



**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH
AND STUDIES**

**(Deemed to be University under section 3 of the UGC Act,
1956)**

FACULTY OF ARCHITECTURE AND DESIGN

DEPARTMENT OF ARCHITECTURE

CURRICULUM

AND

SCHEME OF EXAMINATION

(BACHELOR OF ARCHITECTURE)

BATCH: 2021-25

FOREWORD

This is to certify that this booklet contains the entire Curriculum and Scheme of Examination of Bachelor of Architecture (B.Arch) being offered at Department of Architecture and Design of this University. This has been duly vetted and finally approved by the Academic Council of the University vide **MRIIRS/29thAC/2019/001** held on **5th July, 2019** and changes, if any deemed appropriate, shall be duly incorporated after the necessary approval by the Academic Council.

This Curriculum and Scheme of Examination of B.Arch shall be implemented w.e.f. AY 2019-20.

Date:
MRIIRS

Prof. (Dr.) Naresh Grover
Dean-Academics,

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FACULTY OF ARCHITECTURE AND DESIGN

PREAMBLE

The Bachelor of Architecture degree program prepares students for professional Practice in the field of Architecture. Being an undergraduate program, it has bright scope, providing exposure to a variety of interests in this field and assisting students to discover their own directions for future development.

There is increasing recognition today of Architecture as an intellectual discipline, both as art & science and as a profession. Through architectural design, Architects make vital contributions in defining and shaping our environment and future of society with the use of appropriate technologies for a diverse range of situations, both in the rural and urban contexts.

Considering the diverse Indian complexities in terms of social, cultural, geographical, Climatic, economic and technical aspects, which are unique and typical of every region in our country, the task for the profession of Architecture becomes all the more challenging.

Making provision of most optimum and sustainable solutions/ options, to address the basic needs of living, working and care of body and soul(three basic human functions) of even the poorest of the poor, to lead a productive and dignified life, demand appropriate skills, understanding, knowledge and a deep commitment to professed ideals. Addressing Architectural Design as a comprehensive creative process, this UG program leading to B. Architecture, is based on the following broad objectives;

- a) To stimulate sensitivity and unveil creative talents.
- b) To reinforce intellectual capabilities and develop proficiency in professional skills to enable graduates to competently pursue alternative careers, within the broad spectrum of architecture.
- c) To provide opportunities to students to try out the role they will eventually play as responsible members of the society, under supervision and interactive guidance.

Keeping in view the above objectives, this program aims at attaining a high level of Excellence in Architectural Design with sound knowledge of Construction. To this end, the Architectural Design and Building Construction & Materials is seen as the core of

the program with supportive inputs from courses in other streams like Professional, Technological and Humanities to built upon a strong foundation of enabling skills in Communications, understanding and analysis. The emphasis is on the development of Faculties of discernment and decision-making with the aid of both objective information and subjective attitudes, based on reason and logic.

Architectural Design, being the core discipline of the course has been dealt in detail and major guidelines have been framed regarding the specific content of these courses. Design tests and group design exercise have been introduced so as to aim for both individual and collective excellence in equal measure. Special emphasis will be laid on the organization of seminars in both compulsory and elective courses in all streams so that students get opportunities in public speaking and become more articulate in direct presentation of their ideas.

To enhance the employability factor of the students, subjects such as Sociology & Psychology of Architecture, CAD I, Green & Intelligent Buildings, Professional Training, Research Methodology, Town Planning, Project Management, Professional Practice are an integral part of the curriculum.

To develop the future architect`s entrepreneurship skill and inclination, subjects such as Communication Skills, Project Management & Professional Practice are a part of the curriculum.

With a major focus on the student's skill development to enhance his learning and employability in the job market, subjects such as Communication Skills, Architectural Graphics & Model Making I, Workshop I, Architectural Graphics II, Workshop & Model Making, Interior Design, Urban Design and Traffic & Transportation are a part of the curriculum.

Given the complexities of present-day Design projects, the Architect's role is not only that of a team leader but also that of a co-coordinator. He needs to possess a sound knowledge of entire spectrum of technologies which go in the making of state of art built

environment, to be able to draw up an integrated framework for activities of the other members of the team, to direct them and to assume overall responsibility for the collective effort. This is manifest in the course in the Technological and professional streams.

ABOUT THE DEPARTMENT

Faculty of Architecture & Design (FAD) is the design Faculty of MRIIRS which equips students with the competencies necessary for being creative professional Designers and Architects and exposes them to the aesthetic, technical, social, political and ethical dimensions of the designed built environment. Courses, seminars and workshops which run parallel to studios expose students to various other dimensions of design and architecture. FAD aims to foster an innovative and intellectually vibrant learning environment in the field. The quality of education offered matches the international standards of design education.

Presently department offers following programs:

- **B Arch** (Bachelor of Architecture)- 5 yr full time
- **B.Sc.- ID** (Bachelor of Science in Interior Design) 3 yr full time
- **B Des** (Bachelor of Design with specialization in Product Design / Animation and VFX / Graphic Design) 4 yr full time
- **M.Sc.- ID** (Master of science in Interior Design) 2 yr full time

Gain access to a wide range of disciplines.

Ours is one of the leading design programs to offer degrees at the undergraduate and graduate within a top-ranked multidisciplinary research university. Located in Faridabad, Haryana, Manav Rachna is a unique place where design, arts, sciences, and humanities converge. We promote an integrated design process that incorporates perspectives from each of these disciplines.

You'll work with people at every point in their careers, with experience in fields as varied as journalism, engineering, fine arts, psychology, business—and of course, design. You'll also have the opportunity to build a strong and diverse professional network with others who are among the best in their fields.

A solid foundation for your next steps.

At its heart, design is about solving problems. It's no wonder businesses and institutions are embracing the value of design, and the demand for design professionals has never been greater. Organizations are actively seeking new approaches to problem solving in the face of escalating business, social, and environmental challenges.

Our programs prepare you for top jobs in leading companies and organizations today, while teaching you to design with future generations in mind. In recent rankings of design schools based on career outcomes, our programs consistently come out on top. Our alumni go on to some of the most desirable positions in the field, with multinational companies, design firms, and nonprofits. Some become design researchers and educators, and many start their own businesses. The career possibilities—and your potential to make an impact on the world—are limitless.

BACHELOR OF ARCHITECTURE

VISION- *DESIGN YOUR CREATIVE FUTURE AT MANAV RACHNA*

The vision of Faculty of Architecture & Design, MRIIRS is to enhance, consolidate & revitalize the thought process of design, thus evolving strong knowledge base that is progressive and dynamic and which is more relevant to the evolving socioeconomic and geographical context.

MISSION

M1 We're not anticipating the future. We're creating it

FAD students go beyond aesthetic and technical expertise to think about their work and its effects on others. Our graduate Programs-all remarkably diverse in their area of emphasis, methods of teaching and curricula-stress this core sensibility while pushing students to create meaningful work.

M 2 We help you go out in the world

At the Design Centre's highly respected Sponsored projects program engages corporations both domestically and internationally who wants to explore the future of design through the fresh perspective of students.

M3 We are Connecting good design to the outside world

Design shop will provide a testing ground for validating the design idea developed by FAD students/faculty/technical staff through direct consumer feedback. This will encourage more people to visit the school public interface areas like Design Gallery, Shops etc., thereby getting directly or indirectly exposed to Design.

M4 at FAD Centre, learning extends to everybody

Serving as a gateway to the College's degree programs, public programs will offer a wide range of hands-on course for everything from advertising to zine making. The college's extension courses will offer classes to anyone seeking an access point to Design Centre's vast creative resources.

FACULTY OF ARCHITECTURE AND DESIGN

DEGREE IN ARCHITECTURE- B ARCH

PROGRAMME EDUCATION OBJECTIVES

- PEO1.** Should be able to stimulate artistic sensitivity and creative powers.
- PEO2.** Strengthen intellectual growth and the capacity to develop creative and responsible solutions to unique and changing problems.
- PEO3.** Acquire leadership capabilities necessary for the competent practice of architecture and lifelong learning..
- PEO4.** Pursue advanced education, research and development, and other creative and innovative efforts in the field of Architecture

FACULTY OF ARCHITECTURE AND DESIGN

DEGREE IN ARCHITECTURE- B ARCH

MRIRRS

PROGRAMME OBJECTIVES

- PO1. **Architectural knowledge:** Ability to gain knowledge of Humanities, Science and Architecture and the application of knowledge in practice.
- PO2. **Problem analysis:** Identify, formulate, research literature, and analyze complex architectural issues reaching substantiated conclusions using basic principal in Architectural Design
- PO3. **Design/development of Architectural solutions:** Identify and solve the social, economical and cultural issues with appropriate consideration for the public health and safety, and environmental considerations.
- PO4. **Conducting Investigation of Complex Architectural Problems:** Use research-based knowledge and research methods and apply theoretical knowledge to Architectural Design solutions.
- PO5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering tools including prediction and modelling to complex architectural shapes with an understanding of the limitations.
- PO6. **The Architect and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional architectural practice.
- PO7. **Environment and sustainability:** Understand the impact of the professional architectural solutions in societal and environmental contexts, and demonstrate the knowled
- PO8. ge of, and need for sustainable development.
- PO9. **Ethics:** Recognize the ethical and professional responsibilities and the norms of Architectural practice..
- PO10. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- PO11. **Communication:** Communicate effectively on real life situation with the construction community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO12. **Project management and finance:** Demonstrate knowledge and understanding of the architecture and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO13. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological advancements in the building construction industry.

PROGRAMME SPECIFIC OBJECTIVES

- PSO1. Ability to enhance creative design skills in attaining design solutions in architecture
- PSO2. To understand the design complexity of the designed structure and use appropriate building construction techniques and technology for the particular structure.

Mapping of PEOs, POs & PSOs

POs / PSOs PEOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
PEO 1	2	3	3	3	3	3	1	-	1	2	3	3	2	2
PEO 2	2	3	2	1	2	2	3	3	3	3	3	2	3	2
PEO 3	3	3	2	1	3	2	1	1	1	1	3	1	3	1
PEO 4	2	2	3	3	3	1	2	1	1	2	2	1	2	3

Choice Based Credit System

Credit based system of study and student's performance/progress is measured by the number of credits that he/she has earned, i.e. completed satisfactorily. Based on the course credits and grade obtained by the student, grade point average is calculated

(a) Course credits assignment

Each course has a certain number of credits assigned to it depending upon its duration in periods for lecture, tutorial, practical and studio in a week. A few courses/activities are without credit (s) and are referred to as Audit Pass Courses (APC) but are mandatory to pass as a partial fulfillment of award of degree.

(b) Earning of credits

At the end of every course, a letter "Grade" shall be awarded in each course for which a student has registered. On obtaining a minimum Pass Grade, student shall accumulate the course credits as Earned Credits. A student's performance shall be measured by the number of credits that he/she has earned and by the weighted grade point average. Grades obtained in the audit courses shall not be counted for computation of grade point average, however shall be mandatory to pass as a partial fulfillment of award of degree.

For Award of Degree of a programme **Bachelor of Architecture**

he/she has to earn minimum **290.50 credits** during the **5 year duration** of the programme **in 10 semesters**.

The total credits required to be earned have been further classified under two baskets of courses: "Compulsory Courses Basket", and "Elective Courses Basket".

The **total credits 264.50 required** to be earned under "**Compulsory Courses Basket**"

and **26 credits** under "**Elective Courses Basket**".

All courses under "Compulsory Courses Basket", are required to be qualified and cleared/pass by each and every students enrolled under the programme and are semester-wise listed in the study scheme along with credits assigned to each course.

Under Elective Courses Basket, there will be three types of courses:

- Semester-wise courses offered by the department itself
- Open/Inter-disciplinary courses offered at the Institute/University level notified from the office of Dean-Academics.
- Massive Open Online Courses (MOOCs) available on SWAYAM Platform or any other platform as recommended by UGC/AICTE and notified from the office of Dean-Academics.

Each course shall have credits assigned to it. Student shall be required to register courses every semester for as many courses/credits specified under "Elective Courses Basket" depending upon his/her interest, capability/pace of learning and availability of time slot (without any clash in time table) so as to earn all required total credits under the "Elective Courses Basket" during the entire programme duration.

However, for registration of courses [including courses under "Compulsory Courses Basket", "Elective Courses Basket" and Previous Semester Courses (wherein he/she was declared in-eligible on the basis of attendance or he/she could not clear the course within permissible given chances)], if any, the maximum limit in a semester shall be 30 credits.

Programme: BACHELOR OF ARCHITECTURE

Study Scheme at a Glance

Fundamental	Cores	Ability Enhancement Courses (AEC)	Skill Enhancement Courses (SEC)	Domain Specific Electives under Compulsory basket*	Domain Specific Electives under Elective basket**
SEMESTER 01					
	ARCHITECTURAL DESIGN-I	COMMUNICATION SKILLS	ARCHITECTURAL GRAPHICS AND MODEL MAKING-I	ENVIRONMENTAL STUDIES	In addition to above Domain Specific Electives Interdisciplinary, Generic, online courses (MOOCs) to be offered shall be notified by the Academic Branch of the University well before start of Semester I Academic Session.
	BUILDING MATERIALS AND CONSTRUCTION-I		WORKSHOP-I		
	ARCHITECTURAL DRAWING 3-I		SURVEYING AND LEVELLING-I		
SEMESTER 02					
	ARCHITECTURAL DESIGN-II	STRUCTURE DESIGN-II	ARCHITECTURAL GRAPHICS-II	CLIMATE LOGY	In addition to above Domain Specific Electives Interdisciplinary, Generic, online courses (MOOCs) to be offered shall be notified by the Academic Branch of the University well before start of Semester I Academic Session.
	BUILDING MATERIALS AND CONSTRUCTION-II	SOCIOLOGY AND PSYCHOLOGY OF ARCHITECTURE	WORKSHOP AND MODEL MAKING-II		
	ARCHITECTURAL DRAWING 3-II		SURVEYING AND LEVELLING-II		
SEMESTER 03					
	ARCHITECTURAL DESIGN-III	HISTORY OF ARCHITECTURE-I	WORKSHOP AND MODEL MAKING-III		In addition to above Domain Specific Electives Interdisciplinary, Generic, online courses (MOOCs) to be offered shall be notified by the Academic Branch of the University well before start of Semester I Academic Session.
	BUILDING MATERIALS AND CONSTRUCTION-III	STRUCTURE DESIGN-III			
	ARCHITECTURAL DRAWING 3-III	PRINCIPLE OF HUMAN SETTLEMENT-I			
SEMESTER 04					
	ARCHITECTURAL DESIGN-IV	HISTORY OF ARCHITECTURE-II		INTRODUCTION TO COMPUTERS-I	In addition to above Domain Specific Electives Interdisciplinary, Generic, online courses (MOOCs) to be offered, shall be notified by the Academic Branch of the University well before start of Semester I Academic Session.
	BUILDING MATERIALS AND CONSTRUCTION-IV	STRUCTURE DESIGN-IV		VERNACULAR ARCHITECTURE	
		BUILDING SERVICES-I			
		PRINCIPLE OF HUMAN SETTLEMENT-II			
SEMESTER 05					
	ARCHITECTURAL DESIGN-V	HISTORY OF ARCHITECTURE-III		INTRODUCTION TO COMPUTERS-II	In addition to above Domain Specific Electives Interdisciplinary, Generic, online courses (MOOCs) to be offered, shall be notified by the Academic Branch of the University well before start of Semester I Academic Session.
	BUILDING MATERIALS AND CONSTRUCTION-V	STRUCTURE DESIGN-V		BUILDING ECONOMICS AND TECHNOLOGIES-I	
		BUILDING SERVICES-II			
		PRINCIPLE OF HUMAN SETTLEMENT-III			
		LANDSCAPE ARCHITECTURE-I			
SEMESTER 06					
	ARCHITECTURAL DESIGN-VI	HISTORY OF ARCHITECTURE-IV		COMPUTER APPLICATION (CAD)	In addition to above Domain Specific Electives Interdisciplinary, Generic, online courses (MOOCs) to be offered, shall be notified by the Academic Branch of the University well before start of Semester I Academic Session.
	BUILDING MATERIALS AND CONSTRUCTION-VI	STRUCTURE DESIGN-VI		GREEN AND INTELLIGENT BUILDINGS	
		BUILDING SERVICES-III			
		PRINCIPLE OF HUMAN SETTLEMENT-IV			
		LANDSCAPE ARCHITECTURE-II			
SEMESTER 07					
	ARCHITECTURAL DESIGN-VII	HISTORY OF ARCHITECTURE-V		URBAN DESIGN	In addition to above Domain Specific Electives Interdisciplinary, Generic, online courses (MOOCs) to be offered, shall be notified by the Academic Branch of the University well before start of Semester I Academic Session.
	BUILDING MATERIALS AND CONSTRUCTION-VII	STRUCTURE DESIGN-PROJECT		TRAFFIC AND TRANSPORTATION	
		BUILDING SERVICES-IV		INTERIOR DESIGN	
				HOUSING FOR URBAN POOR	
SEMESTER 08					
			PROFESSIONAL TRAINING		
SEMESTER 09					
	ARCHITECTURAL DESIGN-VIII	RESEARCH METHODOLOGY			In addition to above Domain Specific Electives Interdisciplinary, Generic, online courses (MOOCs) to be offered, shall be notified by the Academic Branch of the University well before start of Semester I Academic Session.
	BUILDING MATERIALS AND CONSTRUCTION-VIII	TOWN PLANNING			
		BUILDING BYELAWS			
		TALL BUILDINGS			
SEMESTER 10					
	ARCHITECTURAL THEORY	PROJECT MANAGEMENT			
	BUILDING MATERIALS AND CONSTRUCTION-IX	PROFESSIONAL PRACTICE			
MINIMUM CREDITS REQUIRED THROUGH COMPULSORY COURSES - 264.50					
MINIMUM CREDITS REQUIRED THROUGH ELECTIVE COURSES - 26					

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FACULTY OF ARCHITECTURE AND DESIGN											
DEPARTMENT OF ARCHITECTURE											
STUDY SCHEME BATCH - 2019											
SEMESTER- I											
Course Code	Title of Course	Periods/Week					CONTINUOUS ASSESSMENT	END SEM EXAM	TOTAL	Duration and mode of Exam	Credits
		L	T	P	S	Total					
COMPULSORY COURSES											
AR-101 A	ARCHITECTURAL DESIGN-I	0	0	0	9	9	200	100	300	Design Evaluation & Viva Voce	9
AR-102 A	BUILDING MATERIALS & CONSTRUCTION-I	0	0	0	4	4	100	50	150	Practical Examination & Viva voce	4
AR-103 A	ARCHITECTURAL DRAWING-I	0	0	0	4	4	100	50	150	Practical Examination & Viva voce	4
AR-104 A	ARCHITECTURAL GRAPHICS & MODEL MAKING-I	0	0	0	4	4	100	50	150	Practical Examination & Viva voce	4
AR-106 A	WORKSHOP-I	0	0	2	0	2	60	40	100	Practical Examination & Viva voce	1
AR-109 A	COMMUNICATION SKILLS	2	0	0	0	2	60	40	100	3 Hours Theory Examination	2

AR-110	SURVEYING & LEVELING-I	1	0	1	0	2	60	40	100	3 HR Theory Examination	1.5
ELECTIVES COURSES											
CH-202B	ENVIRONMENTAL STUDIES	4	0	0		4	100	100	200	3 Hours Theory Examination	4
						31					29.5

* Under Elective Courses, beside the mentioned Domain Specific Elective Courses, other Inter-disciplinary, Generic, on-line Courses (MOOCs etc) and other approved courses shall be offered, which shall be notified well before start of the semester. The student shall be required and allowed to opt the courses out of offered courses as per maximum limit for maximum credits and for the category of Elective Courses under University Rules.

SEMESTER- II											
Course Code	Title of Course	Periods/Week					CONTINUOUS ASSESSMENT	END SEM EXAM	TOTAL	Duration and mode of Exam	Credits
		L	T	P	S	Total					
COMPULSORY COURSES											
AR-201A	ARCHITECTURAL DESIGN-II	0	0	0	9	9	200	100	300	Design Evaluation & Viva Voce	9
AR-202A	BUILDING MATERIAL & CONSTRUCTION-II	0	0	0	4	4	100	50	150	Practical Examination & Viva voce	4
AR-203A	ARCHITECTURAL DRAWING-II	0	0	0	4	4	100	50	150	Practical Examination & Viva voce	4
AR-204A	ARCHITECTURAL GRAPHICS -II	0	0	0	3	3	100	50	150	Practical Examination & Viva voce	3
AR-205A	STRUCTURAL DESIGN-II	2	0	0	0	2	60	40	100	3 Hours Theory Examination	2
AR-206A	WORKSHOP & MODEL MAKING-II	0	0	3	0	3	60	40	100	Practical Examination & Viva voce	1.5

AR-207A	SOCIOLOGY & PSYCHOLOGY OF ARCHITECTURE	2	0	0	0	2	60	40	100	3 Hours Theory Examination	2
AR-210	SURVEYING & LEVELING-II	1	0	1	0	2	60	40	100	3 HR Theory Examination	1.5
ELECTIVES COURSES											
AR-209 B	CLIMATOLOGY	2	0	0	0	2	60	40	100	3 HR Theory Examination, Practical Examination & Viva voce	2
						31					29

*** Under Elective Courses, beside the mentioned Domain Specific Elective Courses, other Inter-disciplinary, Generic, on-line Courses (MOOCs etc) and other approved courses shall be offered, which shall be notified well before start of the semester. The student shall be required and allowed to opt the courses out of offered courses as per maximum limit for maximum credits and for the category of Elective Courses under University Rules.**

SEMESTER- III

Course Code	Title of Course	Periods/Week					CONTINUOUS ASSESSMENT	END SEM EXAM	TOTAL	Duration and mode of Exam	Credits
		L	T	P	S	Total					
COMPULSORY COURSES											
AR-301 A	ARCHITECTURAL DESIGN - III	0	0	0	9	9	200	100	300	Design Evaluation & Viva Voce	9
AR-302 A	BUILDING MATERIAL & CONSTRUCTION - III	0	0	0	5	5	100	50	150	Practical Examination & Viva voce	5
AR-303A	ARCHITECTURAL GRAPHICS - III	0	0	0	7	7	100	50	150	Practical Examination & Viva voce	7

AR-304A	HISTORY OF ARCHITECTURE - I	2	0	0	0	2	60	40	100	3 Hours Theory Examination	2
AR-305A	STRUCTURAL DESIGN - III	2	0	0	0	2	60	40	100	3 Hours Theory Examination	2
AR-309	WORKSHOP & MODEL MAKING-III	0	0	3	0	3	60	40	100	Practical Examination & Viva voce	1.5
AR-310	PRINCIPAL OF HUMAN SETTLEMENT-I	2	0	0	0	2	60	40	100	3 Hours Theory Examination	2
						30					28.5

SEMESTER- IV

Course Code	Title of Course	Periods/Week					CONTINUOUS ASSESSMENT	END SEM EXAM	TOTAL	Duration and mode of Exam	Credits
		L	T	P	S	Total					
COMPULSORY COURSES											
AR-401 A	ARCHITECTURAL DESIGN - IV	0	0	0	9	9	200	100	300	Design Evaluation & Viva Voce	9
AR-402 A	BUILDING MATERIAL & CONSTRUCTION - IV	0	0	0	5	5	100	50	150	Practical Examination & Viva voce	5
AR-404A	HISTORY OF ARCHITECTURE - II	2	0	0	0	2	60	40	100	3 Hours Theory Examination	2
AR-405 B	STRUCTURAL DESIGN - IV	4	0	0	0	4	60	40	100	3 Hours Theory Examination	4

AR-308A	BUILDING SERVICES - I (WATER SUPPLY & SANITATION)	2	0	0	0	2	60	40	100	3 Hours Theory Examination	2
AR-409	PRINCIPAL OF HUMAN SETTLEMENT	2	0	0	0	2	60	40	100	3 Hours Theory Examination	2
ELECTIVES COURSES											
AR-108A	INTRODUCTION TO COMPUTERS - I	0	0	4		4	100	50	150	Practical Examination & Viva voce	2
AR-408A	VERNACULAR ARCHITECTURE	2	0	0		2	60	40	100	3 Hours Theory Examination	2
						30					28

SEMESTER- V

Course Code	Title of Course	Periods/Week					CONTINUOUS ASSESSMENT	END SEM EXAM	TOTAL	Duration and mode of Exam	Credits
		L	T	P	S	Total					
COMPULSORY COURSES											
AR-501 A	ARCHITECTURAL DESIGN - V	0	0	0	9	9	200	100	300	Design Evaluation & Viva Voce	9
AR-502 A	BUILDING MATERIAL & CONSTRUCTION - V	0	0	0	5	5	100	50	150	Practical Examination & Viva voce	5
AR-504 B	HISTORY OF ARCHITECTURE - III	2	0	0	0	2	60	40	100	3 Hours Theory Examination	2
AR-505 B	STRUCTURAL DESIGN - V	4	0	0	0	4	60	40	100	3 Hours Theory Examination	4

AR-406 A	BUILDING SERVICES - II (ELECTRICAL SERVICES & ILLUMINATION)	2	0	0	0	2	60	40	100	3 Hours Theory Examination	2
AR-508 B	LANDSCAPE ARCHITECTURE - I	4	0	0	0	4	60	40	100	3 Hours Theory Examination	4
ELECTIVES COURSES											
AR-208 B	INTRODUCTION TO COMPUTERS - II	0	0	3	0	3	60	40	100	Practical Examination & Viva voce	1.5
AR-506 B	BUILDING ECONOMICS & TECHNOLOGIES-I	2	0	0	0	2	60	40	100	3 Hours Theory Examination	2
						31					29.5

SEMESTER- VI											
Course Code	Title of Course	Periods/Week					CONTINUOUS ASSESSMENT	END SEM EXAM	TOTAL	Duration and mode of Exam	Credits
		L	T	P	S	Total					
COMPULSORY COURSES											
AR-601 A	ARCHITECTURAL DESIGN - VI	0	0	0	9	9	200	100	300	Design Evaluation & Viva Voce	9
AR-602 A	BUILDING MATERIAL & CONSTRUCTION - VI	0	0	0	5	5	100	50	150	Practical Examination & Viva voce	5
AR-603 B	ESTIMATING COSTING AND	2	0	0	0	2	60	40	100	3 Hours Theory	2

	SPECIFICATI ONS										Examinati on	
AR-604 B	HISTORY OF ARCHITECTU RE - IV	2	0	0	0	2	60	40	100		3 Hours Theory Examinati on	2
AR-605 B	STRUCTURAL DESIGN - VI	4	0	0	0	4	60	40	100		3 Hours Theory Examinati on	4
AR-608 B	BUILDING SERVICES-IV (MECHANICAL SYSTEMS / SERVICES AND HVAC)	2	0	0	0	2	60	40	100		3 Hours Theory Examinati on	2
ELECTIVES COURSES												
AR- 403 A	COMPUTER APPLICATION (CAD) - I	0	0	3	0	3	60	40	100		Practical Examinati on & Viva voce	1.5
AR-607 A	GREEN AND INTELLIGENT BUILDINGS	3	0	0	0	3	60	40	100		3 Hours Theory Examinati on	3
						30						28.5

SEMESTER- VII											
Course Code	Title of Course	Periods/Week					CONTINUOUS ASSESSMENT	END SEM EXAM	TOTAL	Duration and mode of Exam	Credits
		L	T	P	S	Total					
COMPULSORY COURSES											
AR-701	ARCHITECTURAL DESIGN - VII	0	0	0	9	9	200	100	300	Design Evaluation & Viva Voce	9
AR-702	BUILDING MATERIAL & CONSTRUCTION - VII	0	0	0	5	5	100	50	150	Practical Examination & Viva voce	5
AR-705 A	STRUCTURAL DESIGN - PROJECT	1	0	2	0	3	60	40	100	Report	3
AR-507 B	BUILDING SERVICES - III (LIGHTING & ACOUSTICS)	2	0	0	0	2	60	40	100	3 Hours Theory Examination	2
AR-703 A	URBAN DESIGN	3	0	0	0	3	60	40	100	3 Hours Theory Examination	3
AR-704 A	TRAFFIC AND TRANSPORTATION	3	0	0	0	3	60	40	100	3 Hours Theory Examination	3
AR-706 A	INTERIOR DESIGN	3	0	0	0	3	60	40	100	Design Evaluation	3

											n & Viva Voce 6 Hours	
AR-707 A	HOUSING FOR URBAN POOR	3	0	0	0	3	60	40	100		3 Hours Theory Examination	3
ELECTIVES COURSES (ANY ONE)												
AR-708 A	SMART CITIES											
AR-709 A	HILL ARCHITECTURE	3	0	0	0	3	60	40	100		3 Hours Theory Examination	3
AR-710 A-	TALL BUILDINGS											
						34						34

SEMESTER- VIII								
Course Code	Title of Course	NATURE OF COURSE	MARKS BY ARCHITECT'S OFFICE GIVING TRAINING	INTERNAL MARKS	EXTERNAL MARKS	TOTAL	Duration and mode of Exam	Credits
COMPULSORY COURSES								
AR-801	PROFESSIONAL TRAINING	STUDIO	200	400	500	1100	Practical Portfolio & Viva Voce	32

SEMESTER- IX											
Course Code	Title of Course	Periods/Week					CONTINUOUS ASSESSMENT	END SEM EXAM	TOTAL	Duration and mode of Exam	Credits
		L	T	P	S	Total					
COMPULSORY COURSES											
AR-901	ARCHITECTURAL DESIGN - IX	0	0	0	12	12	350	150	500	Design Evaluation & Viva Voce	12
AR-902	ADVANCED BUILDING CONSTRUCTION - IX	0	0		5	5	100	50	150	Practical Examination & Viva voce	5
AR-903 A	RESEARCH METHODOLOGY (DISSERTATION)	3	0	0	0	3	60	40	100	Practical Examination & Viva voce	3
AR-904 A	TOWN PLANNING	4	0	0	0	4	60	40	100	3 Hours Theory Examination	4
AR - 905 A	DISASTER MANAGEMENT	2	0	0	2	2	60	40	100	3 Hours Theory Examination	2
ELECTIVES COURSES (ANY ONE)											
AR-906 A	ARCHITECTURE CONSERVATION	3	0	0	0	3	60	40	100	3 Hours Theory Examination	3
AR-907 A	BUILDING VALUATION										
AR-908 A	ARCHITECTURE JOURNALISM										
ELECTIVES COURSES (ANY ONE)											
AR-909 A	REAL ESTATE MANAGEMENT						60	40	100	3 Hours Theory Examination	3
AR-910 A	ADVANCE INTERIOR DESIGN	3	0	0	0	3					

AR-911 A	ARCHITECTURE PHOTOGRAPHY															
						32										32

SEMESTER- X													
Course Code	Title of Course	Periods/Week					CONTINUOUS ASSESSMENT	END SEM EXAM	TOTAL	Duration and mode of Exam	Credits		
		L	T	P	S	Total							
COMPULSORY COURSES													
AR-1001	ARCHITECTURAL THESIS	0	0	0	26	26	600	300	900	Design Evaluation & Viva Voce	26		
AR-1002 A	PROJECT MANAGEMENT	3	0	0	0	3	60	40	100	3 Hours Theory Examination	3		
AR-1003 A	PROFESSIONAL PRACTICE	3	0	0	0	3	60	40	100	3 Hours Theory Examination	3		
						32					32		

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AR-101 A- ARCHITECTURAL DESIGN -I

Periods/week	Credits	Max. Marks: 300
L: 0 T: 0 P: 0 S: 9	9	Continuous Assessment: 200
Duration and Mode of Exam: Design Evaluation and Viva Voce		End Semester Exam : 100

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will able

- AR 101.1. To understand the application of visual grammar in the domain of Visual design
- AR 101.2. To visualize the effect of color in built form and objects
- AR 101.3. To critique basic design composition
- AR 101.4. To evaluate the human activities in built environment
- AR 101.5. To create composition with various 2D and 3D media with various mediums
- AR 101.6. To analyze the physical dimension of human body and design spaces accordingly

PART-A

Unit 1: Design theory and its application

- 1.1 Elements of Design,
- 1.2 Point, Line, Plane.
- 1.3 Visual Grammar & Gestalt principles

Unit 2: Color theory and its application

- 2.1 Creation of Color wheel and relationships among various color
- 2.2 Colors in built form and objects
- 2.3 Design of two dimensional composition in black and white medium
- 2.4 Design of two dimensional composition in color medium

Unit 3: Basis of Evolution of Architecture

- 3.1 Elements of Design in basic composition
- 3.2 Evaluation of two dimensional composition with the help of above aspects
- 3.3 Application of visual grammar and gestalt principles

PART-B

Unit 4: Study of design related book/ article and its review

- 4.1 Study of one book/ article about design
- 4.2 Presentation of review in written/ verbal/ any other form of the above

Unit 5: Transformation from two dimensional shapes to three dimensional form

- 5.1 Form generation techniques – from 2D to 3D, Additive and Subtractive form
- 5.2 Construction of 3D form with various material and colors
- 5.3 Evaluation and Analysis of 3D form with visual grammar

Unit 6: Anthropometric and Ergonomics in Design devices

- 6.1 Study of relationship between human body movement and human activity
- 6.2 Relationship between human activity and built space
- 6.3 Measured drawing of human activity space – a case study

Text Books/ Reference Books:

1. Ching Francis D.K., (2012), Architecture: Form, Space and Order, 3rd edition, John Wiley & Sons, Hoboken.
2. V.S. Parmar, (1997), Design Fundamentals, Somaiya Publisher Pvt. Ltd, Mumbai.
3. Scott Van Dyke, (1990), Form, Line to Design, Van Nostrand Reinhold.
4. Giedion Sigfried, (2009), Space, Time and Architecture, revised edition, Harvard University Press, Cambridge.
5. Donald Watson, Michael J. Crosbie, Time Saver Standard, 8th Edn.

Software required/Weblinks:

Instructions for paper setting: The subject will be assessed through a design evaluation and Viva Voce.

Assessment Tools:

Portfolio Submissions
 Sessional tests
 Design Evaluation & Viva Voce

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR 101)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR 101.1	2	1	-	-	1	-	-	-	-	2	-	2	3	-
AR 101.2	1	-	1	-	2	-	-	-	1	2	-	3	3	-
AR 101.3	1	-	-	1	-	-	-	2	1	3	-	1	1	-
AR 101.4	-	-	-	-	-	3	1	1	2	2	1	2	2	1
AR 101.5	1	1	1	-	2	-	-	-	1	2	-	1	1	-
AR 101.6	2	2	1	1	1	2	-	1	2	-	-	2	1	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR- 102 A: BUILDING MATERIALS & CONSTRUCTION-I

Periods/week	Credits	Max. Marks: 150
L: 1 T: 0 P: 1 S: 4	4	Internal/Continuous Assessment: 100
Duration and Mode of Exam: Practical Examination & Viva Voice		End Semester Exams: 50

Pre-requisites: NIL

Course Type: Program Core

Course Outcome

- AR-102.1. Develop knowledge of basic tools used in construction.
- AR-102.2. Develop knowledge of material science and behavior of various materials used in construction.
- AR-102.3. To **understand** the basic construction methods and elements used in building construction.
- AR-102.4. To **understand** the types of bricks and bonds used in building construction.

PART-A

Unit 1: Bricks

- 1.1 Terminology used in Brick Masonry.
- 1.2 Types of Bricks and Closers in Brick Masonry

Unit 2: Types and Properties of Materials

- 2.1 properties and uses of Mortar, Lime Mortar, Cement Mortar,
- 2.2 Surkhi Mortar and Mud Mortar

PART-B

Unit 3: Bonding

- 3.1 Types of bonds: English, single and double Flemish
- 3.2 L- junctions, T- junctions, Cross junction in brick masonry

Unit 4: Various Components of Building

- 4.1 Lintels, Sills, Coping and Threshold details.
- 4.2 Design of simple brick jalli
- 4.3 Arches- Types and Constructions.

Text Books/ Reference Books:

1. Building Construction by PC Verghese
2. Building Construction by Rangwala .
3. Building Construction by W. B. Mckay.
4. Building Materials by P. C. Varghese.
5. Building Construction Handbook by R. Chudley .
6. Building Construction Illustrated by Francis D.K.Ching
7. Barry's Introduction to construction of Buildings by Stephen Emmitt & Christopher Gorse

Scheme of Evaluation :

- Progressive evaluation of studio based work in the form of design solutions, portfolios, visual presentations , models , virtual models , seminar presentations, case studies etc.
- End semester combined evaluation by internal and external examiners of the total work done in the semester including viva voce and External Examination – Weight age 50% of total marks for passing in **Internal & External separately**

Assessment Tools:

Continuous Evaluation will be based on Assignment, Project, Attendance, Class Test and Performance in both Sessional Exams.

