence in imparting knowledge with skills in Mechanical Engineering at diploma level to improve the opportunities in employment and higher learning.

2.5 Mission of the Department of Mechanical Engineering

Mission No.	Mission Statement
M1	Use of technology-enhanced tools and techniques by motivated and qualified faculty for enhancement of knowledge, understanding of principles, concepts and latest trends in Mechanical Engineering.
M2	Modernization of workshops and laboratories as per the curriculum specified by the State Board of Technical Education, Andhra Pradesh.
M3	Conduct of laboratories, guest lectures, industrial visits and industrial training for better understanding of critical concepts of Mechanical Engineering.
M4	Provide opportunities for developing multidisciplinary skills, communication skills, professional attitude and ethics.

2.6 Vision of the Department of Civil Engineering

To develop competent and ethical Civil Engineering Diploma graduates with strong technical knowledge, practical skills, and social responsibility to meet industry needs and contribute to sustainable infrastructure development.

2.7 Mission of the Department of Civil Engineering

Code	Mission Title	Mission Statement
DM1	Quality Education	To impart quality Civil Engineering education through a structured, need-based curriculum with emphasis on fundamentals and practical skills relevant to industry.
DM2	Industry Interface	To provide hands-on training, field exposure, and industry interaction that enhance employability and technical competence of diploma graduates.
DM3	Professional Ethics	To inculcate professional ethics, safety awareness, and social responsibility among graduates for sustainable engineering practice.
DM4	Lifelong Learning	To motivate graduates towards lifelong learning, higher education, and continual upgradation of technical skills.

2.8 Where and How the Vision, Mission and PEOs are Published and Disseminated

The Vision and Mission statements of the Institute and of both Departments, along with the Programme Educational Objectives (PEOs), are displayed prominently within the Institution — on notice boards, in the chambers of the Heads of Sections, in laboratories, classrooms, faculty rooms, and the office room. They are also published on the Institution's official website: www.govtpolyrajampeta.ac.in. Additionally, these statements are reproduced in the student handbook, induction programme material, and departmental course files, ensuring wide dissemination among students, faculty, alumni, parents, and industry stakeholders.

2.9 Process for Defining the Vision, Mission of the Department and PEOs of the Programme

A tentative Vision statement was first proposed by the Principal during a general faculty meeting. Subsequently, the Heads of Sections convened group discussions, class-wise, with students and faculty, and the statement was refined incorporating suggestions received from these stakeholders. Based on the revised Vision, appropriate Mission statements were drafted for the Institute and for each Department. Following this, the Programme Educational Objectives (PEOs) for each Diploma programme were formulated in consultation with senior faculty, alumni, and industry representatives. In the final faculty meeting, after detailed deliberations, minor refinements were incorporated, and the Vision, Mission and PEO statements were formally approved by the Academic Committee on 10th February 2024, forwarded by the IQAC Coordinator on 14th April 2024, and approved by the Principal on 28th April 2024 for implementation from the Academic Year 2024-25.

2.10 NBA Compliance Note

NBA Criterion 1 requires that the Vision and Mission be: (i) consistent with institutional goals; (ii) formally approved by the Governing Body / Competent Authority; (iii) posted at prominent locations and published in departmental handbooks; and (iv) reviewed periodically. The Institute fulfils all four requirements, with the Vision, Mission and PEOs formally reviewed and re-approved through the process described above, effective Academic Year 2024-25.

3. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Programme Educational Objectives (PEOs) describe the career and professional accomplishments that graduates of each Diploma programme are expected to achieve within 3-5 years of graduation. PEOs are defined by the Academic Committee in consultation with stakeholders including industry partners, alumni, and faculty.

3.1 PEO Statements — Diploma in Mechanical Engineering

PEO No.	Programme Educational Objective Statement
PEO1	Fundamental knowledge of mathematics, basic sciences and basic interdisciplinary engineering to apply day-to-day challenges in the field of mechanical engineering.
PEO2	Knowledge in the principles, concepts, and techniques in mechanical engineering areas to solve contemporary issues.
PEO3	Application of the principles, concepts, and techniques in mechanical engineering areas to solve contemporary issues and gain hands-on experience.
PEO4	Effective communication on activities regarding planning, designing, manufacturing and servicing functions with the engineering community.

