NOIDA INTERNATIONAL UNIVERSITY

3RD SEMESTER

Civil Engineering

[Diploma in Engineering]

DME 301 : SOLID MECHANICS

Credits: 4 **Semester III**

Module No.	Contents	Teaching Hours
	UNIT-1 **DEFORMATION OF METALS** **Mechanical properties of materials:** Engineering materials – Ferrous and non ferrous materials -Definition of mechanical properties such as strength – elasticity, plasticity, ductility, malleability, stiffness, toughness, brittleness, hardness, wear resistance, machenability, castability and weldability - Alloying elements-effect of alloying element - Fatigue, fatigue strength, creep – temperature creep – cyclic loading and repeated loading – endurance limit. Simple stresses and strains: Definition – Load, stress and strain – Classification of force systems – tensile, compressive and shear force systems – Behavior of mild steel in tension up to rupture – Stress – Strain diagram – limit of proportionality – elastic limit – yield stress – breaking stress – Ultimate stress – percentage of elongation and percentage reduction in area – Hooke's law – Definition – Young's modulus - working stress, factor of safety, load factor, shear stress and shear strain - modulus of rigidity. Linear strain – Deformation due to tension and compressive force – Simple problems in tension, compression and shear force. Definition – Lateral strain – Poisson's ratio – volumetric strain – bulk modulus – volumetric strain of rectangular and circular bars – problems connecting linear, lateral and volumetric deformation – Elastic constants and their relationship - Problems on elastic constants - Definition – Composite bar – Problem in composite bars UNIT-2 **TORSION AND SPRINGS** Theory of torsion – Assumptions – torsion equation – strength of solid and hollow shafts – power transmitted – Definition – Polar modulus – Torsional rigidity – strength and stiffness of shafts – comparison of hollow and solid shafts in weight and strength considerations – Advantages of hollow shafts over solid shafts – Problems. Types of springs – Laminated and coiled springs and applications – Types of coiled springs – Difference between open and closely coiled helical springs – closely coiled helical spring subjected to an axial load – problems to determine shear stress, deflection, stiffness and resilience of closed coiled helical springs UNIT-3 **PROPERTIES OF FLUIDS, ELEMENTS OF HYDRAULIC SYSTEMS, PUMPS AND VALVES**	

	Introduction - Definition of fluid - Classification of Fluids - ideal and real fluids -Properties of a fluid – definition and units - Pressure-units of Pressure - Pressure head-atmospheric, gauge and absolute pressure. **Introduction** – elements of a hydraulic system – advantages of hydraulics systems – disadvantages – qualities of a good hydraulic fluid – hydraulic symbols. **Hydraulic pumps and control valves:** Principles of operation of non positive displacement pumps –centrifugal pumps – volute – diffuser – propeller pumps – mixed flow pumps – principles of operation of positive displacement pumps – rotary pumps – gear – lobe - vane – piston – reciprocating pumps. Control valves: Introduction to valves – types – pressure control valves - relief valve – pressure reducing valve – sequence valves – pressure switches – directional control valves– types only – solenoid controlled –– check valves – foot	12

Reference Books/ Text Books / Case Studies:

Text Books:

1. Strength of Materials ,R.K. Bansal,, Laxmi Publications Pvt. Ltd., New Delhi, 3rd Edition, 2010.
2. Strength of materials, S.S.Rattan, Tata Mcgraw hill, New Delhi,2008, ISBN 9780070668959,
3. Strength of Materials, B K Sarkar, I Edition, 2003 Tata Mcgraw hill, New Delhi.
4. Engineering mechanics, R.K. Bansal, Laxmi Publications Pvt. Ltd., New Delhi,

Reference Books:

1. Hydraulics & Pneumatics Power for production Harry L Stewart – Industrial Press Inc, New York - 1977
2. Pneumatic circuit by Harry L. Stewart – Audel Series – 1976
3. Fundamentals of pneumatic control Engg – Text book By Festo Company -1985
4. Introduction to Pneumatics – Text Book by Festo Company - 1983

