A.P. State Council of Higher Education Semester-wise Revised Syllabus under CBCS, 2020-21

Course Code:

Four-year B.A. /B.Sc. (Hons) Domain Subject: MATHEMATICS IV Year B.A./B.Sc.(Hons)– Semester – V

Max Marks: 100

Course-6B: Multiple integrals and applications of Vector calculus (Skill Enhancement Course (Elective), 5 credits)

I. Learning Outcomes:

Students after successful completion of the course will be able to

- 1. Learn multiple integrals as a natural extension of definite integral to a function of two variables in the case of double integral / three variables in the case of triple integral.
- 2. Learn applications in terms of finding surface area by double integral and volume by triple integral.
- 3. Determine the gradient, divergence and curl of a vector and vector identities.
- 4. Evaluate line, surface and volume integrals.
- 5. understand relation between surface and volume integrals (Gauss divergence theorem), relation between line integral and volume integral (Green's theorem), relation between line and surface integral (Stokes theorem)

II. Syllabus: (Hours: Teaching: 75 (incl. unit tests etc.05), Training: 15)

Unit – 1: Multiple integrals-I

- 1. Introduction, Double integrals, Evaluation of double integrals, Properties of double integrals.
- 2. Region of integration, double integration in Polar Co-ordinates,
- 3. Change of variables in double integrals, change of order of integration.

Unit – 2: Multiple integrals-II

- 1. Triple integral, region of integration, change of variables.
- 2. Plane areas by double integrals, surface area by double integral.
- 3. Volume as a double integral, volume as a triple integral.

Unit – 3: Vector differentiation

- 1. Vector differentiation, ordinaryderivatives of vectors.
- 2. Differentiability, Gradient, Divergence, Curl operators,
- 3. Formulae involving the separators.

- 1. Line Integrals with examples.
- 2. Surface Integral with examples.
- 3. Volume integral with examples.

(15h)

(15h)

(15h)

(15h)

Unit – 5: Vector integration applications

- 1. Gauss theorem and applications of Gauss theorem.
- 2. Green's theorem in plane and applications of Green's theorem.
- 3. Stokes's theorem and applications of Stokes theorem.

III. Reference Books:

- 1.Dr.M Anitha, Linear Algebra and Vector Calculus for Engineer, Spectrum University Press, SR Nagar, Hyderabad-500038, INDIA.
- 2.Dr.M.Babu Prasad, Dr.K.Krishna Rao, D.Srinivasulu, Y.AdiNarayana, Engineering Mathematics-II, Spectrum University Press, SR Nagar, Hyderabad-500038,INDIA.
- 3. V.Venkateswararao, N. Krishnamurthy, B.V.S.S.Sarma and S.Anjaneya Sastry, A text Book of B.Sc., Mathematics Volume-III, S. Chand & Company, Pvt. Ltd., Ram Nagar,NewDelhi-110055.
- 4. R.Gupta, Vector Calculus, Laxmi Publications.
- 5. P.C.Matthews, Vector Calculus, Springer Verlag publications.
- 6. Web resources suggested by the teacher and college librarian including reading material.