



IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)

Department of Civil Engineering

(U.G.NBA Accredited up to June 2023)

Minor Certification in Civil Engineering

(To be offered to the students of other departments excluding CE)

List of Minors subjects from Semester V to VIII

S.No.	Subject Code	Semester	Subject Name	Contact Hours per week			Total Credits
				L	T	P	
1	MICE-501	V	Construction Materials	3	-	2	4
2	MICE-601	VI	Building Design and Drawing	3	1	-	4
3	MICE-701	VII	Transportation Engineering	3	1	-	4
4	MICE-801	VIII	Geomatics Engineering	2	-	2	3
Total			11	2	4	15	



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MICE-501	Construction Materials	2L : 1T : 2P (5 hrs.)	4 credits
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Course Objective:

The objective of this course is to understand different types of construction materials

Course Contents: (40hrs.)

MODULE 1

(10 hrs.)

Stones, Brick, Mortar and Concrete: Stones :Occurrence, Classification of Rocks, varieties, Characteristics and their testing, uses, quarrying and dressing of stones, Deterioration of Stones, Retardation of Decay of Stones, Preservation of Stones, Artificial Stones. Brick : Manufacturing , characteristics, Classification and uses, Improved brick from inferior soils, Hand molding brick table, Clay-fly ash brick table Concrete : Ingredients, Grades of Concrete ,Concrete Production ,Special Concrete

MODULE-II

(10 hrs.)

Timber ,Glass , Steel and Aluminium : Timber: Important timbers, their engineering properties and uses, defects in timber, seasoning and treatment, need for wood substitutes, ,Plywood, Particle Board ,Fibre Board, Applications of wood and wood products , Plaster Boards, Adhesives, types of Gypsum Board and their uses Glass: What is glass , Nature of Glass, Structure of Glass, Macro Molecular Structure, Main Oxides in Glass, Thermal and Optical Properties ,Effect of Coating, Steel : Physical Properties of Structural Steel, Grades of Steel Aluminium : Properties ,Forms ,Uses, Advantages

MODULE–III**(10 hrs.)**

Flooring , Roofing ,Plumbing and Sanitary Material: Flooring and Roofing tiles , Types of Flooring – Marble, Kota stone , wood etc. Type of Roofing , P.V.C. materials, CI , GI, Asbestos pipe , Stone ware pipes

MODULE–IV**(10 hrs.)**

Paints, Enamels and Varnishes: Composition of oil paint, characteristic of an ideal paint, preparation of paint, covering power of paints, Painting: Plastered surfaces, painting wood surfaces, painting metal Surfaces. Defects, Effect of weather, enamels, distemper, water wash and colour wash, Varnish, French Polish, Wax Polish

MODULE–V**(10 hrs.)**

Miscellaneous ConstructionMaterials: Bitumen, Tar and Asphalt their characteristics and uses ,Ultra Poly Vinyl chloride Pipes, Thermal and sound insulating materials, and water proofing materials .

Course Outcome:

- CO1. To learn about the various conventional construction materials, their properties and utility as building materials.
- CO2. To learn about different advanced construction materials, their properties and feasibility as building materials.
- CO3. To learn about different tools & elements used in roofing, flooring, plumbing and sanitation works in a building and also learn about their types.
- CO4. To understand importance & engineering properties of painting & polishing in construction works and to learn about the agents used as well as their types
- CO5. To study some unconventional & miscellaneous materials and their tests to check their utility as construction materials for specific purposes like insulation, water proofing etc.

References Books:

1. Donald R Askeland, Pradeep P Fulay, Wendelin J Wright, The science and Engineering of Materials, Cengage Learning.
2. S K Duggal, Building Materials, New Age International.
3. P C Vaghese, Building Materials, PHI Learning.
4. S.C. Rangwala, Engineering Materials, Charotar.
5. M S Shetty, Concrete Technology, S. Chand Technical.
6. A M Neville, J J Brooks, Concrete Technology, Prentice Hall.



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MICE-601	Building Planning and Drawing	3L : 1T : 0P (4 hrs.)	4 credits
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Course Objective:

The objective of this course is to understand building design and able to drawing

Course Contents: (40hrs.)