DME 303: FLUID MECHANICS

Credits: 4 **Semester III**

Module No.	Contents	Teaching Hours
I	**Introduction**: Ideal and real fluids, fluid mechanics, Hydrostatics, Hydrodynamics, Hydraulics. **Properties of Fluid**: Mass density, specific weight, specific gravity, viscosity, surface tension - cohesion, adhesion and, capillarity, vapour pressure. Units of measurement and their conversion compressibility. **Hydrostatic Pressure:** Pressure, intensity of pressure, pressure head, Pascal's law and its applications. Total pressure, resultant pressure, and center of pressure. Total pressure and center of pressure on horizontal, vertical and inclined plane surfaces of rectangular, triangular, trapezoidal shapes and circular. **Buoyancy:** Buoyancy, metacentre, stability of floating body.	12
II	**Measurement of Pressure**: Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure. Piezometer, simple manometer and differential manometer. **Fundamentals of Fluid Flow**: Types of Flow: Steady and unsteady flow, laminar and turbulent flow, uniform and non-uniform flow. Discharge and continuity equation (flow equation). Types of hydraulic energy: Potential energy, kinetic energy, pressure energy. Bernoulli's theorem; statement and description (without proof of theorem) and simple numerical problems. **Flow Measurement**: Venturimeter and mouthpiece, Pitot tube, Orifice and Orificemeter, Current meters, Notches and weirs.	14
III	**Flow in Pipes**: Definition of pipe flow; Reynolds number, laminar and turbulent flow - explained through Reynold's experiment, Critical velocity and velocity distributions in a pipe for laminar flow, Head loss in pipe lines due to friction, sudden expansion and sudden contraction, entrance, exit, obstruction and change of direction, Hydraulic gradient line and total energy line, Flow from one reservoir to another through a long pipe of uniform cross section, Pipes in series and parallel, Water hammer phenomenon and its effects **Flow through open channels**: Definition of an open channel, uniform flow and non-uniform flow, Estimation of Discharge using Chezy's and Manning's formula, Most economical channel sections (rectangular and trapezoidal, Head loss in open channel due to friction. **Hydraulic Pumps:** Hydraulic pump, reciprocating pump, centrifugal	16

	pumps	

Reference Books/ Text Books / Case Studies:

1. Asawa, G.L. (2009), Fluid Flow in Pipes and Channels, CBS Publishers and Distributors, New Delhi.
2. Gupta, V. and Gupta, S.K. (1984), Fluid Mechanics and its Applications, New Age International (P) Limited, Publishers, New Delhi.
3. Massey, B.S. (revised by John Ward-Smith) (1998), Mechanics of Fluids, Chennai Micro Print Pvt. Ltd., Chennai.
4. Streeter, V.L., Wylie, E.B., and Bedford, K.W. (1998), Fluid Mechanics, McGraw Hill Companies, Singapore.

DCE 301: SURVEYING - I

Credits: 4 **Semester III**

Module No.	Contents	Teaching Hours
I	**Introduction:** Basic concepts of surveying -objectives, Types of surveying, Unit of measurement and their types, Instruments used for taking these measurements, classification based on surveying instruments **Chain Surveying**: Purpose of chain surveying, principles of chain surveying and its advantages and disadvantages, Obstacles in chain surveying, Direct and indirect ranging offsets and recording of field notes, Errors in chain surveying and their corrections	6
II	**Leveling**: Leveling principles, Basic terms and definitions, Leveling instruments their working, advantages and disadvantages, Types of leveling staff, Concepts of line of collimation, axis of the bubble tube, axis of the telescope and vertical axis, Temporary adjustment and permanent adjustment of dumpy level by two peg method, Concept of back sight, foresight , intermediate sight, change point, to determine reduce levels, Level book and reduction of levels by Height of Instrument and Rise and Fall method, Arithmetic checks, problem on reduction of levels, fly leveling, check leveling and profile leveling (L-section and X-section), errors in leveling, permissible limits, reciprocal leveling, Computations of Areas of regular figures and irregular figures. Simpson's rule: prismatic formula and graphical method use of planimeter for computation of areas.	10
III	**Compass Surveying**: Type of compass and their setting and use, Concept of direction (magnetic and true meridian), Bearing (Whole Circle bearing and Reduced Bearing), azimuths, magnetic dip and declination, Compass surveying, Local attraction- causes, detection, error and corrections. **Plane Table Surveying**: Purpose of plane table surveying, equipment used in plane table survey, setting of plane table, methods of plane table surveying, concepts of three point problem two point problem, errors in plane table surveying and corrections or precautions, testing and adjustment of plane table alidade.	8