3.2 PEO-Mission Mapping — Mechanical Engineering

PEO	M1	M2	M3	M4
PEO1	3	2	1	1
PEO2	3	2	2	1
PEO3	2	3	3	2
PEO4	1	2	2	3

3.3 PEO Statements — Diploma in Civil Engineering

PEO	Title	Statement
PEO1	Professional Practice	Apply Civil Engineering knowledge and practical skills to perform effectively in technical and supervisory roles in construction, public works, and allied sectors.
PEO2	Industry & Societal Contribution	Contribute to infrastructure development by applying multidisciplinary knowledge gained through industrial exposure and field experience, addressing societal and regional needs.
PEO3	Lifelong Learning	Pursue higher education, certifications, and continuous professional development to remain updated with evolving technologies and practices.

PEO	Title	Statement
PEO4	Professional & Ethical Conduct	Practice the profession with integrity, safety consciousness, and a commitment to sustainable engineering.

3.4 PEO-Mission Mapping — Civil Engineering

PEO	DM1	DM2	DM3	DM4	Correlation Rationale
PEO1	3	3	1	2	Professional practice directly builds upon quality technical education (DM1) and hands-on skills (DM2).
PEO2	2	3	2	3	Aligns with industry exposure (DM2) and societal infrastructure development (DM4).
PEO3	3	1	1	3	Lifelong learning builds on quality education (DM1) and ongoing skill upgradation (DM4).
PEO4	1	2	3	1	Ethical and professional conduct is the direct outcome of DM3.

3.5 NBA Compliance Note on PEOs

NBA Criterion 3 mandates that PEOs must be: (i) defined in consultation with stakeholders; (ii) mapped to the Mission with justification; (iii) reviewed periodically (minimum once every accreditation cycle); and (iv) published in the department handbook and institutional website. All four requirements are fulfilled for both programmes, as documented in the Academic Committee minutes dated 10th February 2024.

4. PROGRAMME OUTCOMES (POs) & PROGRAMME SPECIFIC OUTCOMES (PSOs)

4.1 Programme Outcomes (POs) — NBA Defined (7 POs, Common to All Diploma Programmes)

PO	Competency Domain	Official NBA Programme Outcome Definition
PO1	Basic & Discipline-Specific Knowledge	Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve engineering problems.
PO2	Problem Analysis	Identify and analyse well-defined engineering problems using codified standard methods.
PO3	Design / Development of Solutions	Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
PO4	Engineering Tools, Experimentation and Testing	Apply modern engineering tools and appropriate techniques to conduct standard tests and measurements.
PO5	Engineering Practices for Society, Sustainability and Environment	Apply appropriate technology in the context of society, sustainability, environment and ethical practices.
PO6	Project Management	Use engineering management principles individually or as a team member to manage projects in multidisciplinary environments.
PO7	Life-Long Learning	Ability to analyse and engage in independent and life-long learning in the context of technological changes.

4.2 Programme Specific Outcomes — Mechanical Engineering

PSO	Focus Area	PSO Statement
PSO1	Design & Manufacturing	Apply knowledge of mechanical engineering principles for design, manufacturing, and maintenance of mechanical systems and components.
PSO2	Thermal & Fluid Systems	Analyse and solve problems related to thermal, fluid and energy systems using standard tools and techniques.
PSO3	Workshop & Industrial Practice	Operate, maintain and troubleshoot machine tools, equipment, and industrial systems in workshop and field environments.

4.3 Programme Specific Outcomes — Civil Engineering

PSO	Focus Area	PSO Statement
PSO1	Core Civil Engineering Practice	Apply fundamental civil engineering knowledge in surveying, construction, structural components, and public works to support execution and supervision of infrastructure projects.
PSO2	Field & Laboratory Skills	Perform and interpret field and laboratory tests related to civil engineering materials, soil, water, and structures, and apply the results in real-time engineering practices.
PSO3	Project Execution & Estimation	Prepare estimates, specifications, and execute construction and maintenance works in compliance with codal provisions and quality standards.

