

Course Code	PEU5302					
Level	05					
Course Title	Combinatorics					
Credit value	3					
Core/Optional	Optional					
Prerequisites	Pass in G.C.E. Advanced Level Combined Mathematics/ Higher Mathematics or Equivalent					
Hourly breakdown	Theory		Practical	Independent Learning	Assessment	Total
	Sessions*2= 25*2= 50 hrs	DS hrs =4*3 = 12 hrs		Sessions*3=25*3 = 75 hours Online learning = 11 hours	Continuous Assessments (CA)= 2 hrs	150 hrs
Course Aim/s.	Apply the counting techniques to the problems related to finite sets that come up in various applications and utilize them in solving optimization problems those come up in combinatorics.					
PLOs addressed by course	<p>PLO1: Knowledge: Explain the fundamental, principles and broader knowledge pertaining to the chosen science disciplines offered for the degree.</p> <p>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.</p> <p>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.</p> <p>PLO5: Creativity and Problem Solving: Identify and analyze problems using quantitative and/or qualitative approaches using scientific methodology to provide valid conclusions.</p> <p>PLO9: Lifelong Learning: Develop the capacity to foresee new trends and their impacts and continuously update knowledge and develop skills willingly to meet those future challenges.</p>					
Course Learning Outcomes (CLO)	<p>At the completion of this course student will be able to</p> <p>CLO1: identify and counting different types of functions, matrices and apply basic counting principles to solve problems related to sets and matrices (PLO 1,3,4,5,9)</p> <p>CLO2: apply Pigeonhole, multiplicative and additive principles to solve problems related to counting (PLO 1,3,4,5,9)</p> <p>CLO3: differentiate permutations, combinations, circular order, linear order, partitioning and identify the relationship between them (PLO 1,3,4,5,9)</p> <p>CLO4: construct flow chart to represent a simple algorithm and interpret a flow chart and determine its outcome (PLO 1,3,4,5,9)</p> <p>CLO5: apply the theorems to solve counting problems related to probability (PLO 1,3,4,5,9)</p> <p>CLO6: prove Pascal's triangle and binomial expansion using combinatorial argument and method of proof by induction (PLO 1,3,4,5,9)</p> <p>CLO7: identify the terms and the coefficients of the binomial and multinomial expansions and express the coefficients of those expansions (PLO 1,3,4,5,9)</p> <p>CLO8: solve some problems related to combinatorial identities and prove them using permutation, combinations and binomial expansion (PLO 1,3,4,5,9)</p>					
Content (Main topics, sub topics)	History of counting, Functions, Sets, Matrices and their counting, Pigeon hole principle, Multiplication Principle, Additive principle, Permutations, Combinations, Cyclic order, Partition functions, Flow charts and Algorithms, Probability theory, Generalized multiplications, Principle of Induction, Binominals Expansion, Pascal's Triangle, Multinomial expansion, Combinatorial Identities.					
Teaching Learning methods (TL)	<p>Self-Learning/Independent learning of Self-study</p> <ul style="list-style-type: none"> ▪ Instructional Material (IL) ▪ Online Activities (OL) ▪ Reference Work (R^F) <p>Compulsory contact sessions</p> <ul style="list-style-type: none"> ▪ Assessments (AS) and Feedback – MCQs (MCQ); Structured Essay (SEQ); Essay Questions (ES) <p>Non-compulsory contact sessions</p> <ul style="list-style-type: none"> ▪ Day Schools (DS) 					
Assessment strategy	Overall Continuous Assessment Mark (OCAM): 40%			Final Assessment (FA): 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:	<ul style="list-style-type: none"> • Kolman, B, Busby, R, Ross, S. (2008). <i>Discrete Mathematical Structures (6th Edition)</i>. Pearson Education Limited • Johnsonbaugh, R. (2008). <i>Discrete Mathematics (7th Edition)</i>. Prentice Hall • Seidenberg, A. (1962). <i>The Ritual Origin of Counting</i>. Springer 					