Reference Books/ Text Books / Case Studies:

1. Schofield, W. and Breach, M., Engineering Surveying, Butterworth-Heinemann publisher (an imprint of Elsevier).
2. Punmia, B.C., Jain, A.K., and Jain, A.K. (2005), Surveying and Levelling, Vol. 1 and 2, Standard Publishers, New Delhi.
3. Duggal, S.K. (2009), Surveying, Vol. 1 and 2, Tata McGraw Hill Education Private Limited, Noida.

4. Kanetkar, T.P. and Kulkarni, S.V. (2008), Surveying and Levelling, Vol. 1 and 2, Vidyarthi Griha Prakashan, Pune.
5. Subramanian, R. (2007), Surveying and Levelling, Oxford University Press, New Delhi.
6. Arora, K.R. (2010). Surveying, Vol. 1 and 2. Standard Book House, New Delhi.
7. Ghilani, C.D. and Wolf, P.R. (2012). Elementary Surveying. Prentice Hall.
8. Venkatramaiah, C. (2011), Text Book of Surveying, University Press, Hyderabad.

DCE 302: BUILDING MATERIALS & CONSTRUCTION

Credits: 4 **Semester III**

Module No.	Contents	Teaching Hours
I	**Building Stones:** Classification of Rocks-Geological classification, Chemical Classification, Physical classification, general characteristics of stones- marble, kota stone, granite, sand, trap, basalt stone, lime stone and slate. **Brick and Tiles**: Introduction to bricks, Raw materials for brick manufacturing and properties of good brick making earth, Manufacturing of bricks, classification and specification of bricks as per BIS:1077, testing of bricks as per BIS:3495 (Compressive strength, water absorption – hot and cold water test, efflorescence, Dimensional tolerance, soundness). Building tiles; Types of tiles-wall, ceiling, roofing and flooring tiles, Ceramic, terrazzo and PVC tiles. **Cement**: Introduction, raw materials, flow diagram of manufacturing of cement, Various types of Cements, their uses and testing. **Lime:** Classification and types of lime & properties of lime. **Timber:** Classification & Identification of Timber, Properties of timber, defects in timber, factors affecting strength of timber, method of seasoning & preservation of timber. **Metal:** Ferrous Metals- Composition, properties and uses of cast iron, mild steel, HYSD steel, high tension steel as per BIS, Commercial forms of ferrous, metals, Aluminum and Stainless Steel.	14
II	**Introduction:** Definition of a building, classification of buildings based on occupancy, Different parts of a building. **Foundations:** Concepts, types of foundation-shallow and deep, Shallow foundation-constructional details of: Spread foundations for walls, thumb rules for depth and width of foundation and thickness of concrete block, stepped foundation, masonry pillars and concrete columns, Earthwork- Layout/setting out for surface excavation, cutting and filling, Excavation of foundation, trenches, shoring, timbering and de-watering **Walls:** Purpose, classification, load bearing, non-load bearing, dwarf wall, retaining, breast walls and partition walls, Classification of walls as per materials of construction: brick, stone, reinforced brick, reinforced concrete, precast, hollow and solid concrete block and composite masonry walls, Partition walls: **Masonry:** Brick Masonry- Definition of terms like header, stretcher, queen closer, king closer, frog and quoin, course, bond, facing, backing, hearting, jambs, reveals, soffit, plinth, pillars and pilasters, Bond – meaning and necessity; English, flemish bond and other types of bonds, Construction of brick walls –methods of laying bricks in walls, precautions observed in the construction of walls, methods of bonding new brick work with old (toothing, raking, back and block bonding), construction of stone masonry walls, Importance towards special care during execution of stone masonry work on dressing of stone, size and placing of bond and corner stones, filling joints, proper packing of internal cavities of rubble masonry wall, raking of joints to receive finishes. **Arches and Lintels:** Meaning and use of arches and lintels- Glossary of terms used in arches and lintels - abutment, pier, arch ring, intrados, soffit, extrados, voussoiers, Springer, springing line, crown, key stone, skew back, span, rise, depth of an arch, haunch, spindle, jambs, bearing, thickness of lintel, effective span, Arches- Types of Arches	16

