KALINGA UNIVERSITY

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SCHEME & SYLLABUS FOR

Bachelor of Vocational Studies (B.Voc.) Building Technology

NAAC GRADE B+ Accredited University

nirf RANKING 2024 Ranked in Top 151-200 Universities

Kalinga University, Naya Raipur, Chhattisgarh

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B.VOC IN BUILDING TECHNOLOGY

Semester-01								
Course Code	**Course Title**	**Credits**	**L**	**T**	**P**	**Internal Marks**	**End Semester Exam Marks**	**Total Marks**
BVBT101	Communication Skills	3	3	0	0	30	70	100
BVBT102	Fundamentals of Information Technology	3	3	0	0	30	70	100
BVBT103	Bar Bender and Fixer -I	3	3	0	0	30	70	100
BVBT104	Shuttering Carpenter -I	3	3	0	0	30	70	100
BVBT105P	**On Job Training/ Internship/Workshop**	18	0	0	36	50	150	200
Total		**30**	**12**	**0**	**36**	**170**	**430**	**600**

Semester-02								
Course Code	**Course Title**	**Credits**	**L**	**T**	**P**	**Internal Marks**	**End Semester Exam Marks**	**Total Marks**
BVBT201	Building Planning and Design	3	3	0	0	30	70	100
BVBT202	Environmental Studies	3	3	0	0	30	70	100
BVBT203	Bar Bender and Fixer -II	3	3	0	0	30	70	100
BVBT204	Shuttering Carpenter-II	3	3	0	0	30	70	100
BVBT205P	**On Job Training/ Internship/Workshop**	18	0	0	36	50	150	200
Total		**30**	**12**	**0**	**36**	**170**	**430**	**600**

Semester-03								
Course Code	**Course Title**	**Credits**	**L**	**T**	**P**	**Internal Marks**	**End Semester Exam Marks**	**Total Marks**
BVBT301	Mason - I	3	3	0	0	30	70	100
BVBT302	Painter and Decorator-I	3	3	0	0	30	70	100
BVBT303	Construction Materials and Technology	3	3	0	0	30	70	100
BVBT304	Strength of Material	3	3	0	0	30	70	100
BVBT305P	**On Job Training/ Internship/Workshop**	18	0	0	36	50	150	200
Total		**30**	**12**	**0**	**36**	**170**	**430**	**600**

Semester-04								
Course Code	**Course Title**	**Credits**	**L**	**T**	**P**	**Internal Marks**	**End Semester Exam Marks**	**Total Marks**
BVBT401	Mason - II	3	3	0	0	30	70	100
BVBT402	Painter and Decorator-II	3	3	0	0	30	70	100
BVBT403	Construction Planning, Machines and Equipments	3	3	0	0	30	70	100
BVBT404	Building Construction	3	3	0	0	30	70	100
BVBT405P	**On Job Training/ Internship/Workshop**	18	0	0	36	50	150	200
Total		**30**	**12**	**0**	**36**	**170**	**430**	**600**

Semester-05								
Course Code	**Course Title**	**Credits**	**L**	**T**	**P**	**Internal Marks**	**End Semester Exam Marks**	**Total Marks**
BVBT501	Scaffolder -I	3	3	0	0	30	70	100
BVBT502	Estimating and Costing	3	3	0	0	30	70	100
BVBT503	Highway Engineering	3	3	0	0	30	70	100
BVBT504	Building Repair and Rehabilitation	3	3	0	0	30	70	100
BVBT505P	**On Job Training/ Internship/Workshop**	18	0	0	36	50	150	200
Total		**30**	**12**	**0**	**36**	**170**	**430**	**600**

Semester-06								
Course Code	**Course Title**	**Credits**	**L**	**T**	**P**	**Internal Marks**	**End Semester Exam Marks**	**Total Marks**
BVBT601	Scaffolder -II	3	3	0	0	30	70	100
BVBT602	Geotechnical Engineering	3	3	0	0	30	70	100
BVBT603	Sustainable Construction Methods	3	3	0	0	30	70	100
BVBT604	Green Buildings	3	3	0	0	30	70	100
BVBT605P	**On Job Training/ Internship/Workshop**	18	0	0	36	50	150	200
Total		**30**	**12**	**0**	**36**	**170**	**430**	**600**

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SEMESTER - 01

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BVBT101
COMMUNICATION SKILLS

Course Objective:

- The purpose of this course is to introduce students to the theory, fundamentals and tools of communication and to develop in them vital communication skills which should be integral to personal, social and professional interactions. One of the critical links among human beings and an important thread that binds society together is the ability to share thoughts, emotions and ideas through various means of communication: both verbal and non-verbal. In the context of rapid globalization and increasing recognition of social and cultural pluralities, the significance of clear and effective communication has substantially enhanced.

Course outcomes:

- The purpose of this course is to introduce students to the theory, fundamentals and tools of communication
- To develop vital communication skills which should be integral to personal, social and professional interactions.
- One of the critical links between human beings.
- An important thread that binds society together is the ability to share thoughts, emotions and ideas through various means of communication: both verbal and non-verbal.
- In the context of rapid globalization and increasing recognition of social and cultural pluralities, the significance of clear and effective communication has substantially enhanced.

Unit - 1 **06**

- **Introduction:** Theory of communication, types and modes of communication, mediums and channels of communication, barriers to communication, English as a global language, the lingua franca, social influences on English

Unit - 2 **06**

- **Language of Communication:** Verbal and non-verbal (spoken and written) personal, social and business barriers and strategies intra-personal, inter-personal and group communication, varieties of English, language, accent, dialect, colloquialism, historical influences on English

Unit - 3 **06**

- **Speaking Skills:** Monologue dialogue group discussion effective communication/mis-communication interview public speech, regional influences on English, convergence and divergence, linguistic imperialism

Unit - 4 **06**

- **Reading and Understanding** Close reading, reading analysis of a text - audience and purpose, content and theme, tone and mood, stylistic devices, structure comprehension- analysis and interpretation translation (from Indian language to English and vice-versa) literary/knowledge texts

Unit - 5 **06**

- **Writing Skills**: Documenting report writing making notes letter writing, writing tabloids, diary entry, open letters, essays, newsletter and magazine articles, skits, short stories, impersonating characters it will enhance language of communication, various speaking skills such as personal communication, social interactions and communication in professional situations such as interviews, group discussions and office environments, important reading skills as well as writing skills such as report writing, note taking etc. while, to an extent, the art of communication is natural to all living beings, in today's world of complexities, it has also acquired some elements of science. it is hoped that after studying this course, students will find a difference in their personal and professional interactions.

References:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.
4. Language through Literature (forthcoming) ed. Dr. Gauri Mishra, Dr. Ranjana Kaul, Dr. Brati Biswas

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BVBT102
FUNDAMENTALS OF INFORMATION TECHNOLOGY

Course objective:

- This is a basic course for commerce students to familiarize with computer and it's applications in the relevant fields and exposes them to other related courses of IT.

Course Outcomes:

- Gain a foundational understanding of key IT concepts, including hardware, software, and networks.
- Develop proficiency in using common computer applications, such as word processing and spreadsheet software.
- Explore the ethical and security considerations in IT, emphasizing responsible digital behavior.
- Acquire problem-solving skills by applying IT knowledge to real world scenarios.
- Prepare for further studies in IT or related fields by establishing a strong IT knowledge base.

