

**NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR**

**PROPOSED NEW SCHEME OF EXAMINATION FOR**

**TEN SEMESTER INTEGRATED COURSE OF B. ARCH.(APPLICABLE FROM 2010-11)**

**SECOND SEMESTER**

S.No.	Subject Code	Subject	Periods per week			Scheme of Examination			Total Marks	Credit [L+{(T+P)/2}]
			L	T	P	ESE	FE/SE	TA		
1	1211	Architectural Design II (Basic Design & Visual Arts)	2	0	0	0	50	100	150	2
2	1212	Building Construction and Technology II	2	0	0	70	30	75	175	2
3	1213	Structural Design and Systems II	3	2	0	70	30	20	120	4
4	1214	Architectural Graphics Skills-II	3	0	0	70	30	75	175	3
5	1215	Building Materials and Science II	2	1	0	70	30	20	120	3
6	1216	Environmental Studies	2	2	0	70	30	20	120	3
7	1221	Architectural Design II (Basic Design & Visual Arts) Studio	0	0	6	50	0	0	50	3
8	1222	Building Construction and Technology II Studio	0	0	3	25	0	0	25	2
9	1224	Architectural Graphics Skills II- Studio	0	0	3	25	0	0	25	2
10	1227	Workshop practice and Site exposure II	0	0	2	0	0	20	20	1
11	1228	Discipline						20	20	1
<b>TOTAL</b>			<b>14</b>	<b>5</b>	<b>14</b>	<b>450</b>	<b>200</b>	<b>350</b>	<b>1000</b>	<b>26</b>

# NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR.

## SYLLABUS FOR FIVE YEARS B.ARCH. DEGREE COURSE (A Ten semester integrated course)

### SECOND SEMESTER B. ARCH.

Subject Code	Subject	Periods per week			Scheme of Examination			Total Marks	Credit [L+{(T+P)/2}]
		L	T	P	ESE	FE / SE	TA		
1211	<b>Architectural Design II (Basic Design and Visual Arts)</b>	2	0	0	0	50	100	150	2

- Principles of Aesthetics and introduction to aesthetical terms like form, balance, rhythm, harmony, texture, color, symmetry, contrast, discord, accentuation, monotony etc.
- Introduction of Architectural design with an approach of functional understanding and analysis of problems with studies of space requirement for different furniture (objects), activities and circulation, Relationship between occupied and unoccupied spaces.
- Design of small shelters and study of multi units involving 3 to 4 functional spaces, Natural and manmade objects of functional and aesthetic value. Aspects of area determination in conjunction with relevant building Bye Laws and area relationship.
- Case studies for measured drawing of small buildings and furniture. Introduction of presentation drawings. Small views (isometric and perspective) of the studied building.
- Study and design of small structures like ceremonial gates, temporary exhibition stalls, kiosks, bus stop, small pavilions etc.

Two time problems (as class tests) are to be conducted in class other than regular design problems.

Note:

1. Sessionals will be in the form of drawings and models along with technical report for the design dealt with. The evaluation should be done in intermediate reviews consisting of internal/external experts.
2. There should be regular site visits to the building types dealt in the studio problem for which audiovisuals should be prepared.

References:

1. Joseph De Chiara, Michael J Crosbie, Time Saver Standards for Building Types, McGraw Hill Professional 2001.
2. Julius Panero, Martin Zelnik, Human Dimension and Interior Space, Whitney Library of Design, 1975
3. Joseph De Chiara, Julius Panero, Martin Zelnik, Time Saver Standards for Interior Design and Space Planning, McGraw Hill 2001.
4. Ernst Neuferts Architects Data, Blackwell 2002
5. Ramsey et al, Architectural Graphic Standards, Wiley 2000.
6. Richard P. Dober, Campus Planning
7. Kanvinde, Campus Planning in India
8. Kevin Lynch, Site planning, MIT Press, Cambridge, 1967
9. Sam F. Miller, Design Process: A Primer for Architectural and Interior Design, Van Nostrand Reinhold, 1995

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		L	T	P	ESE	FE / SE	TA		
1212	<b>Building Construction and technology II</b>	2	0	0	70	30	75	175	2