	Damp Proofing and Water Proofing: Dampness and its ill effects on bricks, plaster, wooden fixtures, metal fixtures and reinforcement, damage to aesthetic appearance, damage to heat insulating materials, damage to stored articles and health, sources and causes of dampness, Sources of dampness - moisture penetrating the building from outside e.g. rainwater, surface water, ground moisture. Moisture entrapped during construction i.e. moisture in concrete, masonry construction and plastering	

	work etc. Moisture which originates in the building itself i.e. water in kitchen and bathrooms etc., Damp proofing materials and their specifications: rich concrete and mortar, bitumen, bitumen mastic, polymer coating, use of chemicals, Damp proofing of : basement, ground floors, plinth and walls, special damp proofing arrangements in bathrooms, WC and kitchen, damp proofing for roofs and window sills **Floors:** Glossary of terms-floor finish, topping, under layer, base course, rubble filling and their purpose, Types of floor finishes - cast-in-situ, concrete flooring (monolithic, bonded) Terrazzo tile flooring, stone (marble and kota) flooring, PVC flooring, Terrazzo flooring, glazed tiles flooring, Timber flooring, description with sketches. The methods of construction of concrete, terrazzo and timber floors and their BIS specifications, Special emphasis on level/slope/reverse slope in bathrooms, toilets, kitchen, balcony and staircase.	
III	**Roofs:** Types of roofs, concept of flat, pitched and arched roofs, Glossary of terms for pitched roofs - batten, eaves, facia board, gable, hip, lap, purlin, rafter, rag bolt, valley, ridge, rain water gutter, anchoring bolts, False ceilings using gypsum, plaster boards, cellotex, fiber boards, Special emphasis on maintenance of slopes, overlaps of roofing materials, applicability and problems of wind ties, size of anchoring bolts **Stairs:** Glossary of terms: Staircase, winders, landing, stringer, newel, baluster, riser, tread, width of staircase, hand-rail, nosing, Classification of staircase on the basis of material – RCC, timber, steel, Aluminum, Planning and layout of staircase: Relations between rise and tread, determination of width of stair, landing etc., Various types of layout - straight flight, dog legged, open well, quarter turn, half turn (newel and geometrical stairs), bifurcated stair, spiral stair **Surface Finishes:** Plastering - classification according to use and finishes like plain plaster, grit finish, rough cast, pebble dashed, concrete and stone cladding etc., dubbing, proportion of mortars used for different plasters, techniques of plastering and curing, Pointing - different types of pointing and their methods Painting - preparation of surface, primer coat and application of paints on wooden, steel and plastered wall surfaces, Application of white washing, color washing and distempering, polishing, application of cement and plastic paints Selection of appropriate paints/finishes for interior and exterior surfaces, Importance of preparation of surfaces such as hacking, grooving etc. before application of surface finishes. **Anti-Termite Measures:** Introduction, site preparation and chemicals used in anti-termite treatment, Treatment of masonry foundation, Treatment of RCC foundation, Treatment of top surface of earth filling, Treatment of junction of walls and floors, Treatment along external perimeter of building, Treatment and selection of timber, Treatment in existing buildings. **Building Planning:** Site selection- Factors to be considered for selection of site for residential, commercial, industrial and public building, Basic principles of building planning, arrangement of doors, windows, cupboards etc. for residential building, Orientation of building as per IS: 7662 in relation to sun and wind direction, rains, internal circulation and placement of rooms within the available area, concept of Vastu-Shastra, Introduction to National Building code. **Building Services:** Introduction to firefighting systems, Ducting for Air-conditioning, service lines for cable telephone, and electrical wiring, garbage disposal systems. Water supply system (internal and external).	18

