MATHEMATICS FOR ARCHITECTURE II

ENSH 155

Lecture : 3 **Year : I**
Tutorial : 2 **Part : II**
Practical : 0

Course Objectives:
To equip students with a sound understanding of vector, matrices, probability and statistics enabling them to effectively apply these principles in their respective fields.

1 Vector Algebra and Calculus (10 hours)

1.1 Two and three dimensional vectors
1.2 Scalar products and vectors products of three and four vectors
1.3 Reciprocal system of vectors
1.4 Vector differentiation and integration: Velocity and acceleration
1.5 Directional derivative and gradient
1.6 Divergence and curl

2 Matrices and their Applications (10 hours)

2.1 Algebra of matrices
2.2 Rank of matrices and its application in system of linear equations
2.3 Vector space, linear dependence and independence
2.4 Linear transformations
2.5 Eigen value, Eigen vectors and Cayley-Hamilton theorem with applications

3 Statistics (10 hours)

3.1 Measure of central tendency: Mean, median and mode
3.2 Measure of partition: Range, inter quartile range, quartiles, deciles and percentiles
3.3 Measures of dispersion: Mean deviation, standard deviation
3.4 Correlation and regression
3.5 Measures of skewness and kurtosis

4 Probability (10 hours)

4.1 Review of basic probability
4.2 Conditional probability, Bayes' theorem
4.3 Random variable and probability distribution
4.4 Binomial and Poisson's distribution

5 Mensuration (5 hours)

5.1 Area of regular polygon, area of irregular rectilinear figures, field book

5.2 Estimation of area using trapezoidal rule and Simpson's rule

Tutorial (30 hours)

1. Discussion on problems of scalar and vector product of three and four vectors, construction of reciprocal system; Problems on velocity and acceleration; Problems on gradient and directional derivatives; Calculation of divergence and curl
2. Problems on finding the rank of various matrices; Problems on finding the solution of system of equations; Discussion of problems on linear dependence and independence; Discussion on problems of finding Eigen values and vectors; Finding the inverse of a matrix using Clay-Hamilton theorem
3. Discussion of problems of finding mean, median and mode of various real world problems; Estimation of range, quartiles, deciles and percentiles; Problems on standard deviation; Problems on estimation of skewness of various data
4. Problems on conditional probability using Bayes theorem, probability distribution, binomial and Poisson's distribution
5. Problems on estimation of areas of regular polygon and irregular rectilinear figures and estimation of area using trapezoidal and Simpson's rule

Final Exam

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as indicated in the table below:

Chapters	Hours	Mark distribution*
1	10	14
2	10	14
3	10	14
4	10	14
5	5	4
Total	**45**	**60**

* There may be minor deviation in marks distribution.

References

1. Kreyszig, E. (2011). Advanced engineering mathematics. John Wiley & Sons.
2. Stewart, J. (2011). Calculus: Early transcendentals. Cengage Learning.
3. Johnson, R.A. (2017). Miller & Freund's probability and statistics for engineers. Pearson Education.
4. Kern, W.F., Bland, J.R. (1934). Solid mensuration with proofs (Latest Edition.). John Wiley & Sons.
5. Pierpoint, A.E. (1993). Mensuration for Indian schools and colleges: Part I (Latest Edition). Orient Longman.