

विश्वेश्वरय्या राष्ट्रीय प्रौद्योगिकी संस्थान, नागपूर  
VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY, NAGPUR  
**DEPARTMENT OF ARCHITECTURE & PLANNING**



**Course Book**  
**First Year B.Arch.**

2015-2016





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**DEPARTMENT OF ARCHITECTURE & PLANNING,  
V. N. I. T. Nagpur**



**INSTITUTE MISSION**

The Mission of VNIT is to achieve high standards of excellence in generating and propagating knowledge in engineering and allied disciplines. V.N.I.T. is committed to providing an education that combines rigorous academics with joy of discovery. The Institute encourages its community to engage in a dialogue with society to be able to effectively contribute for the betterment of humankind.

**INSTITUTE VISION**

To contribute effectively to the national endeavour of producing quality human resource of world class standard by developing a sustainable technical education system to meet the changing technological needs of the Country, incorporating relevant social concerns and to build an environment to create and propagate innovative technologies for the economic development of the Nation.



### Faculty Profile:-

Faculty	
Name	Specialization
Adane V.S.	Building Services, Construction, Design, City Planning, Urban Infrastructure Planning.
Bahadure P.N.	Urban Planning, Compact City Ideas, Housing
Bahadure S.P.	Construction, Design, Sustainable Development, Building Materials.
Bakde V.K.	Building Materials and Specifications, Building Construction, Visual Arts, Architectural Design, Housing, Slums.
Deshkar S.M.	Architectural Design, Urban Planning, Environmental Planning & Education, Disaster Management, Urban Biodiversity Conservation, Green Infrastructure Planning.
Deshmukh Amit M.	Detailing, Working Drawings, Building regulations, Interior Design, Computer applications, City Development Plans, Urban Legislations, Project formulations and implementation
Deshmukh Aniket M.	Architectural Design, Professional Office Practice, Urban Planning, Urban Transportation
Dongre A.R.	Specifically interested in working across the allied disciplines of Architecture and Urban Design Form studies through structure-architecture interaction, climate responsive design, heritage studies, architectural acoustics and complex systems in space design.
Ghugre V.V.	Architectural Design, Urban Planning, Building Material, Graphics, Building Construction, RS & GIS thermal environment studies.
Joglekar K.N.	Construction, Architectural Graphics, Working Drawing, Transportation Planning.
Kapse V.S.	Construction Technology, Low Cost Housing, Architectural Graphics, Architectural Design, Urban Planning, Urban Poverty.
Khan S.H.	Architectural Design, History & Theory of Architecture, Basic and Visual Arts, Interior & Space Design.
Kotharkar Rajashree S.	Climate Responsive Architecture, Green Buildings, Urban Sustainability, Urban Heat Island Study, Compact City, Vernacular Architecture.
Patil A.P.	Urban Design, Urban Complexity, Complexity Science, Emergence, Agent-Based-Modeling, Public Realm, Informal Sector, and Human Settlements.
Sabnani C.S.	Interior Design, Appropriate Technology, Architectural Design, Low Cost Housing, Urban Planning.
Wahurwagh Amit	Architectural Conservation, Cultural Landscapes, Architectural Knowledge



<b>Faculty</b>	
<b>Name</b>	<b>Specialization</b>

**Department of Architecture & Planning,  
VNIT, Nagpur**

**Mapping of Course**

**B.Arch., Year of Admission- 2015-16**

<b>OVERALL CREDIT STRUCTURE</b>					
<b>Undergraduate Core (UC)</b>			<b>Undergraduate Elective (UE)</b>		
Category	Credit	% of total	Category	Credit	% of total
Departmental Core (DC)	168	76.71	Departmental Electives (DE)	17-23	10.50
Basic Sciences (BS)	4	1.83	Humanities (HM)	0-3	
Engineering Arts and Science (ES)	18	8.22	Open Category (OC)	0-3	
Humanities and Social Science (HU)	6	2.74			
<b>Total</b>	<b>196</b>	<b>89.50</b>	<b>Total</b>	<b>23</b>	<b>10.50</b>
<b>Grand Total UC+UE</b>			<b>219</b>		





**MAPPING OF COURSE  
B. ARCHITECTURE  
YEAR OF ADMISSION 2015-16**

SEM	SR.N O.	CODE	COURSES	STRUCTUR			CREDITS	CATEG ORY	CREDITS					TOTAL CREDITS	Hou rs	
				L	T	P			DC	DE	BS	ES	HU			
I	1	ARP 161	Basic Design	1	0	6	4	DC	4					4	35	
	2	ARP 162	Graphics I	0	0	4	2	DC	2					2		
	3	ARP 163	Visual Arts	0	0	4	2	DC	2					2		
	4	ARL 158	Construction I	2	0	4	4	DC	4					4		
	5	ARL 151	Building Materials	3	0	0	3	DC	3					3		
	6	ARL 152	History of Architecture I	3	1	0	4	DC	4					4		
	7	HUL 179	Communication Skills	3	0	0	3	HU					3	3		
	8	MAL 103	Mathematics	3	1	0	4	BS			4			4		
	9	SAC 101	Health Information and Sports- Part1	0	0	0	0							0		
				15	2	18	26		19	0	4	0	3	26		
II	1	ARP 164	Architectural Design I	1	0	6	4	DC	4					4	37	
	2	ARP 165	Graphics II	0	0	4	2	DC	2					2		
	3	ARP 166	Modelling Workshop	0	0	4	2	DC	2					2		
	4	ARL 159	Construction II	2	0	4	4	DC	4					4		
	5	ARL 153	Climate Responsive Architecture	3	1	0	4	DC	4					4		
	6	ARL 154	History of Architecture II	3	0	0	3	DC	3					3		
	7	ARL 155	Theory of Architecture	3	0	0	3	DC	3					3		
	8	AML 169	Engineering Mechanics	3	1	0	4	ES				4		4		
	9	SAC 102	Health Information and Sports- Part2	0	0	2	0							0		
				15	2	20	26		22	0	4	0	0	26		
III	1	ARP 271	Architectural Design II	1	0	6	4	DC	4					4	36	
	2	ARP 272	Graphics III	0	0	4	2	DC	2					2		
	3	ARL 258	Construction III	3	0	4	5	DC	5					5		
	4	ARL 251	History of Architecture III	3	1	0	4	DC	4					4		
	5	ARL 261	Advanced Building Materials (DE-1)	3	0	0	3	DE		3						3
		ARL 262	Art & Architecture Apprication (DE-1)													
		ARL 263	Environmental Studies (DE-1)													
	6	ARL 264	Green Architecture (DE-2)	3	0	0	3	DE		3						3
		ARL 265	Barrier Free Envirmental Design (DE-2)													
7	CEL 283	Surveying	0	0	4	2	ES					2	2			
8	AML 281	Strength of Materials	3	1	0	4	ES					4	4			
				16	2	18	27		15	6	0	6	0	27		
IV	1	ARP 273	Architectural Design III	1	0	6	4	DC	4					4	32	
	2	ARP 274	Computer Aided Design and Simulation	0	0	4	2	DC	2					2		
	3	ARL 259	Construction IV	3	0	4	5	DC	5					5		
	4	ARL 252	Building Services I <sup>#</sup>	3	1	0	4	DC	4					4		
	5	ARL 253	History of Human Settlements	3	0	0	3	DC	3					3		
	6	ARL 254	Environment Behavioural Studies	3	0	0	3	DC	3					3		
	7	ARP 276	Visual Communication (DE-3)	0	0	4	2	DE		2						2
		ARP 277	Building Documentations (DE-3)													
		ARL 266	Vernacular Architecture (DE-4)													
8	ARL 267	Contemporary Design Theory and Criticism (DE-4)	3	0	0	3	DE		3					3		
	ARL 268	Theory of Structure (DE-4)														
				13	1	18	26		21	5				26		
V	1	ARP 361	Architectural Design IV	1	0	8	5	DC	5					5	34	
	2	ARP 362	Working Drawing I	0	0	4	2	DC	2					2		
	3	ARL 358	Construction V	3	0	4	5	DC	5					5		
	4	ARL 351	Building Services II <sup>##</sup>	3	1	0	4	DC	4					4		
	5	ARL 352	Specifications	3	0	0	3	DC	3					3		
	6	ARL 353	Building Legislation	3	0	0	3	DC	3					3		
	7	AML 482	Concrete Structures	3	1	0	4	ES				4		4		
				16	2	16	26		22	0	4	0	0	26		
VI	1	ARP 363	Architectural Design V	1	0	8	5	DC	5					5	33	
	2	ARP 364	Working Drawing-II	0	0	4	2	DC	2					2		
	3	ARL 359	Construction VI	3	0	4	5	DC	5					5		
	4	ARL 354	Building Services III <sup>###</sup>	3	0	0	3	DC	3					3		
	5	ARL 355	Acoustics	3	0	0	3	DC	3					3		
	6	ARL 356	Estimation and Valuation	3	0	0	3	DC	3					3		
	7	AML 481	Steel Structures	3	1	0	4	ES				4		4		
				16	1	16	25		21	0	4	0	0	25		
VII	1	ARP 481	Architectural Design VI	1	0	8	5	DC	5					5	27	
	2	ARL 458	Landscape Design	2	0	4	4	DC	4					4		
	3	ARL 451	Urban Planning and Design	3	0	0	3	DC	3					3		
	4	ARL 452	Professional Practice	3	0	0	3	DC	3					3		
	5	ARL 461	Disaster Mitigation and Management (DE-5)	3	0	0	3	DE		3						3
		ARL 462	Appropriate Technology (DE-5)													
	6	ARL 463	Rural Planning and Development (DE-6)	3	0	0	3	DE		3						3
ARL 464		Building Repair and Restoration (DE-6)														
6	ARL 465	Earthquake Resistant Structures (DE-6)	3	0	0	3	DE						3			
				15	0	12	21		15	6	0	0	0	21		
VIII	1	ARP 482	Architectural Design VII	1	0	8	5	DC	5					5	21	
	2	ARL 459	Interior Design	2	0	4	4	DC	4					4		
	3	ARL 453	Construction and Project Management	3	0	0	3	DC	3					3		
	4	ARL 466	Project Proposals and Documentations (DE-7)	3	0	0	3	DE		3						3
		ARL 467	Architectural Conservation (DE-7)													
4	ARL 468	Architectural Research Methods(DE-7)	3	0	0	3	DC	3					3			
5	HUL	Building Economics & Real Estate Development	3	0	0	3	HU					3	3			
				9	0	12	18		12	3	0	3	0	18		
IX	1	ARC 401	Practical Training	0	0	8	8	DC	8					8		
				0	0	8	8		8	0	0	0	0	8		
X	1	ARD 401	Project I (Seminar and Dissertation)	0	0	6	3	DC	3					3	29	
	2	ARD 402	Project II	0	0	20	10	DC	10					10		
	3	ARL 469	Housing (DE-8)	3	0	0	3	DE		3				3		
		ARL 470	Infrastructure Planning and Design (DE-8)													
3	ARL 471	Industrial Architecture (DE-8)	3	0	0	3	DC	3					3			
				3	0	26	16		13	3	0	0	0	16		
				118	10	164	219		0	168	23	4	18	6	219	292



