



Approved by All India Council for Technical Education (AICTE), New Delhi.

UG programs Accredited by National Board of Accreditation (NBA): CSE, ECE & ISE

Affiliated to Visvesvaraya Technological University (VTU) Belagavi, Recognized by Govt. of Karnataka

2.6 STUDENT PERFORMANCE AND LEARNING OUTCOME

(2.6.1. Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes offered by the institution are stated and displayed on the website.)

Outcome-Based Education (OBE):

Outcome-Based Education (OBE) in technological universities and colleges is crucial as it ensures curriculum alignment with industry standards and global requirements, fostering graduates' competencies necessary for success. By correlating courses with Program Outcomes (POs) and Program Specific Outcomes (PSOs), OBE facilitates systematic assessment, enabling targeted improvements and keeping the curriculum relevant. Moreover, it promotes critical thinking, problem-solving, and lifelong learning skills, essential in today's rapidly evolving technological landscape. OBE's focus on both input and output parameters ensures comprehensive evaluation, ultimately enhancing the quality and relevance of education provided by technological institutions.

PROGRAM OUTCOMES (POS):

Program Outcomes (POs) are statements that describe what students are expected to know and be able to do upon graduating from the program. These relate to the skills, knowledge, analytical ability, attitude, and behaviour that students acquire through the program. The POs essentially indicate what the students have attained through the curriculum, assessment, and evaluation during the program. As such, POs define the professional profile of an engineering graduate. The National Board of Accreditation (NBA) has defined the following twelve POs for an engineering graduate:

- **PO1: Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2: Problem analysis:** Identity, formulate, review research literature, and analyze




Prof. Mrityunjaya V Latte
PRINCIPAL
EAST POINT COLLEGE OF
ENGINEERING & TECHNOLOGY
BANGALORE- 560 049.

complex engineering problems reaching substantiated conclusions using the first principles of mathematics, natural sciences, and engineering sciences.

- **PO3: Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
- **PO4: Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis, interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5: Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- **PO6: The engineer and society:** Apply to reason informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **PO7: Environment and sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and multidisciplinary settings.
- **PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **PO12: Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs):

In technical institutes, Program Specific Outcomes (PSOs) hold significant importance in delineating the specialized competencies and expertise that students are expected to attain upon completing their studies. Typically ranging from 2 to 4, these outcomes define the unique knowledge, skills, and abilities specific to various technical disciplines. By customizing PSOs to each program, technical institutes ensure that graduates are well-prepared to meet the demands of their chosen field, or any other specialized area. Serving as guiding principles for curriculum development, instructional strategies, and assessment practices, PSOs provide a focused framework for educational objectives beyond the broader Program Outcomes (POs). Through the attainment of PSOs, technical institutes empower their graduates with the specialized expertise needed to thrive in their respective technical domains, thus contributing significantly to industry advancements and societal progress.

As an example, PSOs of the Department of CSE is mentioned below:

Upon graduation students will be able:

- **PSO1:** To conceptualize, model, design, simulate, analyse, develop, test, and validate computing systems and solve technical problems arising in the field of computer science engineering.
- **PSO2:** To specialize in the sub-areas of computer science & engineering systems such as cloud computing, Robotic Process Automation, cyber security, big data analytics, user interface design, and IOT to meet industry requirements.
- **PSO3:** To build innovative solutions to meet the demands of the industry using appropriate tools and techniques.

COURSE OUTCOMES (COS):

Course Outcomes are narrower statements that describe what students are expected to know, and can do at the end of each course. These relate to the skills, knowledge, and behaviour that students acquire in their progress through the course. The procedure for attainment for COs and POs and PSOs is explained in detail in the following section. The targets for various attainments are fixed and the attainment levels of students are checked batch-wise. These achievement levels further become inputs for gap analysis. Once the gaps are identified and analysed, corrective measures will be taken to fill the gap.




