AMAG05 SOIL AND FLUID MECHANICS

UNIT-1 INTRODUCTION OF SOIL MECHANICS

1.1 field of soil mechanics, phase diagram physical and index properties of soil classification of soils, general classification based on particles size,

1.2 Textural classification and I.S. soil classification system stress condition in soils, effective and neutral stress, elementary concept of Bousinesque and Wester guards' analysis,

1.3 New mark influence chart. Shear strength mohr stress circle, theoretical relationship between principle stress circle,

1.4 Theoretical relationship between principal stress mohr -coulomb failure theory, effective stress principle. Determination of shear parameters by direct shear to be circle,

1.5 Theoretical test. Numerical exercise based on various types of tests.

UNIT-2 COMPACTION COMPOSITION OF SOILS STANDARD AND MODIFIED PROTECTOR TEST

2.1 Abbot compaction and Jodhpur mini compaction text field compaction method and control.

2.2 Consolidation of soil: Consolidation of soils, one dimensional consolidation spring analogy, Tirzah's theory Laboratory consolidation text,

2.3 Calculation of void ratio and coefficient of volume change,

2.4 Taylor's and Casagrand's method, determination of coefficient of consolidation.

UNIT-3 EARTH PRESSURE

3.1 Plastic equilibrium in soils, active and passive states, Rankine' s theory of earth pressure active and passive earth pressure for cohesive soils, simple numerical exercise.

3.2 Stability of slopes: Introduction to stability analysis of infinite and finite slopes friction circles method Taylor's stability number.

UNIT-4 PROPERTIES OF FLUIDS

4.1 SI deal and real fluid. Pressure and its measurement, Pascal' s law, pressure forces on plane and curved surfaces, centre of pressure, buoyancy, metacentre and metacentric height,

4.2 Condition of floatation and stability of submerged and floating bodies;

4.3 Kinematics of fluid flow: Lagrangian and Eulerian description of fluid motion, continuity equation,

4.4 Path lines, streak lines and stream lines, stream function, velocity potential and flow net.

4.5 Types of fluid flow, translation, rotation, circulation and vorticity, Vortex motion.

UNIT-5 DYNAMICS OF FLUID FLOW

5.1 Bernoulli' s theorem, venturimeter, orifice-meter and nozzle, siphon;

5.2 Laminar flow: Stress-strain relationships, flow between infinite parallel plates both plates fixed, one plate moving, discharge, average velocity,

5.3 Shear stress and pressure gradient; Laminar and turbulent flow in pipes,

5.4 General equation for head loss Darcy, Equation, Moody's diagram,

5.5 Minor and major hydraulic losses through pipes and fittings, flow through network of pipes, hydraulic gradient and energy gradient, power transmission through pipe;

5.6 Dimensional analysis and similitude: Rayleigh's method and Buckingham's `Pi' theorem, types of similarities, dimensional analysis, dimensionless numbers.

5.7 Introduction to fluid machinery.

Reference Books:

1. Braja M. Das and G. V. Ramana (2010). Principles of Soil Dynamics, Cengage learning.
2. Modi, P.M. and Seth, S.M. (1991). Hydraulics and Fluid Mechanics. Standard Book House, New Delhi.
3. Shames, I. (1982). Mechanics of Fluids (II ed.). Mc Graw- Hill International.
4. Subramanya, K. (1992).