4.4 PO-PSO Correlation Matrix (Representative — Applicable to Both Programmes)

Scale: 3 = High, 2 = Medium, 1 = Low, — = No Mapping.

Programme Outcome	PSO1	PSO2	PSO3
PO1: Basic & Discipline Knowledge	3	2	2
PO2: Problem Analysis	3	3	2
PO3: Design / Development of Solutions	3	2	2
PO4: Engineering Tools & Testing	2	3	3
PO5: Engineering Practices for Society	1	2	3
PO6: Project Management	1	1	3
PO7: Life-Long Learning	2	2	2

5. COURSE OUTCOMES (COs) — FORMULATION STANDARDS

5.1 CO Formulation Principles (NBA-Mandated)

S.No	Criterion	Requirement / Standard
1	Action Verb (Bloom's Taxonomy)	Each CO must begin with a specific, measurable Bloom's action verb (e.g., Apply, Analyse, Design, Evaluate) from levels L1-L6.
2	Specificity	COs must be specific to the course content and not replicate PO definitions. Each CO must be independently measurable.
3	Number of COs per Course	Each course shall define 4-6 Course Outcomes, covering the major units of the syllabus.
4	Measurability	Each CO must be assessable through CIE and/or SEE instruments with clear marks weightage.
5	Mapping Requirement	Each CO must be mapped to relevant POs/PSOs with justification of mapping strength (1, 2 or 3).

5.2 Bloom's Taxonomy Levels — Reference Chart

Level	Category	Action Verbs	Application Context
L1	Remember	List, Recall, Identify, State	Recall standard definitions, codal provisions, and basic terminology.
L2	Understand	Explain, Describe, Summarise, Interpret	Explain working principles and processes.
L3	Apply	Apply, Demonstrate, Solve, Use	Apply formulae and standard procedures to solve defined problems.
L4	Analyse	Analyse, Compare, Differentiate	Analyse test results, data, and engineering situations.
L5	Evaluate	Evaluate, Justify, Assess	Evaluate alternative solutions / designs against given criteria.
L6	Create	Design, Develop, Formulate	Design components, systems or processes to meet specified requirements.

5.3 Illustrative CO Statements — Sample Courses

M301: Strength of Materials (III Semester) - Mechanical Engineering

CO	Bloom's	Course Outcome Statement
CO1	L2	Explain the concepts of stress, strain and elastic constants for engineering materials.
CO2	L3	Apply principles of bending and shear to calculate stresses in beams.
CO3	L3	Apply torsion equations to determine stresses in circular shafts.
CO4	L4	Analyse columns and struts for buckling under axial loads.

C301: Steel Structures (V Semester) - Civil Engineering

CO	Bloom's	Course Outcome Statement
CO1	L2	Explain fundamentals of limit state design of steel structures.
CO2	L6	Design fillet welded joints.
CO3	L3	Apply design procedures for tension and compression members.
CO4	L4	Analyse simple steel roof trusses for member forces.

6. CO-PO / PSO MAPPING FRAMEWORK

6.1 Mapping Scale & Justification Protocol

Strength	Level	Justification Criterion
3	High / Strong	The CO directly and substantially addresses the PO/PSO. Course content, assessment, and outcomes are fundamentally built around this competency.
2	Medium / Moderate	The CO partially addresses the PO/PSO. The course provides meaningful but not comprehensive coverage of the competency.
1	Low / Marginal	The CO touches upon the PO/PSO indirectly, with limited depth of coverage.
—	No Mapping	No discernible relationship exists between the CO and the PO/PSO.

6.2 Sample CO-PO/PSO Mapping Matrix: M301 Strength of Materials

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	1	2	3	1	1
CO2	3	3	2	2	1	1	2	3	2	1
CO3	3	3	2	2	1	1	2	3	2	1
CO4	2	3	3	2	1	1	2	3	2	2

6.3 Programme-Level CO-PO Mapping (Consolidated)

The programme-level mapping aggregates individual course CO-PO correlation matrices using a weighted average approach. Each cell represents the average strength of correlation across all COs for all courses in that semester/year, weighted by credit hours. This consolidated mapping is computed and reviewed separately for the Civil Engineering and Mechanical Engineering programmes.

