

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR
DEPARTMENT OF ARCHITECTURE AND PLANNING

Scheme for B. Tech Engineering with Minor in Building Science and
Services

S.No.	Course Name	Semester	Type	Credits	L	T	P	S
1	Building Science-I	V	Theory	3	2	1	0	0
2	Quantity Survey and Specifications	V	Theory	3	2	1	0	0
3	Building Services-I	VI	Theory	3	2	1	0	0
4	Building Science-II	VI	Theory	3	2	1	0	0
5	Building Services- II	VII	Theory	3	2	1	0	0
6	Construction Management	VIII	Theory	3	2	1	0	0

Natiripipralis
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MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR
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Scheme for B. Tech Engineering with Minor in Building Science and
Services

Syllabus of Courses

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
	Building Science -I	3	2	1	0	0

PREREQUISITE

NONE

COURSE OBJECTIVE(s)

- To instruct students with fundamental understanding of climate sensitive design including passive design techniques.

COURSE OUTCOMES

1. To understand the elements of climate and its impact on built form.
2. To understand concepts of climate responsive building design.
3. To understand the passive design strategies for light and ventilation in buildings.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	CWS	20%
b)	MTE	30%
c)	ETE	50%

COURSE CONTENTS

MODULE I- Climatic zones, macro and micro-climate, elements of climate; solar radiation, Temperature, Humidity, Wind, Cloud, Precipitation, Interpretation of weather data and its application in design of buildings.

MODULE II- Effect of climate on building envelope such as heat flow, heat transfer, heat storage and time lag of various building materials and elements.

MODULE III- Effect of climate on humans: thermal indices (temperature and humidity measurement), thermal comfort, psychometric chart and its application in site planning and design evolution.

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MODULE IV- Orientation of building with respect to sun, wind and view, study of indigenous shelter and urban form as a response to climate. Sun path diagram, shading devices and fenestration design.

MODULE V- Natural ventilation in and around building, evaporative cooling, earth air tunnel, stack and venturi effect.

REFERENCES

1. Bansal, N.K., "Passive Building Design: A Handbook of Natural Climate Control", Elsevier Science.
2. Koenisberger, "Manual of Tropical Housing and Building- Part I: Climatic Design", Universities Press.
3. Majumdar, M. "Energy Efficient Buildings in India", the Energy and Resources Institute, TERI.
4. Hausladen, G., "Climatic Design: Solutions for Buildings that can do more with less Technology", Birkhauser.
5. Szolokay S V., "Introduction to Sustainable Architectural Science", Elsevier
6. Civil Engineering - NOC:principles and applications of Building Science. NPTEL. (n.d.). Retrieved April 28, 2023, from <https://archive.nptel.ac.in/courses/105/107/105107156/>

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DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
	Quantity Survey and Specifications	3	2	1	0	0

PREREQUISITE

NONE

COURSE OBJECTIVE(s).

- Basic understanding of preparing estimates and construction documents for Design of building
- To make student aware about basic concepts, techniques and applications of Estimation and costing.
- To understand various types of specifications for all kind of building works and building materials.
- Understanding of preparation of Contract document and tender process

COURSE OUTCOMES

- Basic understanding of preparation of specifications, taking out quantities, abstract sheet generation and tender documents for buildings.
- Students able to analyze and quantify for small scale buildings ie single rooms, small residential building

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three Components;

S. No.	Component	Weightage
a)	CWS	20%
b)	MTE	30%
c)	ETE	50%

COURSE CONTENTS

MODULE II: Significance of specifications in building construction. General and detailed Specifications for all kind of building works and building materials with reference to BSR (Basic Schedule of Rates), CPWD or other government organization. Standard mode of measurement, and various methods of calculating detailed quantities through drawings.

MODULE I: Introduction to different items of building works for framing estimates. Types of estimates. Approximate and detailed estimate.

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MODULE III: Abstract of Estimates, bills of quantities (BOQ), calculating quantities of civil, electrical, sanitary works, contingencies, etc. Analysis of rates for major items

MODULE IV: Types of contracts, tenders and components of tender document, general conditions of contracts.

EXERCISES:

- Preparation of bill of quantity and estimates for small residential building.