Unit - 1 **06**

- **Computer characteristics:** Speed, storage, accuracy, diligence; digital signals, binary system, ASCII; historic evolution of computers;
- **Classification of computers:** microcomputer, minicomputer, mainframes, supercomputers;
- **Personal computers:** desktop, laptops, palmtop, tablet; hardware & software; von Neumann model.

Unit - 2 **06**

- **Hardware:** CPU, memory, input devices, output devices.
- **Memory units:** RAM (SDRAM, DDR RAM, RDRAM etc. feature wise comparison only); ROM-different types: Flash memory;
- **Auxiliary storage:** Magnetic devices, optical devices; floppy, hard disk, memory stick, CD, DVD, CD/DVD-Writer**;**
- **Input devices -** keyboard, mouse, scanner, speech input devices, digital camera, touch screen voice input, joystick, optical readers, bar code reader;
- **Output devices:** Display device, size and resolution; CRT, LCD, LED;
- **Printers:** Dot-matrix, inkjet, laser; plotters, sound cards & speaker.

Unit - 3 **06**

- **Software:** System software, application software; concepts of files and folders, introduction to operating systems, different types of operating systems: single user, multitasking, time-sharing multi-user; booting, POST;
- **Basic features of two GUI operating systems:** Windows & Linux (Basic desk top management); Programming Languages, Compiler, Interpreter, Databases;
- **Application software:** Generic features of word processors, spread sheets and presentation software; generic introduction to latex for scientific typesetting; utilities and their use; computer viruses & protection, free software, open source.

Unit - 4 **06**

- **Computer Networks and Internet:** Connecting computers, requirements for a network: server, workstation, switch, router, network operating systems; internet: brief history, world wide web, websites, URL, browsers, search engines, search tips; internet connections: isp, dial-up, cable modem, well, dsl, leased line wireless and Wi-Fi connectivity ; email, email software features (send receive, filter, attach, forward, copy, blind copy); characteristics of web-based systems, web pages, web programming languages.

Unit - 5 **06**

- **Information Technology and Society:** Indian IT Act, intellectual property rights, issues. application of information technology in railways, airlines, banking, insurance, inventory control, financial systems, hotel management, education, video games, telephone exchanges, mobile phones, information kiosks, special effects in movies.
- **Programming Concepts & Techniques:** Program concept, characteristics of programme, stages in program development, tips for program designing, programming aids, algorithms, pseudo code, notations, design, flowcharts, symbols, rules, compiler & interpreter. introduction to programming techniques, top-down & bottom-up approach, unstructured, & modular programming, cohesion, coupling, debugging, syntax & logical errors, linking and loading, testing and debugging, documentation.

References:

1. Programming in C, R.S. Salaria, Khanna Publishing House
2. Computer Concepts and Programming in C, R.S. Salaria, Khanna Publishing House
3. Handbook of Computer Fundamentals, N.S. Gill, Khanna Publishing House

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BVBT103
BAR BENDER AND FIXER - I

Unit - 1 **08**

Health, Safety & Environment:

- Procedures for evacuation of workers during emergency
- Operation and selection of appropriate PPEs for different working condition.
- Health, safety and accident reporting procedures
- Identification and use of basic dressing materials and first aid.

Unit - 2 **08**

Material Handling & Storing:

- Permissible Stacking heights according to size and length of bars.
- Sizing, sorting and identification
- Workplace procedures and policies for manual and mechanical handling
- Site layout and obstacles during shifting
- Housekeeping standards procedures required in the workplace.
- Position of overhead electrical wires and cables during shifting / lifting of materials.

Unit - 3 **07**

Erect and dismantle 3.6 meter temporary Scaffold:

- Safety measures followed while working at height
- Tools and equipments used for erecting and dismantling 3.6 meter temporary scaffold
- Type of materials used for the task
- Process of erecting and dismantling
- Process of accessibility & site tidiness.

Unit - 4 **07**

Understand Bar Bending Schedule and drawings:

- Knowledge of North direction
- Knowledge of scale used in drawing
- Elevation, plan and sectional drawing
- Identify structure location as per drawing
- Reinforcement specifications and Main bars and distributors
- Cover requirement and difference between clear cover and effective cover

References:

1. Mackay Building Construction Vol. 1 to 4 VaynStrand
2. Mitchell Elementary Building Construction B. T. Batsford, London
3. Molnar Building Construction Drafting and Design CBS Publications. Delhi
4. Sushil Kumar Building Construction Delhi : Standard Publishers, 1999, 18 th Ed.
5. Arora S. P. & Bindra Building Construction Jaipur : Dhanapat rai & Sons
6. S. P. Rangwala S. C. Building Construction Anand : Charotar & Publishing House

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BVBT104
SHUTTERING CARPENTER - I

Unit - 1 **08**

Health, Safety & Environment:

- Procedure for evacuation of workers during emergency
- Use and importance of health, safety and accident reporting procedures
- First Aid Knowledge with identification and use of basic dressing materials
- Sound knowledge of safety norms.

Unit - 2 **08**

Material Handling and Storing:

- Norms followed to stack material at specified height
- Sequence followed for stacking formwork materials
- Workplace procedures and policies for manual and mechanical handling
- Standard housekeeping procedures followed at workplace.

Unit - 3 **07**

Making Shutter for Formwork:

- Drawing / Sketch relevant to task
- Purpose of Angle fillet, studs, support clits etc.

Unit - 4 **07**

- Various joints and their appropriate applications
- Sheathing materials that can be utilized at optimum

References:

1. Mackay Building Construction Vol. 1 to 4 VaynStrand
2. Mitchell Elementary Building Construction B. T. Batsford, London
3. Molnar Building Construction Drafting and Design CBS Publications. Delhi
4. Sushil Kumar Building Construction Delhi: Standard Publishers, 1999, 18 th Ed.
5. Arora S. P. & Bindra Building Construction Jaipur: Dhanapat rai & Sons
6. S. P. Rangwala S. C. Building Construction Anand: Charotar & Publishing House

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BVBT105P
INDUSTRIAL TRAINING/ON JOB TRAINING/ WORKSHOP

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SEMESTER-02

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BVBT201
BUILDING PLANNING AND DESIGN

Unit - 1 **08**

- **Building bye-Laws-** Introduction, Terminology, Objectives, Floor area ratio (FAR) and Floor space Index (FSI), Principles underlying building byelaws, Minimum plot sizes and building frontage, Open spaces, Minimum standard dimensions of building elements. Provisions for - lighting & ventilation, safety from fire & explosions, means of access, drainage & sanitation and safety of works against hazards or accidents.
- Requirements for- off street parking, green belt and landscaping, special requirements for low income housing, Sizes of structural elements and Applicability of the bye-laws.
- Climate and its influence on building planning- Solar radiation, Temperature of air, Wind, Humidity, Precipitation, Climatic zones, Climate and comfort, Earth and its motion, Directions and their characteristics, Landscaping.