Module 1 (10 Hrs)

Drawing of Sub Structures Elements Drawing of various elements of buildings like various types of footing, open foundation, raft, grillage, pile and well foundation,

Module 2 (10 Hrs)

Drawing of Super Structures Elements Drawing of frames of doors, window, various types of door, window and ventilator, lintels and arches, stairs and staircase, trusses, flooring, roofs etc.

Module 3 (10 Hrs)

Building Planning Provisions of National Building Code, Building bye-laws, open area, setbacks, FAR terminology, principle of architectural composition (i.e. unity, contrast, etc.), and principles of planning, orientation.

Module 4 (10 Hrs)

Building Services Introduction of Building Services like water supply and drainage, electrification, ventilation and lightening and staircases, fire safety, thermal insulation, acoustics of buildings.

Module 5

(10 Hrs)

Building Planning & Lay out Details Planning of residential buildings – Load bearing / Framed Structure – (a) Bungalows (b) Row houses, (c) Ownership flats, (d) Apartments. Layout details, Elevation, sectional details. Planning of public buildings - Functional requirements of public buildings.

Course Outcome:

- CO 1. Understand the substructure of building and its drawing
- CO 2. Know about the superstructure elements of building and their drafting.
- CO 3. Understand the basic laws of building codes and principles of building.
- CO 4. Understand about building services like water supply and drainage, electrification fire safety, thermal insulation etc
- CO 5. Understand about building planning and layout details

References Books:

1. Loyal JS, Dongre A, “Building Design and Drawing” Satya Prakashan Edition 2016
2. Ghose D.N. “Civil Engineering Design and Drawing”, CBS publisher. 2nd Edition, 2015
3. Agrawal S. C., Architecture and Town Planning, Dhanpat Rai & Co. 2013
4. Malik & Meo; “Building Design and Drawing” Computech publication 2009
5. Shah, Kale & Patki; Building Design and Drawing; TMH 1st Edition 2001
6. Gurucharan Singh & Jgdish Singh “Building Planning, Design and Scheduling” 2009.

Suggested List of Experiment:

1. Sketches of various building components.
2. One drawing sheet of various building components containing doors, windows ventilators, lintels and arches stairs foundations etc.
3. One drawing sheet each for services and interiors of buildings
4. One drawing sheet containing detailed planning of one/two bed room residential building (common to all students)
5. One drawing sheet each of residential and institutional building (Each student perform different drawing).
6. Use of AutoCAD for preparation of drawings



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MICE-701	Transportation Engineering	3L : 1T : 0P (4 hrs.)	4 credits
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Course Objective:

To provide fundamental knowledge of various types of transportation systems.

Course Contents: (40hrs.)

Module 1

(10 Hrs)

Introduction to Transportation Engineering: Importance of Transportation, Different modes of transportation, Overview of Road, Rail, Air and Water Transportation, Comparison of various modes of Transportation. Organizations and their functions - Central Road Research Institute (CRRI), Indian Road Congress (IRC), Railway Board (RB), Inland Waterways Authority of India (IWAI), Airport Authority of India (AAI), International Civil Aviation Organization (ICAO), Directorate General of Civil Aviation (DGCA).

Module 2

(10 Hrs)

Highway Transportation: Introduction: Highway planning and development in India, Classification of Rural and Urban roads, Highway alignment and surveys, Preparation of Detailed Project Report. Design and Construction of Pavement: Pavement component functions, factors affecting pavement design and basic pavement design of Flexible and Rigid pavement as per IRC guidelines. Traffic Engineering: Traffic characteristics, Traffic studies: Traffic Volume study, Spot speed studies, Travel time - Delay study, PCU, Origin and Destination studies, Parking studies, Road accident studies. Traffic regulations and control devices.

Module 3

(10 Hrs)

Rail Transportation: Role of Indian Railways in National Development, Basic requirement of railway alignment and functions of Permanent Way, Types of components and functions: Gauge, Rail, Fittings, Ballast, Embankments, Subgrade. Purpose: Coning of wheel, Super-elevation, points and crossing, signalling and interlocking, yard, junction and terminal.