## Notes

### Method of Assessment

1. **Lecture Courses (L):** Remains same as per Institution norms.
2. **Studio Courses ( P):**
  - Continuous evaluation same as P type course at institution.
  - Design courses in odd semesters should have: Minor Problem and Time Problem.
  - Design courses in even semesters should have: Minor Problem, Major Problem and External Viva.
  - Design assignments shall be of group (minor) and individual (major) type.

3. **Assessment Method for combined Lecture and Studio courses :**

The marks percentage distribution is as follows:

Ses I	Ses II	End Sem Exam (ESE)	Mid Term Assessment (MTA) I	MTA II	End Term Assessment (ETA)
10	10	30	15	15	20

- Studio assessment should be done one week prior to the ESE.
- Student failing to get 40% marks in the studio component of the subject will not be allowed to appear for the End Exam and he/she will be awarded FF grade.
- The student will be asked fresh registration for the course in the subsequent Even/Odd sem.

### Prerequisite

- To register for Project in X semester.  
Credits for all previous Architectural Designs should be earned.
- For practical training minimum 140 credits to be earned.
- Only one theory course can be registered along with practical training) for Students with backlog.

### Zero Credits Courses:

Health Information and Sports - Part 1 and Part 2.

### Electives:

- Total 8 elective heads.
- Select one elective from the elective basket.
- Minimum two electives should run under each elective heads.

Students in the current program with backlog will be suggested suitable equivalent courses in consultation with faculty advisor and HoD (Applicable only for the students with backlog).





## Details of Course Contents

### ARP 161- BASIC DESIGN

1-0-6 Cr-4

#### Objective:

- To introduce the various facets of art and architecture and the formal vocabulary of design.
- To understand the elements and principles of Basic Design as the building blocks of creative design and visual composition.
- To nurture creativity and sensitise the pupil to various design aspects.

**Course:** Introduction to Architectural Design through Basic Design Terminology and concepts.

- Elements of Design: Properties, qualities and characteristics of point, line, direction, plane, shape, form, colour and texture
- Principles of Design: Scale, Proportion, Balance, Harmony, Rhythm Contrast, etc.
- Elementary design exercises for study and exploration using elements and principles of design by means of two and three dimensional compositions.
- Introduction to Expression in Art and Architecture - sense of enclosure-openness, robustness, dynamism, spatial geometry, etc
- Appraisal of design form in terms of visual character, play of light and shade, solids and voids etc.

**Sessional work:** Number of exercises in the form of design studios, seminars and creative workshops.

**Method of Assessment:** Assessment of students' work, Progressive evaluation at three stages, Time Problem.

#### Expected Outcome:

- Understanding of the qualities and effects of different elements and principles of design along with their composite fusion.
- Understanding of space and form through 2D and 3D Composition.

#### References:

- Charles Wallschlagger and Cynthia Busic-Snyder, "**Basic Visual Concepts and Principles for Artists, Architects and Designers**", Mc Graw Hill, New York 1992.
- Exner V., Pressel D., "**Basics Spatial Design**", Birkhanser, 2009.
- Francis D.K.Ching, "**Architecture: Form, Space and Order**", Van Nostrand Reinhold Co., (Canaa), 1979.
- Joshua C. Taylor, "**Learning to Look: A Handbook for the Visual Arts**", (Phoenix Books), University Of Chicago Press, 1981
- Mark Baskinger and William Bardel, "**Drawing Ideas: A Hand-Drawn Approach for Better Design**", Watson-Guptill, 2013.
- Nathan Knobler, "**Visual Dialogue**", Harcourt School; 3 Sub edition, 1980.
- Owen Cappelman and Michael Jack Jordon, "**Foundations in Architecture: An Annotated Anthology of Beginning Design Project**", Van Nostrand Reinhold New York, 1993.
- Paul J. Zelanski and Mary Pat Fisher, "**The Art of Seeing**", Pearson, 2010.
- Pramod V.S., "**Design fundamentals in Architecture**", Somaiya Publications Pvt. Ltd., New Delhi, 1973.



## ARP 162- GRAPHICS I

0-0-4 Cr-2

### Objective:

- The Subject is aimed at developing the drawing skills as tools for creative thinking, visualization, perception, imagination, representation and to understand fundamentals of architectural drawing.
- Students shall understand the graphic treatment of two and three dimensional drawings including perception and presentation of simple architectural shapes, forms and basic elements of building /structure.
- Students shall also familiarize for preparing and developing architectural innovative presentation techniques including lettering and rendering, etc.