Prof. Mrityunjaya V Latte
PRINCIPAL
EAST POINT COLLEGE OF
ENGINEERING & TECHNOLOGY
BANGALORE- 560 049.

a) Syllabus

ROBOTIC PROCESS AUTOMATION DESIGN & DEVELOPMENT (Effective from the academic year 2018-2019)

SEMESTER-VII

CourseCode	18CS745	CIEMarks	40
NumberOfContactHours/Week	3:0:0	SEEMarks	60
TotalNumberOfContactHours	40	ExamHours	3Hrs
		CREDITS	03

Course Learning Objectives: This course(18CS745) will enable students to:

1. To understand basic concepts of RPA
2. To Describe RPA, where it can be applied and how it implemented
3. To Describe the different types of variables, Control Flow and data manipulation techniques
4. To Understand Image,Text and Data Tables Automation
5. To Describe various types of Exceptions and strategies to handle

Module-1

**Contact
Hours**
08

RPA Foundations- What is RPA - Flavors of RPA- History of RPA- The Benefits of RPA- The downsides of RPA- RPA Compared to BPO, BPM and BPA - Consumer Willingness for Automation- The Workforce of the Future- RPA Skills-On-Premise Vs. the Cloud- Web Technology- Programming Languages and Low Code- OCR-Databases-APIs- AI-Cognitive Automation-Agile, Scrum, Kanban and Waterfall0 DevOps- Flowcharts.

Textbook 1: Ch 1, Ch 2, RBT:L1,L2

Module-2

RPA Platforms- Components of RPA- RPA Platforms-About Ui Path- About UiPath - The future of automation - Record and Play - Downloading and installing UiPath Studio -Learning Ui Path Studio- - Task recorder - Step-by-step examples using the recorder.

Textbook 2: Ch 1, Ch 2, RBT: L1, L2

Module-3

Sequence, Flowchart, and Control Flow-Sequencing the workflow- Activities-Control flow, various types of loops, and decision making-Step-by-step example using Sequence and Flowchart-Step-by-step example using Sequence and Control flow-Data Manipulation-Variables and Scope-Collections-Arguments - Purpose and use-Data table usage with examples- Clipboard management-File operation with step-by-step example-CSV/Excel to data table and vice versa (with a step-by-stepexample).

Textbook 2: Ch 3, Ch 4, RBT:L1,L2

Module-4

Taking Control of the Controls- Finding and attaching windows- Finding the control- Techniques for waiting for a control- Act on controls - mouse and keyboard activities- Working with UIExplorer- Handling events- Revisit recorder- Screen Scraping- When to use OCR- Types of OCR available- How to use OCR- Avoiding typical failure points.

Text book 2: Ch 5 RBT:L1,L2

Module-5

Exception Handling, Debugging, and Logging- Exception handling- Common exceptions and ways to handle them- Logging and taking screenshots- Debugging techniques- Collecting crash dumps- Error reporting- Future of RPA

Text book 2: Ch 8 Text book 1: Ch 13 RBT:L1,L2



b) Course Outcome

Course Code / Name: C404 / Robotic Process Automation		
Subject Code	Course Code	Course Outcomes
Robotic Process Automation/ 18CS745	C404.1	Demonstrate understanding of the fundamental concepts of Robotic Process Automation and its applications.
	C404.2	Understand different components and service providers of RPA.
	C404.3	Demonstrate the concept of sequence, flowcharts, control flow, data manipulation and excel automation with example.
	C404.4	Describe different control methods and OCR in RPA.
	C404.5	Analyse various exceptions and methods for handling exceptions and errors.

c) CO and PO / PSO mapping

Mapping is the process of representing, preferably in matrix form, the correlation among the parameters. It may be done for one-to-many, many-to-one, and many-to-many parameters. The following table shows the correlation matrix between CO and PO/PSO which finally leads to PO/PSO attainment.

There are three correlation levels: **1 (LOW), 2 (MEDIUM), 3(HIGH)**

Year / SEM: 4th year / 7thSem

Course Code & Subject code: C404 / 18CS745

Subject name: Robotic Process Automation

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C404.1	2	-	-	-	-	-	-	-	-	-	-	2	-	3	3
C404.2	2	2	1	1	3	-	-	-	-	-	-	2	1	3	3
C404.3	3	3	2	1	3	-	-	-	-	-	-	2	2	3	3
C404.4	3	3	2	1	3	-	-	-	-	-	-	2	2	3	3
C404.5	3	3	1		3	-	-	-	-	-	-	2	1	3	3
AVG	2.6	2.75	1.5	1	3	-	-	-	-	-	-	2	1.5	3	3

COURSE OUTCOME-PROGRAM OUTCOME MAPPING MATRIX OF ALL COURSES INCLUDING FIRST-YEAR COURSES

The Table 1 shows the CO-PO/PSO mapping of the 2018-scheme batch (2019-2023):