Sessional I	20%
Sessional II	20%
Assignment	50%
Class Performance	5%
Attendance	5%

Course Articulation Matrix

CO Statement (AR 102)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS 1	PS 2	PS 3	PS 4
AR -102.1	1	-	-	1	-	-	-	2	1	3	-	1	1	-	1	-
AR – 102.2	1	1	1	-	2	-	-	-	1	2	-	1	1	-	1	1
AR -102.3	2	2	1	1	1	2	-	1	2	-	-	2	1	1	2	2
AR -102.4	1	1	1	-	2	-	-	-	1	2	-	1	1	-	1	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR-103 A: ARCHITECTURAL DRAWING - I

Periods/week	Credits	Max. Marks : 150
L: 0 T: 0 P: 0 S: 4	4	Continuous Assessment : 100
Duration and Mode of Exam: Practical Examination & Viva Voce		End Semester Exam : 50

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

- AR-103.1. Understand the concepts and fundamentals of architectural drawing. Select drawing tools and techniques for drafting and freehand drawing for architectural design communication.
- AR-103.2. Demonstrate a line, plane or solid into drawing using orthographic projections. Develop representation skills and to nurture the understanding of the nature of geometrical forms and basic construction techniques in terms of projections.
- AR-103.3. Identify a type of line, intensity, thickness, text to draw a shape.
- AR-103.4. Analyze the process of representation of 3 dimensional objects from 2D to 3D.
- AR-103.5. Choose the appropriate technique of projection and model to show 2 dimensional and 3 dimensional.
- AR-103.6. Make the drawings of complex compositions. Combine the 2 dimensional drawings and 3 dimension form using development of surfaces. Originate the 2 dimensional into 3 dimensional drawing using metric projection.

PART-A

Unit 1: Geometrical Drawing: Introduction to Drafting

- 1.1 Getting acquainted with necessary instruments of drawing.
- 1.2 Learning to draw straight and curved lines with different qualities.
- 1.3 Basic Lettering and annotation techniques in technical drawings.

Unit 2: Plane Geometry and Solid Geometry

- 2.1 Introduction to Descriptive Geometry, study of reference lines.
- 2.2 Construction and development of planar surface – square, rectangle, polygon etc. Introduction of multi-view projection – projection of points, lines and planes. Multi-view projection of solids – cube, prism, pyramids, cones, cylinders etc.

Unit 3: Orthographic Projections

- 3.1 Meaning of terms - Plan, Elevation, Section and understanding them by drawing simple objects through theory of Orthographic Projections of lines, planes and solids.
- 3.2 Introduction of projections, one point, two point.

PART-B

Unit 4: Isometric drawing and Techniques

- 4.1 Drawing isometric projection-2d and 3d
- 4.2 Representing and interpenetration of solids
- 4.3 Drafting and shade of 2d and 3d projections

Unit 5: Axonometric Drawing and Techniques

- 5.1 Different ways of presentation of solids in 3D projections
- 5.2 Shading Techniques in 3D projections.

Unit 6: Paraline Drawings-II

- 6.1 Different ways of presentation of solids in 3D projections
- 6.2 Geometry; Color & Texture;
- 6.3 Light & Shade in Design.

Text Books/ Reference Books:

1. N.D.Bhatt, Elementary Engineering Drawing (Plane and Solid Geometry), Charotar Publishing House, India
2. Francis Ching, (1964), Architectural Graphics, Van Nostrand Rein Hold Company, New York.
3. Robert W. Gill, (2008), Rendering with Pen and Ink, Thames & Hudson London.

Instructions for paper setting: Practical Examination & Viva Voce

Assessment Tools:

Progressive evaluation of lecture based assignments given in the form of drawings, portfolios and quiz.
 Sessional tests
 Practical examination
 Viva voce

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-103)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-103.1	3	-	2	2	3	2	-	-	3	2	1	3	3	3
AR-103.2	3	1	2	2	3	2	3	-	2	2	-	3	2	2
AR-103.3	3	3	2	3	2	-	-	-	1	3	-	3	1	1
AR-103.4	3	3	2	3	2	-	-	-	2	2	-	3	1	2
AR-103.5	2	2	2	2	2	-	3	-	3	2	-	3	1	2
AR-103.6	2	-	2	-	2	-	3	3	3	3	2	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR – 104 A: ARCHITECTURAL GRAPHICS & MODEL MAKING - I

Periods/week	Credits	Max. Marks : 150
L: 0 T: 0 P: 0 S: 4	4	Continuous Assessment : 100
Duration and Mode of Exam: Practical Examination & Viva Voce		End Semester Exam : 50

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

- AR-104.1. Recall the grammar of art by involving them in a series of free hand exercises both indoor and outdoor to understand form, proportion, scale, etc.
- AR-104.2. Demonstrate various mediums and techniques of art through which artistic expression can be achieved.
- AR-104.3. Develop presentation skills, visual expression and representation, imaginative thinking and creativity through hands on working with various mediums and materials.
- AR-104.4. Examine his/her skills, observations, visualizations, creativity, representations, etc. and guide them accordingly.
- AR-104.5. Explain about series of exercises which are graphic and abstract representations of art.
- AR-104.6. Create a series of exercises which will help the students in experiment with form and volume.

PART-A

Unit 1: Visualization & Typography

- 1.1 Observation and recording through drawing using pencil, pen, brush, charcoal, crayons and computers.
- 1.2 Understand Typography and lettering.

Unit 2: Color wheel in arts

- 2.1 Creation of Color wheel and relationships among various colors
- 2.2 Colors in built form and objects
- 2.3 Primary, Secondary & Tertiary colors
- 2.4 Warm and cool colors

Unit 2: 3-Dimensional Objects

- 2.1 Drawing simple, geometric objects, complex geometries and objects in nature.
- 2.2 Line drawing, shade and shading techniques.

PART-B

Unit 4: 2D Shapes and Patterns

- 4.1 Drawing Exercises of 2D Shapes in medium black and white with overlapping and grouping.
- 4.2 Drawing Exercises of various patterns Shapes in medium color

Unit 5: 3-Dimensional Objects

5.1 Drawing simple, geometric objects, complex geometries and objects in nature.

5.2 Line drawing, shade and shading techniques.

Unit 6: Still Life Sketching

6.1 Outdoor sketching

6.2 Nature studies with pencil ink and water colors

Text Books/ Reference Books:

1. Jaccuelina, (1991), Graphic Illustrations in Black and White, Design Press, New York.
2. Crowne Philip, (1991), Architectural Rendering', Rofovision S.A Switzerland.
3. Robert W. Gill, (2008), Rendering with Pen and Ink, Thames & Hudson London.

Instructions for paper setting: Practical Examination & Viva Voce

Assessment Tools:

Progressive evaluation of studio based work in the form of drawings, sketches, portfolios, visual presentations, models etc.

Sessional tests

Practical examination

Viva voce

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-104)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-104.1	2	2	3	3	3	3	3	1	3	3	-	3	3	3
AR-104.2	2	-	3	3	3	2	3	-	3	3	-	3	3	3
AR-104.3	3	-	3	2	3	2	2	-	3	3	-	3	3	3
AR-104.4	3	-	3	2	3	2	2	1	3	3	-	3	1	1
AR-104.5	3	-	2	2	2	1	1	1	2	3	-	2	1	1
AR-104.6	3	1	3	2	3	2	2	2	3	3	1	3	3	3

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AR-106 A: WORKSHOP -I

Periods/week Credits
L: 0 T: 0 P: 2 S: 0 1
Duration of Examination: Practical Examination and Viva Voce

Max. Marks: 100
Continuous Assessment: 60
End Semester exam: 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will able to

- AR 106.1. **Sensitize** the usage of various materials for production of art work
- AR 106.2. **Apply** different mediums and machine tools for production various types of art work
- AR 106.3. **Create** art forms with different mediums
- AR 106.4. **Use** different kinds of tools and machinery for production of design models
- AR 106.5. **Apply** fundamental architectural concepts to solve brick masonry problems
- AR 106.6. **Extract** desired understanding and conclusions consistent with objectives and limitations of the brick bond

PART-A

Unit 1: Development of Art and Craft Skills (manual skills)

- 1.1 Introduction to different hand tools and their process
- 1.2 Rules, safety and precautions
- 1.3 Learning the usage of various materials in 2D and 3D art work
- 1.4 Create an art work with the above materials by hand

Unit 2: Application of Manual and Automated Tools in Art Work

- 2.1 Learning to handle machine tools
- 2.2 Application of machine tools for art work

Unit 3: Art Work in Design

- 3.1 Study of application of art work in design field
- 3.2 Creation of art work for design presentation

PART-B

Unit 4: Brick Masonry Construction

- 4.1 Small brick masonry construction models for understanding of various bonds, jallies etc.
- 4.2 Three dimensional building blocks and forms using different materials.

Unit 5: Use of Different materials and its application

5.3 Use of Clay and Brick for creating three dimensional forms in space

Unit 6: Brick models and 3D models

6.1 Small brick masonry construction models

6.2 Model of various bonds and arches etc.

6.3 Three dimensional building blocks and forms using different materials.

Text Books/ Reference Books:

1. Morris, M., (2000), Architecture and the Miniature: Models”, John Wiley and Sons, 2000.
2. Mills, Criss B., (2000), Designing with Models: A Studio Guide to Making and Using Architectural Models”, Thomson and Wadsworth.
3. Raghuwanshi, B.S., (2001), A Course in Workshop Technology - Vol. I and II, Dhanpat Rai and Co.

Software required/Weblinks:

Instructions for paper setting:

The subject will be assessed through a practical examination and Viva Voce.

Assessment Tools:

Continuous evaluation shall be made of students work based on various models , assignments and market surveys

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR 106)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR 106.1	-	1	1	1	2	1	1	-	2	3	-	2	3	2
AR 106.2	-	2	-	-	3	-	-	1	3	3	-	3	2	1
AR 106.3	1	2	1	1	3	-	-	-	2	3	-	2	1	1
AR 106.4	1	-	2	-	2	-	-	1	1	2	1	1	-	-
AR 106.5	2	-	-	-	2	-	-	1	2	3	-	1	-	1
AR 106.6	2	1	-	2	1	-	-	3	3	3	1	2	-	-

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR-109 A: COMMUNICATION SKILLS

Periods/week Credits

L: 2 T: 0 P: 0 S: 0 2

Duration and mode of Examination: 3 Hours Theory Examination

Max. Marks: 100

Continuous Assessment: 60

End Semester Exam : 40

Pre-requisites: NIL

Course Type: Program Core

Course Outcomes

The Student will able to

AR-109.1. recognizes common errors in verbal and written skills.

AR-109.2. Identifies differences in intents within communication

AR-109.3. Demonstrate role-play based on different situations

AR-109.4. formulates the verbal and nonverbal communications

AR-109.5. Demonstrate the dictions and meanings through effective communication

AR-109.6. Able to revise judgments and change behavior in light of new evidence

PART-A

Unit 1: Understanding the basics of communication skills

1.1 Ice-breaking Exercises, practicing accents, exercises on listening skill, and exercises on writing skills.

1.2 Scope and Importance of communication

1.3 Listening, Speaking- 2 important parts of communication

1.4 Reading & Writing

Unit 2: Command on simple grammar and building up vocabulary

2.1 Assignments on Time and Tense, Agreement, Active-Passive

2.2 Time and Tense, Agreement, Active-Passive, Narration,

2.3 Use of Determiners, Prepositions & Phrasal Verbs

2.4 Word-formation, Synonyms, Antonyms, Homonyms, One-word Substitutes, Idioms and Phrases.

2.5 Collocations, Abbreviations of Scientific and Technical Words

Unit 3: Writing

3.1 To develop the ability to concisely and correctly writing and presenting ideas in a logical manner. Professional letters to fellow architects, clients, public authorities, contractors etc.

3.2 Writing of proceedings and minutes of meetings.

PART-B

Unit 4: Soft Skills

4.1 Non-Verbal Communication in Cross-Cultural Situations, Case Studies.

4.2 Assignments on E-mail Etiquette, Social Networking, Blog Writing, Discussions on Current Issues

4.3 Interpersonal Communication.

4.4 Verbal & Non-verbal communication, Body language, Persuasion.

4.5 Negotiation, Neuron-Linguistic Programming

Unit 5: Communication and media (social and popular)

5.1 Group Discussions and Readings on Topics Related to Race, Ethnicity, and Diaspora

5.2 The Social and Political Context of Communication

5.3 Recent Developments and Current Debates in Media

Unit 6: Comprehension

6.1 To locate key points in Lectures and Speeches.

6.2 To develop the ability to read and listen with understanding and draw reasoned conclusions.

Text Books/ Reference Books:

1. Raman Meenakshi and Sharma Sangeeta, "Technical Communications – Principles and Practices", Oxford University Press, New Delhi.
2. Raman, M. & Sharma, S., Technical Communication : Principles and Practice, 2nd Ed.
3. Market, Mike, 2012. Technical Communication.
4. Rizvi, M. Ashraf, Effective Technical Communication.
5. Anderson, Paul V., Technical Communication : A Reader- Centred Approach, 6 Ed.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

Assignment/Tutorials

Sessional tests

Surprise questions during lectures/Class Performance

Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR- 110: SURVEYING & LEVELING-I

Periods/week Credits
L: 1 T: 0 P:1 1.5
Duration of Examination: 3 Hrs

Max. Marks : 100
Internal/Continuous Assessment : 60
End Semester Exam : 40

Pre-requisites: NONE

Course Type: Program Core

Course Coordinator/Co-Coordinator:

Course Outcomes

- AR-110.1. To understand the concept of surveying in architecture
- AR-110.2. To understand the elementary surveying techniques
- AR-110.3. To understand the role of conventional surveying techniques
- AR-110.4. To understand the methods of levelling
- AR-110.5. To understand the direct and indirect methods of contouring and interpolation of contours
- AR-110.6. To understand the role of advance surveying techniques

PART-A

Unit 1: Introduction to surveying

- 1.1 Concept of surveying & levelling and its tactical importance for Architecture profession
- 1.2 Overview and classification of various survey techniques & equipments
- 1.3 Scaling of survey measurements and Errors in Surveying
- 1.4 Concept of Trigonometry, Traversing & Tachometry in Surveying

Unit 2: Elementary Surveying Techniques

- 2.1 Chain Surveying: Principles of survey, equipment required selection of station, methods of taking offsets. Booking the field notes, obstacles in chaining, errors in chaining, chaining on sloping ground and reciprocal ranging.
- 2.2 Compass Surveying: The prismatic compass, its construction and uses. Other types of compasses. Reduced and whole circle

Unit 3: Conventional Surveying Techniques

- 3.1 Plane Table Surveying: Equipments, methods, advantage & disadvantage, errors etc.
- 3.2 Theodolite Surveying: Theodolite's temporary & permanent adjustment, measuring of magnetic bearings, horizontal & vertical angles. Theodolite traverse & balancing closing error.
- 3.3 Tachometric Surveying: General instruments, different systems of tachometric measurements, stadia method, Subtense method.

PART-B

Unit 4: Leveling

- 4.1 Leveling: Different types of levels, their temporary and permanent adjustment, and leveling staff. Book of the readings and reduction of levels. Errors in leveling.
- 4.2 Curvature and refraction reciprocal leveling profile, leveling cross sections.

Unit 5: Contours

- 5.1 Contouring: Characteristics of contour lines
- 5.2 direct and indirect methods of contouring and interpolation of contours
- 5.3 Interpretation and preparation of contour maps.

Unit 6: Advance Survey Techniques

- 6.1 Limitations of traditional surveys techniques, limitations of DBMS and CAD packages
- 6.2 Site modeling with total station survey (TSS) and exercises in setting out of building works.
- 6.3 Measurements of coordinates and elevations of objects from various points and minimizing the errors with traversing with TSS
- 6.4 Introduction to Remote sensing & GIS- concept and definition
- 6.5 Concept of DGPS and its applications & Site modeling with DGPS

Text Books/ Reference Books:

1. Punia, B.C. et.at.2005. Surveying Vol.1,2,3, Laxmi PubI.(Pvt.) Ltd., New Delhi.
2. Duggal, S.K., 2004. Surveying Vol.1&2. Tata McGraw Hill Pub. Co. ltd. New Delhi.
3. Subramanian,R.2012. Surveying andLeveling.OxfordUniv.Press,NewDelhi.
4. Arror, K.R., 2004. Surveying Vol. 1,2,3. Standard Book House, N. Delhi.
5. Chandra, A.M., 2002. Plane Surveying. New Age International Pvt. Ltd., New Delhi.

Software required/Weblinks:

8085 Simulator
EMU-8086
<http://nptel.ac.in/downloads/106108100/>

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 10 marks.

Assessment Tools:

Assignment/Tutorials
Sessional tests

Surprise questions during lectures/Class Performance
Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-110)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-110.1	3	3	3	3	2	-	-	-	-	-	-	2	3	2
AR-110.2	3	3	3	3	2	-	-	-	-	-	-	2	3	2
AR-110.3	3	3	3	2	2	-	-	-	-	-	-	2	3	2
AR-110.4	3	3	3	2	2	-	-	-	-	-	-	2	3	1
AR-110.5	3	3	3	3	3	-	-	-	-	-	-	2	3	2
AR-110.6	1	1	1	1	2	3	3	3	3	3	3	2	2	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)

CH-202B: ENVIRONMENTAL STUDIES

Periods/week Credits Max. Marks: 200

L: 4 T: 0 P: 0 S: 0 4 Continuous Assessments: 100

Duration and Mode of Examination: 3 Hours theory examination End Semester Exam: 100

Course Type: Elective Domain Specific

Course Outcomes

The students will be able to

CH-202.1 Understand the significance of equitable use of natural resources and will be able to utilize the knowledge of biodiversity conservation and protection of environment.

CH-202.2 Learn about atmospheric pollution and global issues related to environment like natural disasters and will be able to understand the different acts for pollution control.

CH-202.3 Develop an understanding to major health issues of women and children will gain knowledge of Mortality and Mortality rate.

CH-202.4 Gain Knowledge of different ecosystems and energy flow in ecosystem.

CH-202.5 To know about the various environmental pollution, causes, effects and control measures

CH-202.6 Know the Social Issues and the Environment

PART- A

Unit 1: Multidisciplinary Nature of Environmental Studies

- 1.1 Definition, scope and importance.
- 1.2 Need for Public awareness.

Unit 2: Natural Resources

Renewable and non-renewable resources:

- 2.1 Natural resources and associated problems.
- 2.2 Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
- 2.3 Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- 2.4 Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- 2.5 Food resources: World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- 2.6 Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
- 2.7 Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

2.8 Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

Unit 3: Ecosystems

- 3.1 Concept of an ecosystem, Structure and function of an ecosystem
- 3.2 Producers, consumers and decomposers, Energy flow in the ecosystem
- 3.3 Ecological succession
- 3.4 Food chains, food webs and ecological pyramids
- 3.5 Introduction, types, characteristic features, structure and function of the following eco-system: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit 4: Biodiversity and its Conservation

- 4.1 Introduction – Definition: Genetic, species and ecosystem diversity
- 4.2 Bio geographical classification of India,
- 4.3 Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values
- 4.4 Biodiversity at global, National and local levels
- 4.5 India as a mega-diversity nation, Hot-spots of biodiversity
- 4.6 Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India
- 4.7 Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

PART-B

Unit 5: Environmental Pollution

- 5.1 Definition, causes, effects and control, measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal Pollution
- 5.2 Nuclear hazards, Pollution case studies.
- 5.3 Floods, earthquake, cyclone and landslides.

Unit 6: Social Issues and the Environment

- 6.1 From unsustainable to sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management
- 6.2 Resettlement and rehabilitation of people; its problems and concerns, Case Studies.
- 6.3 Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act.
- 6.4 Issues involved in enforcement of environmental legislation, Public awareness.

Unit 7: Human Population and the Environment

- 7.1 Population growth, variation among nations
- 7.2 Population explosion – Family Welfare Programme
- 7.3 Environment and human health. Human Rights

Unit 8: Chemistry for peaceful purposes

- 8.1 The duality of chemistry: Chemistry for peaceful purposes versus Chemical Weapons
- 8.2 Dual – use nature of toxic and precursor chemicals
- 8.3 Weapons of mass destructions, disarmament

CH-202.4	2	1	1	-	-	-	-	1	2	3	-	-	-	2
CH-202.5	-	-	-	2	-	-	-	-	-	-	1	-	-	-
CH-202.6	1	-	-	-	-	1	3	-	-	3	1	1	-	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR-201 A: ARCHITECTURAL DESIGN -II

Periods/week	Credits	Max. Marks: 300
L: 0 T: 0 P: 0 S: 9	9	Continuous Assessment: 200
Duration and Mode of Exam: Design Evaluation and Viva Voce		End Semester Exam : 100

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will able

- AR 201.1. To organize and structuring of space in a building
- AR 201.2. To understand the application of the architectural design process for small scale projects of human habitat
- AR 201.3. To transform the human behavioral needs into architectural program requirements
- AR 201.4. To analyze the information on context and the human-space relationship
- AR 201.5. To compose the architectural spaces in a design project
- AR 201.6. To communicate architectural drawings with the help of various mediums

PART-A

Unit 1: Introduction-Vernacular Architecture

- 1.1 Design concepts of vernacular built form.
- 1.2 Application of learned processes.

Unit 2: Design process and human as user of space

- 2.1 Study and differentiate human needs, wants and desire
- 2.2 Study of cases for different user's requirements
- 2.3 Transform the behavioral requirements into space form
- 2.4 Study of relationship among spaces with proximity chart, storytelling etc.

Unit 3: Human activity and context

- 3.1 Study of a context and its surroundings and collect information
- 3.2 Analyze the above information in favour of the usage perspective
- 3.3 Understanding of human scale to the context

PART-B

Unit 4: Consideration while designing

- 4.1 Design consideration with respect to vernacular architecture
- 4.2 Analyze the relationship among the spaces and vernacular architecture

Unit 5: Architectural Composition

- 5.1 Composition of spaces with geometric or non-geometric forms
- 5.2 Visualization of Architectural composition from different positions on context
- 5.3 Color composition of exterior and interior spaces
- 5.4 Application of building materials according to colour composition and texture
- 5.5 Verbal presentation with technical drawings of built form

Unit 6: Detail design of interior spaces with a theme

- 6.1 Detail planning and design of Interior spaces considering human needs and human anthropometric data with a theme
- 6.2 Application of building materials with colour and texture in detail design
- 6.3 Verbal presentation of Interior spaces

Text Books/ Reference Books:

1. Paul Alan Johnson, (1994), The Theory of Architecture – Concepts and themes, Van Nostrand Reinhold Co., New York.
2. Schirmbeck Egon, (1987), Idea, Form and Architecture-Design principles in contemporary Architecture, Van Nostrand Reinhold.
3. Steele James, (2005), The Architecture of RasemBadran- narratives on people and place, Thames and Hudson,
4. Yatin Pandya, (2007), Elements of Space making, Mapin, Ahmedabad.

Software required/Weblinks:

Instructions for paper setting:

The subject will be assessed through a design evaluation and Viva Voce.

Assessment Tools:

Portfolio Submissions

Sessional tests

Design Evaluation & Viva Voce

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR 201)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR 201.1	1	1	2	1	-	1	1	1	1	2	-	1	2	1
AR 201.2	1	2	2	1	1	1	2	1	1	2	1	1	1	1
AR 201.3	1	3	2	-	-	1	1	1	2	2	1	1	1	1
AR 201.4	3	1	1	1	-	2	2	1	1	1	2	2	1	2
AR 201.5	1	3	2	1	1	1	1	1	1	-	1	3	1	1
AR 201.6	1	1	-	-	3	2	-	-	3	3	2	2	2	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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AR-202 A: BUILDING MATERIALS AND CONSTRUCTION – II

Periods/week Credits

L: 0 T: 0 P: 0 S: 4 4

Max. Marks: 150

Continuous Assessment : 100

Duration and mode of Examination: Practical Examination & Viva Voce End Semester Exam: 50

Pre-requisites: NIL

Course Type: Program Core

Course Outcomes

The Student will able to

AR-202.1.To develops understanding about complex foundations and the constructions techniques involved.

AR-202.2.To recognizes opening used as different situations made up of timber from day to day life.

AR-202.3.To understands the importance of wooden carpentry joinery details used in opening.

AR-202.4.To evaluated the best suitable joinery in opening.

AR-202.5.To comprehends the details/arrangements of joinery in opening.

AR-202.6.To learn properties of various construction materials like waterproofing materials, clay used as flooring materials and timber used in the building industry.

PART-A

Unit 1: Foundation: Shallow & Deep

1.1 To develop understanding about the principles, Construction Techniques in shallow and deep foundations.

1.2 Shallow foundation: Types, Isolated, Combined and raft foundations and their construction techniques.

1.3 Deep Foundation: Grillage foundations, Piles foundations, Caisson foundations, etc.

Unit 2: RCC as a material

2.1 Theory of RCC as a material.

2.2 Introduction to RCC Structure Reinforced Detail.

2.2 RCC Staircase

Unit 3: Timber Doors and Windows

- 3.1 To know and understand the basic characteristics and classification of timber as a construction material.
- 3.2 To understand openings and the use and construction details of doors and windows with timber shutters and frames. Carpentry details in timber develop understanding in fixing of doors and windows.
- 3.3 Timber: Structure and Timber trees, Varieties of Timber, defects in timber, decay of timber, Qualities of Timber for Construction, seasoning, storage and preservation of Timber, properties and strength of manufacturing products, veneers, plywood, block boards, fiberboard, etc.
- 3.4 Doors: classification of doors; (a) paneled doors (b) ledged and battened doors (c) ledged, braced and battened doors (d) framed, ledged, braced, and battened doors (e) flush doors
- 3.5 Windows: Timber windows; Casement window and its details.

PART-B

Unit 4: Arches

- 4.1 Study of Openings will proceed to the study of Arches and its Classification
- 4.2 Classification of Arches on the basis of geometrical shape, materials, Construction techniques, viz. flats, segmental, semicircular, Tudor, Circular, elliptical, semi-elliptical, venetian, Florentine arches, etc. Illustration of terminology for arches, construction detailing and methods of centering.

Unit 5: Concrete

- 5.1 To introduce concrete as mixture of cement sand and aggregate.
- 5.2 Concrete: Composition, properties of PCC and RCC, methods of concrete construction- Various stages involved like- batching, mixing, transporting, compacting, curing, shuttering. Also study of collared concrete, light weight concrete precast concrete, quality control of concrete.

Unit 6: RCC Frame Structure

- 6.1 Concept of Frame Structures, with in-fills
- 6.2 RCC Footings and Foundations
- 6.3 Form Work

Text Books/ Reference Books:

1. McKay, W.B., "Building Construction Volume I, II, III and IV", Longmans, 1955.
2. Ching, Francis D. K. and Adams, Cassandra, "Building Construction Illustrated", Wiley and Sons, 2000.
3. The Construction of Buildings – Barry Volume I, II, III and IV 5. Chudley, Roy, "Construction Technology", Longman, 2005.
4. Rangwala, S. C., "Building Construction", Charotar Publishing House, 2007.
5. Punmia B. C., Jain A. J., and Jain A.J., Building Construction, Laxmi Publications, 2005.
6. M. Gambhir, NehaJamwal, Building Materials Products, Properties and Systems, Tata McGraw Hill Publishers, New Delhi, 2011.
7. R.K.Gupta, Civil Engineering Materials and Construction Practices, Jain brothers, New Delhi, 2009.
8. National Building Code of India (Latest Edition), Bureau of Indian Standards.

*Each Module should include market surveys and Construction site visits compulsorily. Instructions for paper setting:**The Subject will be assessed through a practical examination & viva-voce.**

Assessment Tools:

Portfolio Submission

Sessional tests
 Construction Detail Evaluation and Viva-voce
 Term end examination
 Course Articulation Matrix

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

CO Statement (AR-202)	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	PS O 1	PS O 2
AR-202.1	-	1	2	-	-	-	-	-	1	-	1	2	-	2
AR-202.2	-	-	-	-	-	-	1	2	-	-	1	1	1	1
AR-202.3	-	1	-	-	1	-	-	1	1	-	-	2	-	1
AR-202.4	-	-	-	-	-	-	-	1	-	-	-	1	1	-
AR-202.5	1	-	-	1	1	1	-	1	1	1	-	1	1	-
AR-202.6	1	1	-	1	-	-	1	2	1	-	1	1	1	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)

AR – 203 A: ARCHITECTURAL DRAWING - II

Periods/week	Credits	Max. Marks : 150
L: 0 T: 0 P: 0 S: 4	4	Continuous Assessment : 100
Duration and Mode of Exam: Practical Examination & Viva Voce		End Semester Exam : 50

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

- AR-203.1. Recall the concepts and fundamentals of Architectural Drawing.
- AR-203.2. Illustrate the representation of 3 dimensional objects on sheet.
- AR-203.3. Develop representation skills in 3 dimensional drawings and also in sciography. Develop drawing/sketching 3- Dimensional Architectural drawings using and freehand techniques. Apply the projected drawing method of exterior and interior perspective.
- AR-203.4. Analyze the process of representation of 3 dimensional objects from 2D to 3D.
- AR-203.5. Choose the appropriate technique of projection to showcase their idea in 3 dimensional.
- AR-203.6. Create three-dimensional views of buildings. Construct one and two point perspective drawings from floor plans and elevations. Construct conceptual and presentation drawings as a design presentation tool for various purposes. Develop the skill of representation in advance drawing techniques involving perspective and sciography.

PART-A

Unit 1: Sciography

- 1.1 Sciography and methods of representing it in 2D projections.
- 1.2 Applying sciography in 3D geometrical projections especially Isometric Projections.
- 1.3 Principles of shade & shadow, Shadows of lines, planes & simple solids due to near & distant sources of light, shadows of architectural elements

Unit 2: Perspective Projection

- 2.1 Perspective and relatively realistic representations, introduction to concepts such as station point, picture plane, eye level, center of vision, cone of vision, vanishing point etc.
- 2.2 One point and two point perspectives.

Unit 3: Representation through various means

- 3.1 Shape Representation, Construction of Grids,
- 3.2 Uniform / Non Uniform, Ortho/ free transformations.
- 3.3 Diagrammatic Construction

PART-B

Unit 4: Layering and grouping of Drawing

- 4.1 Coordinate Space and Metric, Geometric Primitives and Symbols, Object Properties, Basic Transformation absolute and referential , editing,
- 4.2 Segmentation by color, layering and grouping, printing / plotting.

Unit 5: Rendering Techniques

- 5.1 Architectural rendering techniques for building exteriors and interiors using pen & ink, color, values, tones, etc.
- 5.2 Architectural representation of trees, foliage, human figures, cars, symbols etc.

Unit 6: Drafting Skills

- 6.1 Diagrammatic Construction with representation of distance, scale
- 6.2 Proportion, symmetry, order, composition.

Text Books/ Reference Books:

1. N.D.Bhatt, Elementary Engineering Drawing (Plane and Solid Geometry), Charotar Publishing House, India
2. Francis Ching, (1964), Architectural Graphics, Van Nostrand Rein Hold Company, New York.
3. Robert W. Gill, (2008), Rendering with Pen and Ink, Thames & Hudson London.

Instructions for paper setting: Practical Examination & Viva Voce

Assessment Tools:

Progressive evaluation of lecture based assignments given in the form of drawings, portfolios and quiz.
 Sessional tests
 Practical examination
 Viva voce

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-203)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-203.1	2	2	2	3	3	1	1	1	2	3	-	3	2	3
AR-203.2	3	-	3	-	3	2	1	-	3	3	-	3	2	2
AR-203.3	2	-	3	2	-	3	3	-	1	3	1	3	3	3
AR-203.4	1	3	-	3	3	1	1	1	3	3	-	3	2	2
AR-203.5	1	3	1	3	3	-	-	-	-	2	-	2	2	2
AR-203.6	3	-	3	2	2	1	2	3	3	3	1	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR 204 A: ARCHITECTURAL GRAPHICS - II

Periods/week

Credits

Max. Marks : 150

L: 0 T: 0 P: 0 S: 3 3

Continuous Assessment : 100

Duration and Mode of Exam: Practical Examination & Viva Voce

End Semester Exam : 50

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

AR-204.1. Recall the need to combine the use of manual drawing tools and techniques for drafting and freehand drawing for architectural design communication.

AR-204.2. Demonstrate an understanding of furniture, people and accessories in one and two point projected perspective drawing.

AR-204.3. Develop representation skills in 3 dimensional drawings.

AR-204.4. Analyze the human-space relationship.

AR-204.5. Evaluate the importance of Sketch using freehand techniques.

AR-204.6. Construct the drawings of complex compositions.

PART-A

Unit 1: Preliminaries for Sketching

1.1 Abstraction of perceived images, conceptual statements using different media.

1.2 Explanation of fundamentals of drawings and its practice.

1.3 Object drawing, studies in light and shade of simple, natural and geometric forms.

Unit 2: Indoor Sketching

2.1 Sketching exercises along with inputs of light, shade, proportion and scale including but not limited to objects such as Pen, Television, Flower pot, Tea-pot, Cups etc.,

2.2 Human figures / Postures, Furniture. Enclosed Spaces in courtyards, Plazas, Chowks, Buildings, Canteen & Restaurant etc.

Unit 3: Outdoor Sketching

- 3.1 Architectural representation of the following on drawings: trees, hedges, foliage, human figures in different postures, cars,
 3.2 Elements of nature, etc. Outdoor sketching of simple buildings. Outdoor sketching of gardens, fiver fronts, water sports etc.

PART-B

Unit 4: Color Theory Application

- 4.1 Painting through various techniques
 4.2 Using various nediums

Unit 5: Sculpture Making

- 5.1 Introduction of sculpture –Sculpture using various materials such as clay, plaster of Paris, paper, wire etc.
 5.2 Plastic media and their expressional potential

Unit 6: Human figure

- 6.1 Human figure/anatomy studies in line, drawings, shade and sculptural mass.

Text Books/ Reference Books:

1. LallinCarref, Bhagwat Gajanan, Desai A, Visual Art & Basic Study, Somaiyya Publication.
2. Faber Bissen, Gerritsen Frans, (1975), Theory of Practice of Colours, Publisher, Cengage Learning.
3. Jaccuelina, (1991), Graphic Illustrations in Black and White, Design Press, New York.
4. Crowne Philip, (1991), Architectural Rendering', Rofovision S.A Switzerland.
5. Robert W. Gill, (2008), Rendering with Pen and Ink, Thames & Hudson London.

Instructions for paper setting: Practical Examination & Viva Voce

Assessment Tools:

Progressive evaluation of studio based work in the form of drawings, sketches, portfolios, visual presentations etc.

Sessional tests

Practical examination

Viva voce

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-204)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-204.1	1	2	3	-	3	-	2	-	3	3	-	3	-	3
AR-204.2	2	2	2	2	2	2	3	-	2	2	1	3	3	3
AR-204.3	3	3	3	3	2	2	-	-	2	3	-	3	3	2
AR-204.4	-	3	-	3	-	2	-	-	2	2	-	1	-	2
AR-204.5	2	3	-	3	-	-	-	-	2	2	-	1	-	2
AR-204.6	3	-	3	3	3	3	3	3	3	3	-	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR-205 A: STRUCTURAL DESIGN-II

Periods/week Credits

L: 2 T: 0 P: 0 S: 0 2

Duration and mode of Examination: 3 Hours Theory Examination

Max. Marks: 100

Continuous Assessment: 60

End Semester Exam: 40

Pre-requisites: NIL

Course Type: Program Core

Course Outcomes

The Student will be able to

AR-205.1. Basic study of resolution of forces as well as various study of various theorems related with equilibrium

AR-205.2. To learn why we provide a particular type of footing, beam, slab or retaining wall in a building.

AR-205.3. To learn how to draw and make shear force diagrams.

AR-205.4. To learn how to draw and make bending moment diagrams.

AR-205.5. Calculate of Shear Stress distribution in various sections.

AR-205.6. Develop understanding of shear and bending stresses in Trusses.

PART-A

Unit 1: Introduction

1.1 Brief History of Strength of Materials, properties of Solid Materials.

1.2 Basic Terminology

1.3 Stress definition and applications

Unit 2: Stresses and various Laws

2.1 Simple Stresses and Strains, Hook's Law, Ultimate Stress, Working Stresses

2.2 Factor of Safety, Poisson's Ratio, Relationship between E, N and K.

Unit 3: Shear Force and Bending Moments diagrams-I

3.1 Shear Force and Bending moment diagrams

3.2 Types of Beams and Loads

3.4 Sign conventions for shear force

3.5 Important points for shear force

Unit 4: Shear Force and Bending Moments diagrams-II

- 4.1 S.F. and B.M. diagram for a cantilever with a point load at the free end, uniformly distributed load and uniformly varying load.
- 4.2 S.F. and B.M. diagram for a simply supported beam with a point load at the midpoint, a simply supported beam with an eccentric point load, carrying a uniformly distributed load and uniformly varying load.
- 4.3 S.F. and B.M. diagram for overhanging beams, beams carrying inclined load and beam subjected to couples.