Reference Books/ Text Books / Case Studies:

1. Sharma, SK; and Mathur, GC; "Engineering Materials;" Delhi-Jalandhar, S. Chand and Co.
2. Surendra Singh; "Engineering Materials;" New Delhi, Vikas Publishing House Pvt. Ltd.
3. Chowdhuri, N; "Engineering Materials;" Calcutta, Technical Publishers of India.
4. Bahl, SK; "Engineering Materials;" Delhi, Rainbow Book Co.
5. Gupta, Sushil Kumar, Singla, DR, and Juneja BM; "A Text Book of Building Construction"; Ludhiana, Katson Publishing House.
6. Deshpande, RS and Vartak, GV; "A Text Book of Building Construction"; Poona, United Book Corporation.
7. Rangwala, SC: "Building Construction"; Anand, Charotar Book Stall
8. Kulkarni, GJ; "A Text Book of Building Construction"; Ahmedabad Book Depot
9. Arora, SP and Bindra, SP; "A Text Book of Building Construction"; New Delhi Dhanpt Rai and Sons.
10. Sharma,SK and Kaul, BK; "A Text Book of Building Construction"; Delhi, S Chand and Co.
11. Sushil Kumar; "Building Construction"; Standard Publishers Distributors, Delhi
12. Moorthy, NKR; "A Text Book of Building Construction"; Poona, Engineering Book Publishing Co.
13. SP – 62 Hand Book of BIS
14. B.I.S. – 6313 Part 1, 2, 3
15. National Building Code 2005
16. Handbook of Civil Engineering by PN Khanna.
17. Video films on Damp proofing, water proofing, surface finishes.

DCE 303: ENVIRONMENTAL EDUCATION

Credits: 04 **Semester III**

Module No.	Content	Teaching Hours
I	**Environment and Ecology:** Definition of environment and ecology ,ecosystem and types of ecosystems, energy flow in an ecosystem, food chain, ecological pyramids, ecological balance, important biogas chemical and material cycles, (water, carbon, sulphur, oxygen and nitrogen etc) **Protection of Environment:** Importance of clean environment, control of environmental pollution With respect to air, land and water. Conservation of natural resources, **Noise Pollution:** Definition, sources and effects of noise Pollution and control. **Renewable Source of Energy:** Role of non-conventional sources of energy (biogas, solar, wind etc) in environmental protection	10
II	**Water Pollution:** Causes of pollution in surface and underground water; BIS standards for water quality, BIS standards for waste water disposal, measures to combat pollution due to waste water, eutrophication of lakes **Air Pollution:** Definition, principal air pollutants, atmospheric parameters influencing air pollution, effects of air pollution on human beings, plants, animals and economic effects, automobile pollution, BIS ambient air quality standards and measures to combat air pollution **Effects of mining, blasting and deforestation:** Environmental deterioration due to mining, effects of deforestation and killing of wild animals. Case studies on mining, blasting and deforestation	14
III	**Land Use:** Effect of land use on environmental quality, natural disasters, soil degradation problems - erosion, salinization and water **Environmental Impact Assessment:** Definition and requirements, environmental impact assessment of constructional activities – housing, dams, multi- storied buildings, roads, etc, case studies, environmental auditing - basic concepts, sustainable development – concept of carrying capacity **Legislation to Control Environmental Pollution:** Indian legislative acts for water, land and air pollution control – provisions, scope and implementation	12

	Global Issues of Environmental Engineering: Global warming, ozone depletion, acid rain, radiation hazards and their control	

Text Book:

1. Garg, S. K. (2008). Water Supply Engineering, Khanna Publishers, New Delhi.
2. Garg, S. K. (2008). Sewage Disposal and Air Pollution , Khanna Publishers, New Delhi.

