

20MA202T					Mathematics - III					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	25	50	25	--	--	100

**COURSE OBJECTIVES**

- To understand the concept of Fourier series and Fourier transform
- To conceptualise the heat, wave, and Laplace equation and their solutions
- Expansion of periodic functions/waveforms in terms of sine and cosine functions.
- To acquaint the concept of Fourier transform and their applications in petroleum science
- To become familiar about Geostatistics and its applications in petroleum technology

**UNIT 1 Fourier Series and Fourier Transform along its Applications****11 Hrs.**

Periodic function, definition and its properties, definition of a Fourier series of function, need of Fourier series, Dirichlet's condition, Finding the coefficients, Fourier series of even and odd function, Extending the scope of Fourier series, Fourier series of arbitrary interval, convergence of Fourier series, Harmonic analysis, applications of Fourier series.

Introduction, definition, existence, Fourier transform of simple functions, properties of Fourier transform, Fourier Sine and Cosine transforms, Fourier transform in science and engineering, Solving differential equations through Fourier transforms:

**UNIT 2 Partial Differential Equation****08 Hrs.**

Partial Differential Equations: Formation PDEs, Solution of Partial Differential equations  $f(x,y,z,p,q) = 0$ , Nonlinear PDEs first order, Some standard forms of nonlinear PDE, Linear PDEs with constant coefficients, Equations reducible to Homogeneous linear form, Classification of second order linear PDEs.

**UNIT 3 Applications of Partial Differential Equations****10 Hrs.**

Importance of second order partial differential equations and their classification, method of variable separable, physical significance of elliptic, parabolic and hyperbolic equations, One and two dimension heat, Laplace and wave equations in Cartesian and polar coordinates and their solution by variable separable, Laplace and Fourier transform

**UNIT4 Geostatistics and its Applications****10 Hrs.**

Introduction to Geostatics, Probability Theory review, Spatial Analysis, Variogram Modelling, Estimation (Global and Local). Cross validation, Estimators (Simple kriging, Indicator kriging, Block kriging); Geostatistical simulation (Cholesky decomposition, conditional simulation, sequential gaussian simulation- SGS)

**Total 39 Hrs.****COURSE OUTCOMES**

On completion of the course, student will be able to

CO1 – Implement fundamentals of special functions for its application in solving petroleum engineering problems

CO2 – Classify and recognise various Ordinary differential equations and its application

CO3 – Analyse linear differential equation of first and second order

CO4 – appraise the concept of partial differential equation and its application in Petroleum engineering domain

CO5 – solve and apply Fourier series and Fourier integral

CO6 – Examine Laplace transformation and its applications

**TEXT/REFERENCE BOOKS**

1. Higher Engineering Mathematics, by B. S Grewal, Khanna Publication, Delhi
2. Higher Engineering Mathematics Vol. 1 by Dr. K.R.Kachot, Mahajan Publishing House
3. Higher Engineering Mathematics Vol. 2 by Dr. K.R.Kachot, Mahajan Publishing House
4. Advanced Engineering Mathematics (8th Edition), by E. Kreyszig, Wiley-India (2007).
5. Engineering Mathematics Vol 2, by Baburam, Pearson

**END SEMESTER EXAMINATION QUESTION PAPER PATTERN****Max. Marks: 100**

Part A : 4 questions of 6 marks each  
 Part B: 4 questions of 10 marks each  
 Part C: 3 questions of 12 marks each

**Exam Duration: 3 Hrs**

24 Marks (40 min)  
 40 Marks (80 min)  
 36 Marks (60 min)