REFERENCES :-

1. Estimation and Costing –S.C. Rangwala
2. Estimation and Costing- B.C.Punmia
3. Estimation and Costing- B.N. Dutta
4. Estimating and Costing (Civil Engineering) 6th Edition - G.S Birdie
5. Estimation and Costing- M.Chakraborty
6. PWD and CPWD standard Schedule of Rates

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DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
	Building Services- I	3	2	1	0	0

PREREQUISITE

NONE

COURSE OBJECTIVE(s)

1. To familiarize and equip the students with basic knowledge of :
2. Fundamentals of water supply, drainage, sewerage system and solid waste disposal.
3. Water distribution systems and their requirements at different scales, such as buildings, site, neighbourhoods, etc.
4. Sanitation and its layout requirements at different scales, such as building, colony and neighborhood.
5. Calculations and disposal of rainwater and solid waste disposal

COURSE OUTCOMES

1. To give a basic overview and understanding of water supply and distribution at building and neighbourhood level.
2. To understand drainage and sewage removal at building and neighbourhood level.
3. Design efficient water supply layouts with detailed calculations.
4. To understand & design house Connection & Plumbing Appurtenances.
5. Design rain water disposal and rain water disposal drawings.
6. To equip students to make detail drawings for water supply and sanitation at building level.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	CWS	20%
b)	MTE	30%
c)	ETE	50%

COURSE CONTENTS

MODULE I - Water Supply: Terminology, sources of water, fundamentals of treatment of water and types of water distribution system at neighbourhood/city level. Requirements and calculations of water consumption for various building types and occupancies, storage and distribution of water within low rise building premises. Hot water and solar water heating installations and supply, study of fittings, appliances and their layout within the building.

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MODULE II - Drainage and Sanitation: Terminology and concepts: Surface run-off, Storm water drainage and rainwater harvesting. Design considerations for wastewater, sewage and solid waste management for buildings.

REFERENCES BOOKS :-

1. Renewable Energy Sources: Twidell & Weir, CRC Press.
2. R. Barry, Building Construction Volume 1 to 5
3. Francis Ching D.K., Building Construction Illustrated
4. S.K. Sharma, Civil Engineering Construction Materials
5. Sushil Kumar, Building Construction
6. Building Construction : W.B. McKay
7. National Building Code.
8. Udemy.com : Design of Plumbing Systems in a Building for Water Supply by Rishabh Srivastava

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DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
	Building Science II	3	2	1	0	0

PREREQUISITE

NONE

COURSE OBJECTIVE(s)

- To educate students with the concepts of acoustics and illumination in a building.

COURSE OUTCOMES

1. To understand concepts of design approach considering acoustics and illumination in a building.
2. To understand properties of acoustical materials and fixing details.
3. To understand the classification of lighting system.
4. To understand the element of design using artificial lighting.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	CWS	20%
b)	MTE	30%
c)	ETE	50%

COURSE CONTENTS

MODULE I- Basic terminology and definitions, Physics of sound. Behavior of sound in an enclosed space and outdoor environment. Requisites for acoustic environment. Acoustic design approaches for different building types with reference to applicable standards.

MODULE II- Selection of acoustic materials based on properties, construction and fixing details. Noise and its control, control of structure borne and air borne noise from different sources.

MODULE III- Basic terminology and definitions, Laws of illumination. Design for artificial lighting with reference to applicable standards.

MODULE IV- Classification of lighting systems: direct, indirect, diffused etc. Light sources and their applications, types, construction details, in indoors and outdoors.

MODULE V- Use of artificial lighting as an element of design in different building types such as exhibitions, theaters, offices and stores.

REFERENCES:-

1. Architectural Acoustics (Applications of Modern Acoustics) – Marshall Long
2. Room Acoustics – Heinrich Kuttruff
3. Auditorium Acoustics and Architectural Design – Michael Barron
4. Detailing for Acoustics – Peter Lord and Duncan Templeton
5. Architectural Acoustics – M. David Egan
6. Lighting Design Basics – Mark Karlen, James R Benya.
7. National Programme on Technology Enhanced Learning. (n.d.). *Energy efficiency acoustics and daylighting in Building*. Course. Retrieved April 28, 2023, from https://onlinecourses.nptel.ac.in/noc20_ce08/preview
8. *Architecture - NOC:architectural acoustics*. NPTEL. (n.d.). Retrieved April 28, 2023, from <https://archive.nptel.ac.in/courses/124/105/124105004/>

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DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
	Building Services-II	3	2	1	0	0

PREREQUISITE

NONE

COURSE OBJECTIVE(s).