PART-B

Unit 5: Bending Stresses

- 5.1 Study of bending moment and their effect in various elements of trusses.
- 5.2 Bending equation & Bending stresses in symmetrical and unsymmetrical sections

Unit 6: Simple stresses in Trusses

- 6.1 Study of stresses and strains and their effect in various elements of trusses.
- 6.2 Forces in members- analytical method
- 6.3 Method of sections

Text Books/ Reference Books:

1. R.K. Bansal, (1998), Engineering Mechanics & Strength of Material', Laxmi Publishers Pvt. Limited.
2. Anand S. Arya, (2008), Masonry and Timber Structures', Nem Chand and Brothers.
3. Frederick Putnam Spalding, (2008), Masonry Structures, Bibliolife.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR- 205)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-205.1	-	1	-	-	-	-	-	-	-	1	-	2	1	-
AR-205.2	1	-	1	-	-	-	-	-	1	-	-	2	1	-
AR-205.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AR-205.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AR-205.5	-	-	-	-	-	-	-	-	-	-	-	1	1	1
AR-205.6	-	-	-	1	-	-	-	-	1	-	-	-	-	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)

AR-206 A: WORKSHOP & MODEL MAKING -II

Periods/week

Credits

Max. Marks: 100

L: 0 T: 0 P: 3 S: 0

1.5

Continuous Assessment: 60

Duration of Examination: Practical Examination and Viva Voce

End Semester exam: 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

AR 206.1. Analyze the geometry of 3D objects

AR 206.2. Sensitize the usage of various materials for production of art work

AR 206.3. Create architectural models in scaled version with different mediums

AR 206.4. Use different kinds of tools and machinery for production of design models

AR 206.5. Demonstrate proficiency in using discipline specific tools

AR 206.6. To communicate artifacts with the help of various mediums

PART-A

Unit 1: Development of Surfaces

1.1 Methods of surface development by Parallel-line, Radial-line, Triangulation methods, approximate methods,

1.2 development of lateral surfaces of right solids, viz. Cubes, prisms, cylinders, pyramids, cones.

1.3 Development of transition pieces, for spheres etc.

Unit 2: Construction skills-Carpentry and Welding

2.1 Carpentry and joinery

2.2 Carpentry details and equipment's

2.3 Sheet metal, steel welding and forging, assembly of components and laminating.

Unit 3: Measurement and Scale

3.1 Model making on different scales.

3.2 Measuring Techniques

3.3 Study of Scales

PART-B

Unit 4: Use of advanced Tools and Materials – I

- 4.1 Use of materials, viz. Acrylic, Polystyrene (thermocole),
- 4.2 Softwood, plastics, glass fiber, metals in architectural models.

Unit 5: Use of advanced Tools and Materials - II

- 5.1 Painting model surfaces with various finishes,
- 5.2 Development of topography and landscape elements,
- 5.3 Use of materials like cork, polyurethane foam,
- 5.4 Use of laser, acid etching, stereolithography for development of building envelope

Unit 6: Presentation modeling

- 6.1 Skills to use the tools with precision,
- 6.2 Techniques for preparation of presentation models.
- 6.3 General information and practice with different finishing materials.
- 6.4 Boards and bases for model presentations

Text Books/ Reference Books:

1. Morris, M., (2000), Architecture and the Miniature: Models”, John Wiley and Sons, 2000.
2. Mills, Criss B., (2000), Designing with Models: A Studio Guide to Making and Using Architectural Models”, Thomson and Wadsworth.
3. Raghuwanshi, B.S., (2001), A Course in Workshop Technology - Vol. I and II, Dhanpat Rai and Co.

Software required/Weblinks:

Instructions for paper setting:

The subject will be assessed through a practical examination and Viva Voce.

Assessment Tools:

Continuous evaluation shall be made of students work based on various models , assignments and market surveys

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR 106)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR 206.1	-	1	2	-	3	1	1	-	2	3	-	2	3	2
AR 206.2	-	2	-	-	3	-	-	1	3	3	-	3	2	1
AR 206.3	1	1	1	1	3	-	-	-	2	3	-	2	1	2
AR 206.4	3	-	3	-	2	-	-	1	1	2	1	1	3	1
AR 206.5	1	-	-	-	2	-	-	1	2	3	-	1	3	2
AR 206.6	2	1	-	2	3	-	-	-	3	3	1	2	1	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR-207 A: SOCIOLOGY AND PSYCHOLOGY OF ARCHITECTURE

Periods/week

Credits

Max. Marks : 100

L: 2 T: 0 P: 0 S: 0

2

Continuous Assessment : 60

Duration and Mode of Exam: 3 Hrs Theory Examination

End Semester Exam : 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

- AR-207.1. Relate importance of architecture and design through time and across cultures
- AR-207.2. Compare what have been the major issues in the development of architectural design in socio-cultural context.
- AR-207.3. Identify the relationship between sociology and architecture as well as psychology and spatial behavior.
- AR-207.4. Analyze the place specific nature of architectural design.
- AR-207.5. appraise about architecture and its relationship to its historical, political, social, economic, technological contexts.
- AR-207.6. Elaborate about Urban Ecological design such as relationships to nature, landscape, personal space and territoriality.

PART-A

Unit 1: : Sociology in Architecture

- 1.1 Sociology- Introduction and relation with Planning
- 1.2 Impact of sociology in architecture.

Unit 2: Society

- 2.1 Concept of society and its types – rural and urban.
- 2.2 Social interaction – verbal and non-verbal
- 2.3 Sociology of space and built environment, sociology of artifacts.
- 2.4 Requirement for space for various social activities.

Unit 3: : Study of Different Settlements

- 3.1 Social relationship in various settlements
- 3.2 Planning theories In past.
- 3.3 Type of settlements - urban and Rural
- 3.4 Settlement parameters for society interactions

PART-B

Unit 4: Introduction to Psychology

- 4.1 Concept of psychology
- 4.2 Nature of relationship between psychology and spatial behavior.
- 4.3 Role of Psychology in designing.

Unit 5: Territorial Spaces

- 5.1 Territorial organization among humans.
- 5.2 Three major types of territorial space: Micro Space, Meso Space and Macro Space.

Unit 6: Lurch's Theory of Cognitive Pattern

- 6.1 Lurch's Theory of Cognitive.
- 6.2 More focused on psychology of spaces, colors, form, layout w.r.t. architecture.
- 6.3 Urban Ecological design - nature, landscape, personal space and territoriality.

Text Books/ Reference Books:

1. Oliver, P., ed. 1997, Encyclopedia of Vernacular architecture of the World Vol. 1-3, CUP, Cambridge.
2. Rappaport, Amos, 1969, House Form & Culture. Prentice Hall Inc.
3. Brunskill, R.W., 1987, Illustrated Handbook on Vernacular Architecture.
4. Pamar, V.S, 1989, Haveli: Wooden Houses & Mansions of Gujarat. Mapin Pub. Ahmedabad.
5. Jain, Kulbhushan 1992, Mud Architecture of the Indian Desert, Aadi Centre, Ahmedabad.
6. Fathy, Hassan 2000. Architecture for the Poor: An Experiment in Rural Egypt. Univ. of Chicago Press.
7. Rudofsky, Bernard, 1964, Architecture without Architects. . Museum of Modern Art, NY.
8. Heath, K., 2009. Vernacular Architecture & Regional Design - Cultural Processes & Environmental Responses, Architectural Press, London.
9. Bhatia, Gautam, 1981, Laurie Baker: Life, Works & Writings. Viking/ HUDCO, New Delhi.
10. King, Anthony D. 1980, Building and Society, Routledge Kegan & Paul.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

- Assignment/Tutorials
- Sessional tests
- Surprise questions during lectures/Class Performance
- Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-207)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-207.1	3	3	2	3	3	3	-	3	2	2	-	2	3	3
AR-207.2	3	2	-	2	2	-	3	2	2	2	-	2	2	2
AR-207.3	2	3	-	-	1	3	2	2	2	2	-	2	2	2
AR-207.4	-	3	-	3	1	-	-	-	2	3	-	2	2	2
AR-207.5	3	-	2	2	1	3	2	3	2	2	-	3	2	3
AR-207.6	3	-	3	1	1	3	3	3	3	3	1	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)

AR-209 B: CLIMATOLOGY

Periods/week	Credits	Max. Marks: 100
L: 2 T: 0 P: 0 S: 0	2	Continuous Assessment: 60
Duration & Mode of Exam: 3 Hrs Theory Exam, Practical Exam and Viva Voce		End Semester Exam: 40

Pre-requisites: None

Course Type: Elective – Domain Specific

Course Outcomes

The student will be able to

- AR 209.1. **Develop** sensitivity towards existing informal settings and elements of built space
- AR 209.2. **Map** gathered information about different climatic conditions
- AR 209.3. **Apply** the learning of sun and earth in designing
- AR 209.4. **Apply** climate responsive techniques to design shading devices.
- AR 209.5. **Critique** the materials, construction techniques and structural systems used in the elements of Daylighting
- AR 209.6. **Develop** sensitivity for the design guidelines in order to design climate responsive buildings.

PART-A

Unit 1: Introduction

- 1.1 Built environment, conditions, impact and issues of climatic balance in traditional and contemporary built environments.
- 1.2 Examples from different regions in India and other parts of the world, issues of ecological balance.

Unit 2: Comfort: The Desirable Conditions

- 2.1 Requirement of ventilation; Heat balance of body
- 2.2 Sun path diagram — comfort zone & bio-climatic chart — comfort range
- 2.3 Air change per hour — recommended values of air changes for different occupancies as per the NBC
- 2.4 Methods of ventilation

Unit 3: Solar Analysis

- 3.1 Earth Sun Relationship

- 3.2 Solar Geometry
- 3.3 Types of sun path diagram
- 3.4 Sun Analemma
- 3.5 Plotting Azimuth and Altitude

PART-B

Unit 4: Shading Mask

- 1.1 Sky Obstruction Diagram
- 1.2 Generating Shading Mask
- 1.3 Shading Design – When and What
- 1.4 Types and size of shading device
- 1.5 Horizontal shadow angle and Vertical shadow angle
- 1.6 Thermal Performance of building

Unit 5: Day lighting

- 5.1 Day lighting fundamentals
- 5.2 Quantitative data: Luminous flux, Illuminance and Luminance
- 5.3 Qualitative data: Brightness, Contrast and Glare

Unit 6: Building design Guidelines

- 6.1 Factors affecting design
- 6.2 Building Orientation
- 6.3 Daylight factor
- 6.4 ECBC

Text Books/ Reference Books:

1. Koensberger, Ingersoll, Mayhew, Szokolay, 1974, Manual of Tropical Housing & Building.
2. Krishan A. Baker, 2004/2005, Climate Responsive Architecture, McGraw Hill Education (Asia) Co. and China Architecture & Building Press.
3. Lippesmeier, Georg, 1980, Building in the Tropics, Callwey Verlag, Munchen.
4. Gideon S. Golany, 1983, Design for Arid Regions, Publication Van Nostrand Reinhold, New York.
5. B. Givoni, 1981, Man, Climate & Architecture, Von Nostrand Reinhold Company New York.
6. C.P. Kukreja, 1978, Tropical Architecture, Tata McGraw Hill Publishing Company.
7. Martin Evans, 1980, Housing, Climate & Comfort, Architectural Press.

Software required/Weblinks:

1. Climate consultant

Instructions for paper setting:

Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each part 'A' and part 'B'. Students need to attempt two questions out of three from each part.

Assessment Tools:

- Assignment/Tutorials
- Sessional tests
- Surprise questions during lectures/Class Performance

Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR 209)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR 209.1	3	1	1	-	1	2	3	1	-	-	-	2	1	1
AR 209.2	2	2	1	-	-	2	1	2	1	2	-	2	2	1
AR 209.3	2	2	2	1	-	1	-	1	1	1	2	2	1	2
AR 209.4	3	1	1	-	1	2	3	1	2	3	-	2	1	1
AR 209.5	3	2	1	-	-	2	1	2	1	3	-	2	2	1
AR 209.6	3	2	2	1	-	1	-	1	2	3	2	2	1	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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AR-210 : SURVEYING & LEVELING -II

Periods/week	Credits	Max. Marks: 100
L: 1 T: 0 P: 1 S: 0	1.5	Continuous Assessment: 60
Duration & Mode of Exam: 3 Hrs Theory Exam,		End Semester Exam: 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

AR 210.1. **Understand** the role of modern techniques of surveying and leveling in architecture

AR 210.2. **Discuss** limitations and validate tools, techniques and resources

AR 210.3. **Enable** the students to understand basics of leveling with various instruments & methods.

AR 210.4. **Identify** the strengths and limitations of tools for acquiring information and concept of contouring.

AR 210.5. **Enable** the student to understand the concept of Total Station Survey and its multi-functioning in

surveying

AR 210.6. **Use** of satellite for measurements of survey points with help of DGPS

PART-A

Unit 1: Introduction to advanced surveying

1.1 Overview and classification of various survey techniques & equipment

1.2 Scaling of survey measurements and Errors in Surveying

1.3 Concept of Trigonometry, Traversing & GIS in Surveying

Unit 2: Total Station

- 2.1 Familiarization
- 2.2 Interpretation and preparation of contour maps
- 2.3 Exercises in layout of buildings and checking the same at site.

Unit 3: Leveling

- 3.1 Leveling: Different types of levels,
- 3.2 Temporary and permanent adjustment leveling staff.
- 3.3 Book of the readings and reduction of levels.
- 3.4 Errors in levelling.
- 3.5 Curvature and refraction reciprocal levelling profile.
- 3.6 Levelling cross sections.

PART-B

Unit 4: Contours

- 4.1 Characteristics of contour lines
- 4.2 Direct and indirect methods of contouring
- 4.3 Interpolation of contours.
- 4.4 Interpretation and preparation of contour maps

Unit 5: Advance Survey Techniques - TSS

- 5.1 Limitations of traditional surveys techniques.
- 5.2 Limitations of DBMS and CAD packages
- 5.3 Site modeling with total station survey (TSS) and exercises in setting out of building works.
- 5.4 Measurements of coordinates and elevations of objects from various points
- 5.5 Minimizing the errors with traversing with TSS

Unit 6: Advance Survey Techniques - GIS

- 6.1 Introduction to Remote sensing & GIS
- 6.2 Concept and definition
- 6.3 Concept of DGPS and its applications
- 6.4 Site modeling with DGPS

Text Books/ Reference Books:

1. Punia, B.C. et.al. 2005. Surveying Vol.1,2,3, Laxmi PubI.(Pvt.) Ltd., New Delhi.
2. Duggal, S.K., 2004. Surveying Vol.1&2. Tata McGraw Hill Pub. Co. Ltd. New Delhi.
3. Subramanian, R. 2012. Surveying and Leveling. Oxford Univ. Press, New Delhi.
4. Arora, K.R., 2004. Surveying Vol. 1,2,3. Standard Book House, N. Delhi.
5. Chandra, A.M., 2002. Plane Surveying. New Age International Pvt. Ltd., New Delhi.

Software required/Weblinks:

Instructions for paper setting:

Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each part 'A' and part 'B'. Students need to attempt two questions out of three from each part.

Assessment Tools:

Assignment/Tutorials

Sessional tests
 Surprise questions during lectures/Class Performance
 Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR 210)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR 210.1	3	1	1	1	3	-	-	1	2	1	1	2	1	2
AR 210.2	1	2	1	2	3	-	1	-	2	1	-	2	2	1
AR 210.3	1	1	-	-	3	2	1	-	2	-	-	3	1	2
AR 210.4	1	2	1	2	3	-	1	-	2	1	-	2	2	1
AR 210.5	2	1	1	-	3	-	1	-	3	3	1	2	1	2
AR 210.6	3	2	2	2	3	1	2	1	2	1	2	1	1	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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AR-301 A: ARCHITECTURAL DESIGN -III

Periods/week	Credits	Max. Marks: 300
L: 0 T: 0 P: 0 S: 9	9	Continuous Assessment: 200
Duration and Mode of Exam: Design Evaluation and Viva Voce		End Semester Exam : 100

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will able

AR 301.1. To apply the learning of the visual aspect of design

AR 301.2. To develop sensitivity towards existing informal settings and elements of built space.

AR 301.3.To critique the materials, construction techniques and structural systems used in the elements of built forms

AR 301.4. To apply climate responsive techniques to simple single storied load bearing structures

AR 301.5. To generate design concepts required for the given project

AR 301.6. To complete the architectural project with all given requirements for the given project

PART-A

Unit 1: Design Problem - Introduction

- 1.1 Study of the context and elements of built and un- built spaces
- 1.2 Documentation work through visual, verbal and graphical communication skills (Group work)

Unit 2: Literature Study and Case-Study

- 2.1 Study of the live examples related to design problem and elements of built and un- built spaces
- 2.2 Documentation work through visual, verbal and graphical communication skills (Group work)
- 2.3 Case Study presentation

Unit 3: Conceptual Development

- 3.1 Framing of spatial requirements
- 3.2 Aesthetic appeal, functional quality and elementary structural concepts
- 3.3 Concept Development - Relation to various functional aspects of the design problem: Use of bubble diagrams, flow diagrams, zoning of site, etc

PART-B

Unit 4: Climate responsive techniques

- 4.1 Design of shading devices based on location.
- 4.2 Form evolution based on orientation
- 4.3 Climatic consideration for the design, orientation of building on site their application in elevations as functional/aesthetic solutions will also be a part of the design exercise

Unit 5: Design Problem introduction

5.1 Synthesising and Analysing the above data

5.2 Deriving Area Requirements for the Design Exercise

5.3 Relation to various functional aspects of the design problem: Use of bubble diagrams, flow diagrams, zoning of site, etc

5.4 Finalization of design proposals: schematic 2D/ 3D / single line/ conceptual level site plan, floor plan, elevations and sections should be finalized

Unit 6: Final Design Proposal

6.1 Final developed to-scale drawings- site plan, plans, elevations, sections, elevations

6.2 Facilitation to the floor plan for justification of provided spatial proposals

6.3 Detailed Site Plan with built and un-built spaces and landscaping features

6.4 Development of views and construction details

6.5 Model of the proposed design

Text Books/ Reference Books:

1. Scott Van Dyke, 1988, From Line to Design, 2nd Edition, PDA Pub Corp.
2. Bernard Rudofsky, 1972, Architecture without Architects, 1st Edition, Academy Editions Ltd.
3. Siegfried Giedion, 2008, Space, Time & Architecture, 5th Edition, Harvard University Press.
4. Michael Crosbie, 2017, Time Saver Standards for Architectural Design, 8th Edition, McGraw Hill Education.

Software required/Weblinks:

Instructions for paper setting: The subject will be assessed through a practical examination and Viva Voce.

Assessment Tools:

Portfolio Submissions

Sessional tests

Design Evaluation & Viva Voce

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR 301)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR 301.1	1	1	1	2	1	2	3	2	3	3	1	1	2	-
AR 301.2	3	2	2	3	2	1	3	1	2	2	1	3	1	1
AR 301.3	2	3	3	3	2	1	2	1	1	2	1	3	1	1
AR 301.4	3	3	3	2	2	3	2	2	3	2	2	3	2	1
AR 301.5	3	3	3	2	2	2	3	2	2	2	1	2	1	2
AR 301.6	3	3	3	2	2	3	2	2	3	2	2	3	2	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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AR-302 A: BUILDING MATERIALS AND CONSTRUCTION – III

Periods/week Credits

L: 0 T: 0 P: 0 S: 5 5

Duration and mode of Exam: Practical Examination & Viva-voce

Max. Marks: 150

Continuous Assessment: 100

End Semester Exam: 50

Pre-requisites: NIL

Course Type: Program Core

Course Outcomes

The Student will be able to

AR-302.1. To recognize the various types of temporary supporting structure used in different locations in the building industry.

AR-302.2. To understand doors and windows.

AR-302.3. To understand timber floors.

AR-302.4. To be updated with the properties and applications of various special materials.

AR-302.5. To implement the details/arrangements of temporary structures.

AR-302.6. To create drawings and designs based on the acquired knowledge base in respect to roofs.

PART-A

Unit 1: Timber Roofs

1.1 Classification of roofs: (a) Single roofs; flat roofs, lean-to roofs, double lean-to, couple, close couple and collar roofs (b) Double or Purlin Roofs (c) Trusses rafter roofs (d) Triple or framed roofs (e) Common roof coverings with its laying

1.2 Waterproofing, rainwater gutter details

Instructions

1.3 Kingpost and queen post roof trusses

Unit 2: Timber Floors

2.1 Timber Floors: Construction techniques, types of timber floors: single, double and triple joist timber floors.

2.2 Furnishing of floors with different floor finishes like cement, colored cement, mosaic, terrazzo, tiles etc. special consideration for rubber and PVS Flooring, methods of laying

Unit 3: Doors & Windows

3.1 Doors and Windows – Materials of door construction, types of doors

3.2 Technical terms, window types, glass and glazing types.

PART-B

Unit 4: Introduction to RCC elements like Columns, Beams and Slabs

4.1 To familiarize students with basic information about construction procedures and reinforcement detailing about RCC elements like Columns, Beams and Slabs. Also to make students aware of joining details of Columns, Beams and Slabs.

4.2 Reinforcement detailing of RCC building elements like Columns, beams and slabs through sketches and site visits.

Unit 5: Materials

5.1 Learning of Various materials like panel walls, ferrous and non ferrous metals and roofing materials.

5.2 Hollow and Panel walls: Economy and advantages over solid load bearing walls, practical consideration during construction hollow concrete block construction, different types of Partition wall. Reinforced Brick work.

5.3. Ferrous Metals: Pig iron, cast iron, wrought iron- types, properties, steel-properties, types and uses of steel in construction, properties of mild steel and hard steel, defects in steel

5.4 Non ferrous Metals and Alloys: Aluminium, Copper, lead Nickel important Alloys like- brass, bronze, etc.

5.5 Corrosion of both ferrous and non ferrous metals- types and preventive measures.

5.6 Roofing Material: Study of Contemporary roofing materials

Unit 6: Roof and Roof Coverings

6.1 Classification of roofs, types of pitched roofs

6.2 Advantages, disadvantages, factors for selecting roof coverings, roof covering, material.

Text Books/ Reference Books:

1. Francis D.K. Ching, 2014, Building Construction Illustrated, 5th Edition, John Wiley & Sons.

2. W.B. McKay, 2013, Building Construction, 5th Edition, Pearson Education India.

3. Sushil Kumar, 2010, Building Construction, 1st Edition, Standard Publisher Dist.

4. Rangwala, 2016, Building Construction, 33rd Edition, Charotar Publishing House.

5. B.C. Punmia, 2016, Building Construction, 11th Edition, Laxmi Publications.

***Each Module should include market surveys and Construction site visits compulsorily.**

Instructions for paper setting:The Subject will be assessed through a practical examination & viva-voce.

Assessment Tools:

Portfolio Submission

Sessional tests

Construction Detail Evaluation and Viva-voce

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR – 303 A: ARCHITECTURAL GRAPHICS - III

Periods/week	Credits	Max. Marks : 150
L: 0 T: 0 P: 0 S: 7	7	Continuous Assessment : 100
Duration and Mode of Exam: Practical Examination & Viva Voce		End Semester Exam : 50

Pre-requisites: None

Course Type: Program Core

Course Outcomes

- The student will be able to
- AR-303.1. Define the need to combine the use of manual drawing tools and techniques for drafting and freehand drawing for architectural design communication
 - AR-303.2. Demonstrate an understanding of furniture, people and accessories in elevation and views.
 - AR-303.3. Apply architectural rendering in 2-D and 3-D drawings.
 - AR-303.4. Develop 3 - Dimensional Architectural drawings by Drawing/sketching using freehand techniques.
 - AR-303.5. Explain about series of exercises which are graphic and abstract representations of art.
 - AR-303.6. Construct conceptual and presentation drawings as a design presentation tool for various purposes.

PART-A

Unit 1: Rendering in Pencils

- 1.1 Pencils as presentation medium.
- 1.2 Rendering of various surfaces such as brick, stone, grass, timber etc.
- 1.3 Trees, Human Figure, Automobiles, Lamp Posts, Street Furniture in Plan, Elevation and Perspective.
- 1.4 Rendering of View / Perspective in Pencils.

Unit 2: Composition through Various Mediums

- 1.1 Composition through various principles
- 1.2 Applications through different modes

Unit 3: Watercolor Rendering

- 2.1 Outdoor free hand sketching and color rendering of Trees, Shrubs, Vegetation, Buildings, Vehicles
- 2.2 Color Rendering of various scenes such as Garden Scene, Street Scene, Lake Scene, Village Scene

PART-B

Unit 4: Study of art elements through sketching

- 4.1 Art forms in architecture
- 4.2 Study of contemporary art

Unit 5: Skill Development

5.1 Exercises based on calligraphy and typography

5.2 Rendering of interior and exterior of a building in color and monochrome.

Unit 6: Indian Artist

6.1 Introduction to famous Indian Artists and their art works and styles.

6.2 Case study of Buildings with famous arts and styles

Text Books/ Reference Books:

1. Robert W. Gill, 1984, Rendering with Pen & Ink, Revised Edition, Thames & Hudson.
2. Bodo W. Jaxtheimer, 1982, How to Paint and Draw, New Edition, Thames & Hudson.
3. Albert O. Halse, 1988, Architectural Rendering, 3rd Revised Edition, McGraw-Hill.
4. Jacqueline Gikow, 1990, Graphic Illustration in Black and White, 1st Edition, TAB Books Inc.
5. Philip Crowe, 1993, Architectural Rendering, 3rd Edition, McGrawHill Education.

Instructions for paper setting: Practical Examination & Viva Voce

Assessment Tools:

Progressive evaluation of studio based work in the form of drawings, sketches, portfolios, visual presentations etc.

Sessional tests

Practical examination

Viva voce

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-303)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-303.1	2	-	2	-	3	1	1	-	-	2	-	1	2	2
AR-303.2	3	-	2	-	2	2	2	-	-	3	-	3	3	3
AR-303.3	2	-	3	-	3	-	-	2	3	3	-	1	2	2
AR-303.4	3	-	3	-	3	-	-	3	3	3	1	3	3	3
AR-303.5	1	1	2	2	1	-	2	1	-	2	-	1	2	2
AR-303.6	3	-	3	3	3	-	-	3	3	3	1	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR – 304 A: HISTORY OF ARCHITECTURE - I

Periods/week	Credits	Max. Marks : 100
L: 2 T: 0 P: 0 S: 0	2	Continuous Assessment : 60
Duration and Mode of Exam: 3 Hrs Theory Examination		End Semester Exam : 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

- AR-304.1. Tell different styles of historic architecture.
- AR-304.2. Explain prominent / important historic buildings
- AR-304.3. Identify prominent / important historic buildings by their components / style of design.
- AR-304.4. Analyze the contributing factors for the design development of different styles.
- AR-304.5. Compare various styles on the basis of the contributing factors responsible for their development.
- AR-304.6. Design the buildings in the historic architectural styles.

PART-A

Unit 1: Prehistoric Architecture

- 1.1 Evolution of Architecture
- 1.2 Neolithic and Paleolithic Style of Architecture
- 1.3 Primitive people, shelters, settlements, burial systems, megaliths and memorials. Eg: Oval huts near Nice, Dolmen tomb, Gallery grave, Passage grave, Cairns, Tumulus, Houses at Catal Huyuk, Stonehenge etc.

Unit 2: River Valley Civilization

- 1.1 Introduction to river valley civilization
- 1.2 History and its architectural features

Unit 3: West Asiatic Architecture Style

- 3.1 Introduction to Mesopotamian civilizations, their social systems and cultures
- 3.2 Chaldean, Assyrian and Babylonian Architecture
- 3.3 Salient building types – Mesopotamian:
 - Ziggurats and their development – White Temple, Ziggurat of Ur, Urnammu and Khorsabad
 - Generic Temple Layout - Temple Oval and Khafaje
 - Palace Complex/Citadel of Khorsabad, Nebuchadnezzar's Babylon, Persepolis

PART-B

Unit 4: Chinese Style of Architecture

- 4.1 Architectural character
- 4.2 Building typologies

Unit 5: Greek Architecture

- 5.1 Introduction to Greek civilization, their social systems and cultures
- 5.2 Classical Order – Doric, Ionic, Corinthian
- 5.3 Salient building types:
 - Temple types on basis of column layout – case example of Acropolis, Athens
 - Discussion of Hellenic Temple (Parthenon, Athens) versus Hellenistic Temple (Athena Polias, Priene)
 - Public Buildings and Square – Agora, Stoa, Prytaneum, Bouleuterion, Tholos, Gymnasium, Theatre

Unit 6: Roman Architecture

- 4.1 Introduction to Roman civilization, their social systems and cultures
- 4.2 Contribution in new materials and new construction/structural systems, eg, Pozzolana, Cementae, Stone Blocks, Stone Masonry, Arch, Vault, Dome
- 4.3 Salient buildings:
 - Forums of Rome
 - Pantheon
 - Aqueduct
 - Colosseum
 - Bath of Caracalla
 - Basilica of Trajan

Text Books/ Reference Books:

1. Sir Banister Fletcher, 1999, A History of Architecture, 20th Edition, CBS.
2. G. B. Hiraskar, 2018, The Great Ages of World Architecture, 1st Edition, Dhanpat Rai Publications.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

- Assignment/Tutorials
- Sessional tests
- Surprise questions during lectures/Class Performance
- Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-304)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-304.1	2	-	-	-	-	2	-	1	1	-	1	2	2	2
AR-304.2	2	-	1	1	1	2	-	-	-	2	1	2	2	2
AR-304.3	-	2	-	1	1	2	1	-	-	-	-	2	2	2
AR-304.4	2	3	3	3	1	2	2	-	-	2	-	1	2	1
AR-304.5	2	3	3	3	1	2	2	-	3	1	-	2	2	1
AR-304.6	3	-	3	3	2	3	3	2	3	3	2	3	3	3

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AR-305 A: STRUCTURE DESIGN-III

Periods/week Credits
L: 2 T: 0 P: 0 2
Duration and mode of Examination: 3 Hours Theory Examination

Max. Marks: 100
Continuous Assessment: 60
End Semester Exam: 40

Pre-requisites: NIL

Course Type: Program Core

Course Outcomes

The Student will able to

- AR-305.1. Develop understanding of shear and bending stresses in Trusses.
- AR-305.2. Describe the theory of columns.
- AR-305.3. Calculate deflection in beams through analytical method
- AR-305.4. Describe slope deflection method and their application in fixed and continuous beams.
- AR-305.5. Develop understanding various equation of column design
- AR-305.6. Identify construction of various sections

PART-A

Unit 1: Shear Stress and composite Section

- 1.1 Analytical method for determining shear stresses in various section of building structure.
- 1.2 Shear stress distribution in various sections
- 1.3 Composite Section uses and their advantages,
- 1.4 Assumptions made in the theory of composite sections, derivation of basic equations.
- 1.5 Solution of simple problems.

Unit 2: Three-moment theorem

- 2.1 Analysis of fixed and continuous beams

Unit 3: Deflection of Beams

- 3.1 Analytical method for determining deflection in various sections of Building structure.
- 3.2 Differential equation of deflected beam.
- 3.3 Double Integration method
- 3.4 Macaulay's method.
- 3.5 Statically determinate beams and propped Cantilever
- 3.6 Moment Area Method
- 3.7 Conjugate beam method

PART-B

Unit 4: Slope Deflection method

- 4.1 Analysis of fixed and continuous beams
- 4.2 Yielding of supports.

Unit 5: Column and Struts

- 5.1 Understanding various equations to design columns.
- 5.2 End conditions

- 5.3 Effective length
- 5.4 Slenderness ratio
- 5.5 Euler's formula

Unit 6: Overview of Construction

- 6.1 Cement
- 6.2 Aggregate
- 6.3 Water
- 6.4 Reinforcement
- 6.5 Various Materials as per required Construction material

Text Books/ Reference Books:

1. IS Code 465: 2000
2. Dr. R.K. Bansal, 2018, Strength of Materials, 6th Edition, Laxmi Publications.
3. R.S. Khurmi, 2006, Strength of Material, 1st Edition, S Chand Publishing.
4. R.S. Khurmi, 2018, Engineering Mechanics, 22nd Edition, S Chand Publishing.
5. S.S. Bhavikatti, 2019, Design of Steel Structures, 1st Edition, Dreamtech Press.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

- Assignment/Tutorials
- Sessional tests
- Surprise questions during lectures/Class Performance
- Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-305)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-305.1	-	-	-	-	-	-	-	-	1	-	-	1	-	1
AR-305.2	-	1	-	-	-	-	-	-	1	-	-	1	1	1
AR-305.3	-	-	-	-	-	-	-	-	1	-	-	-	-	-
AR-305.4	-	-	-	-	-	-	-	-	-	-	1	-	-	-
AR-305.5	-	-	1	-	-	-	-	-	-	-	-	1	-	-
AR-305.6	1	-	-	-	1	-	-	-	1	-	-	2	1	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR-309: WORKSHOP & MODEL MAKING -III

Periods/week	Credits	Max. Marks: 100
L: 0 T: 0 P: 3 S: 0	1.5	Continuous Assessment: 60
Duration of Examination: Practical Examination and Viva Voce		End Semester exam: 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

- AR 309.1. **Sensitize** the usage of wood for production of art work
- AR 309.2. **Learn** different carpentry construction techniques
- AR 309.3. **Design** and develop experimental approach, specify appropriate equipment and procedures
- AR 309.4. **Identify** the strengths and limitations of brick masonry
- AR 309.5. **Discuss** limitations and validate tools, techniques and resources
- AR 309.6. **Create/adapt/modify/extend** tools and techniques to solve architectural construction problems

PART-A

Unit 1: Different tools in carpentry

- 1.1 Introduction to different types of Tools used in carpentry
- 1.2 Application of various tools

Unit 2: Joinery Types and its details

- 2.1 Different types of joints, Joinery details
- 2.2 Application in timber construction and interiors.

Unit 3: Use of various materials

- 3.1 Use of Clay, Brick and Soap for creating three dimensional forms in space.

PART-B

Unit 4: Masonry Construction

- 4.1 Small brick masonry construction models
- 4.2 Understanding of various bonds, jallis etc.

Unit 5: 3D objects

- 5.1 Making of three dimensional forms such as cubes, pyramids, cones etc.,

- 5.2 Using different types of materials such as paper, card board, mount board, balsa wood, wax, plaster of Paris etc
 5.3 Composition of 3D objects

Unit 6: Fitter Shop

- 6.1 Introduction to fitter's tools
 6.2 Gauges, measuring instruments etc.
 6.3 Marking of jobs; fitter's job involving chipping, filing, sawing, drilling

Text Books/ Reference Books:

1. Peter Stanyer, 2020, The Complete Book of Drawing Techniques, 1st Edition, Arcturus.
2. Woram Catherine, 2019, Paper Scissors Glue, 1st Edition, Ryland, Peters & Small Ltd.
3. Tim McCreight, 2015, Color on Metal, 1st Edition, Brynmorgen Press.
4. Donna Kato, 2011, The Art of Polymer Clay, 1st Edition, Watson-Guption.

Software required/Weblinks:

Instructions for paper setting:

The subject will be assessed through a practical examination and Viva Voce.

Assessment Tools:

Continuous Evaluation will be based on Assignment, Project, Attendance, Class Test and Performance in both Sessional Exams.

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR 309)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR 309.1	1	2	1	-	3	2	1	-	2	3	-	2	3	2
AR 309.2	2	2	2	1	3	-	-	1	3	3	-	3	2	1
AR 309.3	1	1	1	1	3	1	1	-	2	3	-	2	1	2
AR 309.4	3	1	3	-	2	1	-	1	1	2	1	1	1	2
AR 309.5	2	-	-	-	2	-	1	1	2	3	-	1	3	1
AR 309.6	2	1	-	2	3	2	-	-	3	3	1	2	1	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR-310: PRINCIPAL OF HUMAN SETTLEMENTS-I

Periods/week Credits

L: 2 T: 0 P: 0 S: 0 2

Duration and mode of Examination: 3 Hours Theory Examination

Max. Marks: 100

Continuous Assessment: 60

End Semester Exam : 40

Pre-requisites: NIL

Course Type: Program Core

Course Outcomes

The Student will able to

AR-310.1. To introduce the origins, determinants and elements of human settlements.

AR-310.2. To give an overview of the evolution of human settlements across history.

AR-310.3 To learn about first human civilization growth in India.

AR-310.4. To introduce planned cities as expressions of specific intent.

AR-310.5 To introduce about Various theories related to Human Settlement.

AR-310.6. To give exposure to changes in human settlements today.

