Sl. No.	Sub. Code	Theory	Contact Hours			Credit
			L	T	P/S	
4.1	22EAR7413	Elective 1. Mathematics, Statistics and Operation Research	**3**	**0**	**0**	**3**

Course Objective	The course is aimed to develop basic mathematical techniques required to support architectural and engineering concepts, and is also oriented to understand and analyse practical engineering problems. To introduce Operation Research as a tool for multi-criteria decision making for projects.
Anticipated Learning Outcomes:	The course modules cover statistics and operation research, which will enable the students to analyse field study data and formulate mathematical models.
Module 1 Geometry and measurements	Proportion, Golden ratio, Euclidean geometry, Methods to calculate areas, surface areas of solids and volumes for various geometrical shapes (types of curves) and volumes (cube, sphere, cone, cylinder)
Module 2 Calculus and applications	Methods of differentiation. Calculus of one variable Fundamentals of Integral calculus, Maxima and Minima for a function of one variable, Reduction Formulae, Calculation of areas using integrals: Area bounded by curve – Arc length of curve.
Module 3 Matrices	Elementary rows and column transformation, Gauss elimination and solution of System of equations, Inverse matrix. Eigen Value.
Module 4 Statistics	Introduction to various types of Distributions, Measures of central tendency, Mean/ Median mode, measures of dispersion (Mean deviation/Standard Deviation, Variance), Correlation and Regression. Hypothesis formulation & Testing; Statistical tests: Parametric & Non-parametric.
Module 5 Basics of Operation Research	Introduction to Operations research; linear programming, integer programming, transportation problem, introduction to nonlinear programming.

Note: Most Architectural subjects do not have Textbooks. The Reference books mentioned below are for reference only and University question paper should be prepared from the Syllabus descriptions.

References

1. *Kreyszig, E., Advanced Engineering Mathematics. Hoboken: John Wiley and Sons, 2007.*
2. *Grewal B.S., Higher Engineering Mathematics, 35th edition, Khanna Publishers, 2000.*
3. *Kapoor, V. K. and Gupta, S. C., Fundamentals of Mathematical Statistics, Sultan and Sons*
4. *Kalavathy, S., Operation Research, Vikas Publishing House Pvt. Ltd., 2009*
5. *Boucher, J. S., 1857, Mensuration, Plane and Solid, Longman, Brown, Green, Longmans and Robert, London.*
6. *Vohra, N. D., 2010, Quantitative Techniques in Management. McGraw Hill Publications, New Delhi.*