UNIT 1	<b>Doors (timber):</b> <ul style="list-style-type: none"> <li>• Ledged braced and battened door</li> <li>• Panel door</li> <li>• Glazed door</li> <li>• Flush door</li> </ul>
UNIT 2	<b>Windows (timber):</b> <ul style="list-style-type: none"> <li>• Side and Top hung</li> <li>• Pivoted</li> <li>• Louvers</li> <li>• Ventilators</li> <li>• Fixed and openable fanlights.</li> <li>• Composite window.</li> </ul>
UNIT 3	<b>Door (metal):</b> <ul style="list-style-type: none"> <li>• Pressed steel</li> <li>• 'Z' section, with and without fanlight.</li> <li>• Swing doors.</li> </ul>
UNIT 4	<b>Windows (metal):</b> <ul style="list-style-type: none"> <li>• Pressed steel</li> <li>• 'z' section,</li> <li>• Top and side hung, fixed</li> <li>• Pivoted</li> <li>• Louvers</li> <li>• Ventilators</li> <li>• Fanlights</li> <li>• Composite window.</li> </ul>
UNIT 5	<b>Opening accessories:</b> <ul style="list-style-type: none"> <li>• Jamb casing</li> <li>• Architrave</li> <li>• Palmate</li> <li>• Moldings</li> <li>• Skirting</li> <li>• Door and window fixtures.</li> <li>• Door cum window in timber and metal.</li> </ul>

Note:

1. Sessional shall be done as scaled drawings on drawing sheets and freehand drawings along with occasional visits to construction sites.
2. In theory examination there will be a separate question from each unit with choice within the unit/question. All units/questions will be compulsory.

References:

1. Don A. Watson, "Construction Materials and Processes", McGraw Hill, 1972.
2. W.B. McKay, "Building Construction" Vol, 1 and 2, Longmans, UK, 1981.
3. S.C Rangwala "Building Construction" Charotar Publishing House, India, 2000
4. S.K.Sharma, "A Text book of Building Construction", S.Chand & Co Ltd., New Delhi, 1998
5. American Institute of Timber Construction (AITC), Timber Construction Manual, Wiley Publishers, 2004
6. Francis D.K Ching Building Construction illustrated, John Willey & Sons, 2000
7. Wills H Wagner, Howard Bud, Modern Carpentry, Good Heart – Wilcox publishers, Portland, 2003
8. Barry, Construction of Buildings, Volume 1&2, Blackwell Publishing Ltd., Oxford, 2005

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		L	T	P	ESE	FE / SE	TA		
1213	<b>Structural Design and Systems II</b>	3	2	0	70	30	20	120	4

**STRUCTURAL MECHANICS**

UNIT 1	<ul style="list-style-type: none"> <li>• Strain energy,</li> <li>• Bette's law,</li> <li>• First theorem of Castigliano.</li> <li>• Deflection of truss joint</li> </ul>
UNIT 2	<ul style="list-style-type: none"> <li>• Shear force and bending moment diagram for simply supported beam, cantilever beam, overhang beam (subjected to point load, U.D.L and point load/U.D.L.)</li> <li>• Point of contra flexure,</li> <li>• Member subjected to couple.</li> </ul>
UNIT 3	<ul style="list-style-type: none"> <li>• Theory of bending (simple and pure)</li> <li>• Bending equation,</li> <li>• Section modulus (only for Rectangular, hollow rectangular)</li> <li>• Shear stress distribution for rectangular beam section</li> <li>• Introduction of flitched beam.</li> </ul>
UNIT 4	<p><b>Fixed beam:</b></p> <ul style="list-style-type: none"> <li>• Bending moment diagram for a fixed beam. (Fixed beam subjected to Point load, U.D.L and couple)</li> <li>• Advantages and disadvantages of fixed beam.</li> <li>• Clapeyron's Theorem,</li> <li>• Continuous beam with fixed end.</li> </ul>
UNIT 5	<ul style="list-style-type: none"> <li>• Principal stresses and strain,</li> <li>• Mohr's circle.</li> </ul>

Note:

1. Sessionals work shall include assignments/tests on the above topics.
2. In theory examination there will be a separate question from each unit with choice within the unit/question. All units/questions will be compulsory.

References:

1. R.K. Bansal, A Text Book on Strength of Materials – Laxmi Publications, New Delhi, 1994.
2. B.C. Punmia, SMTS-I, Strength of Materials – Laxmi Publications, New Delhi, 1994.
3. M.M. Ratwani & V.N. Vazirani, Analysis of Structures, Vol. 1, Khanna Publishers – Delhi, 1987.
4. Timoshenko, S.P. and D.H. Young, Elements of Strength of Materials, Fifth edition, East West Press, 1993.
5. A.R. Jain and B.K.Jain, Theory and analysis of structures, Vol. 1, Nemchand and Bros, Roorkee, 1987.
6. R.K. Rajput “Strength of Materials”, S.Chand & Company Ltd., New Delhi 1996.