Table 1: CO-PO-PSO matrix of all courses for 18 Scheme: 2019-23 Batch

Course Code	Subject Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
C101	18MAT11 Calculus And Linear Algebra	3	3	1	2	-	-	-	-	-	-	-	3	-	-	-
C102	18PHY12 Engineering Physics	3	2	-	2	-	-	-	-	-	-	-	2.2	-	-	-
C103	18ELE13 Basic Electrical Engineering	3	3	2	2	2	-	-	-	-	-	-	2	-	-	-
C104	18CIV14 Elements Of Civil Engineering and Mechanics	2.8	2	2	2	-	-	-	-	-	-	-	2	-	-	-
C105	18EGDL15 Engineering graphics	3	2.5	2.33	-	3	1	-	-	-	-	-	2	-	-	-
C106	18PHYL16 Engineering Physics Lab	3	-	-	2	2	-	-	2	-	-	-	3	-	-	-
C107	18ELEL17 Basic Electrical Engineering Lab	3	3	3	3	2	-	-	-	3	-	-	2	-	-	-
C108	18EGH18 Technical English	-	-	-	-	-	-	-	-	-	3	-	3	-	-	-
C109	18MAT21 Advanced Calculus and Numerical Methods	3	3	1	2	-	-	-	-	-	-	-	3	-	-	-
C110	18CHE22 Engineering Chemistry	3	2	1	-	-	-	1.8	-	-	-	-	1	-	-	-
C111	18CPS23 Problem Solving Through C Programming	2	2	3	-	-	-	-	-	-	-	-	2	3	3	3
C112	18ELN24 Basic Electronics	2.7	2	2.6	-	-	-	-	-	-	-	-	-	-	-	-
C113	18EME25 Engineering Graphics	2.2	2	1	-	-	1.8	2	-	-	-	-	1.8	-	-	-

C114	18 CHEL26 Engineering Chemistry Lab	3	1.3	1	-	-	-	1	-	-	-	-	1	-	-	-
C115	18CPL27 C Programming Lab	3	2	3	1	1	-	-	-	1	-	-	3	3	3	3
C116	18EGH28-II Technical English	-	-	-	-	-	-	-	-	-	3	-	3	-	-	-
C201	18MAT31 Transform Calculus, Fourier Series & Num Tech	3	3	2	2	-	-	-	-	-	-	-	3	-	-	-
C202	18CS32 Data Structures and Applications	3	3	2.6	-	-	-	-	-	-	-	-	2	3	3	3
C203	18CS33 Analog and Digital Electronics	3	2	2	1.4	-	-	-	-	-	-	-	-	2	-	-
C204	18CS34 Computer Organization	3	2	1.6	2	-	-	-	-	-	-	-	-	2	2	2
C205	18CS35 Software Engineering	3	3	3	2	-	2	-	2	3	2	1	2	3	3	3
C206	18CS36 Discrete Mathematical Structures	3	3	2	3	-	-	-	-	-	-	-	3	-	-	-
C207	18CSL37 Analog and Digital Electronics Laboratory	3	3	3	2	2	-	-	-	-	-	-	-	3	-	-
C208	18CSL38 Data Structures Laboratory	3	3	3	-	-	-	-	-	1	-	-	2	3	3	3
C209	18KVK39 Vyavaharika Kannada	-	-	-	-	-	-	-	3	-	2	-	-	-	-	-
C210	18MAT41 Complex Analysis, Probability and Statistical Methods	3	3	3	3	-	-	-	-	-	-	-	-	3	2	1
C211	18CS42 Design And Analysis of Algorithms	3	3	3	3	-	-	-	-	-	-	-	-	3	3	3
C212	18CS43	2	3	3	-	-	-	-	-	-	-	-	-	3	3	1



