MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR

M. A. / M. Sc. MATHEMATICS (FINAL)

2016-17

Non-Collegiate

Note- There will be five papers in all. Paper-I: Topology and Functional Analysis and Paper-II: Discrete Mathematics will be compulsory. Each paper will be assigned six hours per week.

Paper I	Topology and Functional Analysis	100	3 Hrs.	6
Paper II	Discrete Mathematics	100	3 Hrs.	6

Optional Papers

Any three of the following paper with the permission of the Head of the Department of Mathematics & Statistics.

Paper III	Relativity and Cosmology	100	3 Hrs.	6
Paper IV	Viscous Fluid Dynamics	100	3 Hrs.	6
Paper V	Number theory	100	3 Hrs.	6
Paper VI	Numerical Analysis	100	3 Hrs.	6
Paper VII	Integral Equations and Internal Transforms	100	3 Hrs.	6
Paper VIII	Optimization Techniques	100	3 Hrs.	6
Paper IX	Advanced Topology	100	3 Hrs.	6
Paper X	Computer Programming	Th. 75 Per. 25	3 Hrs. 2 Hrs.	Th. 04 Pre. 02
Paper XI	Mathematical Theory of Statistics	100	3 Hrs.	6
Paper XII	Space Dynamics	100	3 Hrs.	6
Paper XIII	Astronomy	100	3 Hrs.	6
Paper XIV	Compressible Fluids and Magneto hydro Dynamics	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 –IV
VISCOUS FLUID DYNAMICS

TIME: 3 hours **Max. Marks: 100**

UNIT-I

Viscosity, Analysis of stress, Relation between stress and rate of strain, Navier-stokes equations and equation of energy in cartesian system of coordinates, vorticity and circulation. Reynolds law of similarity, Physical importance of non-dimentional parameters, Reynolds number Froude numbers, Mach number, Prandtl number, Eckert number.

UNIT-II

Some exact solutions of Navier-stokes equations-steady, motion between parallel plates, Hagen poiseuille flow a circular pipe, flow between coaxial circular pipes, flow between two concentric rotating cylinders, Pulsatile flow between parallel surfaces, flow in convergent and divergent channels (Jaffery-Hamel flow),flow in the vicinity of stagnation point, unsteady motion of a plate.

UNIT-III

Theory of very slow motion of a sphere in viscous fluid Osceen's improvement of stoke's theory. Boundary layer Theory: Boundary layer equations for two dimensional flows over a plane wall. Boundary layer on a flat plate (Blasius. Topper solution). Characteristic boundary layer parameters. similar solutions of the boundary layer equations.Exact solutions of the steady state boundary layer equation in two dimensional motion, Boundary layer along a flat plate.

UNIT-IV

Flow past a wedge, Flow past a convergent channel. Boundary layer separation. Blasius series solution, Gortler,new series method. Prandtl-mises transformation, Axial symmetrical and three dimensional boundary layer: - Boundary layer on a Yawed cylinder. Approximate methods for the solution of the boundary layer equations Karman momentum integral equation, Karman-Pohlhousen method. Energy integral equations. Walz-Thwaites method based on energy integral equation.

UNIT-V

Thermal Boundary Layer in Two Dimension Flow.

Thermal boundary layer equation for a plane wall. Forced convection in a laminar boundary layer on a flat plate (i) Crocco's first integral (ii) Reynolds’s analogy (iii) Crocco's second integral for

Pr =1. Free convection from a heated vertical plate: Thermal energy integral equation.Approximate solution of the Pohlhousen's problem of free convection from a heated vertical plate

Book& Recommended:

1. G.Schfichting : Boundary Layer Theory.
2. S.I.Pai : Viscous Flow Theory, Vol.I, Laminar flow.
3. J.L.Bansal : Viscous Fluid Dynamics.
4. M. D. Raisinghania : Fluid Dynamics.
5. Shanti Swarup : Fluid Dynamics.