7. CURRICULUM ARCHITECTURE & STRUCTURAL MAPPING

7.1 Dual Methodology Framework

TOP-DOWN PLANNING APPROACH	BOTTOM-UP ATTAINMENT APPROACH
Starts from Institutional Vision & Mission; derives Departmental Mission; defines PEOs from Mission; defines POs from PEOs; formulates COs from POs; designs assessments to measure COs; selects delivery methods to achieve COs.	Starts from individual student performance data; aggregates unit test marks into CO attainment; aggregates CO attainment into Course attainment; maps Course attainment to PO attainment; combines direct and indirect attainment into final PO attainment; compares with targets for gap analysis; implements CQI actions for the next cycle.

7.2 Course-wise Credit Structure (Both Programmes)

Semester	Theory Courses	Practical Courses	CIE Max	SEE Max	Total Marks	Credits
I Year (Common)	6	4	20	80	100	30
III Semester	5	5	20	80	100	28
IV Semester	5	5	20	80	100	28
V Semester	5	4	20	80	100	27
VI Semester	3	3	20	80	100	24

7.3 Student-Centric Teaching-Learning Framework

S.No	Strategy	Implementation Details
1	Interactive Lectures	Model demonstrations, industrial case studies, multimedia-based instruction.
2	Smart Classroom Sessions	Multimedia presentations, engineering simulation software, video walk-throughs of construction sites / shop floors.
3	Hands-on Laboratory Practice	Structured laboratory sessions mapped to COs with running performance evaluation.
4	Industrial Visits & Guest Lectures	Exposure to live industrial practices, equipment, and processes.
5	Industrial Training (VI Semester)	Six-month on-the-job training in industry with structured assessment by industry supervisors and internal mentors.

8. ASSESSMENT & EVALUATION FRAMEWORK

The Institute enforces an objective, rigorous, and Bloom's-taxonomy-aligned assessment framework based on SBTET AP regulatory guidelines, applicable uniformly to both the Civil Engineering and Mechanical Engineering programmes. Evaluation is structured into Formative Assessment (Continuous Internal Evaluation - CIE) and Summative Assessment (Semester End Examination - SEE).

8.1 Assessment Weightage Matrix

Course Category	CIE Share	SEE Share	Rationale
Theory Courses	20 Marks	80 Marks	CIE provides continuous CO monitoring; SEE confirms terminal competency.
Practical Courses	40 Marks	60 Marks	Balanced split ensures continuous lab CO assessment alongside terminal practical examination.

8.2 Formative Assessment Structure — Theory Courses

ID	Mode	Duration	Max Marks	Scaling & CO Mapping Rules
FA1	Written Unit Test - 1	90 Minutes	40 Marks	CO-wise item-level mapping required. Scaled to 20 marks average with FA2 & FA3.
FA2	Written Unit Test - 2	90 Minutes	40 Marks	Same scaling rule as FA1. At least 60% of items at L3+ Bloom's level.
FA3	Assignment / Tutorial	—	20 Marks	Additional CO coverage and remediation for weaker COs.

8.3 Formative Assessment — Practical & Drawing Courses

Component	Max Marks	Assessment Method
Lab Experiments	40 Marks (Running Average)	Average of all performed experiments across the semester, each mapped to one or more COs. Minimum 10 experiments per course.
Lab Record / File	—	Mandatory submission verified by faculty for completeness, accuracy and CO mapping clarity.

8.4 Industrial Training Assessment Structure (VI Semester)

Assessment Component	Max Marks	Evaluator	CO Mapped
On-Site Assessment 1 (Week 12)	120	Industry Supervisor + External Guide	CO1 (Exposure), CO2 (Problem Identification)
On-Site Assessment 2 (Week 22)	120	Industry Supervisor + Internal Mentor	CO3 (Application), CO4 (Professional Skills)
Final Report & Viva-Voce	60	Internal Mentor + HOD	All COs

8.5 Question Paper Blueprint (CO-wise Distribution)

Paper Type	CO Coverage	Bloom's Min Level	Bloom's Max Level	Remark
FA (Unit Test)	Min 3 COs	L2	L4	At least 30% marks at L3 or above; CO-wise question mapping sheet mandatory.
SEE (Theory)	All COs	L2	L5	Choice-based paper; CO-wise question distribution reviewed by Academic Committee before printing.