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	Operating Systems																
C213	18CS44 Microcontroller and Embedded Systems	3	2	1	-	3	-	-	-	-	-	-	2	2	2	-	
C214	18CS45 Objected Oriented Concepts	3	2.4	2	-	2.6	-	-	-	-	-	-	2.6	2.6	2	-	
C215	18CS46 Data Communication	3	3	3	2	3	-	-	-	2	2	1.5	3	3	3	3	
C216	18CSL47 DAA Lab	3	3	2.8	1.6	3	-	-	-	-	-	-	-	3	3	3	
C217	18CSL48 Microcontroller and Embedded Systems Lab	3	3	3	2	3	-	-	-	-	-	-	-	3	1	-	
C218	18CPC49 Constitution of India, Professional Ethics and Cyber Law	-	-	-	-	-	3	-	3	3	-	-	3	-	-	-	
C301	18CS51 Management Entrepreneurship for It Industry	2	2	2	1	-	-	-	-	-	-	-	1	2	-	1	
C302	18CS52 Computer Network Security	3	3	2	-	-	-	-	-	-	-	-	1	2	2	2	
C303	18CS53 Database Management Systems	2.6	2	2	1	2	-	-	-	2	-	2	2	2	2	-	
C304	18CS54 Automata Theory and Computability	3	3	3	2	2	-	-	-	2	-	-	-	3	-	-	
C305	18CS55 Application Development Using Python	3	3	3	2	3	-	-	2	2	1	1	2	3	2	3	
C306	18CS56 Unix Programming	2	2	1.2	1	1	-	-	-	1	-	-	-	1.2	1.2	1.2	
C307	18CSL57 Computer Networks Lab	3	3	3	3	3	-	-	-	2	3	2	3	3	3	3	
C308	18CSL58 DBMS Lab	3	3	2.0	2	3	-	-	-	3	3	3	3	3	2	-	
C309	18CIV59 Environmental Studies	2	-	-	1	-	2	3	-	-	-	-	-	-	-	-	



C310	18CS61 System Software and Compilers	3	2.8	2.4	2	3	-	-	-	-	-	-	-	2	-	2
C311	18CS62 Computer Graphics and Visualization	3	3	2	1	-	-	-	-	3	2	3	3	3	3	3
C312	18CS63 Web Technology and its applications	3	3	2.2	1.4	3	-	-	-	1	-	-	2	3	3	1
C313	18CS643 Cloud Computing and its Applications	3	3	2.2	2	2	-	-	-	2	-	-	-	1.2	1.2	-
C314	18ME653 Supply Chain Management	2	2	2	1	-	-	-	-	-	-	-	1	2	-	1
C315	18CSL66 System Software Laboratory	3	2.6	2.2	2.4	2.4	-	-	-	-	-	-	-	3	1	1
C316	18CSL67 Computer Graphics Laboratory with mini project	3	3	3	2	3	-	-	-	2.6	2.6	2.6	2.2	2.4	2.8	2.6
C317	18CSMP68 Mobile Application Development	3	3	3	-	3	-	-	1	3	-	-	1	3	-	-
C401	18CS71 Artificial Intelligence & Machine Learning	3	3	2	1.6	3	-	-	-	-	-	-	-	2	2	-
C402	18CS72 Big Data Analytics	2.8	2.6	1.8	1	1.6	-	-	-	1.6	1.6	-	2	2.8	2.6	1.8
C403	18CS734 User Interface Design	2	2	1	1	-	-	-	-	-	-	-	-	1	2	2
C404	18CS745 Robotic Process Automation	2.6	2.8	1.5	1	3	-	-	-	-	-	-	2	1.5	3	3
C405	18CS751 Energy & Environment	3	3	-	-	-	3	2	-	-	-	-	2	-	-	-
C406	18CSL76 AI & ML Lab	3	3	3	2	2	-	-	-	2	-	-	1	2	2	2
C407	18CSP78 Project Phase-1	3	3	3	3	2.8	3	2	3	3	3	2	3	3	3	3
C408	18CS81 Internet of Things	3	2.8	3	1.5	-	-	-	-	3	2	-	2	2	3	-
C409	18CS822 Storage Area Networks	3	3	3	2	3	3	-	-	3	2	3	2	3	3	3



C410	18CSP83 Project Phase-2	3	3	3	3	2.8	3	2	3	3	3	2	3	3	2	3
C411	18CSS84 Technical Seminar	3	3	3	3	-	3	2	3	3	3	3	3	2	3	3
C412	18CSI85 Internship	3	3	3	3	2.8	3	2	3	3	3	2	3	3	3	3
Sum of PO's		168	152	127	87	78	28	18	25	58	41	28	100	109	88	73
No. of Courses Mapped		59	57	55	45	31	11	9	10	25	17	13	45	43	36	31



M. V. Latte
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