ARCH 1104 Mechanics – I (3-0-0)

Course Objectives:

- To know the effect of forces during static conditions.
- To determine axial forces, shear forces and bending moments

Course Outcomes:

- Students will be able to identify the type of force, type of supports and the reactions on beams and plane frames.
- Students will be able to draw SF and BM of a beam

Forces- definitions and review of theories relating to coplanar force systems – Problems relating to coplanar force systems.
Simple plane frames – analytical methods of analysis of determinate frames only.
Beams – Simply supported, cantilever and overhanging beams – significance of different types of supports and loads – calculations of reactions.
Shear force and Bending moment - relations between them. Shear Force and Bending Moment diagrams.

References:

1. Fundamentals of Engineering Mechanics, 2nd Ed. S. Rajashekharan and G. Sankara Subramanian. Publishers: Vikas Publishing House Pvt.Ltd.
2. Engineering Mechanics, K.L.Kumar.T.M.H.
3. Elements of Strength of Materials. S.Timoshenko and D.H. Young. McGraw Hill.

ARCH 1203 Mechanics – II (3-0-0)

Course Objectives:

- To obtain fundamental understanding of the concepts and relations of stress and strain for different engineering materials.
- To understand the stresses and strains in thin cylinders and spherical shells.

Course Outcomes:

- Students will be able to identify the stress developed in beams due to forces applied.
- Able to analyze the stresses developed in cylindrical and spherical shell.

Moment of Inertia: Moments of Inertia of Plane Figures with respect to an axis, parallel axis theorem, Product of inertia, Principal axes and Principal moments of inertia.
Solid Mechanics:
Concepts of Stress & Strain: Concepts of Stress and Strain, Normal stress, Shear stress, normal strain, shear strain, Hooke's law, Poisson's ratio, Biaxial stress, plane stress, stress transformation, principal stresses, Principal strains, Mohr's Circle for stress and strain.
1. Modulus of Elasticity, working Stress, Factor of safety, Strain energy in tension and compression, Resilience, Impact loads. Analysis of Axially Loaded Members: Composite bars in tension and compression - temperature stresses in composite rods, statically indeterminate problems.
Modulus of rigidity, Poisson's ratio, Bulk Modulus, Relationship between elastic constants.
2. Members in Biaxial State of Stress: Stresses in thin cylinders, thin spherical shells under internal pressure - wire winding of thin cylinders.

References:

1. Engineering Mechanics by : S. Timoshenko, D.H. Yound, Mc-Graw Hill International
2. Edition Chapters: 1,2,2,3, & 6.
3. Fundamentals of Engineering Mechanics, Second Edition, Publisher: Vikas

4. Publishing House Pvt. Ltd by S. Rajashekharan and G. Sankara Subramanian.
5. Engineering Mechanics, K. L. Kumar, TMH
6. Elements of Strength of Materials by Timoshenko & Young.

ARCH 2103 Strength of Materials (3-0-0)

Course Objectives:

- To understand the bending of beams under different loading conditions.
- To obtain fundamental understanding on eccentricity loading.

Course Outcomes:

- Able to identify the stress developed in beams due to bending.
- Able to analyze the slope and deflection of beams.

1. Simple Bending of Beams: Theory of simple bending of initially straight beams, Bending stresses, Shear stresses in bending, Distribution of normal and shear stress, beams of two materials, Composite beams.

2. Deflection of Beams: Differential equation of the elastic line, Slope and deflection of beams by integration method, area - moment method, Castiglione's theorems, Conjugate beam method, Unit load method

3. Theory of Columns: Eccentric loading of a short strut, Long columns, Euler's column formula, Lateral buckling, Critical Load, Slenderness ratio.

References:

1. Elements of Strength of Materials by S.P.Timoshenko and D.H.Young, Affiliated East-West Press
2. Strength of Materials by G. H. Ryder, Macmillan Press
3. Strength of Materials by James M. Gere and Barry J. Goodno, Cengage Learning.
4. Strength of Materials by R. Subramanium, Oxford University Press.

