Course Code	PEU5305					
Level	5					
Course Title	Complex Analysis I					
Credit value	3					
Core/Optional	Optional					
Prerequisites	PEU5304(Pass /Valid OCAM/CR)					
Hourly breakdown	Theory		Practical	Independent Learning	Assessment	Total
	25*2= 50 hrs	DS hrs =4*3 = 12 hrs		25*3 = 75 hours Online learning = 11 hours	CA = 2 hrs	150 hrs
Course Aim/s.	1. introduce students to fundamental concepts, theorems and techniques of Complex Analysis. 2. Topics include Cauchy-Riemann Equations, Contour Integrals, Cauchy's Theorem, Cauchy's Integral Formula, Series Expansions, Residue Theorem and evaluation of real integrals using Residue Theorem					
PLOs addressed by course	**PLO1: Knowledge:** Explain the fundamental, principles and broader knowledge pertaining to the chosen science disciplines offered for the degree. **PLO3: Communication**: Demonstrate the competency in communicating efficiently and effectively to present information, ideas and concepts to the scientific community as well as to the wider society. **PLO4: Individual Work, Team Work and Leadership**: Demonstrate the competency in working independently and in groups in addressing issues in multi-disciplinary environments and completing the tasks on time through collaborative learning while exhibiting leadership. **PLO5: Creativity and Problem Solving:** Identify and analyze problems using quantitative and/or qualitative approaches using scientific methodology to provide valid conclusions. **PLO9: Lifelong Learning**: Develop the capacity to foresee new trends and their impacts and continuously update					
Course Learning Outcomes (CLO)	At the completion of this course student will be able to **CLO1:** appreciate the beauty and elegance of the propositions concerning analytic functions and techniques in Complex Analysis,(PLO1, 3,4,5) **CLO2:** understand the difference between Real Analysis of two variables and Complex Analysis (PLO1,3,4,5) **CLO3:** understand that most of the results covered are consequences of just one theorem, namely, Cauchy's Theorem (PLO1,3,4,5) **CLO4:** work with the field of complex numbers, (PLO1,3,4,5) **CLO5:** to have a sound understanding of continuity and differentiability (PLO1,4,5) **CLO6:** work with Cauchy-Riemann equations, (PLO1,3,4,5,9) **CLO7:** have a sound understanding of analyticity, (PLO1,3,4,5,9) **CLO8:** work with complex transcendental functions, of complex numbers including power series (PLO1,3,4,5) **CLO9:** evaluate contour integrals, (PLO1,3,4,5,9) **CLO10:** apply Cauchy's Theorem and Cauchy's Integral Formula (PLO1,3,4,5) **CLO11** obtain appropriate series expansions of functions (PLO1,3,4,5) **CLO12:** evaluate residues at isolated singularities(PLO1,3,4,5,9) **CLO13:** apply the Residue Theorem to evaluate contour integrals (PLO1,3,4,5,9) **CLO14:** apply the Residue Theorem to evaluate real integrals (PLO1,3,4,5,9)					
Content (Main topics, sub topics)	Cauchy-Riemann Equations, Sufficient Conditions for Differentiability, Analytic Functions, Power Series, Harmonic Functions, The Exponential Function, Trigonometric Functions, Hyperbolic Functions, The Complex Logarithmic Functions, Definite Integral of a Complex-Valued Function of a Real Variable, Contours, Contour Integrals, ML-Inequality, Path Independence of Contour Integrals, Green's Theorem in the Plane, Cauchy's Theorem, Cauchy's Integral Formula, Cauchy's Integral Formula for Derivatives , The Taylor Series, The Laurent Series, Types of Singularities, Classification of Singularities, Residues, The Residue Theorem, Evaluation of Integrals of the Form $$\int_0^{2\pi} F(\cos\theta, \sin\theta)d\theta$$, Evaluation of Real Improper Integrals Involving Rational functions.					
Teaching Learning methods (TL)	▪ Independent learning of Self :- study Instructional Material (IL) - Online Activities(OL); Reference Work (RF) ▪ Non—Compulsory contact sessions :- Day Schools (DS) ▪ Assessments (AS) and Feedback – MCQs (MCQ);Structured Essay (SEQ); Essay Questions (ES)					
Assessment strategy	Overall CA Mark (OCAM): 40%			Final Assessment: 60%		
	Details: Continuous Assessment1 (CAT1): -1hr Continuous Assessment2 (CAT2): -1hr OCAM = 60%of Maximum(CAT1, CAT2) + 40%of Minimum(CAT1, CAT2)			Final Evaluation -Theory: 100%-2hrs		
Recommended Readings:	● Saff, E.B., Snider, A.D. (2003). *Fundamentals of Complex Analysis (3rd Edition)*. Pearson. ● Churchill, R.V., Brown, J.W. (2013). *Complex variables & Applications (9th Edition)*. McGraw-Hill Publishers. ● Conway, J.B. (1978). *Functions of one complex variable (2nd Edition)*. Springer Publishers.					