PART-A

Unit 1: Origin Of Human Settlements And Early Settlements

1.1 Origins of civilizations. Elements and determinants of human settlements.

1.2 Human settlements in the pre-historic period. Ancient river valley civilizations of Indus valley, Mesopotamia, Egypt and China with emphasis on the layout and patterns of the settlements and the influence of resources on them.

Unit 2: Pre Industrial Cities

2.1 Greek and Roman civilizations and their settlements - role of defense, politics, trade and other factors in the development of settlement planning.

2.2 Medieval and Renaissance cities in Europe. City plans of Vienna, Amsterdam, and Paris.

2.3 Cities as expression of political power- Washington DC, Pretoria.

2.4 Industrial revolution and its influence on cities.

Unit 3: Cities In India

3.1 Ancient town planning principles of India.

3.2 Medieval Indian cities and factors that led to their development.

3.3 Islamic and Mughal cities.

3.4 Colonial urbanism including presidency towns, hill towns and cantonments. New Delhi as imperial power.

PART-B

Unit 4: Modern And Postmodern Cities

4.1 Planning of the capital cities of Brasilia and Chandigarh.

4.2 Postmodern Utopian vision of Arch gram, Metabolism and Paolo Solei.

Unit 5: Human Settlements in A Changing World

5.1 Changing nature of human settlements today through case studies.

5.2 Topics to include impact of global economy, trade, information and communication technology, sustainability.

Unit 6: Various modern architects

6.1 Contributions of Ebenezer Howard, Lewis Mumford, Patrick Geddes, C.A. Dioxides.

6.2 Visionary/Utopian city concepts by Le Corbusier, Frank Lloyd Wright.

6.3 Modern town planning principles and examples including Manhattan and New Town movement in Britain.

Text Books/ Reference Books:

1. Lewis Mumford, 1968, City in History, Illustrated Edition, Harcourt Brace International.
2. A.E.J. Morris, 1994, History of Urban Form, 3rd Edition, Longman.
3. Spiro Kostof, 1999, The City Shaped: Urban Patterns Meanings through History, Reprint Edition, Bulfinch.
4. Dutt B.B, 1995, Town Planning in Ancient India, 1st Edition, Thacker Spink & Co., Calcutta.
5. FranniwLeautier, 2006, Cities in a Globalizing World, Ilustrated Edition, World Bank Publications.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

Assignment/Tutorials

Sessional tests

Surprise questions during lectures/Class Performance

Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-310)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-310.1	-	-	1	-	1	1	-	1	1	-	-	-	-	-
AR-310.2	1-	2	-	1	-	1	-	1	-	-	1	-	1	-
AR-310.3	-	2	-	-	2	1	-	1	-	-	1	-	1	-
AR-310.4	-	-	2	1	-	1	1	-	1	-	-	1	2	-
AR-310.5	1	1	-	-	2	1	1	-	-	1	-	1	2	2
AR-310.6	1	-	-	1	-	1	1	-	-	1	-	-	2	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR-401 A: ARCHITECTURAL DESIGN -IV

Periods/week Credits
L: 0 T: 0 P: 0 S: 9 9
Duration and Mode of Exam: Design Evaluation and Viva Voce

Max. Marks: 300
Continuous Assessment: 200
End Semester Exam: 100

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

- AR 401.1. **Demonstrate** the learning of the bye laws and to integrate learning from other allied subjects to the design proposal
- AR 401.2. **Integrate** learning from other allied subjects to the design proposal
- AR 401.3. **Understand** the given project in terms of the design process with requirements for the same
- AR 401.4. **Collect** data from standards, case studies and site visits for the current project.
- AR 401.5. **Generate** design concepts required for the given project
- AR 401.6. **Complete** the architectural project with all given requirements for the given project.

PART-A

Unit 1: Introduction

- 1.1 Introduction to byelaws
- 1.2 Expressions specific to different climatic zones and cultures of India.
- 1.3 Occupation and meaning of various spaces within the dwelling
- 1.4 Dwelling and its immediate external context
- 1.5 Individual and cluster scale design projects to form a small community
- 1.6 Functional aspects of building services like drainage, water supply and electricity
- 1.7 Understanding of Appropriate Technologies and Methods of Construction

Unit 2: Relationship of various spaces within dwelling

- 2.1 Occupation and meaning of various spaces within the dwelling.
- 2.2 Dwelling and its immediate external context.

Unit 3: Design Intervention in the Region mentioned in the above modules

- 3.1. Justification of the Design Intervention
- 3.2. Conceptual Design
- 3.3 Design development/ Form Development
- 3.4 Presentation/ Crits

PART-B

Unit 4: Introduction to the Design Problem, Site study and Area Programming

- 4.1 Introduction to the Design Exercise/ Problem
- 4.2 Site Visit and Site Analysis
- 4.3 Case studies

- 4.4 Collecting relevant data for the given design problem
- 4.5 Synthesising and Analysing the above data
- 4.6 Deriving Area Requirements for the Design Exercise

Unit 5: Design Development

- 5.1 Individual and cluster scale design projects to form a small community.
- 5.2 Understanding of Appropriate Technologies

Unit 6: Final Design Proposals

- 6.1 Final developed to- scale drawings- site plan, plans, elevations, sections, elevations
- 6.2 Facilitation to the floor plan for justification of provided spatial proposals
- 6.3 Detailed Site Plan with built and un-built spaces and landscaping features
- 6.4 Development of views and construction details
- 6.5 Model of the proposed design

Text Books/ Reference Books:

Software required/Weblinks:

Instructions for paper setting:

The subject will be assessed through a practical examination and Viva Voce.

Sessional work: Exercise on one or few aspects at a time followed by at least two design problems arranged in sequence leading to more and more complexity. Type of Design Problems: a) Small Residence, Guesthouse, Block of Flats. b) Primary School, Dispensary, Club. c) Post office, Bank, Office etc.

Assessment Tools:

Portfolio Submissions

Sessional tests

Design Evaluation & Viva Voce

.

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR 401)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR 401.1	3	2	2	3	1	1	3	3	2	3	2	3	1	2
AR 401.2	2	3	3	2	2	2	3	2	1	2	1	3	-	1
AR 401.3	3	3	3	2	2	1	2	1	-	2	-	2	1	2
AR 401.4	3	1	-	1	-	-	1	2	3	3	1	2	2	-
AR 401.5	2	3	1	1	2	-	2	1	2	3	1	-	1	1
AR 401.6	3	3	3	3	2	3	3	1	2	3	2	2	1	3

(Deemed to be University under section 3 of the UGC Act 1956)

AR-402 A: BUILDING MATERIALS AND CONSTRUCTION – IV

Periods/week	Credits	Max. Marks: 150
L: 0 T: 0 P: 0 S: 5	5	Continuous Assessments: 100
Duration and mode of Examination: Practical Examination & Viva-voce		End Semester Exam: 50

Pre-requisites: NIL

Course Type: Program Core

Course Outcomes

The Student will able to

AR-402.1. To understand the standards of vertical transportation and staircase.

AR-402.2. To Comprehend the various modes of vertical circulation through live examples.

AR-402.3. To Understand the applications, construction details and varieties of various modes of vertical circulation in the building.

AR-402.4. To acknowledge varieties of various modern modes of vertical circulation in the building.

AR-402.5. To Compare and analyze various materials used for cladding purposes for building components along with their construction details.

AR-402.6. To be aware of the properties of Various materials.

PART-A

Unit 1: Introduction to Vertical transportation

1.1 Description of staircases, technical terminology involved, and classification of staircases based on shape, material and its construction details.

1.2 Vertical section through staircases with detailing at various levels

Unit 2: Types of Staircases

2.1 Different types of staircases- Dog legged, circular, open well, spiral, elliptical, etc. Classification also based on materials like wooden, steel and RCC

2.2 Staircase layout and its construction details, different element of staircases, etc.

2.3 Design and details of Construction of staircases in timber, stone, RCC and Steel.

Unit 3: Elevators

3.1 To understand the working of different types of elevators.

3.2 Design criteria for provision of Elevators

PART-B

Unit 4: Escalators, travellers and Auto Walks

4.1 Critically analyzing building to provide mechanical mode of circulations, installation details with live examples

4.2 Installation, working mechanism of Escalators, Travellers and Auto walks

Unit 5: Cladding

- 5.1 Make student aware of the various materials and fixing details of surface cladding
- 5.2 To understand the concept of thermal comfort and construction details of Cavity Wall.
- 5.3 Details of Cladding of Wall with Stone, tiles, Timber and steel framing
- 5.4 construction of cavity wall with different thermal and acoustical insulative system

Unit 6: Built in Furniture

- 6.1 Built in Furniture, Fixed wood work in a building like pelmets
- 6.2 Paneling, partitions, False Ceiling etc.

Text Books/ Reference Books:

- 1. Francis D.K. Ching, 2014, Building Construction Illustrated, 5th Edition, John Wiley & Sons.
- 2. W.B. Mckay, 2013, Building Construction, 5th Edition, Pearson Education India.
- 3. Sushil Kumar, 2010, Building Construction, 1st Edition, Standard Publisher Dist.
- 4. Rangwala, 2016, Building Construction, 33rd Edition, Charotar Publishing House.
- 5. B.C. Punmia, 2016, Building Construction, 11th Edition, Laxmi Publications.

***Each Module should include market surveys and Construction site visits compulsorily.**
Instructions for paper setting:The Subject will be assessed through a practical examination & viva-voce.

Assessment Tools:

- Portfolio Submission
- Sessional tests
- Construction Details Evaluation and viva-voce
- Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-402)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-402.1	2	1	-	-	1	1	-	1	1	-	-	1	-	1
AR-402.2	-	1	1	-	-	1	-	-	-	-	2	1	1	2
AR-402.3	-	-	-	2	-	-	-	-	-	1	-	1	1	1
AR-402.4	1	-	-	1	1	-	-	-	-	-	1	-	-	-
AR-402.5	-	-	-	-	-	-	-	2	1	-	-	1	1	2
AR-402.6	1	-	-	-	-	-	1	-	-	-	-	-	-	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR – 404 A: HISTORY OF ARCHITECTURE - II

Periods/week	Credits	Max. Marks : 100
L: 2 T: 0 P: 0 S: 0	2	Continuous Assessment : 60
Duration and Mode of Exam: 3 Hrs Theory Examination		End Semester Exam : 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

AR-404.1. Define world architecture during the renaissance and neoclassical periods.

AR-404.2. Relate the link between classical and modern architecture.

AR-404.3. Choose spatial character, scale and structure in historical & traditional built form.

AR-404.4. Analyze the conditions of industrialization and its implications leading to the search for an appropriate new style.

AR-404.5. Assess the emergence of modern architecture, its significance, and influences on world architecture.

AR-404.6. Adapt the modern architecture and the resulting architectural styles that emerged after modernism.

PART-A

Unit 1: Early Christian & Romanesque Architecture

1.1 Introduction to society and culture of 400 -1150 AD in Europe.

1.2 Early Christian Architecture

- Development of Early Christian Church from Roman Basilica
- Salient building – St. Peter’s Basilica

1.3 Romanesque Architecture

- Development of Romanesque architecture from Early Christian architecture

Unit 2: Byzantine & Gothic Architecture

2.1 Contribution of Byzantine architecture in the development of structural system – dome construction over square plan.

2.2 Adoption of Greek cross in church layout

2.3 Use of mosaic and mural in interior

2.4 Salient buildings – Santa Sophia, Istanbul; St. Mark’s Cathedral, Venice

2.5 Introduction to society and culture of 1150 – 1350 AD in Europe

2.6 Development of Gothic church and its new elements:

- Pointed Arch window
- Different arch types – lancet, equilateral, depressed
- Trefoil arch
- Cluster column and intersecting vault roof
- Clerestory window and triforium
- Flying buttress
- Glazed window, stone and metal trellis, flamboyant window, rose window
- Entrance of church

2.7 Salient buildings:

- Cathedrals of St. Dennis,
- Cathedrals of Chartres,
- Cathedrals of Notre Dame (Paris)
- Cathedrals of Reims

Unit 3: Renaissance Architecture

- 3.1 Idea of rebirth, individualism, humanism, changes in socio - cultural, religious, technological and political context - Architectural principles of domestic and religious buildings - philosophies of Renaissance architects such as Leonardo Da Vinci, Brunelleschi, Michael Angelo, Andrea Palladio, Christopher Wren and Inigo Jones.
- 3.2 Examples such as St, Peters Rome and St. Pauls Cathedral – Baroque.
- 3.3 Rococo: characteristics.

PART-B

Unit 4: Emergence of Modern Architecture

- 4.1 Neoclassicism: origin, context, principles and characteristics – works of Ledoux, Schinkel and Jefferson.
- 4.2 Industrial revolution: technological, social and demographic changes – Urbanisation and its impact - new building materials, structures and building typologies such as railway stations, bridges, exhibition buildings.
- 4.3 Response to industrialization.

Unit 5: Search for a new style

- 5.1 Arts and crafts movement, Art nouveau, Expressionism, Futurism, Constructivism, Cubism, De Stijl – contribution of Adolf Loos - Early modernism: Chicago school and development of skyscrapers – Werkbund – Bauhaus, early works of Wright.

Unit 6: Modernism & After Modernism

- 6.1 High Modernism: CIAM and the International Style - ideas and works of Walter Gropius, Le Corbusier, and Mies van der Rohe - Late Modernism: Concepts and important works of Alvar Aalto, Oscar Niemeyer, Eero Saarinen, Philip Johnson, Louis Kahn, Paul Rudolph, and Buckminster Fuller – later works of Wright.
- 6.2 Critiquing modernism – Team X - philosophies and contributions of Jane Jacobs, Venturi, Aldo Rossi, Christopher Alexander; Post modernism – ideas and works of Graves, Venturi, Moore, Johnson, Sterling.

Text Books/ Reference Books:

1. Sir Banister Fletcher, 1999, A History of Architecture, 20th Edition, CBS.
2. G. B. Hiraskar, 2018, The Great Ages of World Architecture, 1st Edition, Dhanpat Rai Publications.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

Assignment/Tutorials

Sessional tests

Surprise questions during lectures/Class Performance

Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-404)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-404.1	2	-	-	-	-	2	-	1	1	-	1	2	2	2
AR-404.2	2	-	1	1	1	2	-	-	-	2	1	2	2	2
AR-404.3	-	2	-	1	1	2	1	-	-	-	-	2	2	2
AR-404.4	2	3	3	3	1	2	2	-	-	2	-	1	2	1
AR-404.5	2	3	3	3	1	2	2	-	3	1	-	2	2	1
AR-404.6	3	-	3	3	2	3	3	2	3	3	2	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

AR-405 B: STRUCTURE DESIGN-IV

Periods/week Credits
L: 4 T: 0 P: 0 4
Duration of Examination:3 Hours Theory Examination

Max. Marks: 100
Continuous Assessments: 60
End Semester Exam:40

Pre-requisites: NIL
Course Type: Program Core

Course Outcomes

The Student will able to

AR-405.1 To distinguish and classify various types of RCC material depending upon the strength and durability parameter.

AR-405.2 To Design a beam for a given system of loading and structural geometry, for flexure and shear.

AR-405.3 To Design a slab for given building floor for different end support conditions

AR-405.4 To outline the features of IS code provisions regarding limit state method for designing concrete structure.

AR-405.5 To Design a column for given axial load and moments.

AR-405.6 To Design a dogleg staircase for given stairwell space in residential or public building.

PART-A

Unit 1: Introduction to Design Methods

1.1 Introduction, Working stress design, Ultimate load design, Limit state design,

1.2 Limit state design versus Working stress design. Building code.

Unit 2:Detailing of Reinforcement

2.1Introduction, Requirements of good detailing, Nominal cover to reinforcement,Spacing of reinforcement, Reinforcement requirements, Reinforcementsplicing, Anchoring reinforcing bars in flexure, Curtailment of tension reinforcement in flexural members, Bar bending schedule.

Unit 3: Flexure Bond

3.1 Introduction, assumption, flexure design of singly reinforced & doubly reinforced and T- Beams by Limit state Methods. IS-Coded provisions, Numerical Problems.

PART-B

Unit 4: Design of Slabs

4.1 Effective span, one way and two way slabs. Design of simply supported slabs Reinforcement Details Numerical Problems.

4.2 Application of thumb rule for beam and slab for fixing sectional properties.

Unit 5: Design of Column

5.1 Short and Long Columns, IS-Code Provisions, Design of Short Columns under Axial compression, Design of long Columns, use of interaction diagram for design. Lateral ties. Reinforcement Detailing, Numerical Problems

Unit 6: Design of Stairs

6.1 Types of stairs, Design single flight stairs. Reinforcement Detailing, Numerical Problems.

6.2 Application of thumb rule for column and slab for fixing sectional properties.

Text Books/ Reference Books:

1. Krishna Raju, 2009, Structural Design and Drawing, Reinforced Concrete and Steel, 3rd Edition, University Press(India)Ltd.
2. P.C. Varghese, 2008, Limit State Design of Reinforced Concrete, 2nd Edition, Prentice Hall Learning Private Limited.
3. Dr. R.K. Bansal, 2018, Strength of Materials, 6th Edition, Laxmi Publications.
4. S.S. Bhavikatti, 2019, Design of Steel Structures, 1st Edition, Dreamtech Press.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

Assignment/Tutorials

Sessional tests

Surprise questions during lectures/Class Performance

Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-405)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-405.1	-	-	-	1	-	-	-	-	1	-	2	2	-	-
AR-405.2	-	-	1	-	-	-	-	-	-	-	-	1	2	-
AR-405.3	-	-	1	-	-	-	-	-	-	-	-	-	-	2
AR-405.4	-	-	-	-	-	2	-	-	-	-	-	-	-	2
AR-405.5	-	-	1	-	-	-	-	-	-	-	-	-	-	-
AR-405.6	2	-	1	-	-	2	-	-	-	-	-	1	-	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)

AR – 308 A: BUILDING SERVICES –I (WATER SUPPLY AND SANITATION)

Periods/week

Credits

Max. Marks : 100

L: 2 T: 0 P: 0 S: 0 2
Duration and Mode of Exam: 3 Hrs Theory Examination

Continuous Assessment : 60
End Semester Exam : 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

- The student will be able to
- AR-308.1. Define the importance of building services.
 - AR-308.2. Classify the active and passive components of plumbing.
 - AR-308.3. Develop understanding of water supply system at city levels.
 - AR-308.4. Analyze the process of solid waste management and hence develop strategies for effective waste management in buildings and built environment.
 - AR-308.5. Value the comprehensive knowledge of architectural space planning for water supply components and integration of systems in built forms.
 - AR-308.6. Design rain and waste water system in domestic building. Design water supply in residential and other small buildings. Design of water-sewer system in buildings (except hydraulics design calculation parts)

PART-A

Unit 1: Importance of Building Services

- 1.1 Importance of water supply and sewerage.
- 1.2 Historical overview of development of water/ sewerage systems.

Unit 2: Water Supply for Urban Area

- 2.1 Sources of water
- 2.2 Quality of water, impurities in water and its treatment.
- 2.3 Water demand calculations; norms and standards.
- 2.4 Water storage, over head tank, and sump.
- 2.5 Water distribution system at city/ neighbourhood overview.
- 2.6 Internal Hot and Cold Domestic Water Supply
- 2.7 Water treatment plant.
- 2.8 Types of water distribution networks.
- 2.9 Water pipe materials, apparatus, joints, fixtures and valves.
- 3.0 Guidelines for laying of water mains, distribution.

Unit 3: Domestic Water Supply

- 3.1 Principles of water supply in domestic buildings.
- 3.2 Water supply in low-rise and multi-storeyed buildings.
- 3.3 Hot-cold water supply network and connections.
- 3.4 Pipe materials, fixtures, joints, equipments.
- 3.5 Roof top water drainage.

PART-B

Unit 4: Domestic Sewage System

- 4.1 Principles of domestic sewer systems norms and standards.
- 4.2 Types of pipe systems.
- 4.3 Types of traps, use and water seal.
- 4.4 Domestic sewer conveyance network.

- 4.5 Components of sewer conveyance network.
- 4.6 Basic terminology, Gully trap, inspection chamber, intercepting trap, man holes etc.
- 4.7 Calculation for Gradient and slope in sewage disposal.
- 4.8 Various sanitary fixtures and its connections.
- 4.9 Sewage disposal to septic tank, cess pool, soak pit.

Unit 5: Rain Water and Storm Water Disposal System

- 5.1 Techniques to divide surface area for rain water disposal.
- 5.2 Details of collection point/ Khurra.
- 5.3 Conveyance network for waste / rain water.
- 5.4 Apparatus for conveyance of water, catch basin, gully traps, calculation for gradient/ slopes.

Unit 6: Design of Domestic Water Supply and Sewage Network

- 6.1 Applications of knowledge water supply and sewage design.
- 6.2 Preparation of drawings excluding hydraulic design.

Text Books/ Reference Books:

1. S.C. Rangwala, 2016, Water Supply and Sanitary Engineering, 29th Edition, Charotar Publishing House Pvt. Ltd.
2. A.K. Upadhyay, 2013, Water Supply and Waste Water Engineering, 2013 Edition, S.K. Kataria& Sons.
3. S.C. Deolatikar, 2015, Plumbing Design and Practice, 1st Edition, McGraw Hill Education.
4. Steve Muscroft, 2007, Plumbing, 2nd Edition, S.Chand& Company Ltd.
5. Stephen Emmitt, 2018, Advanced Construction of Buildings, 4th Edition, Wiley-Blackwell.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each part 'A' and part 'B'. Students need to attempt two questions out of three from each part.

Assessment Tools:

- Assignments
- Sessional tests
- Theory examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-308)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-308.1	2	2	-	2	1	-	-	-	2	-	1	-	-	3
AR-308.2	3	3	-	2	1	-	-	-	3	1	-	-	2	2
AR-308.3	3	3	-	2	1	3	1	-	3	1	-	3	3	2
AR-308.4	3	3	-	2	1	2	2	-	2	1	-	1	2	2
AR-308.5	3	3	-	2	1	2	2	3	2		-	2	2	2
AR-308.6	3	3	-	1	2	3	3	-	2	1	2	3	3	3

AR-409: PRINCIPAL OF HUMAN SETTLEMENTS

Periods/week Credits
L: 2 T: 0 P: 4 S: 0 2
Duration and mode of Examination: 3 Hours Theory Examination

Max. Marks: 100
Continuous Assessment: 60
End Semester Exam: 40

Pre-requisites: NIL

Course Type: Program Core

Course Outcomes

The Student will be able to

- AR-409.1. To introduce the vocabulary, elements and classification of human settlements.
- AR-409.2. To give exposure to planning concepts at different scales of settlements.
- AR-409.3. To give an understanding of planning addressing Rural and Regional Development in India.
- AR-409.4. To give an understanding of planning Urban Planning and Urban Renewal.
- AR-409.5. To Understand with Consideration of Case Studies.
- AR-409.6. To Learn about various aspects in contemporary urban planning in India

PART-A

Unit 1: Introduction To Human Settlements

- 1.1 Introduction to planning as a discipline and brief evolution of the profession. Elements of human settlements.
- 1.2 Human beings and settlements. Nature, shells and networks- their functions and linkages.
- 1.3 Anatomy and classification of human settlements- locational, resource based, population size and occupational structure.

Unit 2: Forms Of Human Settlements

- 2.1 Structure and form of settlements - linear, non- linear and circular, combinations. Reasons for development.
- 2.2 Advantages and disadvantages. Case studies.
- 2.3 Factors influencing the growth and decay of human settlements.

Unit 3: Rural And Regional Development In India

- 3.1 Rural development plans, programmes and policies from case studies.
- 3.2 Regional Plan. Area delineation, land utilization plan, hierarchical system of settlements, their sizes and functions.

PART-B

Unit 4: Urban Planning and Urban Renewal

- 4.1 Introduction to urban planning in India.
- 4.2 Scope, content and limitations of master plan. Structure plan, DDP/ZDP, planned unit development.
- 4.3 Development control rules. Urban renewal, redevelopment rehabilitation and conservation.
- 4.4 Urban development projects – case studies.

Unit 5: Aspects In Contemporary Urban Planning In India

- 5.1 Globalization and its impact on cities. Sustainable planning concepts.
 5.2 New forms of developments, to include self sustained communities, SEZ, transit oriented development (TOD), integrated townships, smart cities. Case studies.

Unit 6:

Text Books/ Reference Books:

1. C.L.Doxiadis, Ekistics, 'An Introduction to the Science of Human Settlements', Hutchinson, London, 1968.
2. Thooyavan K R, 2005, Human Settlements- A Planning guide to Beginners', M.A.Publications.
3. Ministry of Urban affairs and Employment, Government of India, New Delhi, 1996, 'Urban Development Plans: Formulation and Implementation-Guidelines'
4. Andrew D Thomas, 1986, 'Housing and Urban Renewal', Harper Collins.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

- Assignment/Tutorials
- Sessional tests
- Surprise questions during lectures/Class Performance
- Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-409)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-409.1	-	-	1	-	1	1	-	1	1	-	-	-	-	-
AR-409.2	1-	2	-	1	-	1	-	1	-	-	1	-	1	-
AR-409.3	-	2	-	-	2	1	-	1	-	-	1	-	1	-
AR-409.4	-	-	2	1	-	1	1	-	1	-	-	1	2	-
AR-409.5	1	1	-	-	2	1	1	-	-	1	-	1	2	2
AR-409.6	1	-	-	1	-	1	1	-	-	1	-	-	2	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR-108 A: INTRODUCTION TO COMPUTERS-I

Periods/week Credits

L: 0 T: 0 P: 4 S: 0 2

Duration and Mode of Examination: Practical Examination & Vice-voce

Max. Marks: 150

Continuous Assessment: 100

End Semester Exam: 50

Pre-requisites: NIL

Course Type: Elective Domain Specific

Course Outcomes

The Student will able to

AR-108.1. Develop understanding of computer Knowledge regarding today's modern world.

AR-108.2. To Learn about Internet and Surfing related to search and relative data collection.

AR-108.3. Comprehends MS office and its parameter as tools and its application in profession.

AR-108.4. Demonstrate the concepts of MS word, PowerPoint methods and techniques in various architectural projects of progressive complexity

AR-108.5. Evaluates techniques for quicker methods and presentation skills

AR-108.6. To Learn about MS Excel to Perform complex calculation and analysis.

PART-A

Unit 1: Computer Basics

1.1 Hardware & Software with their applications.

1.2 Central Processing Unit, Type of Storage Devices and their capabilities,

1.3 Input and Output Devices like Key Board, Image Scanner, Mouse, Printers, Digitizer, Plotters, Light Pen, and Digital Camera etc. including their role.

Unit 2: Computer Software

2.1 Applications and usage, Types and Examples of system and application software,

2.2 History of Internet, Connecting to the Internet.

Unit 3: Computer Internet

2.1 Applications and usage, Types and Examples of system and application software,

2.2 History of Internet, Connecting to the Internet.

2.2 Application of Email ID, Email ID generation, composes mail and sent mail.

2.3 Draft the Email for professional interaction.

PART-B

Unit 4: Computer Application-MS Word

4.1 MS Word Basics, Formatting, Text & Documents,

4.2 Working with headers & footers, Tables, Graphics, Templates, Macros, Mail Merge, and Importing & Exporting Files.

Unit 5: Computer Application-MS Excel

5.1 Excel Basics, Formatting, Printing, Functions, Charts & Graphics, Window resizing, Establishing Worksheet links, Macros, Using files with other programs, Goal Seek, Scenario.
5.2 Data Validation.

Unit 6: Computer Application- MS Power Point:

6.1 Overview of MS PowerPoint, H/W and S/W Requirements, Creating slides & presentations, rehearsing Presentation, Insert Tools, Format Slide Show, Custom Slide Show

Text Books/ Reference Books:

1. Bittu Kumar, 2017, Mastering MS Office: Computer Skill Development - Be Future Ready, V&S Publishers.
2. S.S. Shrivastava, 2015, M.S. Office., First Edition, Laxmi Publications.

Instructions for paper setting:**The Subject will be assessed through a practical examination & viva-voce.**

Assessment Tools:

Portfolio Submission
Sessional tests
Software related Evaluation and vive-voce
Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-108)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-108.1	-	-	-	-	1	-	-	-	1	-	-	1	2	1
AR-108.2	-	-	-	-	1	-	-	-	-	-	1	-	-	2
AR-108.3	2	-	-	-	-	-	-	-	-	-	-	-	1	-
AR-108.4	-	2	-	-	-	-	-	-	1	-	1	1	-	-
AR-108.5	-	-	-	-	-	-	-	-	-	2	-	2	-	-
AR-108.6	-	-	-	-	-	-	-	-	-	2	1	2	-	-

AR- 408 A: VERNACULAR ARCHITECTURE

Periods/week Credits
L: 2 T: 0 P: 0 S: 0 2
Duration and Mode of Exam: 3 Hrs Theory Examination

Max. Marks : 100
Continuous Assessment : 60
End Semester Exam : 40

Pre-requisites: None

Course Type: Elective - Domain Specific

Course Outcomes

The student will be able to

- AR-408.1. Recall the evolution of settlement and its planning.
- AR-408.2. Explain the determinants of vernacular architecture and factors shaping them.
- AR-408.3. Identify the concepts of materials & technology in vernacular architecture.
- AR-408.4. Analyze the response of the built environment to the context through the study of various vernacular forms of architecture across India.
- AR-408.5. Appraise the elements, techniques and factors which go into the making of vernacular architecture as distinct from other styles of architecture.
- AR-408.6. Elaborate the Vernacular Architecture of various regions with their distinct features / elements.

PART-A

Unit 1: Introduction to Vernacular Architecture

- 1.1 Definition of Vernacular Architecture.
- 1.2 Importance and factors determining the Character of vernacular architecture.
- 1.3 Basic Theories of Vernacular Architecture.

Unit 2: Determinants of Vernacular Architecture

- 2.1 Role and importance of social, cultural, political, economic, climatic, technological factors.

Unit 3: Role and Importance of Materials & technology in Vernacular Architecture

- 3.1 Typical building materials.
- 3.2 Built form & elements.
- 3.3 Construction techniques & environmental performance.

PART-B

Unit 4: Vernacular Architecture and Disaster Management

- 4.1 Disaster management in context of Vernacular Architecture
- 4.2 Disaster resilient vernacular architecture

Unit 5: Illustrated Case Studies

- 5.1 Vernacular settlements / building typology from various regions in India and abroad.

Unit 6: Study of Vernacular Architecture

- 6.1 Vernacular Architecture of various regions of Punjab with their distinct features / elements.
- 6.2 Havelis of Punjab
- 6.3 Rural Houses

Text Books/ Reference Books:

1. Paul Oliver, 1997, 'Encyclopedia of Vernacular Architecture of World, Cambridge University Press.
2. Jay Thakkar, 2008, 'Matra: Ways of measuring Built Form of Himachal Pradesh', CEPT University.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

- Assignment/Tutorials
- Sessional tests
- Surprise questions during lectures/Class Performance
- Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-408)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-408.1	2	2	2	-	-	2	2	-	1	-	-	-	-	3
AR-408.2	2	2	2	2	-	2	2	2	2	-	-	-	2	3
AR-408.3	2	3	-	3	2	2	2	2	2	-	-	-	2	2
AR-408.4	3	3	3	3	3	2	3	2	-	2	-	2	2	3
AR-408.5	2	2	2	3	2	2	2	2	-	-	-	2	2	3
AR-408.6	3	3	3	3	2	3	3	2	2	2	1	2	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR-501 A: ARCHITECTURAL DESIGN -V

Periods/week Credits
L: 0 T: 0 P: 0 S: 9 9
Duration and Mode of Exam: Design Evaluation and Viva Voce

Max. Marks: 300
Continuous Assessment: 200
End Semester Exam: 100

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

- AR 501.1. **Value** various advanced structural systems and latest building materials
- AR 501.2. **Questions** new technology, structural system and materials
- AR 501.3. **Apply** services (studied in previous and present semester) at building level in their design
- AR 501.4. **Formulate** through drawings or models methods developed to meet various requirements
- AR 501.5. **Build** study models with precision (or Graphics) of chosen structure for designed space
- AR 501.6. **Apply** new techniques and systems in their design to present it .

PART-A

Unit 1: Introduction to Design Problem

- 1.1 Design of imaginative forms to develop the creativity in terms of built form.
- 1.2 Application of principles and theory of architectural design and philosophies of contemporary architects
- 1.3 Building structural systems for a multi-storeyed building
- 1.4 Design exercises could be sports complex, exhibition hall(s), interpretation centre, cultural centre, showrooms, auditorium, temporary canopy etc.

Unit 2: Data collection and analysis

- 2.1 Site Visit and Site Analysis Area Programming
- 2.2 Concept and bubble diagram
- 2.3 Collecting and analyzing Data for various spaces
- 2.4 Literature study

Unit 3: Site Planning

- 3.1 Flow diagram (relation of various spaces)
- 3.2 Bubble diagram (locating various zones on site)
- 3.3 Try and Re-create (Analyzing spaces in all dimensions through Block)
- 3.4 Programming examples, Assembler directives and operators, Timing diagrams

PART-B

Unit 4: Design development and Construction details

- 4.1 Single line graphics
- 4.2 Study models for choosing the right option

4.3 Construction details and service details

Unit 5: Pre Final Design

- 5.1 Site Plan and Landscape plan
- 5.2 Rendered floor plans
- 5.3 Elevations and Sections
- 5.4 1-point perspective Sketch of building

Unit 6: Final Design Submission

- 6.1 Drawings and detail physical model
- 6.2 A set of working drawings with all floor plans, elevations and sections
- 6.3 Summative assessment of the studio work could be achieved through Panel discussion, presentation, peer review, public review , Criteria based evaluation etc.

Text Books/ Reference Books:

1. Bureau of Indian Standards, 2016, National Building Code, SP 7.
2. Donald Watson, 1946, Time Saver Standards for Architectural Design , 8th Indian Edition, Mc Graw Hill
3. Ernst & Peter Neufert, 1953, Architectural Standard-Architect's Data, 5th Edition, Wiley Blackwell.

Software required/Weblinks:

Auto cad / Revit
Photoshop

Instructions for paper setting:

The subject will be assessed through a practical examination and Viva Voce.

Assessment Tools:

Portfolio Submissions
Sessional tests
Design Evaluation & Viva Voce

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR 501)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR 501.1	2	2	2	3	2	1	2	1	1	3	2	3	3	2
AR 501.2	3	2	3	3	1	1	3	2	2	1	1	3	2	1
AR 501.3	3	3	2	1	2	2	1	2	1	3	1	3	2	3
AR 501.4	2	2	3	2	3	1	2	2	3	3	2	3	1	2
AR 501.5	3	2	3	2	3	2	2	2	3	2	1	3	1	2
AR 501.6	3	3	3	2	3	2	2	2	3	3	1	3	2	2

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AR-502 A: BUILDING MATERIALS AND CONSTRUCTION – V

Periods/week Credits
L: 0 T: 0 P:0 S: 5 5
Duration and mode of Examination: Practical Examination & Viva-voce

Max. Marks: 150
Continuous Assessments: 100
End Semester Exam: 50

Pre-requisites: NIL

Course Type: Program Core

Course Coordinator/Co-Coordinator:

Course Outcomes

The Student will able to

- AR-502.1. To Comprehend various types of door and windows used in different situations from day to day life.
- AR-502.2. To Understand the variety of available metal sections for varied uses. To comprehend the details/arrangements of reinforcement.
- AR-502.3. To Compare the various types of doors with different material used to analyze the construction details.
- AR-502.4. To Evaluate the best suitable material and types of door. Window and Partitions.
- AR-502.5. To Gain knowledge of properties of various special materials.
- AR-502.6. To compose the various elements of steel truss to make replica (Scaled Model) or drawings of Building components.

PART-A

Unit 1: Special Doors and Shutters

- 1.1 To make students aware of various types of special Metal Doors
- 1.2 Different types of doors; sliding, folding, revolving doors, collapsible shutters, rolling shutters, types of rolling shutters in conventional and contemporary materials. The installation, working and mechanism of such doors and shutters.

Unit 2: Metal Doors, Windows and Partitions

- 2.1 Doors and Windows in steel, aluminum along with technical terminology involved.
- 2.2 Types and varieties of available sections in steel and aluminum in market and their application in providing doors, windows and partitions.
- 2.3 Design considerations and construction details in congruence to IS codes and manuals provided by CPWD and other organizations.

PART-B

Unit 3: RCC Details of Framed Structures

- 3.1 To develop understanding about framed structure in terms of reinforcement and construction details.
- 3.2 To be acquainted with about special structures like retaining wall and buttresses.
- 3.3 Reinforcement and Design details of Footings
- 3.4 Columns, beams , slab and lintels.
- 3.5 Buttresses and Retaining Walls: Details of Construction of Buttresses and retaining walls.

