C4 Matrices and Differential Equations & Geometry

 6 Credits (5L+1 T)

Duration 3hrs Marks : 10(75+25) 75 Lectures + 15 Tutorials

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| **Programme:Certificate****Class:B.Sc.** | **Year:First** | **Semester:Second** |
| **Subject:Mathematics** |
| **CourseCode:B030201T** |  **CourseTitle:Matrices and Differential Equations&Geometry** |
| **Course outcomes:****CO1:** The subjects of the course are designed in such a way that they focus on developing mathematical skills in algebra, calculus and analysis and give in depth knowledge of geometry, calculus, algebra and other theories.**CO2:** The student will be able to find the rank, eigen values of matrices and study the linear homogeneous and non-homogeneous equations. The course in differential equation intends to develop problem solving skills for solving various types of differential equation and geometrical meaning of differential equation.**CO3:** The subjects learn and visualize the fundamental ideas about coordinate geometry and learn to describe some of the surface by using analytical geometry.**CO4:**Onsuccessfulcompletionofthecoursestudentshavegainedknowledgeaboutregulargeometricalfiguresandtheirproperties.TheyhavetheFoundation for higher course in Geometry. |
| **Credits:6** | **Core Compulsory/Elective** |
| **Max.Marks:25+75** | **Min. Passing Marks:** |
| **TotalNo.ofLectures-Tutorials-Practical(inhoursperweek):L-T-P:6-0-0** |
| **PART-A****Matrices and Differential Equations** |
| **Unit** | **Topics** | **No.of****Lectures** |
| **I** | Types of Matrices, Elementary operations on Matrices, Rank of a Matrix, Echelon form of a Matrix, Normal form of a Matrix, InverseofaMatrixbyelementaryoperations,Systemoflinearhomogeneousandnon-homogeneousequations,TheoremsonconsistencyofaSystem of linear equations. | **12** |
| **II** | Eigen values, Eigen vectors and characteristic equation of a matrix, Caley-Hamilton theorem and its use in finding inverse of a matrix,Complexfunctionsandseparationintorealandimaginaryparts,ExponentialandLogarithmicfunctionsInversetrigonometricandHyperbolic functions. | **11** |
| **III** | Formation of differential equations, Geometrical meaning of a differential equation, Equation of first order and first degree, Equationinwhichthevariablesareseparable,Homogeneousequations,Exactdifferentialequationsandequationsreducibletotheexactform,Linear equations. | **11** |
| **IV** | Firstorderhigherdegreeequationssolvableforx,y,p,Clairaut’sequationandsingularsolutions,orthogonaltrajectories,Lineardifferential equation of order greater than one with constant coefficients ,Cauchy-Euler form. | **11** |
|  | **PART B****GEOMETRY** |  |
| **Unit** | **Topics** | **No. of****Lectures** |
| **V** | General equation of second degree, System of conics, Tracing of conics, Confocal conics, Polar equation of conics and its properties. | **12** |
| **VI** | Three-DimensionalCoordinates,ProjectionandDirectionCosine,Plane(Cartesianandvectorform),Straightlineinthreedimension. | **11** |
| **VII** | Sphere,Cone and Cylinder. | **11** |
| **VIII** | Centralconicoids,Paraboloids,Planesectionofconicoids,Generatinglines,Confocalconicoids,Reductionofseconddegreeequations. | **11** |
| **Suggested Readings(PART-A Matrices and Differential Equations):**1. Stephen H. Friedberg, A. JInsel & L. E. Spence, Linear Algebra, Person
2. B. Rai, D. P. Choudhary & H. J. Freedman, A Course in Differential Equations, Narosa
3. D.A.Murray,IntroductoryCourseinDifferentialEquations,OrientLongman
4. Suggested digital plateform :NPTEL/SWAYAM/MOOCs
5. CourseBookspublishedinHindimaybeprescribedbytheUniversities.

**Suggested Readings(Part-B Geometry):**1. RobertJ.TBell,ElementaryTreatiseonCoordinateGeometryofthreedimensions,MacmillanIndiaLtd.
2. P.R.Vittal,AnalyticalGeometry2d&3D,Pearson.
3. S.L.Loney,TheElementsofCoordinateGeometry,McMillanandCompany,London.
4. R.J.T.Bill,ElementaryTreatiseonCoordinateGeometryofThreeDimensions,McMillanIndiaLtd.,1994.
5. Suggested digital plate form :NPTEL/SWAYAM/MOOCs
6. Course Books published in Hindi may be prescribed by the Universities.
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| Thiscoursecanbeoptedasanelectivebythestudentsoffollowingsubjects:Engg.andTech.(UG),Economics(UG/PG),Commerce(UG),BBA/BCA,B.Sc.(C.S.) |

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| **SuggestedContinuousEvaluationMethods:Max.Marks:25** |
| SN | **AssessmentType** | **Max. Marks** |
| **1** | **ClassTests** |  |  **10** |
| **2** | **OnlineQuizzes/ObjectiveTests** | **5** |
| **3** | **Presentation** | **5** |
| **4** | **Assignment** |  | **5** |
| **Courseprerequisites:**Tostudythiscourse, astudentmusthavesubjectMathematicsinclass 12th |
| **Suggestedequivalentonlinecourses:** |
| **FurtherSuggestions:** |