Unit - 2 **08**

- **Principles of Planning of Buildings-** Aspect, Prospect, Privacy, Furniture requirement, Roominess, Grouping, Circulation, Sanitation, Lighting, Ventilation, Cleanliness, Flexibility, Elegance, Economy, Practical Considerations.
- **Orientation Of Buildings-** Introduction, Orientation, Factors affecting orientation, Sun, Wind, Rain, C.B.R.I.: Suggestions for obtaining optimum orientation, Orientation criteria for Indian conditions. Economy Measures in Building Construction- General, Economy of land, material of construction, labour, time and money spending.
- Introduction to Building Drawing and Brief History of Building Drawing, planning of residential buildings and public buildings.

Unit - 3 **07**

- **Functional Planning of Buildings:** Strategies for the basic planning, for various functions of various types of buildings such as Residential Buildings, Commercial Buildings, Institutional Buildings and Hospital Buildings.

Unit - 4 **07**

- **Spatial planning of buildings:** Allocation of spaces for various functions, planning for location of doors and windows in the building, Design of window for natural day-light consideration, window-wall ratio, surface-volume ratio.
- **Drawing & Detailing of Residential Buildings:** Drawing of Layout Plans, Elevations and Sections of single storeyed and double storeyed Residential Buildings.

References:

1. Moore F., Environmental Control System McGraw Hill, Inc., 1994.
2. Brown, G Z, Sun, Wind and Light: Architectural design strategies, John Wiley, 1985.
3. Cook, J, Award - Winning passive Solar Design, McGraw Hill, 1984.
4. Kumara swamy and Kameswara Rao, Building Panning and Drawing, Charotar Publishing House Pvt. Ltd.
5. Dr. H. J. Shah, Building Panning and Drawing, Charotar Publishing House Pvt. Ltd.
6. Malik, R. S., “Civil Engineering Drawing”, Asia Publishing House
7. Shah, M. G. and Kale, C. M., “Principles of Building Drawing”, MacMillan, Delhi

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BVBT202
ENVIRONMENTAL STUDIES

Course Outcomes:

- Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
- Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
- Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
- Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
- Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.

Unit - 1 **06**

Introduction to Environmental Studies:

- Multidisciplinary nature of environmental studies, Scope and importance; concept of sustainability and sustainable development.

Ecosystems:

- What is an ecosystem? Structure and function of the ecosystem;
- **Energy flow in an ecosystem:** food chains, food webs and ecological succession.
- **Case studies of the following ecosystems**: Forest ecosystem, grassland ecosystem, desert ecosystem, aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit - 2 **06**

Natural Resources:

- **Renewable and Non--renewable Resources:** Land resources and land use change; Land degradation, soil erosion and desertification.
- **Deforestation:** Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- **Water:** Use and over--exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter--state).
- **Energy resources:** Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Unit - 3 **06**

Biodiversity and Conservation:

- **Levels of biological diversity:** genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots, India as a mega--biodiversity nation; Endangered and endemic species of India
- **Threats to biodiversity:** Habitat loss, poaching of wildlife, man--wildlife conflicts, biological invasions;
- **Conservation of biodiversity:** In--situ and Ex--situ conservation of biodiversity.
- **Ecosystem and biodiversity services:** Ecological, economic, social, ethical, aesthetic and Informational value.

Unit - 4 **06**

Environmental Pollution:

- Types, causes, effects and controls; Air, water, soil and noise pollution, Nuclear hazards and human health risks
- **Solid waste management:** Control measures of urban and industrial waste. Pollution case studies.

Environmental Policies & Practices:

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- **Environment Laws:** Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
- Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

Unit - 5 **06**

Human Communities and the Environment:

- **Human population growth:** Impacts on environment, human health and welfare. Resettlement and rehabilitation of project affected persons; case studies.
- **Disaster management:** floods, earthquake, cyclones and landslides.
- **Environmental movements:** Chipko, Silent valley, Bishnois of Rajasthan.
- **Environmental ethics:** Role of Indian and other religions and cultures in environmental conservation. Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

References:

- Carson, R. 2002. *Silent Spring*. Houghton Mifflin Harcourt.
- Gadgil, M., & Guha, R.1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
- Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
- Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
- Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll.Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
- Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36--37.
- McCully, P. 1996. Rivers no more: the environmental effects of dams(pp. 29--64). Zed Books.
- McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
- Odum, E.P., Odum, H.T. & Andrews, J. 1971.Fundamentals of Ecology. Philadelphia: Saunders.
- Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
- Rao, M.N. & Datta, A.K. 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd.
- Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012.Environment. 8th edition. John Wiley & Sons.
- Rosencranz, A., Divan, S., & Noble, M. L. 2001. Environmental law and policy in India. Tripathi 1992.
- Sengupta, R. 2003. Ecology and economics: An approach to sustainable development. OUP.
- Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
- Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.
- Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent.
- Warren, C. E. 1971. Biology and Water Pollution Control. WB Saunders.
- Wilson, E. O. 2006. The Creation: An appeal to save life on earth. New York: Norton.
- World Commission on Environment and Development. 1987. Our Common Future. Oxford University Press.

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BVBT203
BAR BENDER AND FIXER-II

Unit - 1 **08**

Identification and use of different type of stirrups and Crank / Shear Bars:

- Relevant cutting and bending tools
- Specifications relevant to cutting & bending of bar
- Knowledge of basic calculations.
- Detailing of Rings, links and hooks.

Unit - 2 **08**

Fabricate reinforcement in lintel, slab and projections:

- Main and distribution of reinforcement bar
- Indian Standard Specification for slab and lintel
- Physical properties of binding wire
- Compute cutting length for rebar as per specification
- Sequence of fabrication for slab and lintel reinforcement
- Use of tie bars
- Tolerance limit for dimensional checking

Unit - 3 **07**

Fabricate beam reinforcement with & without Shear bar:

- Load distribution of beam members
- Utility of stirrups as shear resistor
- Indian Standard Specification for beam reinforcement
- Calculation of cutting length from sketches
- Shifting of prefabricated cage for beams

Unit - 4 **07**

Fabricate reinforcement cage for column and base in situ position while incorporating crank bars:

- Functional knowledge of column & footing
- Classification of footing
- Difference between long column, short column and pedestal
- Indian Standard Specification for column and footing reinforcement
- Calculation of cutting length form sketch
- Type of acting load

References:

- Mackay Building Construction Vol. 1 to 4 VaynStrand
- Mitchell Elementary Building Construction B. T. Batsford, London
- Molnar Building Construction Drafting and Design CBS Publications. Delhi
- Sushil Kumar Building Construction Delhi : Standard Publishers, 1999, 18 th Ed.
- Arora S. P. & Bindra Building Construction Jaipur : Dhanapat rai & Sons
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BVBT204
SHUTTERING CARPENTER-II

Unit - 1 **08**

Erection and dismantling of different type of Scaffolding:

- Tools and equipment used for task
- Materials used for task

Unit - 2 **08**

- Process of erecting and dismantling different types of scaffoldings
- Safety involved in working at height.
- Process of site tidiness.