- Basic laws and terminologies related to electrical services in buildings
- Electrical requirements for a given situation, its calculations and design.
- Artificial Illumination and its application in buildings

COURSE OUTCOMES

1. To give the student a basic understanding of electrical services in building design.
2. Interact technically with electrical and illumination experts.
3. Design efficient electrical layouts with their circuit diagrams.
4. Design efficient illumination levels for various activities and spaces.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	CWS	20%
b)	MTE	30%
c)	ETE	50%

COURSE CONTENTS

Module I: Terminology, typology and systems of wiring and cabling, planning and layout of conduits and electrical installations within a building complex.

Module II: Specifications of fittings & accessories and their installations, earthing and lightning protection in buildings. Domestic electrical appliances, their usage and load calculations for simple building types.

Module III: Installations and space standards for transforms and standby systems like generators, inverters. Single line electrical layout in buildings.

Module IV: Introduction of solar PV panels as a renewable source of energy and integration with electrical supply in buildings.

EXERCISE:

- To study electrical single line layout of domestic building typology, electrical

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legends.

- Understanding of market scenario of domestic appliances, and their specification.
- Identify the electrical load and annual consumption for domestic building.

REFERENCES:-

1. Catalogues of leading Audio equipment's companies
2. National Building Code of India: National Electrical Code.
3. Kothari and Nagrath, Basic Electrical Engineering
4. O.P. Gupta, Energy Technology
5. John Mathew, Introduction to the Design and Analysis of Building Electrical System
6. Gondzik, Mechanical and Electrical Equipment for Building
7. Raina & Bhattacharya, Electrical Design Estimating and Costing.
8. Keyoumars Ehteshami, Handbook of Fire Protection and Safety
9. Kelly & Connell, Interior Lighting Design - A Student's Guide.
10. Indian electricity (IE)
11. National Building Code, 2016
12. BIS Code IS4648 - 1968
13. Electric wiring and Estimation - S. L. Uppal

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DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
	Construction Management	3	2	1	0	0

PREREQUISITE

NONE

COURSE OBJECTIVE(s)

- Understanding the role of an architect in construction management and the importance of their involvement in the construction process.

COURSE OUTCOMES:

1. Ability to prepare detailed project reports (DPR) and feasibility reports, including analyzing project finance, time cost analysis, and resource management.
2. Ability to use CPM and PERT techniques for scheduling construction and applying MS-Projects.
3. Familiarization with planning construction sites, inventory management, liaising with different authorities, arbitration, payment, and legal implications.
4. Knowledge of quality monitoring techniques and tools, labor safety and issues, construction equipment, and methods, relevant standards and codes etc.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components.

S. No.	Component	Weightage
a)	CWS	20%
b)	MTE	30%
c)	ETE	50%

COURSE CONTENTS

MODULE I: Role of Architect in Construction Management. Standards and Codes for Construction & Project Management (IS- 15883-1); SP 702001; IS 4082:1996. Quality Monitoring at the site. DPR preparation.

MODULE II: Feasibility Reports Project Finance, Time Cost Analysis, Resource management and value engineering- Manpower, Labour, and safety issues, Construction equipment and methods, rashing and fast-tracking of projects.

MODULE III: CPM, PERT Scheduling of construction, Application of MS- Projects Planning of construction site. Inventory, liaisoning with different authorities, Arbitration, payment, legal implications.

REFERENCES: -

1. Construction planning and management: P.S. Gehlot
2. Construction management: Trefor Williams
3. Advance construction technology: Roy Chudley, Roger Green
4. Building Construction: W.B. McKay
5. Building Services: Barry Vol.5
6. National Building Code
7. Time Saver Standards
8. Manufacturer's manuals and catalogs.
9. NPTEL: NOC: Principles of Construction Management (Civil Engineering), DIGIMAT, 23- Feb-2020.
10. NPTEL: NOC: Project Management (Management), DIGIMAT, 14-Dec-2018
11. NPTEL: NOC: Construction Methods and Equipment Management (Civil Engineering), DIGIMAT · NPTEL IIT Guwahati, 27-Oct-2021

R. S.