



**Swami Ramanand Teerth Marathwada  
University, Nanded (M.S.).**

**B.A./B.Sc. Third Year  
Syllabus (*Mathematics*)  
SEMESTER -V & VI**

**Effective from June -2011**

## **B.A./B.Sc. Third Year**

### **SEMESTER –V.**

**Note:** (1) Papers XIII (MT 301) and XIV (MT 302) are compulsory.

(2) Choose either XV (A) in semester- V and XIII (A) in semester- VI  
**OR** XV (B) in semester- V and XIII (B) in semester- VI from the following papers.

### **B.A/B.Sc. T.Y. Semester-V**

**No. of periods: 60**

**Max.Marks:50**

#### **Paper XIII (MT 301): Metric Spaces.**

**Unit I:** Definitions and examples, open and closed sets, convergence and completeness.

**Unit II:** Continuity and uniform continuity.

**Unit III:** Compactness, Connectedness.

**Text Book:** Mathematical Analysis. By S.C. Malik and Savita Arora. ( second edition)

**Scope:** Chapter 19 complete.

Unit I: Art. 1, 2, 3.

Unit II: Art. 4.

Unit III: Art. 5, 6.

**References:** 1) Real Analysis By Somasundaram & Chaudhary.

2) Introduction to Real Analysis By Goldberg.

3) Elements of Real Analysis By Shantinarayan & M.D. Raisinghania.

**B.A/B.Sc. T.Y. Semester-V**

**Paper XIV (MT 302): Linear Algebra.**

**No. of periods: 60**

**Max.Marks:50**

**Unit I:** Vector spaces: Elementary basic concepts of vector spaces, linear independence and bases, dual spaces.

**Unit II:** Inner product spaces, Fields: Extension fields.

**Unit III:** Linear transformation: The algebra of linear transformations, characteristic roots.

**Text Book:** Topics in Algebra by I.N. Herstein  
(2<sup>nd</sup> Edn.) John Wiley and sons.

**Scope:** Unit I: Chapt. 4: Art. 4.1,4.2 (corollary 1,2,3 of theorem 4.2.1 without proof).

Unit II: Chapt. 4: Art. 4.4, Chapt. 5: Art. 5.1.

Unit III: Chapt. 6: Art. 6.1,6.2.

**References:** 1) A First course in Abstract Algebra by John B. Fraleigh.  
2) Contemporary Abstract Algebra by Joseph A. Gallian.  
3) Linear Algebra for under graduates by S.R. Mangalgi and D.K. Daftari.  
4) First Course in Linear Algebra by P.B. Bhattacharya, S.K. Jain and S.R. Nagpaul.

**Choose either XV (A) or XV (B) from the following papers.**

**B.A/B.Sc. T.Y. Semester-V**

**Paper XV (A) (MT 303A): Operation Research**

**No. of periods: 60**

**Max. Marks: 50**

**Unit I:** Linear programming (Mathematical formulation), linear programming (Graphical method), graphical solution method, general linear programming problem, canonical and standard forms of L.P.P, simplex method.

**Unit II:** Linear programming (simplex method), fundamental properties of solution, computational procedure, solution of simultaneous linear equations, inverting a matrix.

**Unit III:** Mathematical formulation of the problem, the assignment method, special cases, typical assignment problem, Traveling Salesman problem.

**Text Book:** Operation Research By Kanti Swarup, P.K. Gupta and Man Mohan.  
(Reprint 2005), S. Chand & Co.

**Scope:** Unit I: Chapter-2: Articles 2.1, 2.2. Chapt. 3: Art. 3.1 to 3.6.

Unit II: Chapter-4: Articles 4.1 to 4.6.

Unit III: Chapter-11: Articles 11.1 to 11.6.

**Reference Books:** (1) Introduction to Operation Research By Hiller and Lieberman.,  
Tata Mc Graw Hill.

(2) Operation Research an Introduction By Hamdy A. Taha  
Pearson Pub.

**B.A/B.Sc. T.Y. Semester-V**

**Paper XV (B) (MT 303B): Mechanics-I  
(Statics)**

**No. of periods: 60**

**Max.Marks:50**

**Unit I:** Definitions, Law of parallelogram of forces, determination of magnitude and direction, Resultant of forces.

**Unit II:** Components and resolved parts, the algebraic sum of the resolved parts of two forces, To find magnitude and direction , resultant parallel forces.