Unit - 3 **07**

Assemble & Dismantle of Conventional Formwork for Foundation, Column, Wall and Tie Beam:

- Different type of knots
- Calculation of areas relevant to structure

Unit - 4 **07**

- Footing, column and tie beam
- Type of couplers, properties of woods, bellies and pipes

References:

- Mackay Building Construction Vol. 1 to 4 VaynStrand
- Mitchell Elementary Building Construction B. T. Batsford, London
- Molnar Building Construction Drafting and Design CBS Publications. Delhi
- Sushil Kumar Building Construction Delhi : Standard Publishers, 1999, 18 th Ed.
- Arora S. P. & Bindra Building Construction Jaipur : Dhanapat rai & Sons
- S. P. Rangwala S. C. Building Construction Anand : Charotar & Publishing House

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BVBT205P
ON JOB TRAINING/INTERNSHIP/WORKSHOP

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SEMESTER-03

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BVBT301
MASON - I

Unit - 1 **08**

Health, Safety & Environment:

- Procedures, guidelines and aim relevant to safety, health and environment parameters
- Organizations expectations and Safety procedures at sites
- Selection and visual checking of PPEs and knowledge of indent and return procedures.
- Various health and safety hazards at the workplace
- Reporting procedures on safety violations.
- First aid, safety measure, safety rules, masonry health and safety issues

Unit - 2 **08**

Mason:

- What does a mason do in construction, definition, requirements
- Mason work tools and equipments such as masonry hammer,
- Safety procedures and safety information's, safety equipment
- Precautions in brick masonry work, masonry job analysis, masonry safety manual
- Career as a mason, Mason vs masonry, block mason, mason ring.

Unit - 3 **07**

Material Handling & Storing:

- Loading and unloading practices of materials.
- Handling materials according to its physical properties
- Handling and stacking of hazard/inflammable materials.
- Stacking of materials by its size, shape and height.
- Selection of shortest possible route for shifting material while adhering
- Housekeeping procedures relevant to the task.

Unit - 4 **07**

Erection and dismantling of 3.6 meter temporary Scaffold:

- Safety measures followed while working at height
- Tools and equipments used for erecting and dismantling 3.6 meter temporary scaffold
- Process of erecting and dismantling
- Process of accessibility & site tidiness
- Type of Materials used for the task
- Risk assessment for erection and dismantling of scaffolding
- Safe erection and dismantling of scaffolding
- Sequential erection method for erecting a mobile scaffold

References:

- Mackay Building Construction Vol. 1 to 4 VaynStrand
- Mitchell Elementary Building Construction B. T. Batsford, London
- Sushil Kumar CBS Publications. Delhi Building Construction Building Construction Delhi: Standard Publishers, 1999, 18th Ed.

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BVBT302
PAINTER AND DECORATOR-I

Unit - 1 **08**

Health, Safety & Environment:

- Procedures on evacuation of workers during emergency
- Pointer and Decorator: Objective, function, career
- PPEs: Selection, Operation and Process
- Health, safety and accident reporting procedures
- Safety tools, Safety badges, Safety norms, safety signs
- First Aid with identification and use of basic dressing materials

Unit - 2 **08**

Prepare, Handle & Store paints & related Materials:

- Stacking of materials and the standard norms followed
- System of Sizing and sorting followed
- Points: Object, Characteristics of ideal points, constituents, Types of base, types of points
- Hazards related to paint materials
- Defects in painting, Rectification of the patch work.

Unit - 3 **07**

Preparation of all type of basic surface for painting works:

- Type of materials and ingredients required
- The ratio and mix proportions
- Method of surface preparation of placing and mixing of ingredients
- Process and type of knotting
- Putty preparation techniques, wall paper
- Different type of sealing compounds

Unit - 4 **07**

Material for Decoration:

- Materials used for decoration and decorative surface
- Process of Mural painting
- Other decorative works on exterior portion
- Interior decorative work for ceilings, columns, walls

References:

- Mackay Building Construction Vol. 1 to 4 VaynStrand
- Mitchell Elementary Building Construction B. T. Batsford, London
- Sushil Kumar CBS Publications. Delhi Building Construction Building Construction Delhi: Standard Publishers, 1999, 18th Ed.

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BVBT303

CONSTRUCTION MATERIALS AND TECHNOLOGY

Unit - 1 **08**

- **Building Stones:** Classification of Rocks, Geological classification: Igneous, sedimentary and metamorphic rocks. Chemical classification: Calcareous, argillaceous and siliceous rocks. Physical classification: Un-stratified, stratified and foliated rocks; Requirements of good building stones, testing & identification of common building stones and their uses.
- **Bricks and Tiles:** Introduction to bricks, Raw materials for brick manufacturing and properties of good brick making earth, Classification of bricks as per IS: 1077, Testing of common building bricks as per IS: 3495. Compressive strength, water absorption, efflorescence test, Dimensional tolerance test. Types and use of- tiles for wall, roofing & flooring; ceramic tiles; Hollow masonry blocks; Fly ash bricks.

Unit - 2 **08**

- **Cement:** Introduction, raw materials, manufacturing of ordinary Portland cement, flow diagram for wet and dry process. Properties and uses of ordinary Portland cement. Special cements and their uses. Storage of cement.
- **Lime:** Introduction: Lime as one of the cementing materials. Definition of terms; quick lime, fat lime, hydraulic lime, hydrated lime, lump lime. Calcinations and slaking of lime IS classification of lime. Definition- Properties and uses of Mortar. Types of mortar, cement & lime Mortar, Preparation of cement Mortar.

Unit - 3 **07**

- **Timber and wood based products:** Identification of different types of timber: Teak, Deodar, Shisham, Sal, and Mango. Market forms of converted timber as per IS. Seasoning of timber: purpose, methods of seasoning. Defects and decay in timber Preservation of timber and methods of treatment, Properties and specifications of structural timber.
- **Other wood based products, their brief description of manufacture and uses:** Lamina board, Black board, fiber board. Hard board and gypsum board.
- **Steel:** Manufacture of steel, market forms of steel e.g. mild steel and HYSD steel bars, rolled steel sections.

Unit - 4 **07**

- **Concrete:** constituents of concrete, important properties of concrete both in plastic state and hardened state, brief idea about- various stages of preparation of concrete, workability of concrete and Methods to determine workability, Reinforced cement concrete, shotcrete, lightweight & heavyweight concrete, Ready- mixed concrete, fiber reinforced concrete and pre-stressed concrete.
- **Miscellaneous Materials: Paints-** Purpose, Types, ingredients, properties and uses of oil paints, water paints and Cement paints. Varnishes- Types, properties and uses of varnishes, Trade name of different products. Metals: - uses of ferrous and non- ferrous metals, Commercial forms of ferrous and non-ferrous metals. Plastics – Introduction and uses of various plastic products in buildings such as doors, water tanks and PVC pipes. Types uses and application of- Fiber Sheets, sound and heat insulating materials, Materials used in interior decoration works like POP, Water proofing compounds, fire resisting materials.