Unit 4: Manufacturing Materials

- 4.1 Learning of Various ferrous and non ferrous metal sections used in manufacturing of metal doors and windows along with various fixtures involved.
- 4.2 Metal Sections, fixtures and fastenings for metal doors, windows and partitions.
- 4.3 Adhesives: Market survey and study of various adhesives available for the binding of various types of materials used in building construction.

Text Books/ Reference Books:

1. W.B.Mckay,1983, Building Construction, 5th Edition, Pearsons.
2. Sushil Kumar, 2010, Building Construction, 3rd Edition, Standard Publisher
3. Rangwala, 2016,Building Construction,33rd Edition, Charotar publishing house
- 4.B.C.Punmia,2016, Building Construction, 11th Edition, Laxmi Publications
5. IS Codes and CPWD Manuals

***Each Module should include market surveys and Construction site visits compulsorily.**
Instructions for paper setting:The Subject will be assessed through a practical examination & viva-voce.

Assessment Tools:

- Portfolio submission
- Sessional tests
- Construction Details Evaluation and viva-vive
- Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-502)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-502.1	1	1	-	1	1	1	-	-	-	-	-	1	-	-
AR-502.2	-	-	-	-	-	-	-	-	-	-	-	1	1	2
AR-502.3	-	-	1	-	-	-	-	1	2	1	-	2	-	2
AR-502.4	-	1	-	-	-	-	-	-	-	-	1	-	2	-
AR-502.5	1	-	-	-	-	-	1	-	-	1	-	-	-	-
AR-502.6	1	-	2	1	1	-	-	2	2	1	1	2	-	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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AR – 504 B: HISTORY OF ARCHITECTURE - III

Periods/week Credits
L: 2 T: 0 P: 0 S: 0 2
Duration and Mode of Exam: 3 Hrs Theory Examination

Max. Marks : 100
Continuous Assessment : 60
End Semester Exam : 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

- AR-504.1. Define different styles of historic architecture.
- AR-504.2. Explain prominent / important historic buildings.
- AR-504.3. Identify prominent / important historic buildings by their components / style of design.
- AR-504.4. Analyze the contributing factors for the design development of different styles.
- AR-504.5. Compare various styles on the basis of the contributing factors responsible for their development.
- AR-504.6. Design buildings in the historic architectural styles.

PART-A

Unit 1: Harappan and Vedic Architecture

- 1.1 Architecture and town planning of Harappan civilization such as towns of Lothal, MohenjoDaro, Dholavira, Kalibanga etc.
- 1.2 Understanding of Vedic architecture, and settlements.
- 1.3 Architectural features.

Unit 2: Islamic Architecture

- 2.1 Introduction to early Islamic architecture in India.
- 2.2 Characteristic features of Islamic architecture; minarets, domes, gardens, geometrical and calligraphic decorations.
- 2.3 The buildings of different dynasties of Delhi, Agra, Deccan, Gujarat etc.

Unit 3: Buddhist Style of Architecture

- 3.1 Introduction to new religion and ideas
- 3.2 Architectural treaties and writings: DighaNikaya, Lotus sutra of Mahayana, angas and upangas.
- 3.3 Architectural features: Sanghas and Viharas, temporary shelters.
- 3.4 Buddhist religion and culture - Hinayana and Mahayana, principles and characteristics of architecture through examples such as Sanchi Stupa - Cave architecture - Chaitya hall in Ajantha-Ellora caves.
- 3.5 Prominent Sites:
 - Karli caves Maharashtra
 - Nalanda and Taxila

PART-B

Unit 4: Nagara and Dravidian Style of Architecture

- 4.1 Principles and characteristics of medieval temple architecture – types of temple architecture and its characteristics – Dravida, Nagara and Vesara.
- 4.2 Nagara Architecture: Principles and characteristics with examples such as Sun Temple at Konark.
- 4.3 Dravida architecture – Pallava architecture: Over view of Architecture, contextual adaptations – EgVaikunthaperumal temple at Kanchipuram.

Unit 5: Colonial to Contemporary Architecture

- 5.1 English, French, Dutch and Portuguese Colonial architecture in Indian subcontinent.
- 5.2 Post Independence architecture and planning; New city planning: Chandigarh, Gandhinagar etc.
- 5.3 Modern foreign and Indian architects and their works in India.

Unit 6: Jainism Style of Architecture

- 6.1 Prominent Sites:
 - Dilwara Temple, Mount Abu
 - Adinath Temple, Ranakpur
 - Nasayan Temple, Ajmer
 - Hatheesing Jain Temple, Ahmedabad
 - Digambar Jain Temple, Delhi

Text Books/ Reference Books:

- 1. G. B. Hiraskar, 2018, World Ages of Architecture, 5th edition, Dhanpat rai Publications.
- 2. Satish Grover, 2017, The Architecture of India –II, 2nd Edition, CBS Publishers & Distributors

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

- Assignment/Tutorials
- Sessional tests
- Surprise questions during lectures/Class Performance
- Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-504)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-504.1	3	2	2	2	-	1	2	-	1	2	-	1	2	3
AR-504.2	3	2	2	2	2	2	2	-	1	2	-	2	2	3
AR-504.3	3	3	2	3	2	2	2	-	-	2	-	2	1	2
AR-504.4	3	3	2	3	2	2	2	-	-	3	-	2	1	2
AR-504.5	2	3	2	3	3	2	2	1	-	2	-	2	-	2
AR-504.6	3	2	3	2	3	3	2	1	1	3	1	3	2	3

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AR-505 B: STRUCTURE DESIGN – V

Periods/week Credits
L: 4T: 0 P: 0 S: 0 4
Duration and mode of Examination: 3 Hours Theory Examination

Max. Marks : 100
Continuous Assessment : 60
End Semester Exam :40

Pre-requisites: NIL
Course Type: Program Core

Course Outcomes

The Student will able to

- AR-505.1. To outline the features of IS code provisions regarding limit state method for designing foundation structure.
- AR-505.2. To Design a foundation for a given system of loading and structural geometry.
- AR-505.3. To summarize the conceptual idea behind the development of pre-stressed structural component for general use.
- AR-505.4. Identify the concept of various structural elements and system.
- AR-505.5. Analyze the structure geometry based on strength and stability criteria..
- AR-505.6. Create an integrated system based on structural models and new material for modern skyscrapers

PART-A

Unit 1: Design of Footing

- 1.1 Types of Footing, Theory-Grid flooring and deep beam, Isolated footing for rectangular and circular columns
- 1.2 Reinforcement Detailing, Numerical Problems

Unit 2: Design of RCC Foundations

- 2.1 Types of foundations – raft, pile etc.
- 2.2 Design of foundation for RCC structure –foundation at different levels - piles, pile cap and pile load test.
- 2.3 Design of isolated square and rectangular footing in depth frame consideration of bending moment one way shear, and two way shear area of reinforcement, design examples.

Unit 3: Introduction to Pre-Stressed Concrete

- 3.1 Introduction to Pre-Stressed Concrete, Difference in Pre and Post tensioning systems, Advantages
- 3.2 Basic design concept of Pre-stressed concrete beam, Analysis of pre stress and bending stress, Resultant Stress, Thrust Line, Concept of Load balancing
- 3.4 Various losses of stresses, Stresses behavior at anchorage zone Simple Numerical Problems.
- 3.5 Testing equipment, destructive and non-destructive testing, cube testing on UTM

PART-B

Unit 4: Design of RCC Slabs

- 4.1 Concepts of different types of slabs spanning in one direction, two directions, continuous slab, cantilevered slab, circular slab and flat slab.
- 4.2 Theory and design of RCC one way slabs.

Unit 5: Arches, Shells and Domes

- 5.1 Arch Action
- 5.2 Classification and advantages of Arch, barrel shells hyperbolic parabolic

5.3 Shell, Vaults and Domes: Structural Concept and Classification and Application in Architecture

Unit 6: Structural Systems for Modern Sky Scrapers

- 6.1 High Rise Buildings: Structural Systems and Application,
- 6.2 Sky Scrapers: Structural Concept and Modern Methods of Construction Application,
- 6.3 Case Studies on Structural Systems of Sky Scrapers

Text Books/ Reference Books:

1. IS Codes: IS 465: 2000, SP-16, SP-34
2. B.C. Punmia, 1992, Reinforced concrete structure (Vol - I), 7th Edition, Laxmi Publications
3. S. Unnikrishna Pillai & Devdas Menon, 2017, Reinforcement Concrete Design, 3rd Edition, McGraw Hill Education
4. N. Krishna Raju, 2018, Structural Design and Drawing & Reinforced Concrete and Steel, 1st Edition, New Age International
5. Mallick and Gupta, 2012, Reinforced Concrete, 7th edition, Nem Chand & Brothers

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

- Assignment/Tutorials
- Sessional tests
- Surprise questions during lectures/Class Performance
- Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-505)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR- 505.1	-	-	-	1	-	-	-	-	1	-	2	2	-	-
AR- 505.2	-	-	1	-	-	-	-	-	-	-	-	1	2	-
AR- 505.3	-	-	1	-	-	-	-	-	-	-	-	-	-	2
AR- 505.4	-	-	-	-	-	2	-	-	-	-	-	-	-	2
AR- 505.5	-	-	1	-	-	-	-	-	-	-	-	-	-	-
AR- 505.6	2	-	1	-	-	2	-	-	-	-	-	1	-	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR-506 B: BUILDING ECONOMICS AND TECHNOLOGIES -I

Periods/week Credits
L: 2 T: 0 P: 0 S: 0 2
Duration and mode of Exam: 3 Hrs Theory Exam

Max. Marks: 100
Continuous Assessment: 60
End Semester Exam: 40

Pre-requisites: None

Course Type: Elective – Domain Specific

Course Outcomes

The student will be able to

- AR 506.1. **Intends** to impart knowledge and promote understanding of the role and importance of Economy.
- AR 506.2. **Understand** the role of technologies to make cost effective buildings
- AR 506.3. **Intends** to impart knowledge about financial institutions of India and their role in building economics
- AR 506.4. **Learn** about the measures through which performance of a building can be measured
- AR 506.5. **Get familiar** with the various techniques to measure economic performance of a building.
- AR 506.6. **Intends** to learn the space norms which in turn helps in economic performance of a building.

PART-A

Unit 1: Elements of Economics:

- 1.1 An idea of fundamental concepts of economics Science and their application in Construction industry.
- 1.2 Building Economics- Introduction, Definition, Role, Scope, Importance and Principles of Building Economics.
- 1.3 Micro Economics: Factor of production-Characteristics and importance, demand supply analysis, competitive market and determination.
- 1.4 Macro Economics: National income and its distribution, inequalities of income distribution, its causes and measures

Unit 2: Economics in Relation to Architecture

- 2.1 Technology – Role, Importance and Use,
- 2.2 Up-gradation of local technologies to make building cost – effective.
- 2.3 Building Efficiency, Building Life-cycle Costs
- 2.4 Benefits of Building - Monetary and Non Monetary.

Unit 3: Financing Institution and Project Economics

- 3.1 Financing Institutions in Financing Process,
- 3.2 Interim Finance
- 3.3 Permanent Financing
- 3.4 Economics of the basic inputs into building construction projects - land, labour, capital and Material.
- 3.5 Labor intensive v/s capital intensive projects.
- 3.6 Financing for projects, sources of capital, Agencies and Institutions influencing project economics.

PART-B

Unit 4: Measures and Techniques of Economics performance of building

- 4.1 Net benefit
- 4.2 Rates and Ratios
- 4.3 Performance measures and choosing the measure for economic performance
- 4.4 Benefit Cost Analysis
- 4.5 Incremental Analysis
- 4.6 Breakeven Period
- 4.7 Rate of Return Analysis

Unit 5: Space Norms and New innovation in Building constructions

- 5.1 Project planning and project scheduling and project controlling, Role of Decision in project management
- 5.2 Method of planning and programming, Human aspects of project management, work breakdown structure, Life cycle of a project, disadvantages of traditional management system.

Unit 6: PERT / CPM

- 6.1 Event, activity, dummy, network rules, graphical guidelines for network, numbering of events. CPM network analysis & PERT time estimates, time computation & network analysis.
- 6.2 Project cost, Indirect project cost, direct project cost, slope of the direct cost curve, Total project cost and optimum duration, contracting the network for cost optimization, steps in cost-time optimization.

Text Books/ Reference Books:

- 1. TERI, 2004, Sustainable Building – Design Manual Vol. I and II', 1st Edition, TERI.
- 2. Mann, T. , 1992, Building Economics for Architects. New York: Van Nostrand Reinhold.

Software required/Weblinks:

Instructions for paper setting:

Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part.

Assessment Tools:

Assignment/Tutorials

Sessional tests

Surprise questions during lectures/Class Performance

Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR 506)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR 506.1	1	2	2	-	1	2	3	1	1	1	1	2	2	1
AR 506.2	2	1	2	-	-	2	1	2	1	2	1	3	2	1
AR 506.3	3	2	2	1	2	1	1	1	1	1	2	2	1	2
AR 506.4	2	1	1	1	2	-	3	1	2	3	-	2	1	2
AR 506.5	3	2	2	-	-	2	1	2	1	3	1	2	2	1
AR 506.6	2	1	2	1	2	3	2	1	1	3	2	3	1	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR – 406 A: BUILDING SERVICES –II (ELECTRICAL SERVICES & ILLUMINATION)

Periods/week Credits
L: 2 T: 0 P: 0 S: 0 2
Duration and Mode of Exam: 3 Hrs Theory Examination

Max. Marks : 100
Continuous Assessment : 60
End Semester Exam : 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

- AR-406.1. Define the importance of building services involved in the built environment.
- AR-406.2. Classify the active and passive components of the Electrical system and various principles.
- AR-406.3. Develop understanding of Electrical, Fire fighting and illumination for Small buildings.
- AR-406.4. Analyze the Illumination systems involved at domestic level.
- AR-406.5. Value the Knowledge of essential components of Fire fighting system systems at domestic level.

PART-A

Unit 1: Importance of Building Services

- 1.1 Importance of water supply and sewerage.
- 1.2 Historical overview of development of water/ sewerage systems.
- 1.3 Importance of Electrical, Fire fighting, illumination and vertical transportation system
- 1.4 Historical overview of development of Electrical, Fire fighting, illumination and vertical transportation system.

Unit 2: Electrical Services

- 2.1 Basic principles of electricity
- 2.2 Electricity demand calculations; norms and standards
- 2.3 High side electrical system at site level - Transformers and switch gears – Layout of substations
- 2.4 Electrical distribution system at site level overview
- 2.5 Types of distribution networks at site level and building level.
- 2.6 Planning electrical wiring for building – Main and distribution boards
- 2.7 Types of wires, wiring systems and conduit
- 2.8 Fixing of electrical fixtures and switches
- 2.9 Materials, apparatus, joints, fixtures and breakers –Market survey
- 3.0 Low voltage supply (data and telephone)

Unit 3: Illumination

- 3.1 Visual tasks – Factors affecting visual tasks
- 3.2 Modern theory of light and colour – Synthesis of light.
- 3.3 Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor
- 3.4 Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering.
- 3.5 Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting.
Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

PART-B

Unit 4: Fire Fighting System

- 4.1 Causes and spread of fire, Combustibility of materials and safety norms.
- 4.2 Passive Fire Protection Strategies.
- 4.3 Active Fire Protection Systems.
 - Fire Detection Systems.
 - Alarm Systems.
 - Fire Extinguishing Systems.
 - Smoke Control.
- 4.4 Designing Fire Escapes for Life Safety.
- 4.5 Code Provisions.

Unit 5: Co-Ordination of Building Services

- 5.1 Co-ordination of building services with other service layouts, architectural layouts and structural layouts.
- 5.2 Preparation of Co-ordination drawings.

Text Books/ Reference Books:

- 4. Barry, 1998, "building services, 1st edition, John Wiley and Sons Ltd .
- 5. National Building Code:-B I S
- 6. Jain V. K .,2000, "Handbook of Designing and installation of Services in Buildings,3rd Edition Khanna publishers

Instructions for paper setting:Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each part 'A' and part 'B'. Students need to attempt two questions out of three from each part.

Assessment Tools:

Assignments
Sessional tests
Theory examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-406)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-406.1	3	-	2	2	-	2	1	-	2	-	-	3	-	3
AR-406.2	2	2	2	3	-	-	-	-	2	2	-	2	2	1
AR-406.3	2	2	3	-	3	3	-	-	3	3	-	2	3	3
AR-406.4	3	3	2	3	-	-	-	-	2	-	-	1	-	2
AR-406.5	2	2	2	2	-	-	-	1	2	2	2	1	2	2
AR-406.6	3	2	3	2	3	3	1	-	3	3	2	3	3	3

AR-508 B: LANDSCAPE ARCHITECTURE-I

Periods/week Credits
L: 4 T: 0 P: 0 S: 0 4
Duration and mode of Examination: 3 Hours Theory Examination

Max. Marks: 100
Continuous Assessment: 60
End Semester Exam :40

Pre-requisites: NIL

Course Type: Program Core

Course Outcomes

The Student will able to

- AR-508.1. Recognize the various methods of a scientific landscape analysis with due integration of the MEP.
- AR-508.2. Identify the historic landscape patterns
- AR-508.3 Recognizes how it has been done in the past along with present state in the urban landscapes
- AR-508.4. Understand the role of urban biodiversity. Conduct a Landscape analysis and evaluate it with required functions
- AR-508.5. A knowledge base to deal with complex urban and human induced landscape design issues.
- AR-508.6. Develop a site plan with Landscape design and relate with environment and ecology

PART-A

Unit 1: Introduction

- 1.1 Introduction to landscape architecture; role of landscape design in architecture
- 1.2 Ecology , concept of ecosystem , ecological balance, environmental degradation and deterioration of natural resources

Unit 2: The historic Landscape patterns

- 2.1 To learn to read the land through the imprints left by history
- 2.2 A comparative study of the major traditions of landscape design in the east and the west; Historical Landscape garden styles of India and the world; Chinese, Buddhist, Islamic, European etc.
- 2.3 Reading the historic landscape patterns
- 2.4 Self-Organizationallandscape patterns
- 2.5 The fragmented landscapes
- 2.6 Developing an understanding with Examples, Historic and Archaeological assessments

Unit 3: Landscape Ecology and Processes

- 3.1 To understand landscape ecology and process
- 3.2 To understand the need for urban bio-diversity for better environments.
- 3.3 To learn how to generate and sustain urban biodiversity.
- 3.4 Landscape ecology, concept of ecosystem, eco regions, bio geographic zones, landscape structure, Patch, Corridors and matrix
- 3.5 Ecological urbanism; recent research and the historical overview
- 3.6 Ecological Planning and design

PART-B

Unit 4: Infrastructure enhancements and the green landscape rating system

- 4.1 To learn to develop and plan large sites with minimum or no negative impacts on the environment
- 4.2 Infrastructure enhancements, environmental regulations, environmental site assessments
- 4.3 Storm water management, floodplain studies, grading and earthwork, wastewater collection, treatment, erosion and sediment control
- 4.4 An overview of the landscape rating systems, green landscape rating system

Unit 5: Landscape in urban areas

- 5.1 Significance of landscape in urban areas; road landscaping; waterfront development, landscaping of residential areas , Industrial landscaping .
- 5.2 Basic principles of planting design; Spatial development in landscape design; Study of landscapedesign of any small project including paving and street furniture design

Unit 6: Landscape Architecture as a Profession

- 6.1 To understand the role of a landscape architect in the profession
- 6.2 Landscape architecture profession
- 6.3 Scale and types of Projects
- 6.4 Types of drawings used in land development, samples of landscape architecture drawings, Contract, document and specifications.

Text Books/ Reference Books:

- 1. Prof Shaheer, GeetaWahiDua, 2013, Landscape architecture in India A reader, 1st Edition, LA Journal Of Landscape Architecture.
- 2. PradipKishen ,2006, Trees of Delhi/ Central India , 1st Edition, Penguin India
- 3. T.K. Bose ,2015, Ornamental Plants and Garden Design in Tropics and Subtropics (2 vols), 1st Edition, Astral International Ltd.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

- Assignment/Tutorials
- Sessional tests
- Surprise questions during lectures/Class Performance
- Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-508)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-508.1	1	-	2	-	1	-	-	1	-	1	-	-	-	1
AR-508.2	-	-	2	-	-	2	1	-	-	-	-	-	1	1
AR-508.3	-	-	-	2	-	1	-	-	1	-	-	-	-	-
AR-508.4	1	-	-	-	2	2	1	1	-	-	-	-	1	2
AR-508.5	-	1	-	-	-	-	-	-	2	-	-	-	-	-
AR-508.6	-	1	1	-	1	1	-	-	-	-	1	1	-	-

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AR-208 B: INTRODUCTION TO COMPUTERS-II

Periods/week	Credits	Max. Marks: 100
L: 0 T: 0 P: 3 S: 0	1.5	Continuous Assessment: 60
Duration and mode of Examination: Practical Examination & Vice-voce		End Semester Exam : 40

Pre-requisites: NIL

Course Type: Elective Domain specific

Course Outcomes

The Student will be able to

AR-208.1. Develop understanding of computer aided drafting.

AR-208.2. Comprehends computer aided drafting and its parameter as tools and its application in architecture

AR-208.3. Demonstrate the concepts of CAD drafting methods and techniques in 2D through various architectural projects of progressive complexity

AR-208.4. Demonstrate the concepts of CAD drafting methods and techniques in 3D through various architectural projects of progressive complexity

AR-208.5. Develop the render techniques and Progress of Animation as representation of Project

AR-208.6. Evaluates CAD techniques for quicker methods and presentation skills

PART-A

Unit 1: Introduction to Computer Aided Drafting

1.1 Introduction to computer aided drafting

1.2 To develop and understand tools and basic set up for computer aided drafting

1.3 Theoretical understanding of CAD

Unit 2: Exploring the Interface

2.1 Installation and launching autocad, Using Application menus, Using ribbons,

2.2 Expanding panels, Understanding flyouts, Pick point in the drawing area,

2.3 Saving a file and working with multiple files.

Unit 3: Computer Aided Drafting Methods and Techniques – 2D – Demonstration

3.1 To comprehend tools and systems for 2d drafting

3.2 Develops and draws various architectural plans, elevations and sections through 2 d Cad

3.3 Manipulate and alter through various tools and techniques existing architectural drawings in 2D Cad

3.4 To apply more complex tools and methods to edit drawings in 2D Cad

3.5 Demonstrate presentation drawings in 2D Cad

3.6 Draw and create a complete set of architectural drawings for a dwelling unit in 2 D Cad

PART-B

Unit 4: Computer Aided Drafting Methods And Techniques – 3d

- 4.1 To comprehend tools and systems for 3d modelling in CAD
- 4.2 Develops and draws various architectural volumes, forms and surfaces through 2 d Cad
- 4.3 Convert and draw 2 d architectural drawings to 3d forms

Unit 5: Computer Aided Drafting Methods and Techniques – 3d – Demonstration

- 5.1 To apply more complex tools and methods to edit drawings in 3D Cad
- 5.2 Demonstrate presentation drawings , material application and lighting in 3D Cad
- 5.3 Draw and create a complete set of architectural drawings for a dwelling unit in 3 D Cad

Unit 6: Effective Presentation

- 6.1 Layer management, Plotting and publishing the drawing in modal space and paper space.

Text Books/ Reference Books:

1. Watt, 1989, Fundamentals Of Three-Dimensional Computer Graphics, 5th Edition, Addison wesley
2. Aouad, 2011, Computer Aided Design guide For Architecture, Engineering And Construction, 1st Edition, Routledge
3. Ralph Grabowski, 2002, The Illustrated AutoCAD Quick Reference, First Edition, S.Chand
4. Tikoo Sham, 2000, Autocad 2000: A Problem-Solving Approach, 1st Edition, Delmar Cengage Learning,

Instructions for paper setting: The Subject will be assessed through a practical examination & viva-voce.

Assessment Tools:

Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-208)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-208.1	-	-	-	-	1	-	-	-	1	-	-	1	2	1
AR-208.2	-	-	-	-	1	-	-	-	-	-	1	-	-	2
AR-208.3	2	-	-	-	-	-	-	-	-	-	-	-	1	-
AR-208.4	-	2	-	-	-	-	-	-	1	-	1	1	-	-
AR-208.5	-	-	-	-	-	-	-	-	-	2	-	2	-	-
AR-208.6	-	-	-	-	-	-	-	-	-	2	1	2	-	-

MRIRRS

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)

AR-601 A: ARCHITECTURAL DESIGN -VI

Periods/week

L: 0 T: 0 P: 0 S: 9

Credits

9

Max. Marks: 300

Continuous Assessments: 200

End Semester

Duration and Mode of Exam: Design Evaluation and Viva Voce

Exam: 100

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

AR 601.1. **Value** various indigenous and latest building materials

AR601.A **Demonstrates** architectural and structural vocabulary through verbal and written communication

AR 601.3. **Develop** sensitivity towards building bye laws and universal design.

AR 601.4. **Forms** correlation between design and other subjects studied in previous semesters and till present.

AR 601.5. **Build** with precision block models, study models, site models

AR 601.6. **Communicate** through drawings or models methods developed to meet various requirements.

PART-A

Unit 1: Design problem

- 1.1 The studio emphasis shall be on creative and rational skills for problem solving, preferably on a contoured site.
- 1.2 Design-problem may focus but not limited to a multi-functional.
- 1.3 Service (advanced services) oriented building like housing, convention hall, shopping complex, resort, habitat centre, office building, mixed use occupancy buildings etc. in an urban setting including application of urban development, controls, codes and bye-laws

Unit 2: Literature study and case study

- 2.1 Warm-up exercise/ literature review (group or individual).
- 2.2 Students could be sensitized (social-cultural sensitization) through documentary/ movies/ photos.
- 2.3 Site visit for collecting context specific data for getting better understanding of real- life project details.
- 2.4 The collected data may be analyzed and presented for evaluation.

Unit 3: Bye Laws& Services

- 3.1 Study of state bye laws (Site specific)
- 3.2 Universal Design Guidelines
- 3.3 Service standards (Fire and HVAC)

PART-B

Unit 4: Site Planning

- 4.1 Flow diagram to explore relation of various spaces
- 4.2 Bubble diagram for locating various zones on site
- 4.3 Programming examples, Assembler directives and operators, Timing diagrams.
- 4.4 Re-create for analyzing spaces in all dimensions through Block Models

Unit 5: Design Development

- 5.1 Single line graphics
- 5.2 Rough models
- 5.3 Study models for choosing the right option

Unit 6: Final design Submission

- 6.1 Drawings and detail physical model
- 6.2 A set of working drawings of one of the services showing all details for execution
- 6.3 Summative assessment of the studio work could be achieved through Panel discussion, presentation, peer review, public review, Criteria based evaluation etc.

Text Books/ Reference Books:

- 1. Bureau of Indian Standards, 2016, National Building Code, SP 7.
- 2. Donald Watson, 1946, Time Saver Standards for Architectural Design , 8th Indian Edition, Mc Graw Hill
- 3. Ernst & Peter Neufert , 1953, Architectural Standard-Architect’s Data, 5th Edition, Wiley Blackwell.

Software required/Weblinks:

- Auto Cad
- Adobe Suit (Photoshop and Illustrator)
- Sketch up, Lumion / V Ray

Instructions for paper setting:

The subject will be assessed through a practical examination and Viva Voce.

Assessment Tools:

- Portfolio Submissions
- Sessional tests
- Design Evaluation & Viva Voce

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR 601)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR 601.1	3	2	1	1	2	2	3	2	2	3	1	3	2	1
AR 601.2	3	2	2	2	1	2	2	1	3	3	1	2	1	2
AR 601.3	3	3	3	2	2	3	2	1	1	2	1	3	2	3
AR 601.4	2	2	1	2	2	1	1	1	1	2	2	2	1	1
AR 601.5	1	2	2	3	3	1	1	1	2	1	2	2	2	1
AR 601.6	3	2	1	2	2	1	1	2	1	2	1	2	1	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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AR-602 A: BUILDING MATERIALS AND CONSTRUCTION – VI

Periods/week	Credits	Max. Marks: 150
L: 0 T: 0 P:0 S: 5	5	Continuous Assessments: 100
Duration and mode of Examination: Practical Examination & Viva-voce		End Semester Exam: 50

Pre-requisites: NIL

Course Type: Program Core

Course Outcomes

The Student will able to

- AR-602.1. To Comprehend various types of roofing structures used in different purposes from day to day life. To explain the alternatives of Long span structures in steel.
- AR-602.2. To understand the variety of available MS sections (Hot and Cold Rolled) for varied uses.
- AR-602.3. To comprehend the details/arrangements of combinations for various uses.
- AR-602.4. To make students aware of the process of Pre-fabrication in advanced building construction processes
- AR-602.5. To Compare the various types of steel roofing with different material used to analyze the construction details. To analyze the components of roof structure
- AR-602.6. To organize various elements of steel truss to make replica (Scaled Model) of real truss or steel structures.

PART-A

Unit 1: Metals (Non-Ferrous)

- 1.1 Non Ferrous – Copper & Copper based alloys (Brass & Bronze), Tin, Cadmium, Chromium, Zinc, Lead and Nickel.
- 1.2 Metal Coatings – Electroplating, Anodizing.

Unit 2: Steel Structures

- 2.1 To know the comparison between convention RCC structure over Steel Structure. To understand different types of spanning systems in Steel
- 2.2 To understand the details of trusses providing natural light. To acquaint students about rain water disposal from roof and waterproofing
- 2.3 Construction of steel structures (Factory Shed/ large span)
- 2.4 Details of Roof and Roof Trusses, Steel Columns, portal frames etc.
- 2.5 Waterproofing and rain water disposal from Roofs
- 2.6 North light truss, tubular monitor roof truss

Unit 3: Multi Storied Steel Framed Structures

- 3.1 To understand the structural requirements of multi storied steel structures. To know the concept and need of space frames
- 3.2 Multi-storied steel frame structures connections and their components steel Monitor Trusses

3.3 Space frames

PART-B

Unit 4: Modern Factory Shed/ Large Span Construction

- 4.1 To know about the modern materials for roof covering, supporting structures
- 4.2 How to minimize loading and structure light weight for large span areas
- 4.3 Introduction to a wide range of modern building construction systems incorporating the use of metals like steel, aluminum and composite materials.

Unit 5: Modular, Pre-Fabricated Construction

- 5.1 To know the concept and advantages of Pre Fabrication of Building Components
- 5.2 To understand the process of Pre-Stressing\
- 5.3 Prefabricated construction of building components
- 5.4 Precast, prestressed
- 5.5 Pre Tensioning and Post Tensioning of Concrete members
- 5.6 Advantages of Pre- stressing over RCC

Unit 6: Materials

- 6.1 To understand various methods of joining of steel members
- 6.2 To know about various modern materials/ Patented material used for false ceiling and roof covering
- 6.3 Steel Structures: Study of Steel structures, Construction, joining, welding riveting etc. Hot rolled sections, cold forming of sheets into sections.
- 6.4 Materials of Suspended ceilings: Study variety of false ceiling types and materials available in the market.
- 6.5 Modern Factory shed Construction: Study of modern building construction materials.
- 6.6 Study of Various patent materials of construction available under different trade names with their specifications, properties and uses like Vineertex, Marblex, Fixopan, Anchor Boards, Novapan, Composite aluminium bond etc.

Text Books/ Reference Books:

- 1. Francis D.K. Ching., 2012, Building Construction illustrated, 4th edition, Wiley
- 2. W.B. McKay, 2013, Building Construction (Vol. 4), 5th Edition, Pearson Education
- 3. Robin Barry ,2009, Barry's Introduction to Construction OF Buildings, 3rd Edition, Wiley
- 4. R.Chudely, 2007, Building Construction Handbook , 5th edition ,A Butterworth-Heinemann Title;

Instructions for paper setting: The Subject will be assessed through a practical examination & viva-voce.

Assessment Tools:

Portfolio Submission

Sessional tests
 Construction Details Evaluation and viva-voce
 Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-602)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-602.1	2	1	-	2	-	1	-	-	-	-	1	-	1	-
AR-602.2	-	-	1	-	-	-	-	1	-	1	-	1	-	-
AR-602.3	-	-	-	1	1	-	-	-	2	1	-	1	-	1
AR-602.4	1	-	1	1	1	-	1	1	2	-	2	1	1	-
AR-602.5	-	1	1	-	1	-	-	-	-	-	1	-	-	2
AR-602.6	-	-	-	-	1	-	-	-	-	-	1	-	-	-

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AR-603 B: ESTIMATING COSTING AND SPECIFICATIONS

Periods/week Credits
L: 2 T: 0 P: 0 S: 0 2
Duration and mode of Exam: 3 Hrs Theory Exam

Max. Marks: 100
Continuous Assessment: 60
End Semester Exam: 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

- AR 603.1. **Know and Recalls** the process of Construction stage wise and the type of Construction and materials
- AR 603.2. **Analyze** the importance and uses of specifications and how to write them
- AR 603.3. **Comprehend** and understand the various processes of Estimating, Valuation, and tendering
- AR 603.4. **Execute and Implement** the appropriate methods for preparing the estimates and valuation reports
- AR 603.5. **Demonstrate** the acquired knowledge to complete a building Estimate/ Valuation report.
- AR 603.6. **Compares, evaluates and interprets** the building typologies for preparing an estimate or doing the valuation, Justify with the help of documents and analysis

PART-A

Unit 1: Introduction of Estimation

- 1.1 Introduction to the basic terms used in Estimation
- 1.2 Important considerations while preparing an Estimate
- 1.3 Introduction to Quantity surveying
- 1.4 Methods preparing estimates
- 1.5 Data required for framing an estimate

Unit 2: Types of Estimates

- 2.1 Introduction to various types of Estimates
- 2.2 Various Techniques of Preparing the Estimates and BOQ's
- 2.3 Long wall and Short wall method

Unit 3: Specifications of materials and Items of work

- 3.1 Introduction to Specifications.
- 3.2 Important considerations while Writing the Specifications
- 3.3 Specifications as per CPWD, PWD etc., and how to read them
- 3.4 Writing Specifications for Building work
- 3.5 Writing Specifications for Interior finishing and Furnishing Works

- 3.6 Writing detailed specifications for various items of work eg. Earthwork in foundation, Cement concrete, Reinforcement cement concrete work, Brick work in cement mortar, Damp proof course, Wood works (door & windows), Glazing,
- 3.7 Plastering (cement & sand), Flooring (cement concrete & tiles), Distempering (dry & oil bound), Painting on wood & iron work, Water proof cement painting, Brick bat coba terracing.

PART-B

Unit 4:Rate Analysis

- 4.1 Introduction to Schedule of Rates
- 4.2 Labour out turn and norms of consumption of basic materials.
- 4.3 Importance of Rate Analysis
- 4.4 Principles of analysis of rates, Market / DSR rates of labor and materials.
- 4.5 Considerations done while doing the Rate Analysis
- 4.6 Calculations for basic building materials like RCC, Brick work
- 4.7 Calculating the various quantities of materials required per unit

Unit 5: Introduction to Tendering

- 5.1 Introduction to various types of tenders and the
- 5.2 Tendering process.
- 5.3 Introduction to contract and its various components.

Unit 6: Valuation of Properties

- 6.1 Introduction to the concepts of Valuation
- 6.2 Various considerations taken while doing valuation
- 6.3 Process of Valuation
- 6.4 Preparing valuation report

Text Books/ Reference Books:

- 1 S. C. Rangwala ,2017,Estimating, costing and valuation: professional practice and quantity surveying,17thedition,charotar Publishing
- 2 B.N. Dutta, 2016,Estimating and costing in civil engineering : Theory and practice , 28th Edition, UBS Publishers
- 3 M.Chakraborti, 2006,Estimating, costing, specification and valuation in engineering : Principles and applications, 29th Edition, Chakraborty
- 4 CPWD Specifications by Central Public Works Department and Delhi Schedule of Rates by CPWD
- 5 S. C. Rangwala, K. S. Rangawala and P. S. Rangawala, 2015,Valuation of real properties, 10th edition, Charotar Publishing

Software required/Weblinks:

Instructions for paper setting:

Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part.

Assessment Tools:

Assignment/Tutorials
Sessional tests
Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR 603)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR 603.1	3	2	2	-	1	2	3	1	1	1	1	2	2	1
AR 603.2	2	1	2	-	-	2	1	2	1	2	1	3	1	1
AR 603.3	3	2	2	1	2	1	2	2	1	1	2	2	2	2
AR 603.4	2	1	1	1	2	-	3	1	2	3	-	2	1	1
AR 603.5	3	2	2	-	-	2	1	2	1	3	1	2	2	1
AR 603.6	3	1	2	1	2	3	2	2	1	2	2	3	1	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR – 604 B : HISTORY OF ARCHITECTURE - IV

Periods/week	Credits	Max. Marks : 100
L: 2 T: 0 P: 0 S: 0	2	Continuous Assessment : 60
Duration and Mode of Exam: 3 Hrs Theory Examination		End Semester Exam : 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

- AR-604.1. define the various factors that contributed to the formation of different styles of architecture in India.
- AR-604.2. explain the impact of Islamic architecture in India through the numerous regional adaptations.
- AR-604.3. identify prominent / important historic buildings by their components / style of design.
- AR-604.4. analyze the intentions of the period and architects as a solution to the need & demands of period.
- AR-604.5. appraise the concepts of spatial, structural and aesthetic composition for various building typologies.
- AR-604.6. design buildings in the historic architectural styles.