9. CO ATTAINMENT COMPUTATION METHODOLOGY

9.1 NBA Attainment Threshold Scale

Student Performance Criterion	Attainment Level	Qualitative Descriptor
< 15% of students score $\geq$ 40% (Theory) / $\geq$ 50% (Practical)	0	Non-Attainment / Negligible
15% - 29% of students score $\geq$ threshold	1	Low Attainment
30% - 59% of students score $\geq$ threshold	2	Moderate Attainment
$\geq$ 60% of students score $\geq$ threshold	3	High Attainment

9.2 Step-by-Step CO Attainment Computation

Step	Action	Formula / Procedure
1	Threshold Check	For each CO, count students scoring $\geq$ 40% (theory) or $\geq$ 50% (practical) in each CIE test and SEE.
2	CIE CO Attainment	Map each CIE test question to COs. Calculate % students above threshold per CO per test. Average across all tests.
3	SEE CO Attainment	Map each SEE question to COs. Calculate % students above threshold per CO.
4	Direct Attainment	Direct CO Attainment = $0.8 \times \text{CIE Attainment} + 0.2 \times \text{SEE Attainment}$.
5	Indirect Attainment	Derived from Course Exit Survey responses, converted to the 0-3 scale.
6	Overall CO Attainment	Overall CO Attainment = $0.8 \times \text{Direct Attainment} + 0.2 \times \text{Indirect Attainment}$.

9.3 Illustrative Computation — Sample Course

CO	CIE Att.	SEE Att.	Direct Att. ($0.8 \times \text{CIE} + 0.2 \times \text{SEE}$)	Indirect (Exit Survey)	Overall Att. ($0.8 \times \text{D} + 0.2 \times \text{I}$)	Target (2.55)
CO1	2.5	2.0	2.40	2.6	2.44	Gap
CO2	2.0	1.5	1.90	2.2	1.96	Gap
CO3	2.8	2.6	2.76	2.8	2.77	Met

10. PROGRAMME OUTCOME (PO) & PSO ATTAINMENT ARCHITECTURE

10.1 PO Attainment Formula

$$\text{Overall PO Attainment} = (0.80 \times \text{PO Direct Attainment}) + (0.20 \times \text{PO Indirect Attainment})$$

PO Direct Attainment is computed by running a weighted matrix multiplication of all CO attainment values across all courses in the programme, scaled by their CO-PO mapping strength (1, 2 or 3). PO Indirect Attainment aggregates stakeholder feedback from Exit Surveys, Alumni Feedback, and Employer Feedback, converted to the 0-3 attainment scale.

10.2 Direct PO Attainment Computation Method

Step	Process	Detail
1	Collect CO Attainment Levels	Record overall CO attainment (0-3) for every course across the programme.
2	Apply CO-PO Mapping Strength	Multiply CO attainment x mapping strength (1/2/3) for each CO-PO pair.
3	Aggregate at Course Level	Average all CO contributions per PO to obtain Course-level PO attainment.
4	Aggregate at Programme Level	Average across all courses (weighted by credits) to obtain Direct PO Attainment.

10.3 Indirect Attainment Sources & Weightage

Feedback Source	Instrument	Weightage	Mapped To
Course Exit Survey	5-point Likert (per CO)	40%	All COs -> POs/PSOs
Programme Exit Survey	5-point Likert (per PO)	30%	PO1-PO7, PSO1-PSO3
Alumni Survey	5-point Likert	15%	PO1-PO7, PSO1-PSO3
Employer Feedback	5-point Likert	15%	PO1-PO7, PSO1-PSO3

10.4 Target Setting — 85% Benchmark Justification

Factor	Justification
Historical Baselines	Historical performance data shows consistent attainment in the 70%-82% range, with strong cohorts approaching 85%.
OBE Maturity Stage	The Institute has cleared initial compliance stages; NBA encourages higher benchmarks at advanced stages of OBE maturity.
Equivalence to Attainment Scale	85% of maximum score corresponds approximately to Attainment Level 2.55 on the 0-3 scale, set as the common target for both programmes.