References:

- Surendra Singh; “Engineering Materials; “New Delhi”. Vikas Publishing House Pvt. Ltd.
- TTTI, Chandigarh “Civil Engineering Materials; “Tata McGraw Hill.
- M.L. Gambhir and Neha Jamwal, “Building Materials”, Tata McGraw Hill.
- Building Materials, P.C.Varghese, PHI Publications
- Engineering materials S.C. Rangwala, Charotar Publishing House
- Building Materials, Duggal, New Age Publication
- Kulkarni, GJ; “Engineering Materials; “Ahmedabad, Ahmedabad Book Depot.
- Gambhir, M. L., “Concrete Technology” MacMillan India Ltd., New Delhi

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BVBT304
STRENGTH OF MATERIAL

Unit - 1 **08**

- **Concept of Equilibrium:** Loads, supports, reactions, displacements; General equilibrium equations; Equilibrium of a point and a member; Concept of free body diagram; Statical determinacy of a problem.
- **Stresses and Strains:** Concept of stress and strain; Type of stresses and strains; Stress-strain diagrams for ductile, brittle materials; Generalized Hooke's law; Concept of working stress and factor of safety; Lateral strain, Poisson's ratio and Volumetric strain; Elastic moduli and relationship between them; Bars of varying section, composite bars, thermal stresses.

Unit - 2 **08**

- **Principal Stresses and Strains:** Concept of principal stresses, principal strains and principal planes; use of Mohr circle in computation of stresses and strains; Rectangular block subjected to normal stress along and across two planes, combination of normal and tangential stress also with shear stress.
- **Shear Force and Bending Moment Diagrams:** Introduction to the concept of shear force, bending moment and the sign convention; Shear force and bending moment diagrams for cantilever, simply supported and overhang beams subjected to point loads, uniformly distributed loads, uniformly varying loads, moments or their combination, point of contra flexure.

Unit - 3 **07**

- **Bending and Shear Stresses:** Assumptions - theory of simple bending; Derivation of bending equation; Centroid and section modulus of various cross sectional shapes including rectangular, circular, I, channel, angle etc.; Determination of bending stresses, bending stress distribution across various beam sections; Determination of shear stress, shear stress distribution across various beam sections.

Unit - 4 **07**

- **Columns and Struts:** Stability of Columns; buckling load of axially loaded columns with various end conditions; Euler's and Rankine's formula; Columns under eccentric load, lateral load.
- **Stresses and strains in thin cylinders:** spherical shells subjected to internal pressures; Normal stress, tangential stress.

References:

- Elementary Structural Analysis, Jain,A.K.,Nem Chand & Bros, Roorkee;
- Strength of Materials, RK Rajput, S Chand.
- Strength of Materials , S. Ramamrutham, Dhanpat Rai Publications.
- Strength of Materials, B.C. Punmia, Laxmi Publications.
- A Textbook of Strength of Materials, Prof. R. K Bansal, Laxmi Publications.

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SEMESTER-04

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BVBT401
MASON-II

Unit - 1 **08**

Bricks, Brick Masonry, Wall:

- Bricks: Definition, Quality, Soaking of bricks, ingredient of good brick earth, size of brick, moulding of bricks, characteristics of good brick, tooting, Racking back, face appearance.
- Brick masonry: Definition, type of bonds and closers, plans of two consecutive courses.
- Tools used in brickwork, defects in brick masonry
- Various types of walls retaining walls
- Mortar : Definition, classification , mix proportions , strength

Unit - 2 **08**

Fixing door & window frames in room / cubical:

- Doors and windows: Size , numbers, location
- Types of doors and windows
- Fixtures and fastenings for doors and windows
- Set out levels relevant to task

Unit - 3 **07**

Plastering, pointing:

- Plastering : definition, objects,, selection of type, types, defects ,remedial measures
- Tools of plastering , material used for plastering
- **Pointing:** definition, methods, types, advantages.
- Difference between plastering and pointing, Stucco plastering, Waterproof plastering.

Unit - 4 **07**

Flooring and Roofs:

- **Flooring :** Definition , objective types, factors affecting
- Method of construction , selection of flouring materials
- Classification of roof
- Roof covering materials

References:

- Mackay Building Construction Vol. 1 to 4 VaynStrand
- Mitchell Elementary Building Construction B. T. Batsford, London
- Sushil Kumar CBS Publications. Delhi Building Construction Building Construction Delhi : Standard Publishers, 1999, 18th Ed.

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BVBT402
PAINTER AND DECORATOR-II

Unit - 1 **08**

Painting and Decorating External Surface of structure:

- Safety precaution while painting and decorating external surface of structure
- Tools and equipment required
- Safety aspects involved while working at height
- Ease of working and accessibility
- Site Tidiness
- Building painting equipments, Housing Rope

Unit - 2 **08**

Application of Paints as per required surface and finish:

- Type of materials and other ingredients required for painting application.
- Standard methods for preparation of platform, placing and mixing of ingredients
- Painting Brush
- Method of application
- Upgraded techniques required for external painting and decoration

Unit - 3 **07**

Polishing & Finishing:

- Polishing: Definition, types, Method
- Furniture Polish, Wax Polish, Thiner
- Stains, lacquers, Primming, Stopping
- Repainting Old wood work/ Structure
- Coloring pigments for paints

Unit - 4 **07**

Distempering & Varnishing:

- Distempering: definition, process, properties
- Varnishing: Definition, process
- Different types of scaling compounds
- Painting and finishing tools
- White washing and coloring washing

References:

- Mackay Building Construction Vol. 1 to 4 VaynStrand
- Mitchell Elementary Building Construction B. T. Batsford, London
- Sushil Kumar CBS Publications. Delhi Building Construction Building Construction Delhi : Standard Publishers, 1999, 18th Ed.

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BVBT403
CONSTRUCTION PLANNING, MACHINES AND EQUIPMENTS

Unit - 1 **08**

- **Introduction:** Need for project planning & management, time, activity & event, bar chart, Milestone chart, uses & draw backs.

Unit - 2 **08**

- **PERT:** Construction of PERT network, time estimates, network analysis, forward pass & backward pass, slack, critical path, data reduction, suitability of PERT for research project, numerical problems.

Unit - 3 **07**

- **CPM:** Definitions, network construction, critical path, fundamental rules, determination of project schedule, activity time estimates, float types, their significance in project control, numerical problems.
- **Cost Analysis and contract:** Type of costs, cost time relationships, cost slopes, conducting a crash programme, determining the minimum total cost of project, numerical problems, updating a project, when to update, time grid diagram, resource scheduling.

Unit - 4 **07**

- **Construction Machinery and Equipment:** Tractors, bull dozers, rippers, scrappers, power shovels, dragline, hoes. Line diagram of each, sizes, output, uses, and factors affecting selection of each equipment.
- **Hoisting & Transporting Equipments:** Hosts, Winches, Cranes, Belt conveyors, Ropeways, trucks & Wagons.
- **Other Equipments:** Plants for grading, batching, mixing, types of mixers, concrete pumps, bitumen plants.

References:

- Construction Planning and Equipment - R.L.Peurifoy - Tata McGraw Hill, New Delhi
- PERT and CPM - L.S.Srinath, East West Press
- Management Guide to PERT & CPM - Wiest & levy; Prentice Hall
- Construction Equipment & Planning and Application. - Mahesh Verma Artec Publication.
- Construction Planning and Management by U. K. Shrivastava; Galgotia Publications Pvt. Ltd.

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BVBT404
BUILDING CONSTRUCTION

Unit - 1 **08**

- **Building Construction:** Site Selection for construction, various components of a building (sub structure and super structure with elaboration of technical terms). **Foundations:** Need and function of foundation, different types of foundations and their uses. Masonry: General principles of bricks masonry, types of bonds. Floors: Types of flooring and their uses. Stairs: Need and types of stairs. Doors and Windows, Purpose of each and their classification.