**Unit III :** Introduction, moment of forces, the sum of vector of a system of forces, the sum of the vector moments of two like forces acting on a rigid body, couples, equivalent couples, conditions of equilibrium of forces.

**Text Book:** Mechanics and Differential Geometry.

By V. Tulsani, Warhekar, N.N. Saste. (S. Chand and Co.)

**Scope:** Unit I: Chapter 1: Art. 1.1 to 1.17.

Unit II: Chapter 2: Art. 2.1 to 2.5 (art 2.5 delete examples).

Unit III: Chapter 3 : Art. 3.1 to 3.7, 3.10, 3.11.

**References:** (1) Mechanics By B.R. Thakur and G.P. Shrivastav.

(2) Mechanics By Shanti Narayan, S. Chand and Co.

## **SEMESTER –VI.**

**Note:** (1) Papers XVI (MT 304) and XVII (MT 305) are compulsory.  
(2) Choose either XVIII (A) or XVIII (B) from the following papers.

### **B.A/B.Sc. T.Y. Semester-VI**

#### **Paper XVI (MT 304): Numerical Analysis.**

**No. of periods: 60**

**Max.Marks:50**

**Unit I: Introduction:** Differences, operators, interpolation, with equal intervals, operators  $E$ ,  $\Delta$ ,  $\nabla$ ,  $D$ .

Newton Gregory formula for forward and backward interpolation, Interpolation for equal intervals of the arguments: divided differences.

**Unit II :** Newton's, Lagrange's formulae for unequal intervals, central differences. Interpolation formulae: Gauss, Bessel and Stirling's formulae, Numerical differentiation, derivative of a function.

**Unit III:** Numerical quadrature: General formulae, Trapezoidal; Simpson's one-third and three-eight rules.

Numerical solution of O.D.E.: Introduction, equation of first order, Euler's method.

**Text Book:** Finite Differences and Numerical Analysis. By H.C. Saxena. ( S. Chand & Co. reprint 2001).

**Scope:** Chapter 1: Art. 1.1 to 1.3, 1.5.1, 1.6, 1.6.1, 1.6.2, 1.7.1, 1.8, 1.8.1, 1.8.2, 1.8.3.

Chapt 2: Art. 2.1, 2.2, 2.2.1( theorems 1 & 2 only), 2.3, 2.4.1.

Chapt.3: 3.1, 3.2, 3.3, 3.4, 3.5.

Chapt. 5: Art. 5.1, 5.2. Chapt. 6: Art. 6.1, 6.2, 6.3.1, 6.3.3, 6.3.4

Chapt. 16: Art. 16.1, 16.2.

**B.A/B.Sc. T.Y. Semester-VI**

**Paper XVII(MT 305): Partial Differential Equations.**

**No. of periods: 60**

**Max.Marks:50**

**Unit I;** Order, method of formatting PDE, Solution of equation, by direct integration, Lagrange's linear equations, working rule, method of multipliers.

**Unit II:** Non-linear in p&q, Charpit's method, linear homogeneous PDE of nth order with constant coefficients, rules for finding C.F., rules for finding P.I., non-homogeneous linear equations, Monge's method.

**Unit III:** Introduction, Method of separation of variables, equation of vibrating string, one-dimensional heat flow, two-dimensional heat flow, Laplace equation in polar co-ordinates.

**Text Book;** Advanced Engineering Mathematics By H.K. Dass.

**Scope:** Unit I; Art. 9.1 to 9.7.

Unit II; Art. 9.8 to 9.14.

Unit III: Art. 9.15 to 9.17, 9.19 to 9.21.

(Pages 591 to 651).

**References:** 1) Introductory course in Differential Equations by Danial Hillel.  
2) Differential Equations by Raisinghanian.

**Choose either XVIII (A) or XVIII (B) from the following papers.**

**B.A/B.Sc. T.Y. Semester-VI**

**Paper XVIII (A) (MT 306A): Topology**

**No. of periods: 60**

**Max.Marks:50**

**Unit I:** Fundamental concepts, Definition of countable and uncountable sets. Well-ordered sets, well-ordering theorem, topological spaces, basis for topology.