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		L	T	P	ESE	FE / SE	TA		
1214	<b>Architectural Graphics Skills- II</b>	3	0	0	70	30	75	175	3

UNIT 1	<b>Perspective Drawings -I</b> <ul style="list-style-type: none"> <li>• Introduction to basic terms, principles, types and techniques of perspective drawings for expression of ideas.</li> <li>• Two point perspective of simple geometrical objects</li> <li>• One point perspective of simple geometrical objects</li> </ul>
UNIT 2	<b>Perspective Drawings –II</b> <ul style="list-style-type: none"> <li>• Two point perspective of complex geometrical objects and buildings</li> <li>• One point perspective of complex geometrical objects and building interiors/ exteriors.</li> <li>• Freehand perspective drawings with various techniques of buildings.</li> </ul>
UNIT 3	<b>Sciagraphy-I</b> <ul style="list-style-type: none"> <li>• Introduction to basic principles of Sciagraphy and its application on two dimensional objects in plans and elevations.</li> </ul>
UNIT 4	<b>Sciagraphy-II</b> <ul style="list-style-type: none"> <li>• Sciagraphy of three dimensional objects in plan, elevations and views (isometric, axonometric and perspective).</li> <li>• Sciagraphy of simple building elements.</li> </ul>
UNIT 5	<b>Practical applications:</b> <ul style="list-style-type: none"> <li>• Development of perspective projections of buildings with sciagraphy and rendering techniques, multiple point perspectives.</li> </ul>

Note:

1. Sessionals are to be done in the form of drawings on drawing sheets and proportionate sketches on above topics. Sessional will be evaluated continuously in class.
2. In theory examination there will be a separate question from Unit 1 to Unit 4 with choice within the unit/question.

References:

1. John M.Holmes, Applied Perspective, Sir Isaac, Pitman and Sons Ltd., London 1954.
2. Robert W.Gill, Basic Perspective, Thames and Hudson, London, 1974.
3. C.Leslie Martin, Architectural Graphics, The Macmillan Company, New York, 1964.
4. Francis Ching, Architectural Graphics, Van Nostrand and Reinhold Company, NY 1975
5. Claude Batley, Indian Architecture, D.B.Taraporevale Sons and Co., Ltd., Bombay
6. William Kirby Lockard, Drawing as a Means to Architecture, Van Nostrand, Reinhold Company, New York.
7. George A Dinsmore, Analytical Graphics – D.Van Nostrand, Company Inc., Canada.
8. Interiors: Perspective in Architectural Design Graphic - SMA Publishing Co. Ltd., Japan, 1967.
9. Ernest Norling, Perspective drawing, Walter Foster Art Books, California, 1986.
10. Bernard Alkins - 147, Architectural Rendering, Walter Foster Art Books, 1986.
11. Rober W.Gill, Advanced Perspective, Thames and Hudson, London, 1974.

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		L	T	P	ESE	FE / SE	TA		
1215	<b>Building Materials and Science - II</b>	2	1	0	70	30	20	120	3

The subject aims at developing the understanding and knowledge of various building materials regarding their availability, constitution, properties, classification, uses and applications.

UNIT 1	<b>Flooring, and wall cladding:</b> along with fixing materials <ul style="list-style-type: none"> <li>• Stones.</li> <li>• Stone slabs.</li> <li>• Stone tiles.</li> <li>• Bricks.</li> <li>• Clay tiles.</li> <li>• Mosaic tiles.</li> <li>• Terrazzo.</li> </ul>
UNIT 2	<b>Roof coverings:</b> along with materials, fittings and fixtures used in the construction. <ul style="list-style-type: none"> <li>• Country tiles.</li> <li>• Mangalore and other designed tiles.</li> <li>• Metal sheets, GI sheets/ steel corrugated sheets.</li> <li>• Structural glass.</li> <li>• Modern roof covering materials like acrylic sheets, fiber glass sheets, polycarbonate sheets, slate, shingles, etc.</li> </ul>
UNIT 3	<b>Wall paneling and ceiling:</b> <ul style="list-style-type: none"> <li>• Timber panels.</li> <li>• Timber boards.</li> <li>• Fiber boards.</li> <li>• Particle boards.</li> <li>• Ply boards.</li> <li>• Laminated boards.</li> <li>• Gypsum boards.</li> <li>• Glass wool boards.</li> <li>• Modern wall paneling materials like Aluminum Composite Panel, glass paneling, glass blocks, PVC sheets, etc.</li> </ul>
UNIT 4	<b>Precast unit:</b> <ul style="list-style-type: none"> <li>• Solid and hollow concrete block.</li> <li>• Waffle unit.</li> <li>• Core unit.</li> <li>• Other pre-engineered units (as per CBRI), Ferro-cement, etc.</li> </ul>
UNIT 5	<b>Surface finishes:</b> <ol style="list-style-type: none"> <li>a) Preparation, application and defect correction on plastered internal and external surfaces.               <ul style="list-style-type: none"> <li>• Lime wash, Colour clay wash, Distempers, Cement based color, Plaster of Paris, Putties along with the adhesives, thinners, solvents.</li> </ul> </li> <li>b) Preparation, application and defect correction on timber and metallic surface.               <ul style="list-style-type: none"> <li>• Primers, paints, varnishes, Polishes along with adhesives, thinners, solvents.</li> </ul> </li> </ol>

Note:

1. Sessional shall be in the form of self-study, market survey, sample and literature collection, reports and seminars/presentation.
2. The works of CBRI, BMTPC, SERC, HUDCO and other institutions be referred and discussed.
3. In theory examination there will be a separate question from each unit with choice within the unit/question. All units/questions will be compulsory.