Unit - 2 **08**

- **Concrete Technology:** Definition of concrete, different types of concrete and their uses, Ingredients of Concrete. Preparation of concrete: Batching, Mixing, Transportation, Placement, Compaction, Curing, Finishing. **Properties of Concrete:** Properties in plastic stage: workability, segregation, bleeding. Properties of hardened concrete: strength, durability. Introduction to standard concrete mixes.

Unit - 3 **07**

- **Formwork, Scaffolding and Steel Fixing:** Introduction and purpose of formwork. Timber joints, cutting and drilling of plywood. Shuttering for beam, column and slab floor. Codal provisions on formwork. Introduction and purpose of scaffolding, Component parts, Types of scaffolding. Types of ties and their uses. Making and placing reinforcement for slab & foundation. Codal provision on steel fixing.

Unit - 4 **07**

- **Services & Utilities:** Introduction to plumbing, plumbing tools and their uses. Water distribution system, material for service pipes, service connection, valves. Aim and principles of house drainage, Pipes and traps. Sanitary fittings. **House wiring:** Types of wires used, tools used for house wiring, Circuit diagram for tube light, bulb, fan and switches & sockets. Fire protection: Fire hazards, characteristics of fire resisting materials, general fire safety requirements for buildings, fire alarms, fire extinguishing equipment.
- **Construction Work Supervision:** Roles and responsibilities of construction work supervisor. Record keeping: Muster roll, measurement book, quantities estimation, register for material receipt and issue, logbook for construction equipment. **Site Registers:** site diary, site order book, inspection register, cement register, steel register, register for approval of other materials, material requisition and issue records. Register for scrap material, POL records, register for construction equipment. Check list (Dos and Dont's) for construction work supervision.

References:

- Building Construction by Sushil Kumar, Standard Publisher and Distributors.
- Building Construction by B.C.Punima, Laxmi Publisher House
- A Text Book of Building Construction by Sharma and Kaul
- Masonry & timber structures including earthquake resistant design, A S Arya, Nem hand & Bros.
- Concrete Technology, by M.L. Gambhir, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
- Indian Practical Civil Engg. Handbook, P N Khanna, Engineers Publishers, 2000.
- National Building Code, B. I. S.
- Handbook of Building Construction, M M Goel, Amrindia Consultancy.

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SEMESTER-05

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BVBT501
SCAFFOLDER – I

Unit - 1 **08**

Scaffolding, Shoring, Underpinning:

- Scaffolding, Parts of a scaffolding, types, points to be kept in view in scaffolding
- Shoring, Types
- Underpinning, Methods of underpinning

Unit - 2 **08**

Health, Safety & Environment:

- Health working conditions, facilities, provisions
- Safety equipments, General Safe practices, preventive measures, safety Hazards, causes of accidents, safety rules, Do's and Don't
- First aid knowledge with identification and use of basic dressing materials, safety signs
- Sound knowledge of safety norms.

Unit - 3 **07**

Erection & Dismantle the towers/ scaffolding:

- Precaution prior to dismantling / erection
- Precautions during and after erection/ dismantling
- Requirements of tools and devices for erection and dismantling towers/ scaffolding
- The checking of Scaffolder tools prior to use
- Dismantling / erection sequence

Unit - 4 **07**

Formworks:

- General, requirements of a good form work
- Loads on formwork, guiding points in the design of form work
- Properties of timber used in formwork
- Formwork for sequence column, RCC column footing, RCC Beam, RCC T-beam
- Types of form work.

References:

- Mackay Building Construction Vol. 1 to 4 VaynStrand
- Mitchell Elementary Building Construction B. T. Batsford, London
- Molnar Building Construction Drafting and Design CBS Publications. Delhi
- Sushil Kumar Building Construction Delhi : Standard Publishers, 1999, 18 th Ed.
- Arora S. P. & Bindra Building Construction Jaipur : Dhanapat rai & Sons
- S. P. Rangwala S. C. Building Construction Anand : Charotar & Publishing House

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BVBT502
ESTIMATING AND COSTING

Unit - 1 **08**

- Introduction to quantity surveying/ estimating and its importance. Types of estimates; - Preliminary estimates, Plinth area estimate, Cubic rate estimate and Estimate per unit base. Detailed estimates- Definition- Stages of preparation – details of measurement and calculation of quantities and abstract. Units of measurement for various items of work as per BIS:1200. Rules for measurements. Different methods of taking out quantities – Centre line method and long wall & short wall method. Preparation of detailed estimate complete with detailed reports, specifications, abstract of cost and material requirement statements for a small residential building with flat roof.

Unit - 2 **08**

- **Analysis of rates:** Detailed specifications of different types of building works from excavation to foundations, superstructure and finishing operation.

1) **Steps in the analysis of rates for any item of work:** Requirement of materials, labour, sundries, water charges and contractor's profit.
2) **Calculation of quantities of materials for:**
   a) Cement mortars of different proportion
   b) Cement concrete of different proportion
   c) Brick/stone masonry in cement mortar
   d) Plastering and pointing
   e) White washing, painting
   f) R.C.C. work in slab, beams.
3) Analysis of Rates- Steps involved in the analysis of rates. Requirement of material, labour, sundries, contractor's profit and overheads.
4) Running and maintenance cost of construction equipment.

Unit - 3 **07**

- **Contracting:** Meaning of contract, Qualities of a good contractor, Essentials of a contract, Types of contracts, their advantages, disadvantages and suitability, system of payment. Single and two cover-bids; tender, tender forms and documents, tender notice, submission of tender and deposit of earnest money, security deposit, retention money, maintenance period. Types of contracting firms/ construction companies. Introduction to CSR and calculation of cost based on premium on Common Schedule Rates (CSR).

Unit - 4 **07**

- **Billing:** Measurement of work for payment of contractors and suppliers. Type of Measurement book, Maintenance of measurement book.
- **Types of payments:** First, running, advance, first & final and final payment.
- **Valuation:** Purpose of valuation, principles of valuation, Definition of various terms related to valuation like depreciation, sinking fund, salvage and scrap value, market value, fair rent, year's purchase etc.
- **Methods of valuation**
  1) Replacement cost method
  2) Rental return method.

References:

- B. N. Dutta- Estimating and costing in Civil Engg, UPSPD.
- M. Chakraborty, "Estimating costing and Specifications in Civil Engg", Jain Book Depot
- D.S.R. [Detailed Schedule Rates] C.P.W.D
- PWD Account Code
- Samuelson and Nardhaus-Economics, Mc Graw Hill
- 'Text book of Estimating and Costing' by G.S. Birdie
- 'Civil Engineering Building Drawing' by Gurucharan Singh

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BVBT503
HIGHWAY ENGINEERING

Unit - 1 **08**

- **Introduction:** Importance of Transportation, Different Modes of Transportation, Characteristics of Road Transport.
- **Highway Development & Planning:** Principles of Highway Planning, Road Development in India, Classification of Roads, Road Patterns, Planning Surveys

Unit - 2 **08**

- **Highway Alignment:** Requirements, Alignment of Hill Roads, Engineering Surveys.
- **Highway Geometric Design:** Cross Section Elements, Carriageway, Camber, Sight Distances, Horizontal Curves, Extra-widening, Super-elevation, Vertical Curves

Unit 2 **07**

Highway Materials:

- Preparation of subgrade, Specification and construction of
  a) Granular Sub base
  b) WBM Base
  c) WMM base
  d) Bituminous Macadam
  e) Dense Bituminous Macadam
  f) Bituminous Concrete,
  g) Dry Lean Concrete sub base and PQC
  h) Concrete roads.
- Properties of Sub-grade and Pavement Component Materials, Tests on Sub-grade Soil, Aggregates and Bituminous Materials. Use of waste material in Highway construction.