Module 4

(10 Hrs)

Water Transportation: Harbour: Classification, components, site selection. Definitions: Harbour, Port, Plimsoll Line, Beam, Draft, Hull, Structures and functions: Jetty, Breakwater, Wharf, Dock, Lock, Quay, Mole, Dolphin. Mooring, Dredging. Natural Phenomenon: Tides, Waves, Wind, Currents. Navigational Aids: Lighthouse, Lightships, Buoys.

Module 5

(10 Hrs)

Air Transportation: Airport: Classification, Master plan, Site selection, Zoning laws, imaginary surfaces. Aircraft Component parts, Importance and Purpose: Wind rose diagram, Runway Orientation, Taxiway, Apron, terminal building, Marking and lighting on Runway, Taxiway and Apron.

Course Outcome:

CO1: Introduction to transportation engineering and various organizations and their functions.

CO2: Illustrate and demonstrate parameters of highway planning and pavement design.
Describe basics of traffic flow parameters, parking, marking, signal, and signs.

CO3: Solve problems of railway track geometrics and to understand various railway track materials, their properties and use.

CO4: Identify various component parts of docks and harbours and apply ship characteristics in planning of harbour.

CO5: Identify various component parts of airports and apply aircraft characteristics in planning of airports.

References Books:

1. Highway Engineering by Gurucharan Singh
2. Highway Engineering by O'Fleherly
3. Airport Planning & Design by S.K. Khanna & M. G. arora
4. Sharma & Sharma, Principles and Practice of Highway Engg.
5. Haung, Analysis and Design of Pavements
6. Railway Engineering by Arora & Saxena - Dhanpat Rai & Sons
7. Harbour, Docks & Tunnel Engineering - R. Srinivasan
8. Relevant IRC & IS codes



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MICE-801	Geomatics Engineering	3L : 0T : 2P (5 hrs.)	4 credits
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Course Objective: To provide knowledge about various types of survey and its modern equipment

Course Contents: (40hrs.)

Module 1

(8 hrs)

GPS surveying and application, GPS System, GPS Signal , GPS Positioning (Principle & Methods), GPS Observables (Types, Errors & Quality).

Module 2

(8 hrs)

Geographic Information System: Introduction to GIS; components of a GIS; Geographically Referenced Data, Spatial Data- Attribute data-Joining Spatial and attribute data, GIS Operations: Spatial Data Input – Attribute data Management, Geographic coordinate System, Datum; Map Projections: Types of Map Projections, Projected coordinate Systems. UTM Zones

Module 3

(8 hrs)

Hydrographic Survey: Soundings, methods of observations, computations and plotting. Principles of photographic surveying: aerial photography, tilt and height distortions, Setting out works

Module 4**(8 Hrs)**

Photogrammetric Survey: basic principles, aerial camera, scale of a vertical photograph, relief displacement of a vertical photograph, height of object from relief displacement, flight planning for aerial photography, selection of altitude, interval between exposures, crab and drift, stereoscope and stereoscopic views, parallax equations. Introduction to digital photogrammetry.s.

Module 5**(8 Hrs)**

E.D.M. Instruments – Geodimeter, Tellurometer, Distomat, Total Station, Applications of Lasers in distance and angular measurements, Introduction of Electronic navigation and Position Fixing – different systems and their Characteristics.

Course Outcome:

CO 1: Ability to understand basic about global positioning system

CO2: To provide knowledge about GIS

CO3: Ability to understand basic concepts hydrographic survey

CO4: To provide knowledge about Photogrammetric Survey.

CO5: To understand the various modern surveying equipment.

Text/Reference Books:

1. Surveying (Vol – I, II & III) – Arora, K.R. (Standard Book House, Delhi, 1993)
2. Elements of Photogrammetry – Wolf, P.R. (McGraw Hill Book Company, New Delhi,)
3. Electronic Distance Measurement – Burnside, C.D. (Oxford, BSP Professional Books, London, 1991)
4. Engineering Surveying Technology – Kennie, T.J.M. and Petrie, G. (Blackie & Sons Ltd., London, 1990)