| 17BSM402 - Partial Differential Equations | | | | | | | | | | |
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| Teaching Scheme | | | | | Examination Scheme | | | | | |
| L | T | P | C | Hrs/Week | Theory | | | Practical | | TotalMarks |
| | | | | | MS | ES | IA | LW | LE/Viva | |
| 3 | 1 | -- | 4 | 4 | 25 | 50 | 25 | -- | -- | 100 |

**OBJECTIVES**

1. Classify linear PDEs into homogeneous, non-homogeneous, reducible and irreducible types;
2. Obtain solutions of reducible/irreducible homogeneous linear equations
3. Classify linear second order PDEs into elliptic, parabolic and hyperbolic types;
4. Obtain solutions of one-dimensional unsteady heat conduction equation and wave Equation under specified initial and boundary conditions with reference to conduction of heat in rods and to the vibrations of stretched string;
5. Obtain solution of two-dimensional Laplace's equation.

**SYLLABUS**

| **Unit-I** | **10** |
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Formation of partial differential equations. Types of solutions. PDEs of the first order. Lagrange's solution. Some special types of equations which can be solved easily by methods other than the general methods. Charpit's and Jacobi's general method of solution.

| **UNIT II** | **10** |
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Partial differential equations of second and higher order. Homogeneous linear PDEs with constant coefficients, Solutions of reducible homogeneous equations, Solutions of irreducible homogeneous equations. Non-homogeneous linear PDEs with constant coefficients.

| **UNIT III** | **10** |
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Classification of second order PDE, Canonical forms, Canonical form for hyperbolic equation, Canonical form for parabolic equation, Canonical form for elliptic equation

| **UNIT IV** | **9** |
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Partial differential equations of second order: Origin of second order ODEs, Classification of linear PDE of second order, One-dimensional heat flow equation, the wave equation, the Laplace equation.

| **APPROXIMATE TOTAL** | **39 Hours** |
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**OUTCOMES**

1. Classify partial differential equations and transform into canonical form;
2. Solve linear partial differential equations of both first, second and higher order;
3. Solve one-dimensional heat flow equation, wave equation and Laplace equation.

**TEXTS AND REFERENCES**


1. K. Sankara Rao; Introduction to Partial differential equations, Prentice Hall India, 3rd edition (2010)
2. I N SNEDDON, Elements of Partial Differential Equations, International edition, McGraw-Hill, Singapore (1986)
3. MD Raisinghania, Ordinary and Partial differential equation, S, Chand Publication, 8th edition, (2005)