Reference Books:

1. Davis, M. L. and Cornwell, D. A. (2008). Introduction to Environmental Engineering, Fourth Edition, McGraw-Hill, Boston et al.
2. Peavy, H. S., Rowe, D. R. and Tchobanoglous, G. (1985). Environmental Engineering, McGraw-Hill, New York et al.
3. Punmia, B. C., Jain, A. and Jain, A. (2010), Water Supply Engineering, Laxmi Publications (P), Bangalore et al.
4. Modi, P. N. (2001). Water Supply Engineering, Standard Book House, New Delhi.

DCE 353: FLUID MECHANICS LAB.

Credits: 2 **Semester III**

List Of Practical

Module No.	Contents	Teaching Hours
1	To verify Bernoulli's Theorem	
2	To find out Venturimeter coefficient	
3	To determine coefficient of velocity (C_v), Coefficient of discharge (C_d)	
4	Coefficient of contraction (C_c) of an orifice and verify the relation	

	between them	
5	To perform Reynold's experiment	
6	To verify loss of head in pipe flow due to **a.** Sudden enlargement **b.** Sudden contraction **c.** Sudden bend	24
7	Demonstration of use of current meter and Pitot tube	
8	To determine coefficient of discharge of a rectangular notch/triangular notch .	

DCE 351 : SURVEYING LAB-I

Credits: 2 **Semester III**

List Of Practical

Module No.	Contents
1	**Chain surveying:** **a.** Ranging a line, chaining a line and recording in the field book, Taking offsets - perpendicular and oblique (with a tape only).

	Chaining of a line involving reciprocal **b.** ranging **c.** Chaining a line involving obstacles to ranging **d.** Chain Survey of a small area.
2	**Compass Surveying :** Study of prismatic compass, Setting the compass and taking observations, Measuring angles between the lines meeting at a point
3	**Levelling:**
4	**a.** Study of dumpy level and levelling staff, Temporary adjustments of various levels, Taking staff readings on different stations from the single setting and finding differences of level between them. **b.** To find out difference of level between two distant points by shifting the instrument **c.** Longitudinal and cross sectioning of a road/railway/canal **d.** Setting a gradient by dumpy and auto-level
5	**Plane Table Surveying:** **a.** Study of the plane table survey equipment, setting the plane table, marking the North direction. **b.** Plotting stations by intersection, radiation and resection method after orientation by different methods. **c.** Traversing an area with a plane table.
	Layout of Buildings by use of surveying instruments.

DCE-352:-BUILDING MATERIAL AND CONSTRUCTION LAB

Credits: 2 **Semester III**

List Of Practical

Module No.	Contents
	CONSTRUCTION MATERIALS LABORATORY
1	To determine the crushing strength of bricks
2	To determine the water absorption of bricks and efflorescence of bricks
3	To identify various types of timbers such as: Teak, Sal, Chir, Sissoo, Deodar, Kail
4	To determine fineness (by sieve analysis) of cement
5	To conduct field test of cement.
6	To determine initial and final setting times of cement
7	To determine compressive strength of cement
	BUILDING CONSTRUCTION LABORATORY
1	Demonstration of tools and plants used in building construction
2	To prepare Layout of a building: two rooms building with front verandah
3	To construct brick bonds (English bond only) in one, one and half and two brick thick: (a) Walls for L, T and cross junction (b) Columns
4	Demonstration of following items of work at construction site by: **a.** Timbering of excavated trenching **b.** Damp proof courses laying **c.** Construction of masonry walls **d.** Laying of flooring on an already prepared lime concrete base **e.** Plastering and pointing exercise **f.** Constructing RCC work **g.** Pre-construction and post construction termite treatment of building and woodwork
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DME 351: SOLID MECHANICS LAB.

Credits: 2 **Semester III**

List Of Practical

Module No.	Contents	Teaching Hours
	1.Direct Tension Test 2 Torsion Test 3 Hardness Test A) Brinell's Hardness Test B) Rockwell Hardness Test 16 18 21 4 Test on Springs 5 Compression Test on Cube 6 Impact Test 7 Punch Shear Test	