Unit - 3 **07**

- **Highway Drainage and Maintenance:** Importance of drainage and maintenance, Surface Drainage and Subsoil Drainage, Construction in Water-logged areas, Pavement Failures, Pavement Evaluation, Maintenance and Strengthening Measures.

Unit - 4

Traffic Engineering:

- **Traffic Characteristics:** Road User Characteristics, Driver Characteristics, Vehicular Characteristics.
- **Traffic Studies:** Volume Studies, Speed Studies, O-D Survey, Parking Study. Basics of barrier design
- **Traffic Safety and Control Measures:** Traffic Signs, Markings, Islands, Signals, Cause and Type of Accidents, Use of Intelligent Transport System.
- **Traffic Environment Interaction:** Noise Pollution, Vehicular Emission, Pollution Mitigation Measures.

References:

- Khanna S.K., and Justo, C.E.G. “Highway Engineering”, Nem Chand and Brothers, Roorkee, 1998.
- Kadiyali, L.R. “Principles and Practice of Highway Engineering”, Khanna Publishers, New Delhi, 1997.
- Flaherty, C.A.O. “Highway Engineering”, Volume 2, Edward Arnold, London, 1986.
- Sharma, S.K. “Principles, Practice & Design of Highway Engineering”, S. Chand & Company Ltd., New Delhi, 1985.
- Mannering, “Principles of Highway Engineering & Traffic Analysis”, Wiley Publishers,

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BVBT504
BUILDING REPAIR AND REHABILITATION

Course outcomes:

By the end of this course students will have the capability/knowledge of

- Various distress and damages to concrete and masonry structures
- The importance of maintenance of structures, types and properties of repair materials etc
- Assessing damage to structures and various repair techniques

Unit - 1 **08**

- **Introduction:** Maintenance, rehabilitation, repair, retrofit and strengthening, need for rehabilitation of structures.
- **Cracks in R.C. buildings:** Various cracks in R.C. buildings, causes and effects.
- **Damages to masonry structures:** Various damages to masonry structures and causes,

Unit - 2 **08**

- **Repair materials:** Various repair materials, Criteria for material selection, Methodology of selection, Health and safety precautions for handling and applications of repair materials
- **Special mortars and concretes:** Polymer Concrete and Mortar, Quick setting compounds
- **Grouting materials:** Gas forming grouts, Salfo alumate grouts, Polymer grouts, Acrylate and Urethane grouts.
- **Bonding agents:** Latex emulsions, Epoxy bonding agents.
- **Protective coatings:** Protective coatings for Concrete and Steel

Unit - 3 **07**

- **Damage diagnosis and assessment:** Visual inspection, Non-Destructive Testing using Rebound hammer, Ultra sonic pulse velocity, Semi destructive testing, Probe test, Pull out test, Chloride penetration test, Carbonation depth testing, Corrosion activity measurement.
- **Substrate preparation:** Importance of substrate/surface preparation, General surface preparation methods and procedure, Reinforcing steel cleaning

Unit - 4 **07**

- **Crack repair:** Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Autogenous healing, Overlays, Repair to active cracks, Repair to dormant cracks, IS codes related to retrofitting and repair. Corrosion of embedded steel in concrete: Corrosion of embedded steel in concrete, Mechanism, Stages of corrosion damage, Repair of various corrosion damaged of structural elements slab, beam and columns)
- **Jacketing:** Jacketing, Column jacketing, Beam jacketing, Foundation jacketing, Beam Column joint jacketing, Reinforced concrete jacketing, Steel jacketing, FRP jacketing.

References:

- Nayak, BS, “Maintenance Engineering for Civil Engineers”, Khanna Publishers, Delhi
- Ransom, WH “Building Failures - Diagnosis and Avoidance”, Publishing E and F.N. Span
- Repair and protection of concrete structures by Noel P.Mailvaganam, CRC Press,1991
- “Earthquake resistant design of structures” by Pankaj agarwal, Manish shrikande, PHI, 2006.
- Ravishankar K., Krishnamoorthy T.S, “Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures”, Allied Publishers, 2004.

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SEMESTER-06

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BVBT601
SCAFFOLDER – II

Unit - 1 **08**

Erect & dismantle the staircase and lift tower:

- Location of stair case, Requirements of a good stairs, classification, technical terms.
- Tools used to erect/ dismantle of stair case and lift tower
- Precaution while erection/ dismantle of stair case and lift tower
- Advanced materials/ equipments require to dismantle/erection of the tower and stair case

Unit - 2 **08**

Site safety while erection/dismantle:

- Accidents during erection/dismantle
- Safe access of site
- Working at height
- Ladder safety, crane safety
- Goods Hoist, Scaffold safety procedure

Unit - 3 **07**

Equipments for Erection & Dismantling lift towers and stair case:

- Various lifting cranes for erection/dismantling lift towers
- Advanced method to erect/ dismantle life towers/ stair case
- Prefabricated steel modular scaffolding

Unit - 4 **07**

General:

- Control measure for working platforms
- Opportunities in carpentry, Mason
- Opportunities in scaffolding, Bar Bender and fixing
- Mini project related with Scaffolding

References:

- Mackay Building Construction Vol. 1 to 4 VaynStrand
- Mitchell Elementary Building Construction B. T. Batsford, London
- Molnar Building Construction Drafting and Design CBS Publications. Delhi
- Sushil Kumar Building Construction Delhi : Standard Publishers, 1999, 18 th Ed.
- Arora S. P. & Bindra Building Construction Jaipur : Dhanapat rai & Sons
- S. P. Rangwala S. C. Building Construction Anand : Charotar & Publishing House

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BVBT602
GEOTECHNICAL ENGINEERING

Unit - 1 **08**

- **Soil Investigation:** Object of soil investigation for new and existing structures. Depth of exploration for different structures. Spacing of bore Holes. Methods of soil exploration and relative merits and demerits. Types of soil sample. Design features of sampler affecting sample disturbance. Essential features and application of the following types of samples- Open Drive samples, Stationery piston sampler,. Rotary sampler, Geophysical exploration by seismic and resistivity methods. Bore Hole log for S.P.T.