### Course:

- Introduction to architectural drafting Architectural techniques. Drawing of different types of Architectural Letterings.
- Understanding concept of Scale, their construction including Plain and Diagonal scales. Knowing use of architectural scale in drawings. Drawing of interesting 2 dimensional images in Reduced and Enlarge scales.
- Concept of Orthographic Projections. Introduction to projections of basic elements like ...point, lines, planes and solids with reference to HP and VP. Drawing of relevant simple compositions in plan and all elevations.
- Sections and true sections of all types of solids in different positions.
- Development of lateral surface of all types of solids.
- Explaining concept of Isometric & Axonometric projections / views. Understanding concept of Isometric scale. Drawing of Isometric views of all simple solids including few of interesting compositions of building elements like column, beam and slabs etc.
- Graphical codes / symbolical presentations (in plans, sections and elevations) of basic building materials and constructional elements, furniture, services like water supply, sanitation and electrical etc.
- Preparation of presentation drawings (plan and elevations) of minor innovative built form, furniture, building components etc.

**Method of Assessment:** Plates, sketches and tests.

### References:

- John Montague, Willey, John Willey and sons, Inc. “**Basic Perspective Drawing**”, A Visual Approach, Sixth Edition.
- Shah, Kale & Patki, “**Building Drawing**”, Tata McGraw-Hill Book Co.
- N. D. Bhatt “**Engineering Drawing**”, Charotar Publishing House.
- K.L. Narayanan “**Engineering Drawing**”, SciTech Publications.
- Mulik S.H. “**Perspective & Sciography**”,



## ARP 163- VISUAL ARTS

0-0-4 Cr-2

**Objective:** This studio aims at imparting a basic artistic backing essential in architectural learning. The objectives of the course include polishing the skills of the hand by intensive working with different mediums to help enhance self-expression through effective visual presentation. It also includes study of basic principles of visual arts and relationship of allied forms of art, their contributions in the enrichment of architectural expression and an understanding of Architectural Tectonics.

### Course:

- Mediums of Expression. Use of pencil, pen and ink and charcoal sketching, Learning through exercises of sketching, shading, free hand drawing, rendering etc. by use of mixed media rendering, water colour compositions and primary use of acrylic/ oil colours. Architectural sketching and rendering of historic and contemporary buildings using different mediums.
- Colour theory. Hues, Chromatic and Tonal Values of colours. Colour wheel and colour composition, Properties (visual and psychological) of colour, Symbolism of colours, Types of colour schemes.
- Alternative media exploration. Experimentation through advanced art exercises; glass painting, earthen pot painting, mural making, mixed media, collage etc. Link with digital media.
- Principles of visual arts. Enhancing understanding by experimentation through use of elements of visual arts such as point, line, plane, form, space, colour, texture, light, solids and voids, shadow and shade etc.
- Allied visual and performing arts and relationship to built environments.
- Tectonics: Understanding of effect of scale, proportions, order, material effects such as textures, patterns, light, sound, temperature etc in architectural spaces.

**Method of Assessment:** Continuous evaluation of studio work through midterm evaluations and end term evaluation on completed portfolio at semester end.

### Expected Outcome:

- Exercises of sketching, shading, free hand drawing, rendering etc. on sketch book, drawing sheets in studio and outdoor sketching etc.
- Experimentation with colours, learning through exercises and creative tasks.
- Seminar presentations, Book reviews, Notes and reports for study components.
- Model making and creative assignments to experiment and explore different media and possibilities for application in visual arts.

### References:

- Gill Robert; “**Rendering with Pen & Ink**”. Thames & Hudson, London.
- Ruskin John; “**Seven lamps of Architecture**”, George Allen & Unwin Ltd., London, 1925.
- Salingaros Nikos; “**A Theory of Architecture**”, Umbau, 2008.
- “**Scott. Design Fundamentals**”.
- Sukhatme Shirish; [www.artinarch.co](http://www.artinarch.co)



## ARL- 158 CONSTRUCTION I

2-0-4 Cr-4

**Objective:** Objective of the course is to learn in progression various construction systems from simple building construction techniques to comprehensive, complex construction methods. The subject is focus on understanding the relationship between architectural design, building materials, services etc. Emphasis shall be on reasoning and analysis while acquainting the students with different building elements. The course shall aim at building a strong sense of visualization to enable students to evolve and apply alternative materials and methods of construction. At first year level student shall aware about various technical terms, basic principles of construction and methods / techniques of construction through various elements / components of building. 11

### Course:

- Introduction to various elements of building from foundation to roof.
- General idea of load transmission in load bearing & frame structures, their advantages, disadvantages and suitability.
- Introduction to various types of foundations with emphasis on simple foundation for load bearing walls, plinth filling, steps, etc.
- Various types of construction in brick and stone masonry. Types of bond – English, Flemish, Local etc.
- Introduction to various types of Lintels and Arches.
- Introduction to basic tools and equipments used in construction.

### Method of Assessment:

Sessional and End term Examination. Continuous evaluation of student work and Teacher Assessment.

### References:

- Arora, S.P. & Bindra, S.P., “**A Text Book of Building Construction**”, Dhanpat Rai & Sons, New Delhi, 1994.
- Barry R., “**Construction of Building**”, Orient Longman lid, 1999.
- Chudley R., “**Building Construction Handbook**”, British library cataloguing, 2008.
- Francis DK Ching, “**Building Construction Illustrated**”, Van Nostrand Reinhold Ltd., 2001.
- Goyal, M.M , “**Handbook of Building Construction**”, Thomson Press.2004
- Jha, J. & Sinha, S.K., “**Building Construction**”, Khanna Publishers, New Delhi, 1977.
- Kumar S.K., “**Building Construction**”, Standard publisher. 2003.
- Mckay, W.B, “**Building Construction**” - Vol. I, Longman, 2005.
- Mehta, M., Scarborough, W. and Armpriest, Diane, “**Building Construction: Principles, Materials and Systems**”, Pearson Prentic Hall, 2008.
- Punmia B.C., “**Building Construction**”, Laxmi Publications Pv. Ltd., 1995.
- Rangwala S.C., “**Building Construction**”, Charotar Publishing House, 1963.
- Simmons H. L, “**Olin’s Construction Principles, Materials and Methods**”, John Wiley and Sons, 2007.



## ARL – 151 BUILDING MATERIALS

3-0-0 Cr-3

**Objective:** The objective of the course is to make the students aware of various building materials used in construction industries and to understand their relationship with architectural design and building construction.

**Course:** Study of various materials used commonly for building construction in rural & urban areas, with their properties, various types, market forms available and application in buildings.

- Clay products: Classification of bricks, Fire Brick, Fly Ash Bricks, Tiles, Terra-cotta, Earthenware, Porcelain, Stoneware.
- Stones: Uses of Stones, Qualities of Good Building Stones, Dressing, Common Building Stones of India, Artificial Stone.
- Cement: Properties, Different Types and Uses in Building construction
- Mortar & Concrete: Composition, Classification and Uses of Mortar, Proportioning Concrete, Curing, and Types Of Concrete.
- Glass: Classification with Commercial Forms, their Suitability, limitations, precautions, etc.
- Timber: Market Forms & Industrial Timber, their suitability, limitations, precautions, etc.
- Metals: Ferrous & Nonferrous Metals and Alloys, Commercial Forms, their Suitability, limitations, precautions, etc.
- Paints and Varnishes: Different types of paints, method of application on different surface, their Suitability, limitations, precautions, etc.

**Method of Assessment:** Tests, Assignments, Site Visit and Market Survey Reports.

### Expected Outcome:

To make the students aware about the different materials available for building materials along with their properties, uses, their Suitability, limitations, precautions, etc.

### References:

- P.G. Varghese, “**A Text Book of Building Materials**”, Prentice-Hall of India Pvt. Ltd., Publication.
- Mohan Rai and M.P. Jain “**Advances in Building Materials and Construction**” Singh publication by CBRI, Roorkee.
- H. Zhang , “**Building Materials in Civil Engineering**” ,Woodhead Publishing, ISBN: 978-1-84569-955-0
- Arora, “**Building Materials**”,
- Khanna, “**Civil Engineers Hand Book**”
- Chaudhary, “**Engineering Materials Engineering Materials**”, Dr. Janardan Jha Khanna Publishers.
- R K Rajpoot, “**Engineering Materials**”,
- Rangawala P.C. “**Engineering Materials**”, Charter Publishing House, Anand, India.
- Sushil Kumar, “**Engineering Materials**”, Standard Publication and Distributors, New Delhi.
- Chakraborti M “**Estimating, Costing, Specification and Valuation in Civil Engineering**” (English) 24th Edition
- “**National Building Code 2005**”.
- “**Use of Bamboo & reeds in construction**”, UNO publications.



