SRM UNIVERSITY
(Under section 3 of UGC Act 1956)

Course Code	Course Name	L	T	P	C
MAT1241	Vector Calculus, Fourier Series and Fourier Transforms	4	1	0	4

INSTRUCTIONAL OBJECTIVES

At the end of the course the students should be able to

- Familiar with physical interpretation of divergence and curl of a vector
- Be exposed to evaluating line, surface and volume integrals
- Be thorough with the study of Fourier series expansions
- Be familiar with half range Fourier series and harmonic analysis
- Be thorough with properties and theorems on Fourier transforms with applications

Unit I **12 hours**

Gradient, Divergence of a scalar point function and curl of a vector point function directional derivative, unit normal to a surface, Solenoidal and irrational vectors – physical interpretation of divergence and curl of a vector point function.

Unit II **12 hours**

Line surface and volume integrals; theorems of Gauss, Stokes and Greens (with proof) - simple problems.

Unit III **12 hours**

Fourier series- definition - Fourier Series expansion of periodic functions with Period 2π and period $2l$ – Use of odd & even functions in Fourier Series.

Unit IV **12 hours**

Half-range Fourier Series – definition- Development in Cosine series & in Sine series Change of interval.

Unit V **12 hours**

Dirichlet's conditions, Fourier integral formula (with proof),Fourier transform, Inverse Theorem for Fourier transform, Fourier sine and cosine transforms and their inversion formulae. Linearity property of Fourier transforms, Change of scale property, Shifting theorem, Modulation theorem, Convolution theorem of Fourier transforms, Parseval's identity.

TEXT BOOKS

1. S.Narayanan and T.K.Manickavachagam Pillai, Vector algebra and Analysis, S.Viswanathan Pvt. Ltd., 1995
   Unit I: Chapter 4: Sec 6 – 12; **Unit II:** Chapter 6: Sec 2 – 5.1

2. S.Narayanan and T.K.Manickavachagam Pillai, Calculus, Volume III, Vijay Nicole Imprints Pvt. Ltd., Chennai, 2004
   Unit III & IV: Chapter 6: Sec 1, 2, 3 and 5

3. A.R.Vasistha and R.K.Gupta, Integral Transforms, Krishna Prakashan Media Pvt. Ltd., New Delhi, 2011.
   Unit V: Chapter 6: Sec 6.1 – 6.13.

REFERENCE

1. S. Narayanan, R. Hanumantha and T. K. Manickavachagam Pillai, Ancillary Mathematics, Volume I & II, S.Viswanathan Printers, Chennai, 2007.