PART-A

Unit 1: Introduction:

Introduction and understanding of 'Islam's' philosophy and its consequent rituals and their interpretation in building type e.g. mosque, tomb, fort and their elements like domes, minarets, arch, squinch, landscape, motif, calligraphy, directionality, symmetry, geometry, material, court, water, patterns etc.

Unit 2 : Early Islamic Architecture

- 2.1 Introduction to Islamic culture worldwide; early Islamic architecture in India beginnings under the slave kings (cir. A.D. 1200 to 1290), The Sayyid (1414-51) and the lodi (1451-1526) dynasties, Provincial styles (Bengal, Gujrat, Malwa, Deccan, Sasaram)
- 2.2 Architectural Treatises and Writings: al-Bīrūnī (d. 1048) - Kitab fi Tahqiq ma li'l-Hind (Researches on India), Fazl, Abu'l (1877). Akbarnamah (Persian), Vol. 1. Asiatic Society, Calcutta. (Online book), Fazl, Abu'l (1879). Akbarnamah (Persian), Vol. 2. Asiatic Society, Calcutta, Akbar nama by Abul Fazl, Travel in the Mughal empire, Travels of Pietro Della Valle in India
- 2.3 Architectural features: Minars, minarets, towers and turrets, domes, The buildings of the Khalji dynasty, the Delhi or imperial style The Tughlaq dynasty (1320 to 1413), Lodhi, Sayyid
- 2.4 Prominent Sites:
 - Tomb of Ghiyath al-Din Tughlaq, three cities of Tughlaq
 - Khirki Masjid
 - Stepped well Bai Hari, Rauza, Sayed mosque Ahmedabad
 - Qutub complex
 - Jaunpur mosques
 - Jami masjid (1470)
 - Atala masjid (1408)

- Cambay : jami masjid (1325)
- Ahmedabad: tin darwaza (c. 1425)
- Ahmedabad : jami masjid (1423)
- Bijapur : Ibrahim rauza (c. 1615)

Unit 3: Islamic Architecture in India

- 3.1 Origin, sources and evolution of Islamic Architecture in India –Imperial style in New Delhi, Provincial style and Mughal style - Context, materials, techniques, principles and elements of various Islamic building typologies - mosque, madrasa and tomb.
- 3.2 Imperial style: architectural characteristics with examples such as Qutub Minar and Alai Darwaza in Delhi, Tomb of GhiyasuddinTuqhlaq.
- 3.3 Provincial style: Sources, contextual influences in Provincial Architecture of various regions such Punjab, Bengal, Gujarat, Jaunpur, Deccan – examples such as Charminar at Hydrebad and Golgumbaz at Bijapur.
- 3.4 Mughal Style: Mughal architecture principles and characteristics during various period – examples such as City of Fatehpur sikri and Taj Mahal at Agra.

PART-B

Unit 4: Architectural developments from 1800 A.D to 2000 A.D. contextual India

- 4.1 British rule and colonial architecture and town planning developments, Portuguese, Dutch, French and British settlements and military installations.
- 4.2 Fusion of local and imported styles.

Unit 5: Colonial Architecture in India

- 5.1 The British architecture of the colonial days in India- the capitol at Delhi and the residency at Lucknow emphasizing on their planning criteria and architectural features. Incorporation of local motifs and materials.
- 5.2 Prominent Sites:
 - French colony Pondicherry
 - The Basilica of Bom Jesus (Good Jesus), Goa Portugese
 - Old Amritsar: Golden Temple (1764 & after)
 - Chhatrapati Shivaji terminus

Unit 6: Influence of modernism in Indian architecture.

- 6.1 Works of B.V. Doshi, A.P. Kanvinde, Charles Correa, Raj Rewal, J.A. Stein etc.

Text Books/ Reference Books:

1. G. B. Hiraskar, 2018, World Ages of Architecture, 5th edition, Dhanpat rai Publications.
2. Satish Grover, 2017, The Architecture of India –II, 2nd Edition, CBS Publishers & Distributers

Instructions for paper setting: **Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will**

be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

Assignment/Tutorials

Sessional tests

Surprise questions during lectures/Class Performance

Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-604)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-604.1	3	2	2	2	2	2	2	2	-	3	-	3	2	3
AR-604.2	2	2	2	2	2	2	2	3	-	3	-	2	2	3
AR-604.3	3	2	2	2	2	2	2	2	2	2	-	3	2	3
AR-604.4	2	3	2	3	2	2	2	2	-	2	-	2	2	3
AR-604.5	2	2	2	2	2	3	3	3	-	2	-	3	1	3
AR-604.6	3	2	3	2	2	2	3	3	3	3	1	3	3	3

AR – 608 B: Building Services- IV (Mechanical Services & HVAC)

Periods/week	Credits	Max. Marks : 100
L: 2 T: 0 P: 0 S: 0	2	Continuous Assessment : 60
Duration and Mode of Exam: 3 Hrs Theory Examination		End Semester Exam : 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

- AR-608.1. Define the importance of vertical transportation, Fire Protection and HVAC involved in the built environment.
- AR-608.2. Explain different types of air conditioning systems.
- AR-608.3. Identify the design/execution time considerations specific to each of them.
- AR-608.4. Analyze critically the air conditioning used in their case study buildings.
- AR-608.5. Compare the active and passive components of HVAC and their underlying principles.
- AR-608.6. Design Vertical Transportation, Fire Protection and HVAC in buildings (except detail design calculation)

PART-A

Unit 1 Introduction

- 1.1 To understand the need and importance of mechanical services.
- 1.2 Basic principles, laws and terminologies related to HVAC such as solar angles, U-values, psychometric charts, etc.
- 1.3 Evaporative cooling systems of air conditioning, refrigerant cycle and its reversal.
- 1.4 Components of mechanical vapour compression and refrigeration systems.
- 1.5 Natural and artificial ventilation.

Unit 2: Psychometric

- 2.1 Thermal comfort parameters.
- 2.2 Understanding psychometric chart for HVAC design.
- 2.3 Heat load calculations.

Unit 3: Vertical Transport

- 3.1 Elevators, escalators and travelators - Types of elevators-traction, sky lobby, lift lobby, provision of elevators for a building, planning considerations - location in building, recommendations of the National Building Code, etc.
- 3.2 Safety features and codes. Service requirements: calculations for quality and quantity of service, time, passenger handling capacity, space and physical requirements, machine room spaces and their typical layout. Design of typical lift banks, escalators, (application - location and arrangement in buildings), space requirement (travelators).

PART-B

Unit 4: HVAC

4.1 Different Systems in Current Use from Chilled Water Cooling Systems to Air Handling Package Units etc.

Unit 5: HVAC Layouts & Requirements

5.1 HVAC Installation Requirements and Demands in Building Layout

Unit 6: Ducting Systems

6.1 Supply air, Return Air Ducting Systems

6.2 Their Layouts and Requirements within Building Systems

6.1 Co-ordination to Building Systems

Text Books/ Reference Books:

1. BARRY R, "BUILDING SERVICES, John Wiley and Sons Ltd 1998.
2. Edward - Lighting design.
3. Stein, "Electrical and Mechanical Services, John Wiley & Sons, 1997.
4. National Building Code.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each part 'A' and part 'B'. Students need to attempt two questions out of three from each part.

Assessment Tools:

Assignments
Sessional tests
Theory examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-608)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-608.1	3	2	2	2	2	3	3	2	2	2	-	2	2	2
AR-608.2	2	2	2	2	2	3	3	-	2	3	2	3	2	2
AR-608.3	2	2	2	2	2	3	3	-	2	2	-	2	2	2
AR-608.4	3	3	2	3	2	-	-	-	2	2	-	2	2	2
AR-608.5	2	3	2	3	1	3	3	-	2	2	-	2	3	2
AR-608.6	3	3	3	3	2	3	3	3	2	3	2	3	3	3

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AR-605 B: STRUCTURE DESIGN – VI

Periods/week Credits
L: 4 T: 0 P: 0 S:0 4

Duration and mode of Examination: 3 Hours Theory Examination

Max. Marks:100
Continuous Assessment: 60
End Semester Exam: 40

Pre-requisites: NIL

Course Type: Program Core

Course Outcomes

The Student will be able to

- AR-605.1. Introduction and discusses loads on structures, stresses, the concept of factor of safety, methods of design and gives an introduction of type of rolled steel sections.
- AR-605.2. Design of welded connections.
- AR-605.3. Design of compression members.
- AR-605.4. Design of column base and footing.
- AR-605.5. Design of Tension members
- AR-605.6. Design beams and Gantry Girders

PART-A

Unit 1: General Considerations

- 1.1 Introduction to steel as a structural material.
- 1.2 Advantages and disadvantages of steel.
- 1.3 Structural Steel Stress strain curve for mild steel. Rolled steel sections. Loads. Permissible stresses.
- 1.4 Working stresses. Factor of safety. Minimum thickness of structural members. Design Methods.

Unit 2: Simple Connections-Riveted, Bolted and Pinned Connections

- 2.1 Introduction, Riveted connections, Bolted connections, Pin connections. Type of joints and numerical on finding strength in various connections
- 2.2 Riveted connection – Introduction, Classification, Strength of riveted joint.
- 2.3 Bolted connection – Introduction, Classification of bolts based on type of load transfer, Terminology, Specifications for spacing and edge distances of bolt holes as per I.S. 800-2007, Types of bolt connections, Type of actions on bolts, Design strength of plates in a joint, Design strength of bearingbolts.

Unit 3: Simple Connections- Welded connections

- 3.1 Introduction, Types, Symbols, Types of welded joints, Important specifications for welding as per IS code, Design strength of welded joints. Welding process. Weld defects.
- 3.2 Permissible stresses. Design of butt welds.Design of fillet welds.

- 3.3 Design of intermittent fillet welds, Fillet weld for truss members, Plug and slot welds Distortion of welded parts, Inspection of welds, Fillet weld vs. butt weld, Welded joints Vs. Riveted joints.

PART-B

Unit 4: Design of Compression Members

- 4.1 Introduction, Effective length, Slenderness ratio, Column design formula.
4.2 Types of sections, Assumptions, Design of axially loaded compression members.
4.3 Built up columns (latticed columns) Lacing, Batten.
4.4 Compression members composed of two components back to back.
4.5 Encased column, eccentrically loaded columns, Splices.

Unit 5: Column bases and Footings

- 5.1 Introduction. Types of column bases.
5.2 Slab base. Gusset base. Welded column bases. Grillage footing.
5.3 Design of hold down angles and base plates.

Unit 6: Tension members & Compression members

- 6.1 Tension members – Introduction, Design Strength, Analysis and design of tension member.
6.2 Types of tension members. Permissible stresses. Slenderness ratio. Net sectional area.
6.3 Design of tension member. Lug Angles. Splices. Gusset plate.
6.4 Use of Steel Table for selection of desired section
6.5 Compression members – Introduction, Slenderness ratio, Actual length,
6.6 Effective length, Design strength, Analysis and design of Compression member.

Unit 7: Beams and Gantry Girders

- 7.1 Introduction. Types of sections.
7.2 Lateral stability of beams. Bending stress. Bearing stress. Shear stress. & Deflection
7.3 Web Buckling & Web Crippling & Diagonal buckling.
7.4 Design of laterally supported beams & unsupported beams. Lintels. Purlins.
7.5 Encased beams. Beam bearing plates. Castellated beams.
7.6 Effect of holes in beams. Shear connectors.
7.7 Introduction to Gantry girders.

Text Books/ Reference Books:

1. IS Codes: IS 465: 2000 , SP-16 , SP-34
2. S. Unnikrishna Pillai & Devdas Menon, 2017, Reinforcement Concrete Design, 3rd edition, Tata McGraw Hill, New Delhi.
3. N. Krishna Raju, 2009, Structural Design and Drawing, Reinforced Concrete and Steel, 3rd Edition, University Press (India)
4. James R. Libby, 2007 Prestressed Concrete Design and Construction , 2nd Edition, The Ronald Press Company.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

- Assignment/Tutorials
- Sessional tests
- Surprise questions during lectures/Class Performance
- Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-605)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-605.1	-	-	-	-	-	-	-	-	1	-	-	1	-	1
AR-605.2	-	1	-	-	-	-	-	-	1	-	-	1	1	1
AR-605.3	-	-	-	-	-	-	-	-	1	-	-	-	-	-
AR-605.4	-	-	-	-	-	-	-	-	-	-	1	-	-	-
AR-605.5	-	-	1	-	-	-	-	-	-	-	-	1	-	-
AR-605.6	1	-	-	-	1	-	-	-	1	-	-	2	1	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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AR-403 A: COMPUTER APPLICATION (CAD)-I

Periods/week Credits
L: 0 T: 0 P: 3 S: 0 1.5
Duration and Mode of Examination: 3 Hrs

Max. Marks: 100
Continuous Assessment: 60
End Semester Exam : 40

Pre-requisites: NIL

Course Type: Elective Domain Specific

Course Outcomes

The Student will be able to

- AR-403.1. To recognize the need to combine the use of CAD tools and techniques for architectural design communication.
- AR-403.2. To apply the projected drawing method to exterior and interior perspectives
- AR-403.3. To produce architectural drawings using CAD and illustration software programs.
- AR-403.4. To demonstrate an understanding of furniture, people and accessories, 3- dimensional renderings
- AR-403.5. To demonstrate knowledge of relevant industry standards and their application in architectural drawings and documents.
- AR-403.6. To construct conceptual and presentation renderings as a design presentation tool for various purposes

PART-A

Unit 1: Image Editing Methods and Techniques

- 1.1 To edit and develop images in a raster format through adjustments in image clarity, quality and layers.
- 1.2 Image and photo montage and its various methods and techniques
- 1.3 Image as a vector and editing of its vector properties and compatibility with line drawings
- 1.4 Processing of architectural renderings using image outputs from other software.
- 1.5 Adding entourage to images developed from 3-d modeling software.

Unit 2: Photorealistic Modeling- I

- 2.1 Concepts of modeling, understand computer modeling through various basic shapes and its composition
- 2.2 To develop solid and surface models with architectural scale, proportion and elements
- 2.3 To understand Camera, movement, shades and shadows, day lighting and lighting conditions, setting up a scene through modeling
- 2.4 To edit and develop materials, surfaces and computer aided photo realistic rendering and understanding its adjustments
- 2.5 Using predesigned materials/maps from various sources 3-D Models
- 2.6 To develop animation and photo realistic animations and short movies

Unit 3: MS Office –Basics

MS Word

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR-607 A: GREEN AND INTELLIGENT BUILDINGS

Periods/week Credits

L: 3 T: 0 P: 0 S: 0 3

Duration and mode of Examination: 3 Hours Theory Examination

Max. Marks: 100

Continuous Assessment: 60

End Semester Exam :40

Pre-requisites: NIL

Course Type: Elective Domain Specific

Course Outcomes

The Student will able to

AR-607.1. To recognize the Green Building and various types of Building Materials in India.

AR-607.2. To recognize the Green Building Concepts and Practices in India.

AR-607.3. To explain the Green Building Design in respect to Passive energy system

AR-607.4. To apply Intelligent System in the Modern world of Construction.

AR-607.5. To be aware of the Technology Evolution and IT Market Place.

AR-607.6. To appreciate and communicate the Intelligent Building design Concept and Construction.

PART-A

Unit 1: Introduction

1.1 What is Green Building, Why to go for Green Building,

1.2 Benefits of Green Buildings, Green Building Materials and Equipment in India, What are key Requisites for Constructing a Green Building,

1.3 Important Sustainable features for Green Building,

Unit 2: Green Building Concepts and Practices

2.1 Indian Green Building Council, Green Building Moment in India,

2.2 Benefits Experienced in GreenBuildings, Launch of Green Building Rating Systems, Residential Sector, MarketTransformation;

2.3 Green Building Opportunities and Benefits: Opportunities of GreenBuilding, Green Building Features, Material and Resources, Water Efficiency,

2.4 Optimum EnergyEfficiency, Typical Energy Saving Approach in Buildings,

2.5 LEED India Rating System andEnergy Efficiency,

Unit 3: Green Building Design

3.1 Introduction, Reduction in Energy Demand, Onsite Sources and Sinks,

3.2 Maximize System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks,

3.3 Use of Renewable Energy Sources. Ecofriendly captive power generation for factory, Building requirement

PART-B

Unit 4: Introduction and Origins of the Intelligent Building Concept.

4.1 Definition and characteristics of Intelligent Buildings. A brief history of the development of I.B. concept through recent times highlighting.

Unit 5: Technology Evolution and the IT Market Place.

5.1 Present Technological Context, Exploration of user IT systems, IT demands on building and services,
 5.2 Study of Development of Computer Integrated Building from single function systems to integrated solutions.

Unit 6: Intelligent Design and Construction.

6.1 Client Expectations, Use of IT for effective communication of architectural ideas to clients, locating people and information,
 6.2 Introduction to building efficiency studies with respect to life cycle costs.

Text Books/ Reference Books:

1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009.
2. Tom Woolley and Samkimings, 2009, Green Building Hand Book, 1st edition, Routledge Publishers.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

Assignment/Tutorials
 Sessional tests
 Surprise questions during lectures/Class Performance
 Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-607)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-607.1	-	-	1	-	1	-	-	-	1	1	-	2	-	1
AR-607.2	2	1	-	-	-	-	-	1	2	-	-	2	-	-
AR-607.3	-	1	-	1	-	1	-	-	-	-	-	-	2	-
AR-607.4	2	1	1	-	-	-	-	1	2	1	-	-	-	2
AR-607.5	-	-	-	2	-	-	-	-	-	-	2	-	-	-
AR-607.6	1	-	-	-	-	1	1	-	-	-	1	1	-	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR-701 : ARCHITECTURAL DESIGN -VII

Periods/week Credits
L: 0 T: 0 P: 0 S: 9 9
Duration and Mode of Exam: Design Evaluation and Viva Voce

Max. Marks: 300
Continuous Assessments: 200
End Semester Exam: 100

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

- AR 701.1. **Demonstrates** architectural and composite structural system and services through their design
- AR 701.2. **Apply** services learnt in previous semester to design project at building and site level
- AR 701.3. **Communicate** through drawings or models, methods developed to meet various stages
- AR 701.4. **Develop** sensitivity towards non conventional technologies, energy efficiency and interior design.
- AR 701.5. **Participate** in team activities and forms correlation between design and other subjects studied in previous semesters and till present
- AR 701.6. **Design** a project responsive to the contextual and program requirements.

PART-A

Unit 1: Introduction to Design Problem

- 1.1 Planning and designing of large complexes related to health care and Academic Institutions- Hospitals cum medical colleges etc.
- 1.2 Design-problem may focus on multifunctional, multi storied structure and services with application at site and building level like multi star hotels, multi specialist hospitals, high rise mall etc. in an urban setting including application of urban development controls, codes and bye-laws.
- 1.3 The design proposal will be taken up with byelaws, master plan or any other restriction on large site.

Unit 2: Data Analysis

- 2.1 Warm-up Exercise/ Literature review (Group or Individual).
- 2.2. Planning and designing of traffic nodes-Bus terminal, railway station, Airport.
- 2.3 Site visit for collecting context specific data for getting better understanding of real- life project details.
- 2.4 The collected data (Literature study, Case study and site analysis)

Unit 3: Development of Concept

- 3.1 Light Industrial buildings involving manufacturing display etc.
- 3.2 Flow diagram to explore relation of various spaces

PART-B

Unit 4: Design Development

- 4.1 Detail out of design problems -buildings should have accessibility to the physically challenged

Persons

4.2 Implementation of knowledge of Building services, Building Material and construction and structure.

Unit 5: Pre-Final Design

5.1 Final drawings, views, models, etc. incorporating the comments received in the previous reviews, to be presented before a panel of internal / external reviewers.

Unit 6: Academic Institutions- Hospitals cum medical colleges etc.

6.1 The drawings and detail physical model explaining the approach and consideration of urban setting

6.2 A set of working drawings of one of the services showing all details for execution

6.4 Summative assessment of the studio work

Text Books/ Reference Books:

1. Joseph De Chiara (1973) Time-saver standards for building types, Joseph De Chiara Neufert Architect's data by BousmahaBaiche& Nicholas Walliman,-Blackwell science Ltd.
2. BIS (2016)National Building Code – 2016,Bureau of Indian Standards (1 January 2016)
3. Nicholas T Dines, Charles W. Harris (1988).Time-Saver Standards for Landscape Architecture,Charles W. Harris, Nicholas T Dines New Metric Handbook by Patricia Tutt and David Adler – The Architectural Press

Software required/Weblinks:

Auto Cad and Revit

Adobe Suit (Photoshop and Illustrator)

Sketch up, Lumion / V Ray

Instructions for paper setting:

The subject will be assessed through a practical examination and Viva Voce.

Assessment Tools:

Portfolio Submissions

Sessional tests

Design Evaluation & Viva Voce

Sessional I	20%
Sessional II	20%
Assignment	50%
Class Performance	5%
Attendance	5%

Course Articulation Matrix

CO Statement (AR 701)	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12	PS O1	PS O2
AR 701.1	3	3	2	3	2	2	2	1	2	3	1	2	2	1
AR 701.2	3	2	3	3	2	1	1	-	2	3	2	3	2	2
AR 701.3	2	2	1	1	2	1	1	2	1	3	1	2	3	2
AR 701.4	3	3	3	3	2	2	2	2	1	3	2	3	2	3
AR 701.5	3	3	3	1	3	2	2	2	3	2	2	3	2	1
AR 701.6	3	3	3	3	1	2	3	2	1	3	3	3	1	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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AR-702: BUILDING MATERIALS AND CONSTRUCTION – VII

Periods/week	Credits	Max. Marks: 150
L: 0 T: 0 P: 0 S: 5	5	Continuous Assessment: 100
Duration and mode of Examination: Practical Examination & Viva-voce		End Semester Exam: 50

Pre-requisites: NIL

Course Type: Program Core

Course Outcomes

The Student will able to

AR-702.1. To Develop the understanding of jointing and modular co-ordination

AR-702.2. To identify the different techniques of handling of materials

AR-702.3. To understand Mechanized Construction Equipment

AR-702.4. To appreciate different techniques used to construct building elements.

AR-702.5. To justify various alternatives roofing materials and its construction techniques.

AR-702.6.To display the sensitivity to different non-conventional energy resources, materials and construction techniques

PART-A

Unit 1: Jointing and Modular Co-ordination

1.1 Jointing, Tolerances and Modular Co-ordination.

1.2 Mass Production.

Unit 2: Appropriate Walling Materials and Technologies

2.1 Transportation, storage and handling of materials.

Unit 3: Appropriate performance and characteristics

3.1 Characteristics and Performance

3.2 Application of Mechanized Construction Equipment

PART-B

Unit 4: Mechanized Construction Equipment

4.1 Various mechanized construction equipment

Unit 5: Introduction to vernacular techniques

5.1 Importance and Potential

Unit 6: Region Specific vernacular techniques

6.1 Advanced Vernacular Construction Techniques.

Text Books/ Reference Books:

1. Brenda and Robert Vale(1996) Green Architecture: Design for a sustainable future, Thames and Hundsson; 1996

Instructions for paper setting:The Subject will be assessed through a practical examination & viva-voce.

Assessment Tools:

Portfolio Submission

Sessional tests

Construction Details Evaluation and viva-voce

Sessional I	20%
Sessional II	20%
Assignment	50%
Class Performance	5%
Attendance	5%

Course Articulation Matrix

CO Statement (AR-702)	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12	PS O1	PS O2
AR-702.1	-	-	-	-	1	1	1	-	1	-	1	-	-	-
AR-702.2	-	-	1	-	1	-	1	1	-	-	2	-	2	2
AR-702.3	-	-	-	-	-	1	-	-	-	1	-	1	-	-
AR-702.4	1	1	2	-	-	2	-	-	-	-	-	1	1	-
AR-702.5	1	1	1	-	-	-	1	1	1	-	1	-	2	2
AR-702.6	-	1	-	1	-	-	-	-	1	1	-	-	1	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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AR-703 A: URBAN DESIGN

Periods/week Credits
L: 3 T: 0 P: 0 S: 0 3
Duration and mode of Exam: 3 Hrs Theory Exam

Max. Marks: 100
Continuous Assessment: 60
End Semester Exam: 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

- AR 703.1. **Interpret** relationship between the building and city
- AR 703.2. **Map** the dimensions of urban space
- AR 703.3. **Synthesize** complex urban issues
- AR 703.4. **Resolve** the interface between the building and urban space
- AR 703.5. **Visualize** the urban settings and its varied dimensions
- AR 703.6. **Respond** to urban design of built form context

PART-A

Unit 1: Introduction To Urban Design

- 1.1 Importance of Urban Design
 - 1.2 Elements of Urban Design
 - 1.3 The Dimensions of Urban Design
-

Unit 2: The Morphological Dimension

- 1.1 Key Concepts – Land use , Building Structures, Plot Pattern, The Street Pattern
 - 1.2 The Public Space Network
 - 1.3 Buildings *In*Space and Buildings *Defining* Space
 - 1.4 Traditional Urban Space
 - 1.5 Urban block Patterns and Road Networks and Pod Development and the return to streets
-

Unit 3: The Perceptual Dimension

- 3.1 Human sensory perception of environment
- 3.2 Meaning and symbolism in urban form
- 3.3 Sense of Place and Placeless-nests
- 3.4 Territoriality and personalization
- 3.5 Place Identity
- 3.6 Key Attributes of Successful places

PART-B

Unit 4: The Social Dimension

- 4.1 Relationship between people (Society) and (Urban) space
- 4.2 Necessary, Optional and Social activities
- 4.3 The function of the Public Realm and its Decline
- 4.4 The Physical and Socio Cultural Public Realm
- 4.5 Neighbourhood Unit- Boundaries, Social relevance and Meaning, Social mixed and Balanced Communities
- 4.6 Safety and Security and Accessibility and Exclusion
- 4.7 Equitable Environments

Unit 5: The Visual Dimension

- 5.1 Aesthetics Preferences
- 5.2 Patterns and Aesthetic Order
- 5.3 The Kinesthetics Experience
- 5.4 Positive and Negative Space
- 5.5 Streets and Squares and Street Furniture
- 5.6 Townscape and Urban Architecture and Criteria for Harmonious Integration

Unit 6: The Functional Dimension

- 6.1 Public Private Interface – Comfort, Relaxation, Passive & Active Engagement, Discovery
- 6.2 Social use of Space Movement
- 6.3 Privacy- Visual and Oral
- 6.4 Land use, Density and Urban Form
- 6.5 Environmental Design- Microclimate, Wind shading, Designing for Sun and Shade, Natural Lighting, Parking
- 6.6 Growth of Car free Streets and Squares

Text Books/ Reference Books:

- 1. Matthew Carmona (2003), Public Places - Urban Spaces, Matthew Carmona
- 2. Edward Relph (1976) Place and placelessness, Edward Relph

Instructions for paper setting:

Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part.

Assessment Tools:

- Assignment/Tutorials
- Sessional tests
- Surprise questions during lectures/Class Performance
- Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR 703)	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12	PS O1	PS O2
AR 703.1	3	2	3	-	1	2	3	1	1	2	1	2	2	1
AR 703.2	2	2	2	1	-	2	1	2	1	2	2	3	1	1
AR 703.3	3	2	2	2	2	1	2	2	2	1	2	1	2	2
AR 703.4	2	3	1	1	2	-	3	1	2	3	-	2	2	1
AR 703.5	1	2	3	-	-	2	2	2	1	3	1	2	2	2
AR 703.6	3	1	2	1	2	3	2	2	2	2	2	3	1	2

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AR-704 A: TRAFFIC AND TRANSPORTATION

Periods/week Credits
L: 3 T: 0 P: 0 S: 0 3
Duration and mode of Exam: 3 Hrs Theory Exam

Max. Marks: 100
Continuous Assessments: 60
End Semester Exam: 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

AR 704.1. **Understand** transportation planning process and its role in urban planning.

AR 704.2. **Understand** the various elements of road design, different types of intersection and interchanges.

AR 704.3. **Learn** different hierarchy and classification of roads.

AR 704.4. **Understand** the different surveys used in traffic and transportation which will help in decision making.

AR 704.5. **Measure** the ability of roadway to accommodate traffic.

AR 704.6. **know** the different government initiatives and policies regarding traffic management and planning.

PART-A

Unit 1: Introduction Transportation Planning

- 1.1 Traffic and Transportation: Definitions, Need, Importance, functions.
- 1.2 Comprehensive Urban Planning
- 1.3 Steps in Urban Transportation Planning Process
- 1.4 Levels in Transportation Planning
- 1.5 Traffic System management Measures

Unit 2: Geometric Design of Roads

- 2.1 Fundamental Design Consideration
- 2.2 Horizontal and Vertical Alignment of Roads
- 2.3 Cross sectional Elements of Urban Roads
- 2.4 Interchanges and Intersections

Unit 3: Network Characteristics

- 2.1 Basic characteristics of transportation network
- 2.2 Form and shape of city
- 2.3 Classification and hierarchy of roads (Intercity and Intra city roads)

PART-B

Unit 4:Traffic Surveys

- 4.1 Origin and Destination Surveys
- 4.2 Parking Surveys
- 4.3 Programming and scheduling,
- 4.4 processing of travel data
- 4.5 Analysis and interpretation of traffic studies

Unit 5: Traffic Flow Characteristics

- 5.1 Traffic Flow parameters
- 5.2 Relationship between parameters

Unit 6: Government Initiatives Final Thesis Presentation

- 6.1 National Transit Oriented Development Policy
- 6.2 National urban Transportation Policy, 2016

Text Books/ Reference Books:

1. Juan de Dios OrtúzarS.(1990) Modelling transport ,John Wiley & Sons.
2. Kadiyali, L. R. '(1999)Traffic Engineering and Transport Planning', Khanna Publishers (1 January 1999)

Software required/Weblinks:

Instructions for paper setting:Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part.

Assessment Tools:

- Assignment/Tutorials
- Sessional tests
- Surprise questions during lectures/Class Performance
- Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR 704)	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12	PS O1	PS O2
AR 704.1	2	1	1	-	1	2	3	1	1	2	1	2	2	1
AR 704.2	2	2	2	1	-	2	1	2	1	2	2	3	1	1
AR 704.3	3	1	2	3	1	2	2	2	2	1	2	1	1	1
AR 704.4	2	3	1	1	2	-	2	1	2	3	-	2	2	2
AR 704.5	3	2	3	-	-	2	3	2	1	3	1	2	3	2
AR 704.6	3	1	1	2	2	3	2	2	2	2	2	3	1	2

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AR-705 A: STRUCTURE DESIGN- PROJECT

Periods/week	Credits	Max. Marks: 100
L: 3 T: 0 P: 0 S: 0	3	Continuous Assessment: 60
Duration and Mode of Examination: Practical Examination & Viva Voce		End Semester Exam: 40

Pre-requisites: NIL

Course Type: Program Core

Course Outcomes

- AR-705.1. Introduction to Codal Provision discusses loads on structures, stresses, the concept of factor of safety, methods of design
- AR-705.2. Detailed Structural Design & Drawings of a Public/Residential Building
- AR-705.3. Earthquake and Ground Motion
- AR-705.4. Dynamics of structures and seismic response
- AR-705.5. Introduction of earthquake resistant design
- AR-705.6. Masonry building

PART-A

Unit 1: Introduction to Codal Provision

- 1.1 IS-456-2000
- 1.2 IS-4326
- 1.3 IS-1893
- 1.4 IS-800

Unit 2: Detailed Structural Design & Drawings of a Public/Residential Building

- 2.1 RCC frame structure
- 2.2 Design of Slabs
- 2.3 Design of Beams
- 2.4 Design of columns
- 2.5 Design of staircase
- 2.6 Design of foundation
- 2.7 Detailing of all structural members

Unit 3: Earthquake and Ground Motion

- 3.1 Interior of earth
- 3.2 Cause of earthquakes
- 3.3 Nature and occurrence of earthquakes
- 3.4 Seismic waves
- 3.5 Effects of earthquake
- 3.6 Consequences of earthquake damage
- 3.7 Measurements of earthquakes
- 3.8 Strong ground motion

- 3.9 Seismic zoning
- 3.10 Response of structure of earthquake motion
- 3.11 Seismic design

PART-B

Unit 4: Dynamics of structures and seismic response

- 4.1 Modeling of structures, Equation of motion
- 4.2 Systems with single degree of freedom
- 4.3 Periods and modes of vibration of MDOF systems
- 4.4 Damping

Unit 5: Introduction of earthquake resistant design

- 5.1 Seismic Design requirements
- 5.2 Basic assumptions
- 5.3 Design earthquake loads & Basic load combination
- 5.5 Earthquake resistant design methods
- 5.6 Seismic design requirements & Seismic design of masonry wall
- 5.8 Restoring and strengthening of masonry wall

Unit 6: Masonry building

- 6.1 Categories of masonry buildings
- 6.2 Behavior of unreinforced masonry wall
- 6.3 Behavior of reinforced masonry wall
- 6.4 Behavior of wall- box action and bands
- 6.5 Behavior of infill walls
- 6.6 Seismic design requirements & masonry wall
- 6.8 Restoring and strengthening of masonry wall

Text Books/ Reference Books:

1. P Dayaratnam, P Sarah (2017) Design of Reinforced Concrete Structure ,Medtech; 5th edition (6 July 2017)
2. S.K. Duggal.(2017) Design of steel structures,McGraw Hill Education; 3rd edition (1 July 2017)

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-705)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-705.1	-	1	-	-	-	-	-	-	-	1	-	2	1	-
AR-705.2	1	-	1	-	-	-	-	-	1	-	-	2	1	-
AR-705.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AR-705.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AR-705.5	-	-	-	-	-	-	-	-	-	-	-	1	1	1
AR-705.6	-	-	-	1	-	-	-	-	1	-	-	-	-	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

AR – 507 B: BUILDING SERVICES –III (LIGHTING AND ACOUSTICS)

Periods/week	Credits	Max. Marks : 100
L: 2 T: 0 P: 0 S: 0	2	Continuous Assessment : 60
Duration and Mode of Exam: 3 Hrs Theory Examination		End Semester Exam : 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

- AR-507.1. Define the importance of building services involved in the built environment.
- AR-507.2. Explain different phenomena and principles related to sound propagation and their implications on building design.
- AR-507.3. Develop comprehensive knowledge on lighting principles and design.
- AR-507.4. Analyze the common acoustical defects in an auditorium and the ways to avoid / correct them.
- AR-507.5. Compare the different types of noise, their transmission and the measures to isolate / control them.
- AR-507.6. Design Lighting and Acoustical system in buildings (except detail design calculation)

PART-A

Unit 1: Lighting

- 1.1 Light and its sources(Natural and Artificial)
- 1.2 Nature of light (Wave Theory) vision, perception.
- 1.3 Vocabulary of artificial lighting: Lumens, Lux, M.F., Lighting Level requirements for various areas.

Unit 2: Types of Lamps & Luminaries

- 2.1 Incandescent Lamp, Reflector Lamp, Blown Bulb Lamps, Tungsten Halogen Lamps, Tubular Fluorescent Lamps, Mercury Vapour Lamps, Sodium Vapour Lamps, Compact Fluorescent Lamps.
- 2.2 Decorative Commercial, Industrial, Outdoor, Working out room index ratio and coefficient of utilization.

Unit 3: Day Lighting

- 3.1 Physical parameters of day lighting, day light penetration, day light factor.
- 3.2 Integrating day lighting with artificial, automatic control of artificial lighting in relation to day lighting, calculation of requirements of artificial lighting in relation to available day lighting.

PART-B

Unit 4: Introduction to Basics of Acoustics

- 4.1 Terminology and unit.
- 4.2 Characteristics of audible sound – Propagation, Velocity, Frequency, Pitch, Quality/timbre, Loudness and Intensity.
- 4.3 Behavior of audible sound in enclosures – Reflection, Absorption, Diffraction and Transmission of sound.

Unit 5: Sound system & Acoustical design principles and factors:

- 5.1 Sound reinforcement system, Public address system.
- 5.2 Familiarization and understanding of sound system equipment specification e.g. Amplifiers, Microphones, Speakers, Mixers, Conference systems and accessories.
- 5.3 Acoustical design principles for Auditoriums, Cinema halls, Conference rooms etc. and factors viz. Site selection & planning, Dimensions, Shape, Seats & seating arrangements, Treatment of interior surfaces, Reverberation & sound absorption.