## ARL- 152 HISTORY OF ARCHITECTURE I

3-1-0 Cr-4

**Objective:** Study the chronological evolution and impacts of geographic, climatic, geological, religious, political and socio-cultural backgrounds of Indian ancient and medieval architecture – in relationship to materials and techniques of construction.

**Course:** Introduction to evolution of built form design as a result of socio cultural, physical, technological factors manifested in design attitudes during various phases in history.

- Understanding of the causative forces - the cultures, history, socio religious practices and institution, political and economic conditions, issues of land, climate and technology, Historical and Primitive Architecture.
- Study of architectural developments in India from Indus valley culture to rise, spread & decline of Buddhism & Jainism. Rock-cut Architecture.
- Evolution of Hindu Temple: Gupta, Aihole, Badami, Pattadakal, Mahabalipuram. Indo Aryan Style: Orrisa, Khajuraho, Gujarat, Rajasthan. Dravidian Style: Chola, Chalukyan, Pandya, Pallava, Hoysala Style, Revival of Hindu architecture of South India at Vijaynagara and Madurai.
- Indo Islamic Architecture in India: Imperial Architecture of Delhi, including Slave dynasty, Khilji dynasty, Tughlak dynasty, Sayyid dynasty, Lodhi dynasty.
- Provincial Style Architecture: Development of regional styles noticed in various provinces such as Bengal, Jaunpur, Gujarat, Mandu, Deccan, Malwa and Bijapur.
- Mughal Architecture of India– characteristics, styles, features of different periods and its blend on other styles and vice-versa. Maugham gardens.

### Method of Assessment:

**Sessional work:** Sessional examination and End term Examination, Assignments, Site Visit, Reports, Seminars and Documentation of historic structure, Sketches, Plates, and tests.

**Tutorials work:** aims at to generate interest in the theory course, enjoy and appreciate historic structures, changing the way architectural history is viewed and studied. Short exercise (in groups) on comparative studies and architecture timeline chart preparation, emphasize the connections, contrasts, and influences of architectural movements throughout history, Case studies and photo essays.

### References:

- Bannister Fletcher, “**A History of Architecture**”, 20<sup>th</sup> edition, CBS Publishers and Distributors, New Delhi, 1999
- Christopher Tadgell, “**History of Architecture**”
- Francis D.K.Ching, “**A Global History of Architecture**”, John Wiley and Sons., (Canada), 2011
- Henri Stierlin, “**Hindu India**”, From Khajuraho to the temple city of Madurai, Taschen, Paris, ISBN 3-8228-7649-6
- Percy Brown, “**Indian Architecture (Buddhist and Hindu)**”, D. B. Taraporevala Sons and Co. Private Ltd., Bombay, India, 1995
- Percy Brown, “**Indian Architecture (Islamic Period)**”, D. B. Taraporevala Sons and Co. Private Ltd., Bombay, India, 1995
- Satish Grover, “**History of Architecture**”
- Satish Chandra, “**History of Architecture & Ancient Building Materials in India**”
- Simon Unwin, “**Analysing Architecture**”, Roulledge, London, 2003.



## HUL179 - COMMUNICATION SKILLS

3-0-0 Cr. 3

### Objectives:

To impart to the students the skills that they need in their academic, and later in their professional pursuit. To train the students to adopt an innovative approach to English language teaching and learning.

### Content:

**ENERGY:** Oil, Nuclear Preparation, Alternative Sources

**COMPUTERS:** Introducing Computers, New Frontiers, Computers in India

**TECHNOLOGY:** Appropriate Technology, Printing, Evaluating Technology

**ENVIRONMENT:** Pollution, Ecology, Our living Environment

**INDUSTRY:** Personnel and Production, Safety and Training, Selling Produc

### Reference Books:

1. Orient Longman , A Textbook of English for Engineers and Technologists.
2. Quirk R.and Greenbaum S., A University Grammar of English.
3. Krishnaswamy N., English Grammar ( Longman Publication) (Macmillan India Ltd)



## MAL103 – MATHEMATICS

3-1-0 Cr. 4

**Objectives:** The objective of this subject is to expose student to understand the basic concepts of differential and integral calculus, ordinary differential equations, matrix theory, three dimensional geometry and basic statistics.

### **Content:**

**Calculus:** Tangent and Normal, Maxima and minima of functions of one variable, Curvature (Cartesian and Parametric form), Curve tracing, Taylor's and Maclaurin's expansion for one variable, Indeterminate forms, partial differentiation, Maxima and minima of functions of two variables.

Double integrals, Calculation of areas using double integrals (Cartesian and Polar), Applications of double integrals for Centre of gravity and Moment of inertia.

### **Ordinary Differential Equations:**

First order ODEs: Method of solution, orthogonal trajectories, Newton's law of cooling.

Second and higher order linear ODEs: Solution of homogeneous and non-homogeneous linear equations with constant coefficients, Applications.

### **Matrices:**

Review of inverse of a square matrix using Adjoint matrix. Rank of a matrix, consistency and inconsistency of system of linear equations, solution of LPP using graphical method.

### **Three Dimensional Geometry:**

Directional Cosines and ratio's, angle between two lines, equations of straight line, coplanar lines, equation of plane, shortest distance between lines and planes, tangent plane and normal line, sphere.

### **Statistics:**

Arithmetic mean, median, mode, standard deviation and variance, regression and correlation;

Curve fitting, method of least squares (Straight line and parabola),

### **Reference Books:**

- Kreyszig, E., "Advanced Engineering Mathematics", 8<sup>th</sup> Edition, John Wiley & Sons, New York 2008.
- Thomas G.B., "Calculus and Analytical Geometry", Addison Wesley, London, 1998.
- Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 2011.
- Jain, R.K. and Iyengar, S.R.K.; "Advanced Engineering Mathematics; Narosa Publishers 2005.
- Piskunov, N.: "Differential and Integral calculus", Vol. 1, Vol. 2, MIR Publishers, Moscow - CBS Publishers and Distributors (India), 1996.
- James Stewart, "Calculus -Early Transcendental", Thomson Brooks/Cole, 2008.





**SAC 101- HEALTH INFORMATION AND SPORTS-PART 1**

**0-0-2 Cr. 0**

**Objective:**

To provide physical fitness and good health. Create awareness among the students about their health status by conducting various tests and measurements and suggest them suitable remedial physical fitness program so that they can improve physical and physiological health status. To improve productivity, foster social harmony, inculcate sense of discipline and dedication in general life, develop the spirit of team work, through various sports activities.

**Content:**

**Development of components of fitness through conditioning exercises:**

**Strength:** (Strength Endurance, Maximum Strength, explosive strength), Endurance: (aerobic endurance, anaerobic endurance, speed endurance and strength endurance), Speed, Co-coordinative ability, Flexibility

**Physical Efficiency Test Level 1**(Testing and Evaluation of Physical Fitness):

Cooper Test 12 minute run or walk test, Sit and reach test, 100 meter run, one minute sit up test, Push up/Bent knee push up test,

**Teaching and development of sports skills:** Cognitive, Perceptual, Motor, Perceptual motor.

**First Aid training:**

**Intramural phase 1:** Identification of sports talent through exposing students to inter-section tournament. Football, Volleyball, throw ball, table tennis & Chess.



## ARP 164 – ARCHITECTURAL DESIGN I

1-0-6 Cr. 4

### Objectives:

- Conceptualization of Form, Space and Structure through creative thinking
- Initiate Architectural Design Process.

