

## Syllabus Prescribed for the year 2022-23, UG Programme

**Programme : B.Sc.-I (Mathematics)**

### Semester II

Code of the Course/Subject	Title of the Course/Subject	(Total Number of Periods/week)
DSC-III / Mathematics	Ordinary Differential Equations	<b>9+1</b>

**COs:** After completing this course, students would be able to

1. Solve first order differential equations using different techniques..
2. Solve higher order differential equations and orthogonal trajectories.
3. Calculate complementary function and particular integral of the second order differentialEquation.
4. Describe the different methods to solve second order differential equations.
5. Illustrate applications of differential equations.

Unit	Content
Unit I	Formation of ordinary differential equation, degree and order of a ordinary differential equation, homogeneous differential equations, linear differential equations, Bernoulli's equation, differential equations reducible to the linear form, exact differential equations. <b>(12 period)</b>
Unit II	Differential equations of first order and higher degree, differential equations solvable for p, x and y, Clairaut's equation, orthogonal trajectories (Cartesian and Polar form) <b>(12 period)</b>
Unit III	Linear differential equations with constant coefficients, complementary function of the differential equation, particular integral of the differential equation, homogeneous linear ordinary differential equations. <b>(12 period)</b>
Unit IV	Second order differential equation, Wronskian, method of change of dependent variable, normal form, method of change of independent variable, variation by parameters. <b>(12 period)</b>
Unit V	Applications of ODE: Electric circuit, steady state heat flow, radio active decay and carbon dating, Newton's law of cooling, compound interest. <b>(13 period)</b>
<b>*SEM</b>	
COs: 1. To enhance interest among the students about course. 2. To develop the learning and writing skills. 3. To create mental ability	
<b>**Activities</b>	1. Unit Test 2. Assignment/ open book test 3. Quiz/ Study Tour

### Text books:

1. T.M. Karade , V. G. Mete, V.S. Bawane , P.R. Agrawal, A.Y. Shaikh, R.V. Kene: Differential Equations (Ordinary and Partial), Sonu-Nilu, Nagpur, 2022.
2. V. A. Sharma, V. R. Patil, S. R. Bhojar, G. U. Khapekar, A. N. Rangari: A Text book of Ordinary Differential Equations, Dnyanpath Publication, Amravati, First Edition, 2022.

**Reference Books :**

1. Ayres F Jr.: Differential equations, Schaum's outline series, McGraw Hill, 1981.
2. Coddington: An Introduction to Ordinary Differential Equations, E.A .Prentice Hall ofIndia, 1998.
3. T.M. Karade, N.T. Karade: Ordinary Differential Equations, Sonu-Nilu. Nagpur, 2016.
4. Murray D.A.: Introductory course in Differential Equations, Orient Longman (India), 1967.
5. Piaggio HTS: Differential Equations, CBS Publishers &Distributors, Delhi, 1985.
6. Siminons G.F.: Differential Equations, Tata McGraw Hill, 1972.
7. A.R. Forsyth. A Treatise on Differential Equations. Macmillan and Co. Ltd. London.
8. H. K Dass, Advanced Engineering Mathematics, S. Chand Publication, 2010.
9. B.S. Grewal, Higher Engineering mathematics, Khanna Publisher, New Delhi, 2017.

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**Part B**

**Programme: B.Sc.- I ( Semester-II), Mathematics**

**Semester- II**

<b>Code of the Course/Subject</b>	<b>Title of the Course/Subject</b>	<b>(Total Number of Periods/week)</b>
DSC –IV/ Mathematics	Vector Analysis and Geometry	<b>9+1</b>

**COs:** After completing this course, students would be able to

1. Interpret the vectors, their products, differentiation and integration.
2. Determine curvature and torsion.
3. Apply the concepts of divergence, curls which are useful in physics.
4. Describe the different forms of sphere and properties.
5. Discuss the equations of cone and cylinder.

Unit	Content
Unit I	Scalar and vector product of three vectors, product of four vectors, vector differentiation and vector integration. <b>(12 period)</b>
Unit II	Space curve, t, n, b vectors, fundamental planes, curvature, torsion, Frenet- Serret formulae. <b>(12period)</b>
Unit III	Gradient, divergence and Curl, directional derivative, line integral and work done, circulation. <b>(12 period)</b>
Unit IV	Sphere: Different forms of sphere, section of a sphere by a plane, sphere through a given circle, intersection of spheres and a line, orthogonal spheres and condition of orthogonality. <b>(13 period)</b>
Unit V	Cone : The equation of a cone with a guiding curve, cone with vertex and origin, right circularcone. Cylinder: equation of right circular cylinder. <b>(12 period)</b>
<b>*SEM</b>	
COs: 1. To enhance interest among the students about course. 2. To develop the learning and writing skills. 3. To create mental ability.	
<b>**Activities</b>	1. Unit Test 2. Assignment/ open book test 3. Quiz/ Study Tour

**Text books :**

1. T.M. Karade, Maya S. Bendre, V. B Raut, R.S. Wadbudhe, S.B. Tadam, V.D. Elkar , K.R. Muley: Vector Analysis and Geometry, Sonu Nilu , Nagpur, 2022.
2. V. A. Sharma, V. R. Patil, S. R. Bhoyar, G. U. Khapekar, A. N. Rangari: A Text book of ,Vector Analysis and Geometry, Dnyanpath Publication, Amravati, First Edition, 2022.

**Reference Books :**

1. Murray R. Spiegel, Vector Analysis, Schaum Publishing Company, New York, 1981.
2. N. Saran and S.N. Nigam , Introduction to vector Analysis Pothishala Pvt. Ltd. Allahabad.
3. Shanti Narayan, A Text Book of Vector Calculus, S. Chand & Co. New Delhi.
4. R.J.T. Bell, Elementary Treatise on Co-ordinate Geometry of Three Dimensions, MacmillanIndia Ltd., 1994.
5. P.K. Jain and Khalil Ahmad, A Text Book of Analytical Geometry of Three Dimensions, Wiley Eastern Ltd., 1999.
6. N. Saran and R.S. Gupta, Analytical Geometry of three dimensions, Pothishala Pvt. Ltd. Allahabad, 2000.

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**Programme: B.Sc.- I ( Semester-II), Mathematics**

**Semester- II**

**Code of the Course/Subject      Title of the Course/Subject      (Total Number of Periods/week)**

GIC/ Mathematics                      Numerical Ability-I                      ----

**COs:** After completing this course, students would be able to

1. Restate the ideas and concept of HCF & LCM of number and also find square root & cube roots.
2. Illustrate the problem on numbers, ages, percentage, profit and loss.
3. Analyze ratio and proportion, time, work and distance.
4. Outline the problems on train, simple interest, compound interest, area measurement.
5. Create the Bar graphs, Pie charts and Line graphs.

Unit	Content
Unit I	HCF & LCM of number, Decimal fraction, Simplification, Square root & cube roots.
Unit II	Average, Problem on numbers, Problem on ages, Percentage, Profit & Loss.
Unit III	Ratio & Proportion, pipes and cisterns, Time and work, Time and Distance.
Unit IV	Problem on train, Simple Interest, Compound Interest, Area.
Unit V	Bar Graphs, Pie Charts, Line Graphs.

**Reference:**

- 1) R. S. Agrawal, Quantitative aptitude for Competitive examination, S. Chand Publication
- 2) Arun Sharma, How to Prepare for quantitative Aptitude for CAT, Mac Grow Hill Publication