Unit - 2 **08**

- Earth Pressure Terms and symbols used for a retaining wall. Movement of all and the lateral earth pressure. Earth pressure at rest. Rankine states of plastic equilibrium, Ka and Kp for horizontal backfills. Rankine's theory both for active and passive earth pressure for Cohesion less backfill with surcharge and fully submerged case. Cohesive backfill condition. Coulomb's method for cohesion less backfill. Merits and demerits of Rankine and Coulomb's theories,

Unit - 3 **07**

- **Shallow Foundation:** Type of shallow foundations, Depth and factors affecting it. Definition of ultimate bearing capacity, safe bearing capacity and allowable bearing capacity. Rankine's analysis and Terzaghi's analysis. Types of failures. Factors affecting bearing capacity. Skemptons equation. B.I.S. recommendations for shape, depth and inclination factors. Plate Load test and standard penetration Test. Bosussinesq equation for a point load, uniformly loaded circular and rectangular area, pressure distribution diagrams. New marks chart and its construction. 2:1 method of load distribution. Comparison of Bosussinesq nd Wester guard analysis for a point load. Causes of settlement of structures, Comparison of immediate and consolidation settlement, calculation of settlement by plate load Test and Static Cone penetration test data. Allowable settlement of various structures according to I.S. Code. Situation most suitable for provision of rafts, Proportioning of rafts, Methods of designing raft, Floating foundation.3.

Unit - 4 **07**

- **Pile Foundations:** Necessity and uses of piles, Classification of piles, Merits and demerits of different types based on composition. Types of pile driving hammers & their comparison. Effect of pile driving on adjacent ground. Limitations of pile driving formulae. Cyclic Pile Load Test, Separation of skin friction and point resistance using cyclic pile load test. Determination of point resistance and frictional resistance of a single pile by Static formulas. Piles in Clay, Safe load on a Friction and point Bearing pile.

References:

- Soil Mech. & Foundation Engg, by K.R.Arora, Standard Publishers Distributors
- Geotechnical Engineering, by P. Purshotama Raj
- Soil Mech. & Foundation Engg., by V.N.S. Murthy
- Principle of Foundation Engineering by B.M. Das, CL Engineering
- Basic and applied Soil Mechanics by Gopal Ranjan and A.S.R. Rao, New Age International
- Soil Mech. & Foundations by Muni Budhu Wiley, John Wiley & Sons
- Geotechnical Engineering by Gulhati and Datta, Tata McGraw - Hill Education
- Foundation Engineering by Varghese P.C, PHI Learning.

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BVBT603
SUSTAINABLE CONSTRUCTION METHODS

Course Objectives:

- Understand the Definition, Concept & Objectives of the terms cost effective construction and green building
- Apply cost effective Technologies and Methods in Construction.

Course Outcomes:

At the end of this course students will demonstrate the ability to:

- Classify the sustainable construction materials.
- Apply cutting-edge construction technologies.
- Evaluate different sustainable construction methods.
- Apply different rating systems of construction/buildings as a professional.

Unit - 1 **08**

- **Concepts of energy efficient & environment friendly materials and techniques:** Cost effective materials: Soil, Fly ash, Ferro-cement, Lime, Fibers, Stone Dust, Red mud, Gypsum, Alternate Wood, and Polymer.
- **Energy Efficient & Environment friendly building material products:** Walls - Stabilized and sun dried, soil blocks & bricks, Solid & Hollow concrete blocks, stone masonry blocks, Ferro cement partitions.
- **Green Materials, Green Buildings –** Definition - Features- Necessity – Environmental benefit - Economical benefits - Health and Social benefits - Major Energy efficient areas for buildings – Embodied Energy in Materials.

Unit - 2 **08**

- **Cost effective construction techniques and equipments:**
  a) **Techniques:** Rat trap bond construction, Energy Efficient roofings, Ferro cement technique, Mud Technology.
  b) **Equipments:** Brick moulding machine, Stabilized soil block making machine and plants for the manufacturing of concrete blocks, M.C.R. tile making machine, Ferro cement wall panel & Roofing channel making machine, R.C.C. Chaukhat making m/c.

Unit - 3 **07**

- Types of foundations and construction methods. Basics of Formwork and Staging. Common building construction methods (conventional walls and slabs; conventional framed structure with blockwork walls). Modular construction methods for repetitive works. Precast concrete construction methods. Basics of Slip forming for tall structures. Basic construction methods for steel structures.

Unit - 4 **07**

- **Green Building rating Systems-** Green Rating for Integrated Habitat Assessment) for new buildings – Purpose - Key highlights. Environmental impact of materials; life-cycle assessment; material selection to optimize performance

References:

- Alternative Building Materials and Technologies – By K S Jagadeesh, B V Venkatta Rama Reddy & K S Nanjunda Rao – New Age International Publishers
- Integrated Life Cycle Design of Structures – By Asko Sarja – SPON Press
- Non conventional Energy Resources – By D S Chauhan and S K Sreevasthava – New Age International Publishers
- Buildings How to Reduce Cost – Laurie Backer - Cost Ford

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BVBT604
GREEN BUILDINGS

Course objectives:

- Understand the Definition, Concept & Objectives of the terms cost effective construction and green building.
- Apply cost effective techniques in construction.
- Apply cost effective Technologies and Methods in Construction.
- Understand the Problems due to Global Warming.
- State the Concept of Green Building.
- Understand Green Buildings.

Course outcomes:

At the end of the course the student will be able to:

- Select different building materials for construction.
- Apply effective environmental friendly building technology.
- Analyze global warming due to different materials in construction.
- Analyze buildings for green rating.
- Use alternate source of energy and effective use water.

Unit - 1 **08**

- **Green Building Technologies:** Introduction- Necessity - Concept of Green building, sustainable development, typical features of green buildings, benefits of green buildings towards sustainable development, Green building rating systems – GRIHA (Green Rating for Integrated Habitat Assessment), IGBC and LEED, overview of the criteria as per these rating systems.

Unit - 2 **08**

- **Site selection and planning:** Criteria for site selection, preservation of landscape, soil erosion control, minimizing urban heat island effect, maximize comfort by proper orientation of building facades, day lighting, ventilation, etc. Water conservation and efficiency: Rainwater harvesting methods for roof & non-roof, reducing landscape water demand by proper irrigation systems, water efficient plumbing systems, water metering, waste water treatment, recycle and reuse systems.

Unit - 3 **07**

- **Global Warming:** Definition - Causes and Effects, Contribution of Buildings towards Global Warming - Carbon Footprint – Global Efforts to reduce carbon Emissions Green Buildings – Definition - Features- Necessity – Environmental benefit - Economical benefits - Health and Social benefits - Major Energy efficient areas for buildings – Embodied Energy in Materials Green Materials - Comparison of Initial cost of Green V/s Conventional Building

Unit - 4 **07**

- **Building materials:** Methods to reduce embodied energy in building materials: use of local building materials; use of natural and renewable materials like bamboo, timber, rammed earth, stabilized mud blocks; use of materials with recycled content such as blended cements, pozzolana cements, fly ash bricks, various types of tiles (thermal resistant), materials from agro and industrial waste. reuse of waste and salvaged materials, waste management: handling of construction waste materials, separation of household waste, onsite and off-site organic waste management.
- Utility of solar energy in buildings, utility of solar energy in buildings concepts of solar passive cooling and heating of buildings, low energy cooling, green composites for buildings, water utilisation in buildings, low energy approaches to water management, management of solid wastes, management of sullage water and sewage, urban environment and green buildings, green cover and built environment.

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- Charles J. Kibert, Sustainable Construction – Green Building Design and Delivery, John Wiley & Sons, New York, 2008.

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