### Content:

- Anthropometries, ergonomics, understanding basic human activities in Indian and Global context.
- Measurement of known spaces and finding the horizontal and vertical relationship.
- Application of Basic design in mono-cellular activity through the manipulation of elements and principle of design.
- Spatial aspects related to form, function and expression.
- Design of Single activity spaces and Multi activity spaces.

**Sessional work:** One design assignment, along with other design tasks and assignments.

### Suggested Designs:

- Placement of built in and movable furniture in different architectural spaces w.r.t. openings locations.
- Redesign of familiar spaces.
- Residential Activity Space, Shop, Exhibition Pavilion, Children's Environment, Snack Bar, Petrol Bunk, Fire Station, Small Residence, Nursery School, Dispensary, Etc.

**Method of Assessment:** Assessment of students 'work, Progressive evaluation at three stages, External Review.

### Reference Books:

- Ernst Neuferts, “**Architects Data**”, Blackwell 2002.
- Francis D.K.Ching, “**Architecture: Form, Space and Order**”, Van Nostrand Reinhold Co., (Canaa), 1979.
- Geoffrey H. Baker, “**Design Strategies in Architecture- An Approach to the Analysis of Form**”, Taylor & Francis, 1996.
- Joseph De Chiara, Michael J Crosbie, “**Time Saver Standards for Building Types**”, McGraw Hill Professional 2001.
- Joseph De Chiara, Julius Panero, Martin Zelnik, “**Time Saver Standards for Interior Design and Space Planning**”, McGraw Hill 2001.
- N. John Habraken, Andrés Mignucci and Jonathan Teicher, “**Conversations With Form: A Workbook for Students of Architecture**”, Routledge 2014.
- Owen Cappleman and Michael Jack Jordon, “**Foundations in Architecture : An Amotated Anthology of Beginning Design Project**”, Van Nostrand Reinhold New York, 1993.
- Prammar V.S., “**Design fundamentals in Architecture**”, Somaiya Publications Pvt. Ltd., New Nelhi, 1973.
- Ramsey et al, “**Architectural Graphic Standards**”, Wiley 2000.



## 165 – GRAPHICS II

0-0-4 Cr. 2

**Objectives:** To familiarize the students with preparation of perspective drawing and Sciography by innovative methods.

- To teach the students with perspectives of interiors, Exteriors etc. and showing of shades & shadow.
- To develop innovative presentation techniques in Perspective and Sciography.

Methodology: Lecture, Studios and Home Assignments.

### **Content:**

#### Perspective Drawing:

- Difference with metric projections. Anatomy of perspective: Station point, Eye level, Cone of vision, Picture plane, Horizon line, Ground line, Vanishing points etc.
- Types of perspectives: One point, two points, Three point Perspectives of simple and complex blocks Perspectives of simple household furniture items Perspectives of Built Form.
- Perspective Drawing By Innovative Methods: Preparation of Perspective by innovative methods like approximate method, Diagonal Method, Grid Method etc. And other innovative methods of perspective presentation including rendering in various medium.
- One point and two points perspectives of interiors. Introduction to shortcut methods in perspective drawing.
- Freehand perspective drawing.

#### Sciography :

- Understanding Concept of Sciography and its importance in Architectural drawings.
- Concept of Conventional Angle of Ray. Showing Sciography of Basic objects like point, line, planes and solids on one and both the planes.
- Sciography of interesting architectural three dimensional compositions.
- Showing Shades and shadows in the presentation drawings of small built forms including assignments taken based on same level Architecture Design.

**Method of Assessment:** Plates, sketches and tests.

#### **Reference Books:**

- John Montague, Willey, “**Basic Perspective Drawing, A Visual Approach**”, Sixth Edition, John Willey and sons, Inc.
- Shah, Kale & Patki, “**Building Drawing**”, Tata McGraw-Hill Education.
- N. D. Bhatta, “**Engineering Drawing**”, Charotar Publishing House.
- Narayanan, “**Engineering Drawing**”, SciTech Publications
- Mulik S.H., “**Perspective & Sciography**”,



## ARP 166 – MODELING WORKSHOP

0-0-4 Cr. 2

### Objectives:

To acquire the skill in constructing three dimensional forms using different model making materials and equipment in different scale.

### Content:

- Introduction to different materials like paper, thermocol, mud, wood, foam sheet, sun board, cork sheet, metal sheets, wires, plaster of Paris (PoP), etc. for making models.
- Making basic shapes out of different materials to explore the nature and texture of the material.
- Application of various tools and joining techniques required for model making.
- Introduction to various types of models at appropriate scales- site model, study model, block model, finished presentation models, etc.
- Elementary joinery in wood and plywood.
- Models in appropriate scale for interior and exterior spaces.
- Introduction to digital medium to explore models digitally.

### Sessional work:

Practical and job work to cover the topics mentioned above (related to Studio assignment).

### Method of Assessment:

Assessment of students 'work, Progressive evaluation at three stages.

### Expected Outcome:

Understand of different types of materials and its feasibility in model making.

### Reference Books:

- Akiko Busch, “**The Art of the Architectural Model**”, Design Pr,1991
- John R. Taylor, “**Model Building for Architects and Engineers**”, McGraw-Hill Inc.,US,1971.
- Martha Sutherland, “**Model Making: A Basic Guide (Norton Professional Books for Architects & Designers)**”, W. W. Norton & Company 1999.
- Petra Schmidt and Nicola Stattmann, “**Unfolded: Paper in Design, Art, Architecture and Industry**”, Birkhauser Verlag AG, 2009.
- Rolf Janke, “**Architectural Models**”, 1978.



## ARL 159 – CONSTRUCTION II

2-0-4 Cr. 4

**Objectives:** Objective of the course is to learn in progression various construction systems from simple building construction techniques to comprehensive, complex construction methods. The subject is focus on understanding the relationship between architectural design, building materials, services etc. Emphasis shall be on reasoning and analysis while acquainting the students with different building elements. The course shall aim at building a strong sense of visualization to enable students to evolve and apply alternative materials and methods of construction.

At first year level student shall aware about various technical terms, basic principles of construction and methods / techniques of construction through various elements / components of building. Second semester syllabus is based on timber technology. Students shall aware about the carpentry joints and tools and equipment used in timber construction.

### Course:-

- Timber Doors: Design considerations, Location of doors, Panelled, partly panelled and partly glazed shutters, flush shutters, and ledged, braced, battened and framed shutters. Joinery details of timber frame, styles, rails, panels etc., Fixtures and fastenings.
- Timber Windows: Design considerations, Location of windows, fully glazed window, louvered, centrally pivoted, top hung windows, side hung, partly glazed, Joinery details of timber frame, style, rails, panels, fixing of glass, double glazing etc. Fixtures and fastenings.
- Timber Roof: Classification of roof, various forms of roofs for different spans. Introduction to timber trusses and joinery details of tie beam, principal rafter, common rafter etc., Fixing of roof tiles.
- Timber Floor: Functional requirements of floor in design and construction, Classification of floor - ground and upper floor. Introduction to timber floors in relation to spans, load transmission. Joinery details of bridging joist, binder, and girder etc., Types of strutting.
- Timber staircase: Principles & components of staircase, Requirement of good staircase, Classification of staircase based on geometry and materials like timber, brick, stone, RCC etc. Joinery details of timber tread riser, baluster, handrail, newel post etc.
- Introduction to basic tools and equipments used in timber construction.

**Method of Assessment:** Sessional and End term Examination. Continuous evaluation of student work and Teacher assessment.

### Reference Books:

- Arora, S.P. & Bindra, S.P., “**A Text Book of Building Construction**”, Dhanpat Rai & Sons, New Delhi, 1994.
- Barry R., “**Construction of Building**”, Orient Longman lid, 1999.
- Chudley R., “**Building Construction Handbook**”, British library cataloguing, 2008.
- Francis DK Ching, “**Building Construction Illustrated**”, Van Nostrand Reinhold Ltd., 2001.
- Goyal, M.M , “**Handbook of Building Construction**”, Thomson Press.2004
- Jha, J. & Sinha, S.K., “**Building Construction**”, Khanna Publishers, New Delhi, 1977.
- Kumar S.K., “**Building Construction**”, Standard publisher. 2003.
- Mckay, W.B, “**Building Construction**” - Vol. I, Longman, 2005.
- Mehta, M., Scarborough, W. and Armpriest, Diane, “**Building Construction: Principles, Materials and Systems**”, Pearson Prentic Hall, 2008.
- Punmia B.C., “**Building Construction**”, Laxmi Publications Pv1. Ltd., 1995.
- Rangwala S.C., “**Building Construction**”, Charotar Publishing House, 1963.
- Simmons H. L, “**Olin’s Construction Principles, Materials and Methods**”, John Wiley and Sons, 2007.



