MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR
M. A. / M. Sc. MATHEMATICS (Previous)
2016-17
Non-Collegiate

All papers are compulsory

Paper	Paper Name	Max. Marks	Exam. Hours	Teaching Hours
Paper I	Advanced Abstract Algebra	100	3 Hrs.	6
Paper II	Real and complex Analysis	100	3 Hrs.	6
Paper III	Differential Equations	100	3 Hrs.	6
Paper IV	Geometry	100	3 Hrs.	6
Paper V	Any one of the following: (a) Mechanics (b) Continuum Mechanics	100	3 Hrs.	6

Note:

* **Scheme of Examination:**

Question Paper Pattern for Examination: 100 marks

Section A: Total 10 Question will be set from five units i.e. two question from each unit. These questions require very short answer. Each question will be of one (1) mark (Total 10 marks). All the questions in section A are compulsory.

Section B: Total 10 questions will be set from five units i.e. two question from each unit. Students are required to attempt at least one question from each unit. Each question carries 10 marks (Total 50 marks). The answer of each question should be given approximately in 250 words.

Section C: Total 4 descriptive question will be set from five units of the paper, not more than one question from each unit. Each question may also have two sub-division. Students are required to answer two questions in about 500 words. Each question carries 20 marks (Total 40 marks).

** The right to information act, 2005 is applicable.

PAPER-V (B)
CONTINUUM MECHANICS

TIME: 3 hour **Max. Marks: 100**
UNIT-I

Cartesian tensors, index notation and transformation, law of Cartesian tensors, addition, subtraction and multiplication of Cartesian tensor, gradient of a scalar function, divergence of a vector function and curl of a vector function using the index notation. The identity, Stocks Gauss and Green's theorem. The continuum approach classification of continuous media. Body forces and surface forces, components of stress tensor, force and moment equation of equilibrium.

UNIT-II

The stress quadric, principal stresses and Principal axes, stress invariants and the stress deviator tensor, Maximum shearing stress. Lagrangian and Eulerian description of deformation of flow. The commoving derivative. Velocity and acceleration. The continuity equation.

UNIT-III

Strain tensors, the linear rotation tensor and rotation vector. Analysis of rotation displacement, Geometrical meaning of the components of the linear strain tensor, Principal axis theory for the linear strain tensor, Properties of linear strain tensors. The linear cubical dilation. Compatibility equations for the linear strain components. The rate of strain tensor and the vorticity tensor. The rate of rotation vector and vorticity. Properties of the rate of strain tensor.

UNIT-IV

Law of conservation of mass and Eulerain continuity equation. The momentum integral theorem and the equation of motion, Kinetic equation of state. The first and second laws of thermodynamics and the dissipation functions.

Application: (linear elasticity): Assumptions and basic, equations, generalising Hook's law for an isotropic Homogeneous solid. capatibility equations. classification of types of problems in linear elasticity. The principle of super position.

UNIT-V

The strain energy function, the uniqueness theorem P-L relationship and the work kinetic energy equation. Irrotational flow and the velocity potential, Kinetic equations of state and the first law of thermodynamics.

The equation of continuity. The equation of motion, vorticity-stream surfaces for inviscid flow, Bernoullis equations, Irrotational flow and the velocity potential, similarity parameters and fluid flow.

Books for References:

1. Q. Fredenic & T.S. Chang   : Continuum mechanics: Allyn and Bacon, Inc, Boston.
2. Mase G.E.   : Continuum Mechanics (Schaum series).
3. Sommer Field A   : Mechanics of Deformable bodies.
4. Mortone E. Gurtin   : An Introduction to Continuum Mechanics (Academic Press).