**Unit II:** Orderd topology, the product topology, the subspace topology.

**Unit III:** Closed sets and limit points, closure and interior of a set, limit points, continuity of a function, definition of product topology, connected spaces, compact spaces.

**Text Book:** Topology A Firs Course By James R. Munkres.  
Prentice Hall of India.

**Scope:** Unit I: Chapt. 1: Art. 1.7 (statements of theorems), 1.10

Chapt. 2: Art. 2.1,2.2.

Unit II: Chapt. 2: Art. 2.3, 2.4, 2.5.

Unit III: Chapt. 2: Art. 2.6, 2.7, 2.8(definitions).

Chapt. 3: Art. 3.1(theorems without proof 1.5, 1.6),  
3.5(definitions and examples)

**B.A/B.Sc. T.Y. Semester-VI**  
**Paper XVIII (B) (MT 306B): Mechanics-II**  
**(Dynamics)**

**No. of periods: 60**

**Max.Marks:50**

**Unit I:** Introduction, definitions, expressions for velocity and acceleration, components of velocity and acceleration, tangent and unit vector, curvature and principal normal, tangential and normal components of velocity, angular speed and angular velocity, angular acceleration, areal speed and areal velocity.

**Unit II:** Introduction, Newton's law of motion, mass, linear momentum, impulsive force and its impulse, unit of impulse, work, work done by a force, unit of work, power, energy, kinetic energy of particle of mass.

**Unit III :** Definitions, necessary and sufficient condition for force to be conservation, Rectilinear motion, projectile, central orbits, central orbit in pedal form.

**Text Book:** Mechanics and Differential Geometry.

By V. Tulsani, Warhekar, N.N. Saste. (S. Chand and Co.)

**Scope:** Unit I: Chapt. 1: Art. 1.01 to 1.11, 1.16.

Unit II: Chapt. 2: Art. 2.01 to 2.17.

Unit III: Chapt 2: Art. 2.18 to 2.21 (definitions), 2.22. Chapt. 3: Art. 3.01 to 3.06.

Chapt. 4: Art. 4.01 to 4.06.

**References:** (1) Mechanics By B.R. Thakur and G.P. Shrivastav.

(2) Mechanics By Shanti Narayan, S. Chand and Co.

**Paper XIX (MP 307): Practical Paper.**  
**(B.Sc. T.Y. SEMESTER –V & VI)**  
**No. of periods: 90      Max.Marks:100**

**PRACTICALS USING MATHEMATICAL SOFTWARES.**

SECTION A: Solving problems in Algebra.

SECTION B: Solving of Partial differential equations.

SECTION C: Solving problems in Mechanics/ Topology.

SECTION D: Solving problems in Numerical Analysis.

- NOTE:-**
- 1) No. of periods per week :**03**.
  - 2) Examination pattern: **Yearly**
  - 3) Practical paper is only for **B.Sc.** students.
  - 4) Softwares: **Freeware, MATLAB**.etc.
  - 5) Minimum **Five** practicals from each section should be covered in Record book.

**S.R.T.M.University, Nanded**

**Practical Question paper pattern B.Sc.T.Y. (SEMESTER PATTERN)**

**Subject: Mathematics.**

**Paper: (MP 307) Practical.**

**With effect from June 2011.**

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Time: 3 Hours

Maximum Marks: 100

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**B.Sc. T.Y.**

***N.B.***:- (1)All Questions are Compulsory.

(2)Figure to the right indicates full marks.

(3) In question 1 and 2 choice to be given for 20 marks questions (i.e. Q.1 is divided as Q.1 (a) of 20 marks and Q.1 (b) of 20 marks. Same is for Q.2 also).

***Q.1.*** Question on Section A      **(40 Marks) / (or 20 + 20 marks two questions)**

OR

Question on Section B

***Q.2.*** Question on Section C      **(40 Marks) / (or 20 + 20 marks two questions)**

OR

Question on Section D

***Q.3*** Viva-Voce.      **(10 Marks)**

***Q.4.*** Record Book      **(10 Marks).**

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