## ARL 153 – CLIMATE RESPONSIVE ARCHITECTURE

3-1-0 Cr. 4

### Objectives:

To study the fundamentals of climatology and its application in climate responsive building design.

**Course:-**Climate & Weather. Scales of climate - macro-climate, meso-climate and micro climate. Climatic variables: temperature, humidity, precipitation, cooler radiation, wind, etc. Tropical Climate. Climatic Zones of India & their characteristics.

Geometry of solar movement. Altitude & azimuth angles. Sunpath diagram/Solar chart. Horizontal and vertical shadow angles. Use of shadow angle protractor. Design of shading devices. Performance evaluation of shading devices.

Air flow/wind movement around and through buildings. Natural ventilation. Climatic design recommendations for various climatic zones in India.

Thermal comfort. Indices of thermal comfort - Tropical Summer Index & Effective Temperature.

Thermal effects in buildings. Basic concepts of heat transfer in buildings, units & terminology.

The sky as a source of light, Daylight factor, Lighting - Windows, Room proportions and other building elements, Daylight penetration, Calculation of daylight factor.

Site Climate: Microclimate, site climate data, local factors, presence of water body and vegetation, topography, special characteristics, urban climate cooling degree days and heating degree days.

Passive Design Strategies, Orientation-sitting of building with respect to sun, wind and view, use of evaporative cooling, ground cooling-earth air tunnel, thermal mass-cavity wall, natural ventilation, night time cooling, reflective surfaces and radiant barrier, cool roof and green roof, etc.

Examples of contemporary climate responsive architecture India and Abroad.

**Method of Assessment:** Sessional Exam + Teacher's Assessment + End Term Exam.

**Sessional work:** Reports, Plates, Class tests, Case studies.

### Reference Books:

- Crichfield Howard J., “**General Climatology**”, Phi Learning, 1998.
- Ellis Aronin Jefferey, “**Climate & Architecture**”, Reinhold, 1953.
- Evans Martin, “**Housing, Climate and Comfort**”, London: Architectural Press; New York: J. Wiley, 1980.
- Givoni B., “**Man Climate and Architecture**”, Van Nostrand Reinhold, 1981.
- Keonigsberge O.H., Ingersoll T. G., Mayhew Alan, Szokola S.V., “**Manual of Tropical Housing and Building**”, Orient Blackswan, 1984.
- Kukreja C. P., “**Tropical Architecture**”, Tata Mc Graw-Hill, 1978.
- Olgyay, Aladar, Olgyay Victor, “**Solar Control and shading Devices**”, Princeton University Press, 1957.
- Sealey, Antony “**Introduction to building Climatology**”, C'wealth Assn.of Architects, September 1979.
- Seshadri T. N., Sharma Mela Ram, Sharafat Ali “**Climatological and Solar Data for India**”, Central Building Research Institute, 1969.



## ARL 154 – HISTORY OF ARCHITECTURE II

3-0-0 Cr. 3

**Objectives:** Study the chronological evolution and impacts of geographic, climatic, geological, religious, political and socio-cultural backgrounds of western ancient and medieval architecture – in relationship to materials and techniques of construction.

### Course:-

Introduction to evolution of built form design as a result of socio cultural, physical, technological factors manifested in design attitudes during various phases in history.

- Architecture of Ancient Civilizations: Egyptian –Mastabas, Royal Pyramids and Great Temples. West Asiatic (Mesopotamian and Persia) – Ziggurats and Palaces. Mayan Architecture – step Pyramid Complex
- Classical Architecture: Greek – Columnar and Trabeated structural systems, Doric, Ionic and Corinthian Orders, Agora, Acropolis, Temple of Parthenon, Cultural (theatre) and Sports (Public) Buildings, Optical correction.
- Classical Architecture: Roman Arcuated Architecture, Monumental Scale, Tuscan and Composite Orders, Pantheon, Forum, Basilican, Thermae, Theatres (Colosseum) and circuses.
- Medieval Architecture: Early Christian – Evolution of Church Architecture; Byzantine Architecture – Hagia Sophia;
- Romanesque Architecture: Pisa Cathedral Complex, Gothic Architecture: Pointed Arch Architecture, Notre Dame etc.
- Oriental Architecture: generic forms and transformation of styles in Japanese Architecture, Chinese Architecture.

**Sessional work:** Sessional examination and End term Examination, Assignments, Site Visit, Reports, Seminars and Documentation of historic structure, Sketches, Plates, and tests.

### Reference Books:

- Bannister Fletcher, “**A History of Architecture**”, 20<sup>th</sup> edition, CBS Publishers and Distributors, New Delhi, 1999.
- Christopher Tadgell, “**History of Architecture**”
- Francis D.K.Ching, “**A Global History of Architecture**”, John Wiley and Sons., (Canada), 2011.
- Henri Stierlin, “**Hindu India**”, From Khajuraho to the temple city of Madurai, Taschen, Paris, ISBN 3-8228-7649-6
- Percy Brown, “**Indian Architecture (Buddhist and Hindu)**”, D. B. Taraporevala Sons and Co. Private Ltd., Bombay, India, 1995
- Percy Brown, “**Indian Architecture (Islamic Period)**”, D. B. Taraporevala Sons and Co. Private Ltd., Bombay, India, 1995.
- Satish Grover, “**History of Architecture**”.
- Satish Chandra, “**History of Architecture & Ancient Building Materials in India**”.
- Simon Unwin, “**Analysing Architecture**”, Roudledge, London, 2003.



## ARL 155 – THEORY OF ARCHITECTURE

3-0-0 Cr. 3

**Objectives:** The course aims at introducing basics of architecture and theory of architecture. The objectives of the course is to understand the evolution of the objective principles and subjective values that guide individual and collective decisions about, and assessments of one's own and others', architectural works.

### Course:-

- Introduction to Architecture- Definitions of Architecture – Origin of Architecture – architecture as a discipline – context for architecture as satisfying human needs: functional, aesthetic and psychological-outline of components and aspects of architectural form-site, structure, skin, materials, services, use, circulation, expression, character, experience – Introduction to the formal vocabulary of architecture and Gestalt ideas of visual perception. Debating a Discipline – Architecture, Argument, and the Concept of the Dialectic. “Simplicity and Complexity”, “Natural and Constructed”, “Context and Building”, “Gender, Race and the Body”, “Tangible and Intangible”.
- Elements of Architecture- Understanding fundamental elements such as point, line, plane, form and space, shape, pattern, light, colour, surface
- and texture with reference to the evolution of architectural form and space.
- Elements of Architecture – Form- Understanding perceptual effects of specific geometric forms such as sphere, cube, pyramid, cylinder and cone and its sections as well as their derivatives with respect to the evolution of architectural form and space.
- Elements of Architecture – Space- Understanding perceptual effects of specific configuration of architectural spaces – Enclosure – Internal and External, Continuous spaces – Spatial relationship and its types, Spatial organisation: Centralized, Linear, Radial Clustered, Grid – built form and open space relationships.
- Principles of Architecture- Understanding fundamental principles such as proportion, scale, balance, symmetry/asymmetry, rhythm, axis, hierarchy, datum, unity, harmony, dominance, climax – Movement with reference to the architectural form and space – detailed study of relationship between architectural form and circulation – Types of circulation – Building approach and entrance, path configuration and form, path space relationship, orientation.
- Theories in architecture verses theories in natural sciences or social sciences, three dichotomous pairs of theory of Architecture: “Objective principles and subjective values”, “Individual and collective”, “one's own and others”. Theories of architectural technology: principles of structure, ventilation, drainage, lighting, etc. Theories of architectural history: social phenomena and patterns, linguistic analyses, analyses of physical artifacts, etc. Theories of architectural design: organizational strategies, design methods, spatial concepts, aesthetic judgments, etc.