11. CONTINUOUS QUALITY IMPROVEMENT (CQI) LOOP

11.1 CQI Action Matrix

Attainment Range	Interpretation	Mandatory Corrective Action Protocol
$\geq 85\%$ of Maximum Score	Target Achieved	Sustain pedagogical practices. Document best practices. Consider raising target for next cycle by 2-5%.
70% - 84% of Max Score	Moderate Gap	Formulate course-level improvement plan. Modify delivery strategies. Introduce targeted tutorials and additional practice sessions.
$< 70\%$ of Max Score	Significant Gap	Conduct root-cause analysis. Revise teaching methodology, assessment design, and remedial support; report to Academic Committee.

11.2 Annual CQI Review Schedule

Period	Activity	Output	Responsible
July	Review previous year attainment data	Gap identification report	HOD + Academic Committee
August	Define revised CO targets & delivery plan	Updated course files	Faculty + Academic Committee
December	Mid-year CIE attainment review	Interim CQI notes	Course Faculty + HOD
May-June	Final attainment computation for the academic year	PO/PSO attainment report	Academic Committee + IQAC

11.3 Gap -> Action -> Result Tracking Template

PO/CO	Gap Identified	Root Cause	Action Taken	Result (Next Cycle)
PO2	Attainment below target	Students weak in analytical problem-solving	Introduced problem-solving workshops; revised test format to include case-based questions	To be reviewed next cycle
PO4	Attainment below target	Limited exposure to modern tools	Procured laboratory equipment; introduced software/CAD sessions	To be reviewed next cycle

12. GOVERNANCE, ROLES & RESPONSIBILITIES

12.1 Academic Committee

Role	Designation	Key Responsibilities
Committee Head	Dr. P. Sujatha, Head of Civil Engineering Section (HCES)	Overall OBE framework oversight; chairing Academic Committee meetings; liaison with IQAC and Principal.
Member	Sri M. Venkatanarayana, Head of Mechanical Engineering Section (HMES)	Coordination of OBE implementation for the Mechanical Engineering programme.
Member	Smt. K. Padmavathamma, Head of General Section (HGS)	Coordination of OBE-related general/foundation course components common to both programmes.
IQAC Coordinator	Dr. P. Sujatha	Forwarding the approved framework for institutional ratification; ensuring periodic review and quality compliance.
Approving Authority	Dr. Y. Sudhakar, Principal	Final approval and authorization of the OBE Manual for implementation.

12.2 Course File Compliance Checklist

Each faculty member must maintain a Course File with the following mandatory components. The Academic Committee conducts a formal audit every semester before documentation closure.

S.No	Document Component	Responsibility	Frequency
1	Approved Lesson Plan with CO mapping	Course Faculty	Before semester commencement
2	CO-PO/PSO Mapping Matrix with justification	Course Faculty	Before semester commencement
3	CIE Question Papers with CO mapping	Course Faculty	Each test cycle
4	CO Attainment Computation Sheet	Course Faculty	End of semester
5	Course Exit Survey Results	Course Faculty	End of semester
6	Sample Answer Scripts (best/average/weak)	Course Faculty	End of semester

13. RECORD KEEPING & DOCUMENTATION STANDARDS

13.1 Digital Repository Requirements

In line with NBA's emphasis on evidence-based accreditation, the Institute maintains a structured digital and physical repository of all OBE-related documentation for both the Civil Engineering and Mechanical Engineering programmes. Faculty are required to upload attainment sheets and course files to the institution's shared drive / LMS portal within 15 days of semester end.