Unit 6: Noise Isolation and Control

- 6.1 Noise and its effects.
- 6.2 Types of noise and its transmission.
- 6.3 Sound Insulation and Transmission Loss.
- 6.4 Speech privacy and noise control in specific situations.
- 6.5 Methods of Sound Insulation - control of mechanical noise and vibrations.
- 6.6 Codal Provisions

Text Books/ Reference Books:

7. Handbook for Building Engineers in Metric systems, NBC.
8. Philips Gordon, 2011, Lighting in Architectural Design, 1st edition, McGraw Hill.
9. R.G.Hopkinson and J.D.Kay, 2005, the Lighting of Buildings, 1st edition, Faber, and Faber.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each part 'A' and part 'B'. Students need to attempt two questions out of three from each part.

Assessment Tools:

Assignments
Sessional tests
Theory examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-507)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-507.1	2	-	2	-	2	-	-	-	-	2	-	1	2	3
AR-507.2	2	-	2	2	2	2	1	-	-	2	-	2	2	2
AR-507.3	3	-	2	2	2	2	2	-	2	2	2	3	3	3
AR-507.4	2	3	2	3	2	2	2	-	-	2	-	2	2	2
AR-507.5	2	3	-	3	2	2	2	-	-	1	-	2	2	2
AR-507.6	3	3	3	2	3	3	3	1	2	3	2	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

AR – 706 A: INTERIOR DESIGN

Periods/week

L: 3 T: 0 P: 0 S: 0

Duration and Mode of Exam: Practical Examination & Viva Voce

Credits

3

Max. Marks : 100

Continuous Assessment : 60

End Semester Exam : 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

AR-706.1 Recall the elements and principles of design.

AR-706.2 Show the application of design principles in interiors. Demonstrate use of various presentation mediums.

AR-706.3 Identify the construction methods and techniques in interior design. Apply aspects from building services like acoustics, illumination, electrical in interiors.

AR-706.4 Analyze the importance of ergonomics in work.

AR-706.5 Choose the various materials used in construction.

AR-706.6 Construct the 3d views and perspective drawings of the buildings.

PART-A

Unit 1: Role and importance of Interior Design

1.1 Role of Interiors and their applications in the context of buildings.

Unit 2: Characteristics of Indoor Space

2.1 Effect of enclosure on space perception-size, volume, proportion use of scales for space representation, psychological effects of space, modulation of space, design elements, criteria for different situations.

Unit 3: Principles of Interior Design

3.1 Background for applied decorations- color, texture, plane and fixtures in relation to background, Principle of composition of visual elements modulation of interior space with art objects of space through design, space modulation through artificial and natural lighting, emphasizing of focal points, and unity in interior design.

3.2 Study report of an existing design project.

PART-B

Unit 4: Furniture Design

- 4.1 Role of Furniture.
- 4.2 Evolution of furniture style
- 4.3 Ergonomic factors of furniture design, material used, functional classification, barrier free design, matching of furniture to the decorative style, fitted furniture, its characteristics and applications.

Unit 5: Special Treatments

- 5.1 Decorative materials for ceiling, walls and floors, sources and collecting products information, decorative finishes and fabrics, methods of application, elements and applications of interior landscape, special treatment to emphasis space.
- 5.2 Design of interior space for efficient use of lighting and cooling.

Unit 6: Interior Landscaping

- 6.1 Interior landscaping - elements like rocks, plants, water, flowers, fountains, paving, artifacts, etc. their physical properties.
- 6.2 Methods of application, effects on spaces and design values.
- 6.3 Design of interior landscaping – exhibition space, museums, lobby space, recreation spaces, etc.

Text Books/ Reference Books:

- 1. Julius Panero(1979)Human Dimensions and Interior Space,Watson-Guption; New edition (1 November 1979)
- 2. Joseph Dechiara (2017)Interior Design and Space Planning – Time Saver Standard ,McGraw Hill Education; 2nd edition (1 July 2017)
- 3. Archi World Company,Interior Design-Indoor and Outdoor Landscaping
- 4. Shashi Jain, Creative Interior Design of Enclosed Spaces
- 5. Joseph De Chiara, Martin Zelnik, Julius Panero(1991),Time Saver Standard for Interior Design Space Planning ,Julius Panero, Joseph De Chiara

Instructions for paper setting:Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each part 'A' and part 'B'. Students need to attempt two questions out of three from each part.

Assessment Tools:

- Assignments
- Sessional tests
- Theory examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-706)	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12	PS O1	PS O2
AR-706.1	3	2	2	2	-	-	-	-	-	2	-	3	2	3
AR-706.2	3	2	3	2	2	3	2	-	2	3	-	3	2	3
AR-706.3	2	2	2	2	2	3	3	2	-	2	-	2	2	2
AR-706.4	3	3	2	3	2	3	2	-	-	2	-	3	3	3
AR-706.5	2	2	2	2	3	3	2	-	-	2	-	2	3	3
AR-706.6	3	2	3	2	3	-	2	3	3	2	1	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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AR-707 A: HOUSING FOR URBAN POOR

Periods/week Credits

L: 3 T: 0 P: 0 S: 0 3

Duration and mode of Examination: 3 Hours Theory Examination

Max. Marks: 100

Continuous Assessment: 60

End Semester Exam :40

Pre-requisites: NIL

Course Type: Program Core

Course Outcomes

The Student will be able to

AR-707.1. To define basic elements of housing, neighborhood, community, slums and real estate market. To outline various housing policies and programmes

AR-707.2. To explain inter-relationships between hierarchy of human needs and housing typologies or differentiate settlement design in terms of local context (Physical, Economical, Socio-cultural, Ecological, Environmental aspects)

AR-707.3. To interpret cause and effects housing demand and supply. To apply zoning regulations and subdivision techniques and computation for density, FAR, built-up area, MOS, as per development norms.

AR-707.4. Site planning through analysis of physical, legal and environmental conditions and feasibility analysis of housing project through pre design calculations.

AR-707.5. Critical appraisal of existing housing scheme in terms of quality of life through case study

AR-707.6. To prepare suitable design of a neighborhood under given context includes specific physical, legal, socio-economic, cultural and environmental conditions.

PART-A

Unit 1: Introduction

1.1 To understand basic terminology and relationship between human need, context and housing typologies.

- 1.2 Definition, terminologies and importance
- 1.3 Ecological and environmental aspects of human habitat.
- 1.4 Concept of Neighborhood and Community.
- 1.5 Hierarchy of Human needs and Housing typologies.

Unit 2: Housing Scenario

- 2.1 To recognize housing issues at national context in terms of magnitude of problems, outcomes of initiatives and related factors.
- 2.2 Urbanization and housing statistics
- 2.3 Housing policies and programmers
- 2.4 Factor of housing demand and supply
- 2.5 Housing delivery mechanism

Unit 3: Slum and Housing for Poor

- 3.1 To recognize issues related to slums and affordable housing to poor.
- 3.2 Definition, causes and characteristics of slums
- 3.3 Slum statistics and initiatives for housing for poor
- 3.4 Affordable housing design case studies
- 3.5 Design of affordable housing for poor

PART-B

Unit 4: Development Norms and Standards

- 4.1 To Interpret housing development norms and calculation.
- 4.2 Housing and its relationship with neighborhood and city plan
- 4.3 Zoning regulation, its impact on quality of life of neighbourhood
- 4.4 Density; definitions, types of density, factors, FAR, FSI, etc.
- 4.5 Development norms and standards for services, amenities and facilities
- 4.6 Sub-division techniques.

Unit 5: Land Economics and Real Estate Development

- 5.1 To analyse role of real estate market and development of mass and high rise housing with new concepts.
- 5.2 Introduction to real estate market; potential and challenges
- 5.3 Land economics; Concept of Economics, types of land holding and tenure systems
- 5.4 Factor affecting demand and supply of housing
- 5.5 Relationship between land use, location and land use (Theory of Location and growth pole theory)
- 5.6 Land use constraints, reservations and Land acquisition act, 2013
- 5.7 Land economics and feasibility analysis for housing projects
- 5.8 Models of land development in real estate market (Land pooling and sharing)

Unit 6: Site Planning and Neighborhood Design

- 6.1 To Create Design of Neighborhood under given contexts.
- 6.2 Factors and principles of site planning
- 6.3 Analysis for physical, climatic, legal, financial, socio-cultural aspects
- 6.4 Principles of Neighborhood design
- 6.5 Housing case studies (Successful real estate projects)
- 6.6 Design of Neighborhood (Concept and Calculations)

Text Books/ Reference Books:

1. Sameer Bagaeen (2015) Beyond Gated Community ,Ola Uduku, SamerBagaeen, Routledge; 1st edition (17 June 2015)
2. Joyce YanyunMan(2012) china housing reforms and outcomes ,The Lincoln Institute of Land Policy (11 October 2012)
3. C.S. Yadav,Cities and Housing
4. J.A. Ingham(2013) City slums ,Routledge; 1st edition (8 May 2013)
5. Reddy, Cost effective rural housing technology
6. Matthew Cousins, Design quality in Housing- Leanings from Netherlands
7. Sameer Bagaeen(2015), Gated community .Ola Uduku ,SaskiaSassen, Routledge; 1st edition (17 June 2015)
8. Gyanesh G. Sharma(2016) High density housing for mixed income group ,RanjanaAshishMittal,Aneesh Nandi

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

Assignment/Tutorials

Sessional tests

Surprise questions during lectures/Class Performance

Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-707)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-707.1	-	2	-	1	-	-	1	-	1	-	-	-	1	1
AR-707.2	-	2	-	-	2	1	-	-	-	-	-	1	1	-
AR-707.3	-	-	2	-	1	-	-	1	-	-	-	-	-	-
AR-707.4	-	-	-	2	2	1	1	-	-	-	-	1	2	1
AR-707.5	1	-	-	-	-	-	-	2	-	-	-	-	-	-
AR-707.6	1	1	-	1	1	-	-	-	-	1	1	-	-	-

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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AR-708 A: SMART CITIES

Periods/week

Credits

Max. Marks: 100

L: 3 T: 0 P: 0 S: 0

3

Continuous Assessment: 60

Duration and mode of Examination: 3 Hours Theory Examination

End Semester Exam :40

Pre-requisites: NIL

Course Type: Elective Domain Specific

Course Outcomes

The Student will able to

AR-708.1. To define concept and framework of smart cities

AR-708.2. To understand the challenges and problem faced by today's urban cities.

AR-707.3. To expect these issues can be mitigated through the adoption of information and communication technologies (JCT) to encourage sustainable development, increase efficiency and improve quality of life

AR-708.4. Encouraged in critical thinking to adopt technological solutions to achieve smart and sustainable cities..

AR-708.5. throughout the course, students will not only learn the key technologies in designing and implementing solutions for a smart city, but also understand the challenges for implementing these solutions.

AR-708.6.The fundamental principles, technologies, current applications and future trends in smart cities.

PART-A

Unit 1: Introduction

1.1 Describe the concept of a smart city.

- 1.2 Definition, terminologies and importance
- 1.3 Concept, Principle stakeholders, key trends in smart cities developments

Unit 2: Smart Cities Planning and Development

- 2.1 Understanding smart cities
- 2.2 Dimension of smart cities
- 2.3 Global Standards and performance benchmarks, Practice codes
- 2.4 Smart city planning and development
- 2.5 Financing smart cities development
- 2.6 Governance of smart cities

Unit 3: Project management in Smart Cities

- 3.1 Phases, Stages of project and work break down Structure
- 3.2 Project organization structure, Planning, Scheduling and CPM
- 3.3 Project cost analysis, resource allocation & leveling, Line of balancing technique
- 3.4 Project monitoring and control, Project risk management

PART-B

Unit 4: Functions of various technologies

- 4.1 Key challenges/problems facing professionals in India and other cities around the world
- 4.2 Understand the roles and functions of various technologies (sensors, RFID, cloud computing) that can be used for implementing smart cities
- 4.3 Relation to each other to achieve the sustainability goals.

Unit 5: Technologies Application

- 5.1 Learn the different fields of technology applications in smart and sustainable cities
- 5.2 Criticize the solutions and plans proposed by others.

Unit 6: Green building in smart cities

- 6.1 Introduction to green buildings, Rating system, Energy saving system

Text Books/ Reference Books:

1. Smart City on Future Life - Scientific Planning and Construction by Xianyi Li. 2012.
2. The Age of Intelligent Cities: Smart Environments and Innovation-for-all Strategies (Regions and Cities) by NicosKomninos (2014).
3. Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia by Anthony Townsend (Oct 7, 2013) .
4. IBM Smart Cities: http://www.ibm.com/smarterplanet/us/en/smarter_cities/
5. Siemens Smart Cities : www.siemens.com/smart-city 6. City Science Leadership Team:

Assessment Tools:

- Assignment/Tutorials
- Sessional tests
- Surprise questions during lectures/Class Performance
- Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-708)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-708.1	-	2	-	1	-	-	1	-	1	-	-	-	1	1
AR-708.2	-	2	-	-	2	1	-	-	-	-	-	1	1	-
AR-708.3	-	-	2	-	1	-	-	1	-	-	-	-	-	-
AR-708.4	-	-	-	2	2	1	1	-	-	-	-	1	2	1
AR-708.5	1	-	-	-	-	-	-	2	-	-	-	-	-	-
AR-708.6	1	1	-	1	1	-	-	-	-	1	1	-	-	-

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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AR-709 A: HILL ARCHITECTURE

Periods/week Credits
L: 3 T: 0 P: 0 S: 0 3

Max. Marks: 100
Continuous Assessment: 60
End Semester Exam :40

Duration and mode of Examination: 3 Hours Theory Examination

Pre-requisites: NIL

Course Type: Elective Domain Specific

Course Outcomes

The Student will able to

- AR-709.1 Understand the context of hill architecture
- AR-709.2 Their role and importance in traditional hill architecture of medieval Europe
- AR-709.3 To understand hill settlements and its relevance
- AR-709.4 Encouraged in critical thinking to know options and issues for disasters in hill architecture
- AR-709.5. Throughout the course, students will understand importance of hill architecture in India
- AR-709.6 The different building typologies

PART-A

Unit 1: Introduction

- 1.1 Hill Architecture
- 1.2 Role, Importance, Limitations, Advantages and Disadvantages.
- 1.3 Historical perspective, specific attributes /
- 1.4 Unique features etc. Introduction t building bye-laws of hill architecture

Unit 2: Traditional Hill Architecture of Medieval Europe

- 2.1 Overview, specific features
- 2.2 Building materials and building technologies

Unit 3: Hill Settlements

- 3.1 Approach, overview, specific features of planning
- 3.2 Designing in different climatic regions of the world.

PART-B

Unit 4: Disasters in Hill Areas

- 4.1 Relevance of disasters in hill areas
- 4.2 Issues and options.

Unit 5: Hill Architecture in India

- 1.1 Growth and development
- 1.2 Character and unique features

Unit 6: Building Typologies

- 6.1 Study of various types of traditional buildings in different
- 6.2 Hill Regions of India with their unique features
- 6.3 Factors effecting design of buildings

Text Books/ Reference Books:

1. Immaterial Architecture by Jonathan Hills
2. Actions of Architecture by Jonathan Hills
3. Hill Architecture by Michael Robinson
4. Vernacular Architecture of Himachal Pradesh by Rahul Kumar Bhushan
5. Adaptive Climate Responsive – Vernacular Construction in High Altitude by Ar. Amitava Sarkar

Assessment Tools:

- Assignment/Tutorials
- Sessional tests
- Surprise questions during lectures/Class Performance
- Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-709)	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12	PS O1	PS O2
AR-709.1	-	2	-	1	-	-	1	-	1	-	-	-	1	1
AR-709.2	-	2	-	-	2	1	-	-	-	-	-	1	1	-
AR-709.3	-	-	2	-	1	-	-	1	-	-	-	-	-	-
AR-709.4	-	-	-	2	2	1	1	-	-	-	-	1	2	1
AR-709.5	1	-	-	-	-	-	-	2	-	-	-	-	-	-
AR-709.6	1	1	-	1	1	-	-	-	-	1	1	-	-	-

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR-710 A: TALL BUILDINGS

Periods/week

Credits

L: 3 T: 0 P: 0 S: 0

3

Duration and mode of Examination: 3 Hours Theory Examination

Max. Marks: 100

Continuous Assessment: 60

End Semester Exam :40

Pre-requisites: NIL

Course Type: Elective Domain Specific

Course Outcomes

The Student will able to

AR-710.1. Understand the context of planning, designing and construction of high rise buildings

AR-710.2. Their role and importance in shaping the human settlements and urban form in the modern context.

AR-710.3. To expect these issues can be mitigated through the adoption of information and communication technologies (JCT) to encourage sustainable development, increase efficiency and improve quality of life

AR-710.4. Encouraged in critical thinking to adopt technological solutions to achieve smart and sustainable cities..

AR-710.5. throughout the course, students will not only learn the key technologies in designing and implementing solutions for a smart city, but also understand the challenges for

implementing these solutions.

AR-710.6.The fundamental principles, technologies, current applications and future trends in smart cities.

PART-A

Unit 1: Introduction

1.1 High Rise Buildings:Introduction, Historical Perspective, Origin, Definitions

1.1 Role, Importance, Limitations, Advantages and Disadvantages.

Unit 2: Designing High Rise Buildings

2.1 Planning and Designing of High Rise Buildings.

2.2 Construction of High Rise Buildings.

Unit 3: Technologies and Construction

3.1 Building Technologies used in the Construction.

3.2 Building Materials used in the Construction.

PART-B

Unit 4: Functions and Services

4.1 Study of Building Services in the High Rise Buildings.

4.2 Fire Safety and Structural Safety of High Rise Buildings.

Unit 5: Norms and Legal framework

5.1 Study of Legal Framework governing the High Rise Buildings.

5.2 Study of National Building Code 2005.

Unit 6: Case studies

6.1 Study of famous High Rise Buildings – Burj Khalifa, Sears Towers, Empire State

6.2 Building, World Trade Centre, Imperial Towers and Orchid Woods Mumbai.

Text Books/ Reference Books:

- Smart City on Future Life - Scientific Planning and Construction by Xianyi Li. 2012.
- The Age of Intelligent Cities: Smart Environments and Innovation-for-all Strategies (Regions and Cities) by NicosKomninos (2014).
- Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia by Anthony Townsend (Oct 7, 2013) .
- IBM Smart Cities: http://www.ibm.com/smarterplanet/us/en/smarter_cities/
- Siemens Smart Cities : www.siemens.com/smart-city 6. City Science Leadership Team:

Assessment Tools:

Assignment/Tutorials
 Sessional tests
 Surprise questions during lectures/Class Performance
 Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-710)	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12	PS O1	PS O2
AR-710.1	-	2	-	1	-	-	1	-	1	-	-	-	1	1
AR-710.2	-	2	-	-	2	1	-	-	-	-	-	1	1	-
AR-710.3	-	-	2	-	1	-	-	1	-	-	-	-	-	-
AR-710.4	-	-	-	2	2	1	1	-	-	-	-	1	2	1
AR-710.5	1	-	-	-	-	-	-	2	-	-	-	-	-	-
AR-710.6	1	1	-	1	1	-	-	-	-	1	1	-	-	-

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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AR – 801: PROFESSIONAL TRAINING

Practical Training

Credits

Max.Marks : 1100

1 Semester (16 Weeks)

Marks by Architect's office giving Training : 200

32

Internal Marks: 400

Duration and Mode of Exam: Practical Portfolio & Viva Voce

External Exam :500

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

AR-801.1. Recall skill that helps to adapt to fit special requirements.

AR-801.2. Explain an orientation that would include the process of development of conceptual ideas, presentation skills, involvement in office discussions, client meetings, development of the concepts into working drawings, tendering procedure, site supervision during execution and coordination with the agencies involved in the construction process.

AR-801.3. Apply The professional aspects of an architecture office/company and the multiple issues in conception, preparation and execution of project on a site.

AR-801.4. Analyze the evolution of an architectural project from design to execution.

PART-A

Unit 1: Professional Training Manual

- 1.1 The total marks shall be suitably apportioned to assess on a regular basis the monthly reports, office work and work done outside office hours.
- 1.2 Students are required to send / submit monthly reports of work done by them in the office in which they are working according to prescribed schedule. These reports shall be assessed / marked regularly by the Practical Training Coordinator.
- 1.3 On the conclusion of training, the work done by the student shall be examined and evaluated through a viva – voce to be conducted jointly by the Director / Principal / HoD / Practical Training Coordinator (PTC) and one External Examiner, who will be appointed by the University.

PART-B

Unit 2: Work to be done by the student:

- 2.1 During Training, students are required to do two distinct types of work to make optimum utilization of the period of training.
- 2.1 Monthly reports, office work and work done outside office hours.

PART-B

Unit 3 :Work to be done during office hours :

- 3.1 The Drafting, Tracing, Sketch Designs, Presentation Drawing, Perspectives, Models, Documentation etc.
- 3.2 Working Drawing and Details

Unit 4: Work to be done during extra - office hours:

- 4.1 Prepare a study report on Building Design, Analysis incorporating Site Visits, recording observations etc.

Text Books/ Reference Books: Nil

Instructions for paper setting: Practical Portfolio & Viva Voce

Assessment Tools:

Assignment/Tutorials
Sessional tests
Surprise questions during lectures/Class Performance
Term end examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-801)	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12	PS O1	PS O2
AR-801.1	2	-	2	-	2	2	2	2	2	2	2	1	2	3
AR-801.2	3	-	2	-	2	3	3	3	3	2	3	3	3	3
AR-801.3	3	1	3	1	3	3	2	3	3	3	3	3	3	3
AR-801.4	2	3	2	3	2	3	3	3	3	2	2	3 3	3	3
AR-801.5	2	2	2	2	2	3	2	2	2	2	2	3	2	3
AR-801.6	3	2	3	2	3	3	3	3	3	3	3	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)

AR-901 : ARCHITECTURAL DESIGN -IX

Periods/week

Credits

Max. Marks: 500

L: 0 T: 0 P: 0 S: 12

12

Continuous Assessment: 350

Duration and Mode of Exam: Design Evaluation and Viva Voce

End Semester Exam: 150

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will able to

AR 901.1. **Apply** the experience gained during the training semester in current design projects.

AR 901.2. **Compare** the built and unbuilt environment around.

AR 901.3. **Organize** to work in a team and to present the collected data.

AR 901.4. **Plot** an appropriate program for a project.

AR 901.5. **Formulate** and Highlight the issues.

AR 901.6. **Justifies** the environment for sensitivity.

PART-A

Unit 1: Identify an Area with the Given Objectives

1.1 Higher Order of Office/Commercial complex

- 1.2 Survey the existing urban environment.
- 1.3 Visualize with objectives

Unit 2: Carving the study area- City Centre, District Centre

- 2.1 Delineate the study area- Large Exhibition Complexes, Convention Centre Multiplexes
- 2.2 Collect initial data

Unit 3: Presenting the collected data

- 3.1 Mapping of collected data using techniques and methods.
- 3.2 Campus designing - University, Professional Institutes, Integrated Campus etc

PART-B

Unit 4: Analyzing the collected information

- 4.1 Co-relating the various data for interrelationship.
- 4.2 Analyzing interrelationships of various identified factors.
- 4.3 Examining the data for overall understanding of the information.
- 4.4 Capital Complex-Secretariat, High Court, Assembly

Unit 5: Drawing inferences for interventions

- 5.1 Picking up issues for addressing.
- 5.2 Thinking about developing sensitive responses to the identified issues
- 5.3 Prepare models for spatial analysis
- 5.4 Prepare quantitative data for existing and future proposals

Unit 6: Formulation of the design programme and strategies for intervention

- 6.1 Prepare the vision statement -buildings should have accessibility to the physically challenged persons
- 6.2 Phasing of the project
- 6.3 Implementation of the design solutions

Text Books/ Reference Books:

1. BallyMeeda (2007) Graphics in Urban design ,2nd edition, CRC Press Publication.
2. Ian Bentley(1985)Responsive Environments, 1st edition, Oxford Press.
3. Local Master Plans or Development Plans.
4. Development Control Regulations- as per requirements.

Software required/Weblinks:

Auto Cad, Revit
Photoshop
Illustrator

Instructions for paper setting:

The subject will be assessed through a practical examination and Viva Voce.

Assessment Tools:

Portfolio Submissions

Sessional tests

Design Evaluation & Viva Voce

Sessional I	20%
Sessional II	20%
Assignment	50%
Class Performance	5%
Attendance	5%

Course Articulation Matrix

CO Statement (AR 901)	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12	PS O1	PS O2
AR 901.1	3	3	2	2	1	1	2	1	1	3	2	3	1	2
AR 901.2	3	3	3	3	1	2	2	1	2	2	1	2	2	-
AR 901.3	2	2	2	2	1	1	1	2	3	3	2	3	1	2
AR 901.4	3	3	3	2	1	1	1	1	2	2	1	2	2	1
AR 901.5	2	2	3	3	1	1	2	1	2	3	2	1	2	2
AR 901.6	2	3	2	2	2	1	1	2	1	3	3	2	3	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

AR-902 :ADVANCED BUILDING CONSTRUCTION – IX

Periods/week Credits

L: 0 T: 0 P: 0 S: 5 5

Duration and mode of Examination: Practical Examination & Viva-voce

Max. Marks: 150

Continuous Assessment: 100

End Semester Exam: 50

Pre-requisites: NIL

Course Type: Program Core

Course Outcomes

The Student will able to

AR-902.1. Explain different types of framework systems available in the market and their implication on surface finishes

AR-902.2. Apply their knowledge of framework systems to choose the appropriate system for a wall cladding

AR-902.3. Discuss the building defects

AR-902.4. Explain different design consideration for alteration and their integration with architectural designs.

AR-902.5. Discuss the importance of mechanization in construction industry and the associated issues.

AR-902.6. Understand the nuances of timber as a construction material for contemporary buildings.

PART-A

Unit 1: Surface Finishes

1.1 Interior Surface Finishes.

1.2 Exterior Surface Finishes.

Unit 2: Wall Claddings

- 2.1 Methods, Materials
- 2.2 Designing and Detailing

Unit 3: Building Defects

- 3.1 Kinds of defects, causes and remedies for cracks,
- 3.2 Structural Deflection, Disintegration in RCC and Brick Structures.

PART-B

Unit 4: Addition and Alteration of Existing Building

- 4.1 Structural, Materials and Detailing
- 4.2 Design and Construction considerations including change of use of building

Unit 5: Conversion of spaces

- 5.1 Conversion of Warehouse to Cinema / Factory etc.
- 5.2 Conversion of Godown into Showrooms etc.
- 5.3 Conversion of Halls into Shops etc.
- 5.4 Conversion of Small Spaces into Larger Spaces.
- 5.5 Conversion of Larger Spaces into Smaller Spaces.
- 5.6 Conversion of Buildings of Larger Spans into Small Spans and vice versa.

Unit 6: Larger Span Timber Building

- 6.1 Principles, Design Considerations
- 6.2 Methodologies for using short length, timber and laminated timber materials to cover larger spans.

Text Books/ Reference Books:

1. Neville, 2010, Concrete Technology, 2nd edition, Pearson Publishers
2. A.R. Santhakumar, 2018, Concrete Technology, 2nd edition, Oxford University Publishers
3. Awad S. Hanna, 1998, Concrete Formwork systems, 1st edition, CRC Press Publication

Instructions for paper setting: The Subject will be assessed through a practical examination & viva-voce.

Assessment Tools:

- Portfolio Submission
- Sessional tests
- Construction Details Evaluation and viva-voce
- Term end examination

Sessional I	20%
Sessional II	20%
Assignment	50%
Class Performance	5%
Attendance	5%

Course Articulation Matrix

CO Statement (AR-902)	P 01	P 02	P 03	P 04	P 05	P 06	P 07	P 08	P 09	P 010	P 011	P 012	PS 01	PS 02
AR-902.1	-	-	1	-	1	-	-	-	1	1	-	2	-	1
AR-902.2	2	1	-	-	-	-	-	1	1	-	-	2	-	-
AR-902.3	1	-	-	1	-	-	-	-	-	-	-	-	2	-
AR-902.4	2	1	1	-	-	-	-	1	2	1	-	-	-	2
AR-902.5	-	-	-	2	-	-	-	-	-	-	1	-	-	-
AR-902.6	1	-	-	-	-	1	1	-	-	-	1	1	-	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)

AR – 903 A: Research Methodology (Dissertation)

Periods/week

Credits

L: 3 T: 0 P: 0 S: 0 3

Duration and Mode of Exam: Practical Examination & Viva Voce

Max. Marks : 100

Continuous Assessment : 60

End Semester Exam : 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

- The student will be able to
- AR-903.1. Recall the process of research process.
 - AR-903.2. Explain the importance of research in Architectural context.
 - AR-903.3. Organize a study based on literature survey.
 - AR-903.4. List research papers published in Journals for a study and also the research methods for study.

PART-A

Unit 1: Identification of the investigation

- 1.1 Identification of the investigation to be done in research
- 1.2 Methodology in sequence to achieve to acquire desired results

Unit 2: Assessment of data

- 2.1 Assessment of data to be used in formation of the total thesis profile

PART-B

Unit 3: Data collection methods

- 3.1 Data collection methods like reference books, internet resource, monographs, microfilms, tables and charts and statistical data.

Unit 4: Concluding part of research

- 4.1 Concluding part of research comprising of the data used in the case study for final presentation in presentable format through similar case studies

Text Books/ Reference Books:

1. Intellectual Property Right: A Manual 2007
2. Entrepreneurship Deve and IPR Unit
3. Birla Institute of Technology and Science, Pilani
4. IPR – Wipro (World Intellectual Property Organizaion)

Instructions for paper setting: Practical Portfolio & Viva Voce

Assessment Tools:

Dissertation Report Submission
Practical Portfolio & Viva Voce

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-903)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-903.1	1	2	2	2	1	-	-	-	2	2	-	1	2	2
AR-903.2	3	2	3	2	2	3	2	-	2	2	-	2	2	2
AR-903.3	2	3	3	3	3	2	2	-	2	2	2	3	2	2
AR-903.4	3	2	2	2	3	3	2	-	2	2	-	2	2	2
AR-903.5	3	2	2	2	3	3	3	-	2	3	1	3	3	3
AR-903.6	3	2	3	2	3	3	2	3	2	2	-1	3	2	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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AR – 904 A: TOWN PLANNING

Periods/week

Credits

L: 4 T: 0 P: 0 S: 0 4

Max. Marks : 100

Continuous Assessment : 60

Duration and Mode of Exam: 3 Hrs Theory Examination

End Semester Exam : 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

- The student will be able to
- AR-904.1. Define types of settlements based on different criteria. Identify the elements of a settlement. Describe the principle of a settlement pattern.
 - AR-904.2. Classify constituents of town/city
 - AR-904.3. Utilize the study of this subject for the further studies in the specialized field of Urban/ Town Planning.
 - AR-904.4. Distinguish between different settlements, concepts of planning and techniques of survey
 - AR-904.5. Review the condition of development/status of urbanization

AR-904.6. Discuss local area plans

PART-A

Unit 1: Town Planning

- 1.1 Introduction, role, importance and scope.
- 1.2 Ecological, social and economic aspects of town planning.

Unit 2: Settlement Planning

- 2.1 Overview of evolution of settlement planning - during the Greek, Roman, Mesopotamian and Nile valley civilization with examples.

Unit 3: Town Planning in India& Europe

- 3.1 Town Planning in India - overview of Human Settlements through Indus Valley civilization, Vedic period, Islamic and Colonial periods with examples.
- 3.2 Town planning in Europe - Historical development of town planning in early, medieval, renaissance upto industrial revolution with examples.
- 3.3 Classification of human settlements - based on form, use, scale, road pattern etc.

PART-B

Unit 4: Master Plan

- 4.1 Introduction, objectives, preparation, components, land use classification and role in promoting planned development.
- 4.2 Planning methodology for industrial and recreational towns.
- 4.3 Surveys – introduction, objectives, techniques, collection and analysis of data for planning and traffic and transportation.
- 4.4 Role and importance of planning laws, planning norms & standards, building byelaws.

Unit 5: Slums

- 5.1 Slums – introduction, causes, issues, characteristics, rehabilitation, strategies for improving / minimizing growth of slums,

Unit 6: Towns in India

- 6.1 Existing towns and cities in India– problems, remedial measures.
- 6.2 New towns in India - Chandigarh, Gandhi Nagar, Bhubaneshwar – purpose, siting, planning, development, problems.

Text Books/ Reference Books:

1. Paul D Spreiregen, 2016, The Architecture of Towns & Cities, 1st publication, Mcgraw-hill Publication
2. Arthur Gallion, 1986, Urban Pattern: City Planning and Design, 2 edition , Van Nostrand Reinhold; Subsequent edition (1 February 1986)
3. Dan Cruckshank , 1999, History of Architecture, 20th edition CBS Publish

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

- Assignments
- Quiz
- Sessional tests
- Theory examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-904)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-904.1	2	2	2	2	-	3	2	2	2	2	-	2	-	2
AR-904.2	3	3	2	3	-	3	2	2	3	3	-	3	2	2
AR-904.3	3	2	2	2	2	3	2	2	3	2	-	2	2	2
AR-904.4	3	3	2	3	2	2	3	3	3	2	-	3	2	2
AR-904.5	2	2	2	2	2	3	2	2	3	3	-	3	2	2
AR-904.6	3	2	3	2	2	3	3	3	3	3	1	3	2	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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AR – 905 A: DISASTER MANAGEMENT

Periods/week Credits
 L: 2 T: 0 P: 0 S: 0 2
 Duration and Mode of Exam: 3 Hrs Theory Examination

Max. Marks : 50
 Continuous Assessment : 30
 End Semester Exam : 20

Pre-requisites: None
Course Type: Program Core

Course Outcomes

- The student will be able to
- AR-905.1. Define disasters and typologies
 - AR-905.2. Study about Earthquake
 - AR-905.3. Utilize the principles of designing
 - AR-905.4. Discuss earthquake zones of India
 - AR-905.5. Review the various disasters

AR-905.6. Discuss post disaster management

PART-A

Unit 1: Disaster

- 6.1 Introduction, Typologies, Causes
- 6.2 Effects and Prevention.

Unit 2: Earthquake

- 2.1 Causes and Effects
- 2.2 Problems and Design Issues.

Unit 3: Principles of Designing

- 3.1 Principles of designing RCC
- 3.2 Masonry against earthquake
- 3.3 Construction Techniques to make buildings safe against earthquake.

PART-B

Unit 4: Earthquake Zones in India

- 1.1 Introduction and Features
- 1.2 Design/ Construction requirements.

Unit 5: Causes and Effects of various Disasters

- 5.1 Introduction and Causes, Effects of Fire
- 5.2 Causes, Effects Floods, Cyclones, Landslide, Tsunami, Avalanche etc.

Unit 6: Disaster and Post Disaster Management

- 6.1 Problems, Issues, and options
- 6.2 Technique for constructing safe buildings for above disasters.

Text Books/ Reference Books:

- 1 Encyclopedia of Disaster Management.
- 2 Citizen Guide to Disaster Management by Satish Modh.
- 3 Disaster Management and Preparedness by Nidhi Gauba Dhawan.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

Assignments
 Quiz
 Sessional tests
 Theory examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-904)	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12	PS O1	PS O2
AR-905.1	2	2	2	2	-	3	2	2	2	2	-	2	-	2
AR-905.2	3	3	2	3	-	3	2	2	3	3	-	3	2	2
AR-905.3	3	2	2	2	2	3	2	2	3	2	-	2	2	2
AR-905.4	3	3	2	3	2	2	3	3	3	2	-	3	2	2
AR-905.5	2	2	2	2	2	3	2	2	3	3	-	3	2	2
AR-905.6	3	2	3	2	2	3	3	3	3	3	1	3	2	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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AR – 906 A: ARCHITECTURE CONSERVATION

Periods/week Credits
 L: 3 T: 0 P: 0 S: 0 3
 Duration and Mode of Exam: 3 Hrs Theory Examination

Max. Marks : 100
 Continuous Assessment : 60
 End Semester Exam : 40

Pre-requisites: None

Course Type: Elective Domain Specific

Course Outcomes

The student will be able to
 AR-906.1. Define conservation and modern movement
 AR-906.2. Study about History of Indian Architecture
 AR-906.3. Utilize the principles of construction methods

- AR-906.4. Discuss finishes of historical building
- AR-906.5. Review the different garden styles
- AR-906.6. Discuss legal framework to protect heritage

PART-A

Unit 1: Introduction

- 1.1 Conservation, Modern Movement in Architecture
- 1.2 Its association with conservation movement in architecture.

Unit 2: History of Indian Architecture

- 5.1 Historical styles in Indian Architecture ,overview, specific features
- 5.2 Building materials and building technologies.

Unit 3: Principles of Construction Methods

- 3.1 Study about ornamentation and detailing in historical buildings in various styles.
- 3.2 Construction methods and structural analysis of various historical building styles
- 3.3 Arches, Domes, Vaults and Shikhars.