Application of the above mention points in architecture, demonstrated through various architectural examples worldwide.

**Method of Assessment:**Sessional examination and End term Examination.

**Sessional work:** Sessional examination and End term Examination, Assignments.

### Reference Books:

- Charles Wallschlaeger and Cynthia Busic-Snyder, “**Basic Visual Concepts and Principles for Artists, Architects and Designers**”, Mc Graw Hill, New York 1992.
- Exner V., Pressel D., “**Basics Spatial Design**”, Birkhanser, 2009.
- Francis D.K.Ching, “**Architecture: Form, Space and Order**”, Van Nostrand Reinhold Co., (Canaa), 1979.
- John Ruskin, “**Seven lamps of Architecture**”.
- Joshua C. Taylor, “**Learning to Look: A Handbook for the Visual Arts**”, (Phoenix Books), University Of Chicago Press, 1981
- Korydon Smith., “**Introducing Architectural Theory**”, Debating a Discipline, Routledge, London, ISBN: 978-0-415-88837-0, 2012.
- Michael Brawne, “**Architectural Thought: the Design Process and the Expectant Eye**”, Elsevier, London, ISBN 0 7506 58517, 2005
- Mark Baskinger and William Bardel, “**Drawing Ideas: A Hand-Drawn Approach for Better Design**” Watson-Guptill, 2013.
- Nikos Salingaros, “**A Theory of Architecture**”.
- Nathan Knobler, “**Visual Dialogue**”, Harcourt School; 3 Sub edition, 1980.
- Owen Cappleman and Michael Jack Jordon, “**Foundations in Architecture: An Anotated Anthology of Beginning Design Project**”, Van Nostrand Reinhold New York, 1993.
- Pramur V.S., “**Design fundamentals in Architecture**”, Somaiya Publications Pvt. Ltd., New Nelhi, 1973.
- Paul J. Zelanski and Mary Pat Fisher, “**The Art of Seeing**”, Pearson, 2010
- Simon Unwin, “**Analysing Architecture**”, Rouledge, London, 2003.





## AML 169– ENGINEERING MECHANICS

3-1-0 Cr. 4

### Objectives:

To introduce basic understanding requirement of structural aspect to engineering structures and to explain effect of forces on various structural elements such as beams, trusses, cables etc.

### Course:-

Co-planer Statics Axioms of static and basic concepts, law of forces, force system, Resolution and resultant of forces (concurrent parallel and non-concurrent), supports-types and reactions, free body diagram, equilibrium of forces, conditions of equilibrium. Cables Weightless flexible cables under concentrated loads and uniformly distributed load with level & non-level supports. Friction Laws of static friction, application to inclined planes and ladder. Properties of areas Centroid of areas, first and second moments of area about an axis in plane, parallel axis theorem, radius of gyration about an axis. Pin jointed trusses Solution by method of joints and method of section. Graphic Statics Force polygon and funicular polygon for coplanar forces. Conditions of equilibrium, reactions at supports of simply supported beams and trusses, centroids of planer bodies, simple trusses – Maxwell diagrams.

### Reference Books:

- R.C. Hibbler, “**Engineering Mechanics**”, Pearson Education, Asia Pvt. Ltd.
- J.L. Meriam & L.G. Kraige, “**Engineering Mechanics**”, John Wiley and Sons.
- F.P. Beer & E.R. Johnston, “**Vector Mechanics for Engineers**”, Tata McGraw Hill.



**SAC 102- HEALTH INFORMATION AND SPORTS-PART-2**

**0-0-2 Cr. 0**

**Objective:**

Achieving higher level of physical activity in engineering population will contribute indirectly to gains in other sectors, vital to human development and economic progress. To improve productivity, foster social harmony, inculcate sense of discipline and dedication in general life, develop the spirit of team work, through various sports activities.

**Content:**

**Physical Efficiency Test Level 2**(Testing and Evaluation of Physical Fitness):1500 meter run, shuttle run, standing broad jump, one minute sit up test, flexibility test.

**Testing and assessment of selected Physiological parameters through Sports Medicine Research Lab:**

Total body fat analysis, Harvard step test, BMI, WHR, Back strength, Leg strength, grip strength, resting pulse rate, and resting respiratory rate. **Intramural phase 2:** Badminton, Basketball, Cricket, Kho-Kho.

**CREDITS SYSTEM**

Education at the Institute is organized around semester-based credit system of study. The prominent feature of the credit system is a process of continuous evaluation of a student's performance and flexibility to allow a student to progress at an optimum pace suited to his/her ability, subject to fulfilling minimum requirement for continuation. A student's performance is measured by number of credits he/she has earned (i.e. completed satisfactorily). Based on the course credits and grades obtained by the student, Semester Grade Point Average (SGPA) or Cumulative Grade Point Average (CGPA) is calculated. A minimum number of earned credits and minimum grade point average should be acquired in order to qualify for the award of graduate degree. Details are given in Rules and Ordinances Book.

**Credit requirement**

A student is required to earn minimum of 219 credits in ten semesters. These credits are to be earned from different category of courses like, Departmental Core (DC), Departmental Elective (DE), Basic Sciences (BS), Humanities & Management (HM), Audit Course (AU) and Open Course (OC) .

**Calculations of SGPA & CGPA**

Semester Grade Point Average (SGPA) or Cumulative Grade Point Average (CGPA) is calculated as follows,

$$SGPA = \frac{\sum_{\text{semester}} (\text{Course credits} \times \text{Grade points}) \text{ for all courses except audit}}{\sum_{\text{semester}} (\text{Course credits}) \text{ for all courses except audit}}$$

$$CGPA = \frac{\sum_{\text{semester}} (\text{Course credits} \times \text{Grade points}) \text{ for all courses with pass grade except audit}}{\sum_{\text{semester}} (\text{Course credits}) \text{ for all courses except audit}}$$



### GRADING SYSTEM

Continuous evaluation process, based on student's performance in uniformly placed I & II Sessional Examinations, Teachers Assessment (TA) and End-Semester Examination for each course. At the end of semester, grades shall be awarded by course coordinator or concerned faculty as a performance indicator. Details of these grades are as given below.

Grades	Grade Points	Description of performance
AA	10	Outstanding
AB	09	Excellent
BB	08	Very Good
BC	07	Good
CC	06	Average
CD	05	Below Average
DD	04	Marginal
FF	00	Very-poor/ Unsatisfactory / Absence in End-Sem Examination
W		Attendance Less than 75 %. Not Eligible for End-Sem Examination. Shall repeat the Course
SS		Satisfactory Completion of Audit Course
ZZ		Un-satisfactory / Audit Course continuation

### ATTENDANCE

**100 % attendance in the class of each course is expected.** However, in consideration of constrains / unavoidable circumstances, the attendance can be relaxed only to the extent not more than 25 % . Any student having attendance less than 75 % will not be eligible to appear in End-semester Examination.