13.2 Document Retention Policy

S.No	Document	Format	Retention Period
1	CO Attainment Sheets (all courses)	Excel + PDF	Minimum 5 years (NBA requirement)
2	PO/PSO Attainment Reports	Excel + PDF	Minimum 5 years
3	Exit Survey Raw Data	Excel	Minimum 5 years
4	Approved Vision, Mission, PEO Documents	PDF (signed)	Permanent record

13.3 NBA Criterion Cross-Reference Map

This OBE Manual directly supports the following NBA Criteria for Diploma Accreditation:

NBA Criterion	Criterion Title	Manual Section(s) Addressing This Criterion
Criterion 1	Vision, Mission, PEOs	Sections 2, 3
Criterion 2	Programme Curriculum	Sections 5, 6, 7
Criterion 3	Programme Outcomes & Course Outcomes	Sections 4, 5, 6
Criterion 5	Continuous Improvement	Section 11
Criterion 9	Governance, Institutional Support & Financial Resources	Section 12

A. ANNEXURE A — COURSE EXIT SURVEY TEMPLATE

This survey is to be administered at the end of each course (within the last 2 weeks of the semester) to all enrolled students. Results are used to compute Indirect CO Attainment. Minimum response rate required: 70%.

Rating Scale: 1 = Strongly Disagree | 2 = Disagree | 3 = Neutral | 4 = Agree | 5 = Strongly Agree

Indirect Attainment Conversion: Avg Rating ≤ 1.5 -> Level 0; 1.5-2.5 -> Level 1; 2.5-3.5 -> Level 1.5; 3.5-4.0 -> Level 2; 4.0-4.5 -> Level 2.5; > 4.5 -> Level 3

Q.No	Question Linked to CO	CO Mapped	Rating (1-5)
Q1	I can apply the basic principles and formulae of this course to solve standard engineering problems.	CO1	1 2 3 4 5
Q2	I am able to analyse and interpret engineering data / results related to this course.	CO2	1 2 3 4 5
Q3	I can design / develop solutions related to the concepts taught in this course.	CO3	1 2 3 4 5

B. ANNEXURE B — CO-PO/PSO MAPPING TEMPLATE

To be completed by the course faculty before the commencement of each semester, reviewed by the HOD, and submitted to the Academic Committee.

CO	Bloom's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	L?									
CO2	L?									

C. ANNEXURE C — CO ATTAINMENT COMPUTATION SHEET TEMPLATE

CO	CIE Attainment	SEE Attainment	Direct Att. ($0.8 \times C + 0.2 \times S$)	Indirect Attainment	Overall Att. ($0.8D + 0.2I$)	Target Met? (≥ 2.55)
CO1						
CO2						

D. ANNEXURE D — POLICY AMENDMENT LOG

Rev.	Date	Amendment / Revision Details	Approved By	Effective Date
V1.0	10-02-2024	Initial OBE Manual proposed by the Academic Committee (Dr. P. Sujatha, Sri M. Venkatanarayana, Smt. K. Padmavathamma).	Academic Committee	—
V1.1	14-04-2024	Framework forwarded for institutional ratification.	Dr. P. Sujatha, IQAC Coordinator	—
V2.0	28-04-2024	OBE Manual approved for implementation across Civil and Mechanical Engineering programmes.	Dr. Y. Sudhakar, Principal	AY 2024-25

APPROVAL & CERTIFICATION

This Outcome-Based Education (OBE) Manual of Government Polytechnic, Rajampeta, covering the Diploma in Civil Engineering and Diploma in Mechanical Engineering programmes, has been proposed, reviewed and approved through the following process, and is certified for implementation with effect from the Academic Year 2024-25.

ACADEMIC COMMITTEE HEAD	IQAC COORDINATOR	PRINCIPAL
Name: Dr. P. Sujatha Designation: Head of Civil Engineering Section (HCES) Date: 10-02-2024 Signature: _____	Name: Dr. P. Sujatha Designation: IQAC Coordinator Date: 14-04-2024 Signature: _____	Name: Dr. Y. Sudhakar Designation: Principal Date: 28-04-2024 Signature: _____

Academic Committee Members:

- Dr. P. Sujatha, Head of Civil Engineering Section (HCES) — Committee Head
- Sri M. Venkatanarayana, Head of Mechanical Engineering Section (HMES) — Member
- Smt. K. Padmavathamma, Head of General Section (HGS) — Member

This Manual shall be reviewed periodically by the Academic Committee, in consultation with the IQAC, and updated as required to remain compliant with NBA/SBTET AP guidelines.