PART-B

Unit 4: Finishes in Historical Building

- 4.1 Introduction and finishes in historical buildings.
- 4.2 Landscaping style / plantation around historical buildings

Unit 5: Features of different Garden Styles

- 1.1 Plantation / water features in Mughal Garden and Hindu Temples.
- 1.2 Studying and documenting historical monuments

Unit 6: Legal framework

- 6.1 Methods of saving monuments from vandalism
- 6.2 Existing Legal Framework to protect Heritage and its limitations.
- 6.3 Institutional framework to protect Heritage.

Text Books/ Reference Books:

- 1 Encyclopedia of Vernacular Architecture of World' by Oliver Paul.
- 2 Ways of measuring Built Form of Himachal Pradesh' by Jay Thakkar.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

- Assignments
- Quiz
- Sessional tests
- Theory examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-904)	P 01	P 02	P 03	P 04	P 05	P 06	P 07	P 08	P 09	P 010	P 011	P 012	PS 01	PS 02
AR-906.1	2	2	2	2	-	3	2	2	2	2	-	2	-	2
AR-906.2	3	3	2	3	-	3	2	2	3	3	-	3	2	2
AR-906.3	3	2	2	2	2	3	2	2	3	2	-	2	2	2
AR-906.4	3	3	2	3	2	2	3	3	3	2	-	3	2	2
AR-906.5	2	2	2	2	2	3	2	2	3	3	-	3	2	2
AR-906.6	3	2	3	2	2	3	3	3	3	3	1	3	2	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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AR – 907 A: BUILDING VALUATION

Periods/week : 100

Credits

Max. Marks

L: 3 T: 0 P: 0 S: 0 3

Duration and Mode of Exam: 3 Hrs Theory Examination

Continuous Assessment : 60

End Semester Exam : 40

Pre-requisites: None

Course Type: Elective Domain Specific

Course Outcomes

- The student will be able to
- AR-907.1. Define general principles of Valuation
 - AR-907.2. Study about Value, Price and Cost
 - AR-907.3. Utilize the principles of Values
 - AR-907.4. Discuss rent and its types
 - AR-907.5. Review the concept of net income
 - AR-907.6. Discuss property and lease

PART-A

Unit 1: Introduction

- 1.1 General principles of valuation.
- 1.2 Importance of valuation for rental, income/wealth tax, selling/ purchasing.

Unit 2: Basic concept of Value, Price and Cost

- 2.1 Understand Value, Price and Cost.
- 2.2 Market : Perfect, Imperfect and Monopoly, Law of Demand, Supply and Pricing

Unit 3: Principles of Values

- 3.1 Value in Use and Value in Exchange, Market Value, Reproduction Value
- 3.2 Replacement Value, Re-installment Value
- 3.3 Book Value, Salvage Value / Scrap Value, Capital Value / Sinking Fund.

PART-B

Unit 4: Rent and its types

- 4.1 Depreciation and Obsolescence.
- 4.2 Rent : Ground Rent, Gross Rent, Rack Rent, Net Rent
- 4.3 Leases and Reversion - examples by sums on rent and valuation of Lease-holds.

Unit 5: Concept of Net Income

- 1.1 Net Income : Tear's Purchase,
- 1.2 Examples by sums on Income Computation.

Unit 6: Property and Lease

- 6.1 Property: Freehold, Lease-hold, Condominiums and Co-operatives, Timeshared Property, Developmental Rights.
- 6.2 Principal Methods of Valuation: Cost Approach, Income Approach, Market Approach.

Text Books/ Reference Books:

- 1 Income-tax Act and Rules
- 2 Wealth Tax Act And Rules
- 3 Principles Of Valuation - Dr.S.Mohan
- 4 Guide Lines For Valuation Of Immovable Properties Valuation Cell Income Tax Department Ministry of Finance Govt. Of India 2009.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

- Assignments
- Quiz
- Sessional tests
- Theory examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-904)	P 01	P 02	P 03	P 04	P 05	P 06	P 07	P 08	P 09	P 010	P 011	P 012	PS 01	PS 02
AR-907.1	2	2	2	2	-	3	2	2	2	2	-	2	-	2
AR-907.2	3	3	2	3	-	3	2	2	3	3	-	3	2	2
AR-907.3	3	2	2	2	2	3	2	2	3	2	-	2	2	2
AR-907.4	3	3	2	3	2	2	3	3	3	2	-	3	2	2
AR-907.5	2	2	2	2	2	3	2	2	3	3	-	3	2	2
AR-907.6	3	2	3	2	2	3	3	3	3	3	1	3	2	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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AR – 908 A: ARCHITECTURE JOURNALISM

Periods/week Credits
 L: 3 T: 0 P: 0 S: 0 3
 Duration and Mode of Exam: 3 Hrs Theory Examination

Max. Marks : 100
 Continuous Assessment : 60
 End Semester Exam : 40

Pre-requisites: None
Course Type: Elective Domain Specific

Course Outcomes

The student will be able to
 AR-908.1. Define general principles of Language as applied to journalistic exercise

- AR-908.2. Study about History of Indian basic concepts of report writing
- AR-908.3 Summarizing the report
- AR-908.4. Discuss about research report writing
- AR-908.5. Review the report writing techniques
- AR-908.6. Discuss photo journalism

PART-A

Unit 1: Introduction

- 1.1 Paraphrasing and summarizing given reports
- 1.2 Editing given material.

Unit 2: Basic concept of Report Writing

- 2.1 Collecting material for report writing pertaining to events.
- 2.2 Summing of material for publications.

Unit 3: Summarizing the Report

- 3.1 Editing given material
- 3.2 Writing original reports on design projects/ buildings/complexes etc.
- 3.3 Reporting editorials for magazines and journals.

PART-B

Unit 4: Research Report Writing

- 4.1 Reporting activities like seminars, panel discussions, conferences etc.
- 4.2 Thesis or Research Report Writing.

Unit 5: Report Writing Techniques

- 5.1 The job of subbing like condensing, connecting, titling etc. of reports write-ups submitted for publication.
- 5.2 Writing captions for pictures, programmes and events.
- 5.3 Organizing material for publication in newspapers magazines etc.
- 5.4 Book Reviews.

Unit 6: Photo Journalism

- 6.1 Page compositions, the printing process.
- 6.2 Electronic Media and E-Journals.
- 6.3 Photo Journalism

Text Books/ Reference Books:

- 1 Architecture and Journalism of Ideas of by Bender Thomas.
- 2 Architecture Criticism and Journalism by Mohammed Al Asad.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

- Assignments
- Quiz
- Sessional tests
- Theory examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-904)	P 01	P 02	P 03	P 04	P 05	P 06	P 07	P 08	P 09	P 010	P 011	P 012	PS 01	PS 02
AR-908.1	2	2	2	2	-	3	2	2	2	2	-	2	-	2
AR-908.2	3	3	2	3	-	3	2	2	3	3	-	3	2	2
AR-908.3	3	2	2	2	2	3	2	2	3	2	-	2	2	2
AR-908.4	3	3	2	3	2	2	3	3	3	2	-	3	2	2
AR-908.5	2	2	2	2	2	3	2	2	3	3	-	3	2	2
AR-908.6	3	2	3	2	2	3	3	3	3	3	1	3	2	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)

AR – 909 A: REAL ESTATE MANAGEMENT

Periods/week : 100

Credits

Max. Marks

L: 3 T: 0 P: 0 S: 0 3

Duration and Mode of Exam: 3 Hrs Theory Examination

Continuous Assessment : 60

End Semester Exam : 40

Pre-requisites: None

Course Type: Elective Domain Specific

Course Outcomes

- The student will be able to
- AR-909.1. Define general principles real estate
 - AR-909.2. Study about role of governance in real estate market
 - AR-909.3. Utilize the principles of licensing requirements
 - AR-909.4. Discuss the real estate requirements and its titles
 - AR-909.5. Review the different agreement types
 - AR-909.6. Discuss real estate investment

PART-A

Unit 1: Introduction

- 1.1 Real Estate Scope
- 1.2 Classification of real estate activities and peculiarities
- 1.3 Factors affecting real estate market

Unit 2: Role of Governance

- 2.1 Role of Government in real estate market;
- 2.2 Statutory provisions, laws, rules and regulations application, land use controls in property Development, material for report writing pertaining to events.

Unit 3: Registration and Licensing Requirements

- 3.1 Registration and licensing requirements, Functions of real estate projects, risk management
- 3.2 Facilities management, marketing/advertising, post construction management etc.
- 3.3 Interests in real estate; Documentation in real estate processes

PART-B

Unit 4: Transfer of Titles

- 4.1 Transfer of titles and title records; Real Estate appraisal and valuation;
- 4.2 Role scope, working characteristics and principal functions of real estate participants and stakeholders
- 4.3 Real estate consultants and their activities sorting activities like seminars, panel discussions, conferences etc.

Unit 5: Types of Agreements

- 5.1 Types of agreements between the consultants and principal
- 5.2 Knowledge base for assessment and forecasting the Real Estate market

Unit 6: Real estate Investment

- 6.1 Real estate investment, sources and related issues;
- 6.2 Code of ethics for Real Estate participants
- 6.3 Environmental issues related to Real Estate transactions; Closing the Real Estate transactions
- 6.4 Good practices and managerial responsibilities.

Text Books/ Reference Books:

- 1 SAP Real Estate Management - Daithanka
- 2 A Real Estate Guide.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set

from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

- Assignments
- Quiz
- Sessional tests
- Theory examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-904)	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12	PS O1	PS O2
AR-909.1	2	2	2	2	-	3	2	2	2	2	-	2	-	2
AR-909.2	3	3	2	3	-	3	2	2	3	3	-	3	2	2
AR-909.3	3	2	2	2	2	3	2	2	3	2	-	2	2	2
AR-909.4	3	3	2	3	2	2	3	3	3	2	-	3	2	2
AR-909.5	2	2	2	2	2	3	2	2	3	3	-	3	2	2
AR-909.6	3	2	3	2	2	3	3	3	3	3	1	3	2	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)

AR – 910 A: ADVANCE INTERIOR DESIGN

Periods/week

Credits

Max. Marks : 100

L: 3 T: 0 P: 0 S: 0

3

Continuous Assessment : 60

Duration and Mode of Exam: 3 Hrs Theory Examination

End Semester Exam : 40

Pre-requisites: None

Course Type: Elective Domain Specific

Course Outcomes

- The student will be able to
- AR-910.1. Define general principles of space requirement
 - AR-910.2. Study about the design process
 - AR-910.3. Utilize the principles in writing program
 - AR-910.4. Discuss the design development
 - AR-910.5. Review the post occupancy evaluation
 - AR-910.6. Discuss space planning considerations

PART-A

Unit 1: Introduction

- 1.1 Role and importance of Interior Design, Role of Interiors
- 1.2 Principles of Interior Design and their applications in the context of buildings.

Unit 2: Characteristics of Indoor Space

- 2.1 Effect of enclosure on space perception
- 2.2 Size, volume, proportion use of scales for space representation, psychological effects of space

Unit 3: Enclosure of space

- 3.1 Modulation of space, design elements, criteria for different situations.

PART-B

Unit 4: Principles of Interior Design

- 4.1 Background for applied decorations- color, texture, plane and fixtures in relation to background, Principle of composition of visual elements modulation of interior space with art objects
- 4.2 Modulation thermal and sonic environment of space through design, space modulation through artificial and natural lighting,
- 4.3 Emphasizing of focal points, unity in interior design. Study report of an existing design project.

Unit 5: Furniture Design

- 5.1 Role of Furniture, Evolution of furniture style, ergonomic factors of furniture design, material used, functional classification
- 5.2 Barrier free design, matching of furniture to the decorative style, fitted furniture, its characteristics and applications.

Unit 6: Structural Treatments

- 6.1 Decorative materials for roofing, walls and floors, sources and collecting products information, decorative finishes and fabrics, methods of application,
- 6.2 Elements and applications of interior landscape, special structural form to emphasis space.

Text Books/ Reference Books:

- 1 Human Dimensions and Interior Design by Zenkin
- 2 Interior Design and Space Planning – Time Saver Standard-McGraw Hill
- 3 Interior Design-Indoor and Outdoor Landscaping by Archi World Company

4Creative Interior Design of Enclosed Spaces by Shashi Jain.
 5Time Saver Standard for Interior Design Space Planning by DeChiara/Panero.
 National Building Code - 2005

Instructions for paper setting: **Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.**

Assessment Tools:

- Assignments
- Quiz
- Sessional tests
- Theory examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-904)	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12	PS O1	PS O2
AR-909.1	2	2	2	2	-	3	2	2	2	2	-	2	-	2
AR-909.2	3	3	2	3	-	3	2	2	3	3	-	3	2	2
AR-909.3	3	2	2	2	2	3	2	2	3	2	-	2	2	2
AR-909.4	3	3	2	3	2	2	3	3	3	2	-	3	2	2
AR-909.5	2	2	2	2	2	3	2	2	3	3	-	3	2	2
AR-909.6	3	2	3	2	2	3	3	3	3	3	1	3	2	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
 (Deemed to be University under section 3 of the UGC Act 1956)

AR – 911 A: ARCHITECTURE PHOTOGRAPHY

Periods/week Credits
 L: 3 T: 0 P: 0 S: 0 3
 Duration and Mode of Exam: 3 Hrs Theory Examination

Max. Marks : 100
 Continuous Assessment : 60
 End Semester Exam : 40

Pre-requisites: None
Course Type: Elective Domain Specific

Course Outcomes

- The student will be able to
- AR-911.1. Define art of photography
 - AR-911.2. Study about the concepts of photography
 - AR-911.3. Utilize the techniques of photography
 - AR-911.4. Discuss the digital photography
 - AR-911.5. Review the different perspectives
 - AR-911.6. Discuss lighting considerations

PART-A

Unit 1: Introduction

- 1.1 General introduction to the art of photography
- 1.2 Concept of color

Unit 2: Concepts of Photography

- 2.1 Concepts of lighting, distance, visual angle,
- 2.2 Frame media.

Unit 3: Photography Techniques

- 3.1 Types of camera, properties and priorities; Exposure, Aperture, Speed
- 3.2 Photographic films, Film processing color

PART-B

Unit 4: Digital Photography

- 4.1 Black and white, printing techniques, developing.
- 4.2 Digital Camera & techniques related to Digital photography.

Unit 5: Perspectives

- 5.1 Single Point, Two- Point, Three- Point
- 5.2 Methods of correcting distortions

Unit 6: Lighting

- 6.1 External Lighting
- 6.2 Internal Lighting

Text Books/ Reference Books:

- 1 Dave Saunders, Professional Advertising Photography, Merchurst, London 1988
- 2. Roger Hicks, Practical photography, Cassell, London 1996
- 3. Julian Calder and John Garrett, The 35mm Photographer's Handbook, Pan Books, London
- 4. Julie Adair King, Digital Photography for Dummies, COMDEX, New Delhi 1998

Instructions for paper setting: **Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.**

Assessment Tools:

- Assignments
- Quiz
- Sessional tests
- Theory examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-904)	P 01	P 02	P 03	P 04	P 05	P 06	P 07	P 08	P 09	P 010	P 011	P 012	PS 01	PS 02
AR-911.1	2	2	2	2	-	3	2	2	2	2	-	2	-	2
AR-911.2	3	3	2	3	-	3	2	2	3	3	-	3	2	2
AR-911.3	3	2	2	2	2	3	2	2	3	2	-	2	2	2
AR-911.4	3	3	2	3	2	2	3	3	3	2	-	3	2	2
AR-911.5	2	2	2	2	2	3	2	2	3	3	-	3	2	2
AR-911.6	3	2	3	2	2	3	3	3	3	3	1	3	2	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

AR-1001: ARCHITECTURAL THESIS

Periods/week Credits
 L: 0 T: 0 P: 0 S: 26 26
 Duration and Mode of Exam: Practical Examination & Viva Voce

Max. Marks: 900
 Continuous Assessment: 600
 End Semester Exam: 300

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

AR 1001.1. **Communicates** the ideas clearly using writing, verbal and visual presentation

AR 1001.2. **Compares and evaluate** data and information gathered from Pre-design research and summarizes the information to be used for design

AR 1001.3. **Applies** various codes, standards and regulations governing the project

AR 1001.4. **Demonstrates** synthesis of creativity and technical knowledge and demonstrates the ability for decision making required to progress the understanding already developed.

AR 1001.5. **Combines** the systematic/methodological learning from various stages of study and analysis in the design process towards culmination of an informed design.

AR 1001.6. **Design** a Thesis project responsive to the contextual and program requirements

PART-A

Unit 1: An Illustrated Report

1.1 Which will include the validity and scope of the chosen project, methodology, prototype studies, site analysis, client's and architect's briefs,

1.2 Delineation of programme and desired criteria.

Unit 2: A fully worked out Design Proposal

2.1 Including consideration of site planning, structures

2.2 Services and any other aspect / specific to the project.

Unit 3: Approval of Project

3.1 The intent of the thesis project as well as the criteria for selection of the project will be introduced to the students around 6th week of the previous semester i.e. 9th Semester.

3.2 Students will be required to submit brief write up on three projects out of which one will be approved.

PART-B

Unit 4: Rough Report

4.1. Rough Report shall comprise of all analytical aspects of the project including Synopsis

4.2 Library Studies, Prototype Studies, Site Analysis, Delineation of Building Program etc.

Unit 5: Evolution of Design

5.1 Shall be worked out in minimum of four stages.

Unit 6: Draft of Final Report

6.1 Shall include Evolution of Design, Final Report, Drawings

6.2 Model to be evaluated through a University Examination- through a visual presentation / viva voce.

Text Books/ Reference Books:

1. BallyMeeda, Neil Parkyn and David Stuart Walton, 1998, Graphics in Urban design, second edition, ICE publishing

2. Ian Bentley, 1985, Responsive Environments, 3 edition, Routledge Publication

3. Local Master Plans or Development Plans.

4. Development Control Regulations- as per requirements

Software required/Weblinks:

AutoCad
 Revit
 Photoshop
 Illustrator

Instructions for paper setting:The subject will be assessed through a practical examination and Viva Voce.

Assessment Tools:

Portfolio Submissions
 Sessional tests
 Design Evaluation & Viva Voce

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR 1001)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR 1001.1	3	2	2	3	1	2	2	1	3	3	1	2	1	1
AR 1001.2	3	3	2	2	2	3	2	2	3	3	2	2	2	2
AR 1001.3	3	2	1	2	2	2	2	3	2	3	2	3	2	1
AR 1001.4	2	3	3	1	2	1	1	1	1	2	1	1	2	1
AR 1001.5	3	3	3	3	1	2	3	2	2	3	2	2	1	1
AR 1001.6	3	3	3	3	3	3	3	2	2	3	2	3	2	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)

AR-1002 A: PROJECT MANAGEMENT

Periods/week

L: 3 T: 0 P: 0 S: 0

Duration and Mode of Exam: 3 Hrs Theory examination

Credits

3

Max. Marks : 100

Continuous Assessment : 60

End Semester Exam : 40

Pre-requisites: None
Course Type: Program Core

Course Outcomes

The student will be able to

- AR-1002.1. List the attributes of a project, phases in project cycle, stakeholders involved and their management.
- AR-1002.2. Explain the time, cost, quality, safety and contract management processes involved in a construction project.
- AR-1002.3. Organize project schedule through identification of critical tasks and paths in a project.
- AR-1002.4. Analyze the entrepreneurship issues commonly faced by architectural firms in the Indian Construction Industry.
- AR-1002.5. Review the evaluation technique.
- AR-1002.6. Discuss the tools and skill-sets required for managing office set-ups.

PART-A

Unit 1: Introduction to Project Management

- 1.1 Project management concepts-objectives, planning, scheduling Controlling and role of decision in project management.
- 1.2 Traditional management system, Gantt's approach, Load chart.
- 1.3 Progress Chart, Development of bar chart, Merits and Demerits.

Unit 2: Project Programming and Critical Path Method

- 2.1 Project Network-Events Activity, Dummy, Network Rules, Graphical Guidelines for Network, Umbering the events, Cycles, Development of Network-planning for Network Construction, Models of Network construction, steps in development of Network.
- 2.2 Work Break Down Structure, hierarchies.
- 2.3 Concepts: critical path method-process, activity time estimate, Earliest Event time, Latest allowable Occurrence time, start and finish time of activity, float, critical activity and critical path problems.

Unit 3: Analysis

- 3.1 Cost model-Project cost, direct cost, indirect cost.
- 3.2 Slope curve, Total project cost, optimum duration contracting the network for cost optimization.

PART-B

Unit 4: Programming Evaluation Review Technique

- 4.1 PERT network, introduction to the theory of probability and statistics.
- 4.2 Probabilistic time estimation for the activities of PERT Network.

Unit 5: Computerized Project Management

- 5.1 Introduction: Creating a New project, building a task.
- 5.2 Creating resources and assessing costs, refining your project.

- 5.3 Project Tracking-Understanding tracking, recording actual. Reporting on progress.
- 5.4 Analyzing financial progress.

Unit 6: Cost Optimization

- 6.1 Steps in cost optimization, updating, resource allocation-resource smoothing, resource leveling.
- 6.2 Types of contracts.
- 6.3 Pre-qualification of contractors, Preparation of contract documents, Evaluation of contract bids and Award.

Text Books/ Reference Books:

1. Dr. B.C. Punmia, and K.K. Khandelw, 1987. al-Project planning and control with PERT/CPM, Laxmi publications, New Delhi,
2. Elaine Marmel, 2004. Microsoft office Project 2003 Bible, Wiley Dreamtect (P) Ltd., New Delhi,
3. Sam Kubba, 2010, "Green Construction Project Management and Cost Oversight", Elsevier, 2010.
4. S.P. Mukhopadyay, 1974, "Project Management for architects and Civil Engineers", IIT, Kharagpur.
5. Jerome D. Wiest and Ferdinand K. Levy, 1982. "A Managementuide to PERT/CPM", prentice hall of Indian pub. Ltd. New Delhi
6. SR.A. Burgess and G. White, 1979, "Building production and project management", the construction press, London

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

- Quiz
- Sessional tests
- Theory examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-1002)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-1002.1	2	2	2	2	2	2	2	-	2	2	2	2	2	3
AR-1002.2	2	2	2	2	1	2	2	-	2	2	2	2	2	2
AR-1002.3	2	2	2	2	2	2	2	-	3	2	2	2	3	2
AR-1002.4	3	3	2	3	2	2	2	-	2	2	2	2	2	2
AR-1002.5	2	3	2	3	2	2	2	-	2	2	-	2	2	2
AR-1002.6	3	2	2	2	2	3	2	3	3	3	3	3	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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AR-1003 A: PROFESSIONAL PRACTICE

Periods/week Credits
L: 5 T: 0 P: 0 S: 0 3
Duration and Mode of Exam: 3 Hrs Theory Examination

Max. Marks : 100
Continuous Assessment : 60
End Semester Exam : 40

Pre-requisites: None

Course Type: Program Core

Course Outcomes

The student will be able to

- AR-1003.1. List the provisions in Architects Act 1972.
- AR-1003.2. Explain the influence of statutory and Professional bodies in conduct of professional practice.
- AR-1003.3. Develop comprehensive knowledge on standard procedures involved in the functioning of an architect's office.
- AR-1003.4. Analyze the strategies involved in successful financial, risk and resource management.
- AR-1003.5. Review the process and role of an architect in project execution.
- AR-1003.6. Discuss the role of architects in shaping the built environment, by assimilating the Principles and Organisational structure of an architectural practice.

PART-A

Unit 1: Architecture profession

- 1.1 Importance of Architecture Profession, role of Architects in the society, Architects' Act 1972, Amendments & Provisions, registration of architects, relations with clients, contractors, consultants, public authorities.
- 1.2 Ways of getting works; types of works, works partly executed by other architect; precautions to take before taking up the work; conditions of engagement between the architect and client.
- 1.3 Role of Council of Architecture and Indian Institute of Architects, functions, constitution, and rules & regulations. Code of professional conduct & Ethics, Social responsibility, Publications.

Unit 2: Council of Architecture & Indian Institute of Architects

- 2.1 Constitution, Role and Function, Registration of Architects etc.
- 2.2 History, Objectives, Role and Function in promoting Architectural Profession and Education.

Unit 3: Architectural Practice, Competition & Code of Professional Conduct

- 3.1 Architectural Practice: Types of Practices, Setting Office, Office Organization, Management, Income Tax, Service Tax etc.
- 3.2 Architectural Competition : Importance, Type, Procedure, Guidelines framed by Council of Architecture to conduct competition, Role of Board of Assessors, Professional Advisor and Technical Advisor.
- 3.3 Code of Professional Conduct: Conditions Governing the Appointment of Architects, Scale of Professional Charges, Execution of Work and Payment of Fee.

PART-B

Unit 4: Arbitration, Valuation and Easements

- 1.1 Need/Scope of Arbitration, Indian Arbitration act, arbitrators, umpires, appointment, conduct, powers, duties, Sole/Joint arbitrators, Arbitration procedure, awards & impeachment.
- 1.2 Techniques/elements of valuation, factors affecting valuation of land/building, compensation on acquisition, lease renewal/extension, standard rent, Cost of sale, Purchase & Mortgage.
- 1.3 Easements, types, rights & features; acquisition/extinction/protection; Interim/permanent/mandatory injunctions. dilapidation, insurance, estate development. Consumer protection act.

Unit 5: Copy Right Act & Complaints

- 5.1 Copy Right Act as applicable to Architectural Work.
- 5.2 Complaints: Procedure for Lodging complaints and their resolution based on Indian Architect Act 1972.

Unit 6: Valuation Arbitration and Reconciliation Act

- 6.1 Valuation: Purpose, Objective, Types and Method of Valuation.
- 6.2 Arbitration and Reconciliation Act.

Text Books/ Reference Books:

1. 'Indian Institute of Architects Handbook' - IIA
2. 'The Indian Architects Act 1972.'
3. 'Council of Architecture – Handbook of Professional Documents 2007.
4. 'Indian Arbitration Act.'
5. 'Estimating Costing and Specification' by M. Chakraborty.
6. 'Professional Practice' by RoshanNananvati.
7. 'Professional Practice and Management' by V. S. Apte.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

Assessment Tools:

Quiz
Sessional tests
Theory examination

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Course Articulation Matrix

CO Statement (AR-1003)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
AR-1003.1	3	2	-	2	-	2	3	2	2	-	2	3	2	2
AR-1003.2	2	2	2	2	-	2	2	2	2	2	2	2	2	3
AR-1003.3	2	2	2	2	-	2	2	-	2	-	2	2	2	3
AR-1003.4	2	3	2	3	-	2	2	-	3	-	3	2	2	2
AR-1003.5	2	2	2	2	-	2	2	-	2	-	2	2	2	2
AR-1003.6	2	2	2	2	1	2	3	-	2	2	2	3	3	3

Course Code	Course Name	Regional	National	Global
AR 101A	ARCHITECTURAL DESIGN -I		√	√
AR 102 A	BUILDING MATERIALS & CONSTRUCTION-I		√	√
AR 103 A	ARCHITECTURAL DRAWING-I	√	√	
AR 104 A	ARCHITECTURAL GRAPHICS & MODEL MAKING-I		√	
AR 106 A	WORKSHOP-I		√	
AR 109 A	COMMUNICATION SKILLS		√	√
AR 110	SURVEYING & LEVELING-I		√	
CH 202B	ENVIROMENTAL STUDIES			√
AR 201A	ARCHITECTURAL DESIGN -II		√	√
AR 202 A	BUILDING MATERIALS & CONSTRUCTION-II		√	√
AR 203 A	ARCHITECTURAL DRAWING-II		√	
AR 204 A	ARCHITECTURAL GRAPHICS-II		√	
AR 205 A	STRUCTURAL DESIGN-II		√	√
AR 206 A	WORKSHOP & MODEL MAKING-II		√	√
AR 207 A	SOCIOLOGY & PSYCHOLOGY OF ARCHITECTURE		√	√
AR 209 B	CLIMATOLOGY	√	√	√
AR 210	SURVEYING & LEVELING-II		√	
AR 301A	ARCHITECTURAL DESIGN -III		√	√
AR 302 A	BUILDING MATERIALS & CONSTRUCTION-III		√	√
AR 303 A	ARCHITECTURAL DRAWING-III		√	√
AR 304 A	HISTORY OF ARCHITECTURE-I		√	√
AR 305 A	STRUCTURAL DESIGN-III		√	√
AR 309	WORKSHOP & MODEL MAKING-III		√	√
AR 310	PRINCIPAL OF HUMAN SETTLEMENT-I		√	√
AR 401A	ARCHITECTURAL DESIGN -IV		√	√
AR 402 A	BUILDING MATERIALS & CONSTRUCTION-IV		√	√

AR 404 A	HISTORY OF ARCHITECTURE-II		✓	✓
AR 405 B	STRUCTURAL DESIGN-IV		✓	✓
AR 308 A	BUILDING SERVICES-I (WATER SUPPLY & SANITATION)			✓
AR 108 A	INTRODUCTION TO COMPUTERS-I			✓
AR 408 A	VERNACULAR ARCHITECTURE	✓	✓	✓
AR-409	PRINCIPAL OF HUMAN SETTLEMENT	✓	✓	
AR 501 A	ARCHITECTURAL DESIGN-V			✓
AR 502 A	BUILDING MATERIALS & CONSTRUCTION-V			✓
AR 504 B	HISTORY OF ARCHITECTURE-III			✓
AR 505 B	STRUCTURAL DESIGN-V			✓
AR 406 A	BUILDING SERVICES-II (ELECTRICAL SERVICES & ILLUMINATION)	✓	✓	✓
AR 208 B	INTRODUCTION TO COMPUTERS-II			✓
AR 508B	LANDSCAPE ARCHITECTURE- I	✓		
AR 506 B	BUILDING ECONOMICS & TECHNOLOGIES-I			✓
AR 601 A	ARCHITECTURAL DESIGN-VI			✓
AR 602 A	BUILDING MATERIALS & CONSTRUCTION-VI			✓
AR 603 B	ESTIMATING & SPECIFICATIONS			✓
AR 604 B	HISTORY OF ARCHITECTURE-IV			✓
AR 605 B	STRUCTURAL DESIGN-VI			✓
AR 608 B	BUILDING SERVICES-IVB(MECHANICAL SYSTEMS AND HVAC)			✓
AR 403 A	COMPUTER APPLICATION (CAD)-I			✓
AR 607 A	GREEN & INTELLIGENT BUILDINGS			✓
AR 701	ARCHITECTURAL DESIGN-VII			✓
AR 702	BUILDING MATERIALS & CONSTRUCTION-VII			✓
AR 705 A	STRUCTURAL DESIGN-PROJECT			✓
AR 507 B	BUILDING SERVICE-III (LIGHTING & ACOUSTICS)			✓

AR 703 A	URBAN DESIGN			√
AR 704 A	TRAFFIC AND TRANSPORTATION			√
AR 706 A	INTERIOR DESIGN			√
AR 707 A	HOUSING FOR URBAN POOR	√	√	√
AR 708 A	SMART CITIES		√	√
AR 709 A	HILL ARCHITECTURE	√		√
AR 710 A	TALL BUILDINGS			√
AR 801	PROFESSIONAL TRAINING	√	√	√
AR 901	ARCHITECTURAL DESIGN-IX	√	√	√
AR 902	ADVANCE BUILDING CONSTRUCTION-IX	√	√	√
AR 903 A	RESEARCH METHODOLOGY	√	√	√
AR 904 A	TOWN PLANNING			√
AR 905 A	DISASTER MANAGEMENT	√		√
AR 906 A	ARCHITECTURE CONSERVATION			√
AR 907 A	BUILDING VALUATION			√
AR 908 A	ARCHITECTURE JOURNALISM			√
AR 909 A	REAL ESTATE MANAGEMENT		√	
AR 910A	ADVANCE INTERIOR DESIGN			√
AR 911 A	ARCHITECTURE PHOTOGRAPHY			√
AR 1001	ARCHITECTURAL THESIS		√	√
AR 1002 A	PROJECT MANAGEMENT			√
AR 1003 A	PROFESSIONAL PRACTICE			√

	ENVIRONMENT AND SUSTAINABILITY	PROFESSIONAL ETHICS	HUMAN VALUES	GENDER EQUALITY
ENVIRONMENTAL STUDIES CH 202B	√			

COURSE CODE	COURSE NAME	EMPLOYABILITY	ENTREPRENEURSHIP	SKILL DEVELOPMENT
AR 101A	ARCHITECTURAL DESIGN –I	√	√	
AR 102 A	BUILDING MATERIALS & CONSTRUCTION-I	√	√	
AR 103 A	ARCHITECTURAL DRAWING-I			√
AR 104 A	ARCHITECTURAL GRAPHICS & MODEL MAKING-I			√
AR 106 A	WORKSHOP-I			√
AR 109 A	COMMUNICATION SKILLS	√		
AR 110	SURVEYING & LEVELING-I			√
AR 201A	ARCHITECTURAL DESIGN – II	√	√	
AR 202 A	BUILDING MATERIALS & CONSTRUCTION-II	√	√	
AR 203 A	ARCHITECTURAL DRAWING-II			√
AR 204 A	ARCHITECTURAL GRAPHICS-II			√
AR-205A	STRUCTURAL DESIGN-II	√		
AR-206A	WORKSHOP & MODEL MAKING-II			√
AR-207A	SOCIOLOGY & PSYCHOLOGY OF ARCHITECTURE	√		
AR-209B	CLIMATOLOGY	√		
AR 401A	ARCHITECTURAL DESIGN – IV	√	√	
AR 402 A	BUILDING MATERIALS & CONSTRUCTION-IV	√	√	
AR 404 A	HISTORY OF ARCHITECTURE-II			
AR 405 B	STRUCTURAL DESIGN-IV	√	√	
AR 308 A	BUILDING SERVICES-I (WATER SUPPLY & SANITATION)			√
AR 108 A	INTRODUCTION TO COMPUTERS-I			√
AR-409	PRINCIPAL OF HUMAN SETTLEMENT	√		
AR-408A	VERNACULAR ARCHITECTUE	√		
AR-501 A	ARCHITECTURAL DESIGN - V	√	√	
AR-502 A	BUILDING MATERIAL & CONSTRUCTION - V	√	√	
AR-504 B	HISTORY OF ARCHITECTURE - III	√		
AR-406A	BUILDING SERVICES - II (ELECTRICAL SERVICES & ILLUMINATION)	√		√

AR-506B	BUILDING ECONOMICS & TECHNOLOGIES-I			√
AR-208B	INTRODUCTION TO COMPUTERS - II		√	
AR-508B	LANDSCAPE ARCHITECTURE - I	√		
AR-601 A	ARCHITECTURAL DESIGN - VI	√	√	
AR-602 A	BUILDING MATERIAL & CONSTRUCTION - VI	√	√	
AR-604 B	HISTORY OF ARCHITECTURE - IV	√		
AR-605 B	STRUCTURAL DESIGN - VI	√		√
AR 607 A	GREEN & INTELLIGENT BUILDINGS			√
AR 608 B	BUILDING SERVICES-IVB(MECHANICAL SYSTEMS AND HVAC)			√
AR-701	ARCHITECTURAL DESIGN - VII	√	√	
AR-702	BUILDING MATERIAL & CONSTRUCTION - VII	√	√	
AR-703 A	URBAN DESIGN	√		
AR-704 A	TRAFFIC AND TRANSPORTATION			√
AR-705 A	STRUCTURAL DESIGN - PROJECT	√		
AR-706 A	INTERIOR DESIGN	√		
AR-707 A	HOUSING FOR URBAN POOR			√
AR-708 A	SMART CITIES	√		
AR-709 A	HILL ARCHITECTURE	√		
AR 710 A	TALL BUILDINGS	√		√
AR 507 B	BUILDING SERVICE-III (LIGHTING & ACOUSTICS)			√
AR 801	PROFESSIONAL TRAINING	√	√	√
AR-901	ARCHITECTURAL DESIGN - IX	√	√	
AR-902	ADVANCED BUILDING CONSTRUCTION - IX	√	√	√
AR-903 A	RESEARCH METHODOLOGY (DISSERTATION)	√		
AR-904 A	TOWN PLANNING	√		
AR-906 A	ARCHITECTURE CONSERVATION	√		

AR-907 A	BUILDING VALUATION	√		
AR-908 A	ARCHITECTURE JOURNALISM	√		
AR - 905 A	DISASTER MANAGEMENT	√		
AR-909 A	REAL ESTATE MANAGEMENT	√		
AR-910 A	ADVANCE INTERIOR DESIGN	√		√
AR-911 A	ARCHITECTURE PHOTOGRAPHY	√		
AR-1001	ARCHITECTURAL THESIS	√	√	√
AR 1002 A	PROJECT MANAGEMENT	√		
AR 1003 A	PROFESSIONAL PRACTICE	√		