**विश्वेश्वरय्या राष्ट्रीय प्रौद्योगिकी संस्थान, नागपुर**  
VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY, NAGPUR  
ACADEMIC CALENDER (2015-2016)



2015	SUN	MON	TUE	WED	THU	FRI	SAT
JULY	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
AUG	23	24	25	26	27	28	29
	30	31	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
SEPT	20	21	22	23	24	25	26
	27	28	29	30	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
OCT	18	19	20	21	22	23	24
	25	26	27	28	29	30	31
	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
NOV	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
DEC	20	21	22	23	24	25	26
	27	28	29	30	31	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
JAN 2016	24	25	26	27	28	29	30

2016	SUN	MON	TUE	WED	THU	FRI	SAT
JAN	27	28	29	30	31	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
FEB	31	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
MAR	28	29	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
APR	27	28	29	30	31	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
MAY	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	1	2	3	4
JUNE	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	1	2
	3	4	5	6	7	8	9
JUL	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30

AUTUMN (ODD SEM)		SPRING (EVEN SEM)	
27 Jul, 2015	Commenccement of classes	4 Jan, 2016	Commenccement of classes
15 Sep, 2015	Last date for display of Sessional-I marks & attendance	16 Feb, 2016	Last date for display of Sessional-I marks & attendance
16 Oct, 2015	Last date for display of Sessional-II marks & attendance	24 Mar, 2016	Last date for display of Sessional-II marks & attendance
12 Nov, 2015	Last date of formal teaching & display of attendance & internal marks	22 Apr, 2016	Last date of formal teaching & display of attendance & internal marks
1 Dec, 2015	Last date for display of final grades	10 May, 2016	Last date for display of final grades
3 Dec, 2015	Submission of marks	11 May, 2016	Submission of marks
26 Nov-1 Dec	Registration for next semester	05-09 May	Registration for next semester
18 Dec-1 Jan	Winter /Summer Vacation (for teachers)	30 May-14 Jul	Winter /Summer Vacation (for teachers)
01 - 31 Dec	Ph.D. Progress seminar	1 Jul - 31 Jul	Ph.D. Progress seminar
14 - 17 Dec	Re-examination	23-27 May	Re-examination
21 Dec, 2015	Last date for display of Re-exam marks	30 May, 2016	Last date for display of Re-exam marks
4 Jan, 2016	M. Tech. Project Submission/ Examination	15/30 Jun, 2016	M. Tech. Project Submission/ Examination
17-18 Oct, 2015	AXIS	25 July, 2016	AXIS
26-27 Dec, 2015	STUDENTS EVENTS Alumni Meet	27-28 Feb, 2016	STUDENTS EVENTS Alumni Meet

These Saturdays will be Instruction days: 1/8 Thursday: 8/8 Friday: 9/1 Monday: 20/2 Friday: 05/3 Tuesday: 12/3 Wednesday

HOLIDAY		HOLIDAY	
18 Jul	Id-ul-Fitr	24 Oct	Muharram
15 Aug	Independence Day	11 Nov	Deepavali
17 Sept	Ganesh Chaturthi	13 Nov	Bhad Duj
25 Sept	Id-ul-Zuha	25 Nov	Gurunanak Jayanti
02 Oct	Mahatma Gandhi's Birthday	24 Dec	Id E Milad
22 Oct	Vijaya Dashmi	25 Dec	Christmas Day

HOLIDAY		HOLIDAY	
26 Jan	Republic Day	8 Apr	Gudi Padwa
7 Mar	Mahashivratri	19 Apr	Mahavir Jayanti
23 Mar	Holi	25 May	Buddha Purnima
25 Mar	Good Friday		

SUMMER TERM	
31 May, 2016	Registration for Summer Term
01 Jun, 2016	Commenccement of classes
13 Jun, 2016	Sessional I
15 Jun, 2016	Display of Sessional I Marks
30 Jun, 2016	Sessional II
2 Jul, 2016	Display of Sessional II Marks
19 July, 2016	Display of Attendance & Internal marks
20-21 Jul, 2016	End Semester Examination
23 Jul, 2016	Last date for display of grades

EXAMINATIONS		EXAMINATIONS	
Slot	I Sess	II Sess	End Sem
A	8 Feb	16 Mar	25 Apr
B			26 Apr
C	9 Feb	17 Mar	27 Apr
D			28 Apr
E	10 Feb	18 Mar	29 Apr
F			2 May
G	11 Feb	19 Mar	3 May
H			4 May
I	I & J Slot are for Project Final Evaluation		
J			5 May
			6 May

EXAMINATIONS		EXAMINATIONS	
Slot	I Sess	II Sess	Re Exam
A	2 Sept	7 Oct	16 Nov
B			17 Nov
C	3 Sept	8 Oct	18 Nov
D			19 Nov
E	4 Sept	9 Oct	20 Nov
F			23 Nov
G	5 Sept	10 Oct	24 Nov
H			26 Nov
I	I & J Slot are for Project Final Evaluation		
J			28 Nov



### OTHER INFORMATION

The Director	Dr. N S Chaudhari 0712 280 1370, 2223969 (Fax) <a href="mailto:director@vnit.ac.in">director@vnit.ac.in</a>	Medical Officer	hostelmanager@vnit.ac.in
Dean (Academic)	Dr. O R Jaiswal 0712 2801301 <a href="mailto:deanacd@vnit.ac.in">deanacd@vnit.ac.in</a>		Dr. S J Batra 0712-2801342 9422104694 <a href="mailto:medicalofficer@vnit.ac.in">medicalofficer@vnit.ac.in</a>
Dean (Faculty Welfare)	Dr. P M Padole 0712 2801302 <a href="mailto:deanadm@vnit.ac.in">deanadm@vnit.ac.in</a>	Warden HB-8	Dr. D. Z. Shende 0712 2801567/1612 9422390841
Dean (Planning & Development)	Dr. S R Sathe 0712 2801300 <a href="mailto:deanp_f@vnit.ac.in">deanp_f@vnit.ac.in</a>	Warden HB-8/9	Dr. G. N. Nimbarte 0712 2801435/1622 9373045542
Dean (Research & Consultancy)	Dr. H M Surywanshi 0712 2801304 <a href="mailto:deanr_d@vnit.ac.in">deanr_d@vnit.ac.in</a>	Warden HB-9	Dr. R. P. Vijaykumar 0712 2801782/1679 9970335592
Dean (Student Welfare)	Dr. G P Singh 0712 2801320 <a href="mailto:deanstd_coun@vnit.ac.in">deanstd_coun@vnit.ac.in</a>	Warden GH	Dr. Ashwini Mirajkar 0712 2801804 9850837937
Associate Dean (Hostel Affairs)	Dr. D H Lataye 0712 2801119 <a href="mailto:chiefwarden@vnit.ac.in">chiefwarden@vnit.ac.in</a>	Warden GH	Dr. Pallavi Mahale 0712 2801406/1288 9665232769
Dy. Registrar (Acad)	Mr. D M Parate 0712 2801365 <a href="mailto:dr_acd@vnit.ac.in">dr_acd@vnit.ac.in</a>	Matron (GH)	Mrs. S. V. Joshi 0712 280 13471113/1115
Asstt. Registrar (Exam)	Mrs. A A Ansingkar 0712 2801392 <a href="mailto:asst_registrar@vnit.ac.in">asst_registrar@vnit.ac.in</a>	Account Section	0712 2801242
		Academic Section	0712 2801241
		Examination Cell	0712 2801278
		T & P	0712 2801258
Asstt. Registrar (Hostel)	Mr. Nikhil Chingalwar 0712 2801373	Security Section	0712 2801222
		Hostel Section	0712 2801233
		Guest House	0712 2801221
		Health Center	0712 2801342
		Physical Education	0712 2801232

**For Student's Medical Emergency  
Ambulance: 862 305 6246**

**CIIMS HOSPITAL**, Bajaj Nagar , NAGPUR,  
Phone No: - 2236441/2237662

**WOCKHARDT HOSPITAL**  
27, Corporation Colony, Near Shankar Nagar Square,  
North Ambhazari Road, NAGPUR.  
Phone No: - 224844/6534444

**KRIMS HOSPITAL**  
275, Central Bazar Road , Ramdaspath

NAGPUR. Phone No: - 6614564-65

**CARE HOSPITAL**  
Farmland, Panchasheel Square,  
NAGPUR. Phone No: - 3982444/3982222

**RATHI NURSING HOME**  
Plot No. 40, Balraj Marg, Dhantoli ,NAGPUR. Phone:-  
2420044

**Head, Department of Architecture and planning  
Visvesvaraya National Institute of Technology,  
Nagpur, Maharashtra, India-440010B  
Phone: +91-712-2801376  
Fax:+91-712-2223230  
Email : head@arc.vnit.ac.IN**