ARCH 2205 Structural Analysis (3-0-0)

Course Objectives:

- To understand the bending of continuous beams under different loading conditions.

Course Outcomes:

- Able to draw ILD for different beams and loading conditions.
- Able to analyze the reactions on girders.

1. Application of Clapeyron's three moment theorem to Continuous beams.

2. ILD for determinate structure for reactions at supports, S. F at a given section, B.M. at a given section, maximum shear and maximum B. M at a given section; problems relating to series of wheel loads, UDL smaller than or greater than the span of the beam, Absolute maximum Bending moment.

3. ILD for B.M., S.F normal thrust and radial shear of a three hinged arch.

4. Suspension cables, 3 hinged stiffening girders

5. Introduction to space frames.

References:

1. Structural Analysis - C. S. Reddy, TMH Publisher
2. Structural Analysis - Norvis and Wilber
3. Mechanics of Materials - J. M Gere and S. P. Timoshenko, CBS Publishers and Distributors.

ARCH 3104 Design of RCC Structures (3-0-0)

Course Objectives:

This Course Enables the Student to

- Understand the Design Principles of Reinforced Cement Concrete Structures and evolution of different design philosophies.
- Understanding limit state of collapse; knowledge of design of structural elements in limit state method and conversant with R.C.C Code of practice.

Course Outcomes:

- Able to design a RCC member.

Introduction to Design Of Reinforced Concrete Structures; Limit State method of design, different limit states; concept of different methods of design; theory of singly reinforced beam for bending; Design of singly reinforced rectangular simply supported and cantilever beams for flexure, bond, shear and torsion; Design of doubly reinforced rectangular sections for flexure; Design of singly reinforced T-sections for flexure.
Limit state of collapse in compression; concept of short and long columns, end conditions; design of axially loaded short column
Types of slabs; Design of One way And Two Way Slabs.
Footings: - Types of foundations and footings. Design of isolated column footing.

References:

1. Syal, I.C And Ummat, R.K, Analysis And Design Of Reinforced Concrete Elements, A.H.Wheelker& Co. Ltd,Allahabad
2. Dr.S.RKarve and Dr.V.L Shah-Limited state Theory and design of Reinforced Concrete
(in S.I units)-structure publishers Jaltarang, Pune.
4. Dr.H.J.Shah,-Reinforced Concrete Vol-I –Charotar Publishing
5. Dr.B.CPunmia, Ashoka Kumar Jain, Arun Kumar Jain,-Reinforced Concrete Structure-
Lakmi Publication (P) Ltd New Delhi

ARCH 3204 Design of Steel Structures (3-0-0)

Course Objectives:

This Course Enables the Student to

- Understand the Design Principles of Steel Structures and evolution of different design philosophies.
- Understanding limit state of collapse; knowledge of design of structural elements in limit state method and conversant with steel Code of practice.

Course Outcomes:

- Able to design a steel member.
- Able to design connections of a steel member.

This course focuses on the study of principles and the philosophy of advanced steel structures and their design.
Introduction – Structural system of building; Load path, loading standard as per IS: 875 and load combinations; Rolled steel sections and built up sections. Welded and bolted connection- Failure modes.
Design of tension members; Concept of types of girders and beams; Design of laterally restrained rolled steel beams.
Design of compression members: Effective length, Buckling load; Built up sections, Lacing and Battening.
Concept of types of foundations; Design of slab base and gusseted base.

References:

1. A.S Arya & J.L Ajmani, Design of steel structure; Nemchand Brothers, Roorkee, 1999
2. S.M.A Kazimi& R.S Jindal : Design of steel structure, pentice hall(India), New Delhi,
1981
3. S.N Sinha, Reinforced concrete design, Tata Mc. Grawhill, New Delhi, 1990
4. Ramachandra, Steel structure design, vol-1
5. L.S Neggi, Steel structure.
6. Steel Strucute by V.N Vizarani& M.N Ratwani, M/S Khana Publishing, Delhi
7. Steel Structure by E.H Gaylord.
8. S.K.Duggal, Design of steel structures, by Tata McGrawHill, New Delhi.