References:

1. P.C. Varghese, Building Materials, Prentice Hall of India put Ltd New Delhi 110001, 2005.
2. S. C. Rangwala, Engineering Materials, Character Publishing house, Anand – 388 001, India, 2002.
3. S.K. Duggal, Building materials, Oxford and IBH publishing Co, put, Ltd, New Delhi 110001, 1997.
4. Rural Construction NBO – New Delhi

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		L	T	P	ESE	FE / SE	TA		
1216	<b>Environmental Studies</b>	2	2	0	70	30	20	120	3

The aim of the subject is to acquaint the students about the environment and its effect on human beings in general. The subject is introduced to create awareness among students regarding development in harmony with ecosystem.

UNIT 1	<p><b>Ecosystems:</b></p> <ul style="list-style-type: none"> <li>• Concept of eco-system,</li> <li>• Fundamental of eco-logy and ecosystem,</li> <li>• Components of ecosystem,</li> <li>• Food chain, food web, trophic levels, energy flow, cycling of nutrients,</li> <li>• Major ecosystem types (forest, grassland, and aquatic eco-system).</li> </ul>
UNIT 2	<p><b>Air pollution:</b></p> <ul style="list-style-type: none"> <li>• Atmospheric composition</li> <li>• Classification of air pollutants,</li> <li>• Source and effect of pollutants —green house effect, global warming, ozone depletion, atmospheric stability and temperature inversion etc.</li> <li>• Ambient air quality standards.</li> <li>• Architectural measures for reducing air pollution.</li> </ul>
UNIT 3	<p><b>Water pollution:</b></p> <ul style="list-style-type: none"> <li>• Hydrosphere, Natural water</li> <li>• Classification of water pollutants, trace elements, contamination of water,</li> <li>• Sources and effects of water pollution, types of pollutants</li> <li>• Determination and significance of DO, BOD and COD in waste water.</li> <li>• Eutrophication, methods and equipments used in waste water treatment (Preliminary, secondary and tertiary)</li> <li>• Architectural measures for reducing water pollution.</li> </ul>
UNIT 4	<p><b>Land and noise pollution:</b></p> <ul style="list-style-type: none"> <li>• Lithosphere,</li> <li>• Pollutants (agricultural, industrial, urban waste, hazardous waste)— their origin and effect.</li> <li>• Collection of solid waste, solid waste management, recycling and reduction of solid waste and their disposal techniques (open dumping, sanitary land filling, thermal, composting).</li> <li>• Noise pollution — definitions and causes.</li> <li>• Sources, effects, standards and control measures.</li> <li>• Architectural measures for reducing land and noise pollution.</li> </ul>
UNIT 5	<p><b>Ecofriendly Architecture:</b></p> <ul style="list-style-type: none"> <li>• Urban ecosystem and rural ecosystems</li> <li>• Inter-relationship of manmade development with eco-processes.</li> <li>• Ecofriendly materials,</li> <li>• Ecofriendly energy systems.</li> <li>• Works of various architects who have worked in the field of eco-friendly architecture.</li> </ul>

Note:

Sessionals will be in the form of drawings and models along with technical report for the subject dealt with. The evaluation should be done in intermediate reviews. There could be regular site visits to understand the ecosystems and eco-friendly architecture.

References:

1. Miller T.G. Jr., Environmental Sciences, Wadsworth Publishing Co. (TB)
2. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.
3. Hawkins.R.E, Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
4. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
5. McKinney, M.L & Schoch, R.M. 1996. Environmental Science System & Solutions, Web enhanced edition. 639p.
6. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol I and II, Enviro Media ( R ).

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		L	T	P	ESE	FE / SE	TA		
1221	<b>Architectural Design II (Basic Design and Visual Arts) Studio</b>	0	0	6	50	0	0	50	3

The subject is a lab (studio) oriented subject and hence, the syllabus as specified in Architectural Design II (Basic Design and Visual Arts) (1211) will be the same. The works done as sessionals will be evaluated by internal and external examiners at the end semester examination. For conduction of the practical (viva-voce) examination one external and one internal examiner may be appointed for a group of 15-20 students.



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		L	T	P	ESE	FE / SE	TA		
1222	<b>Building Construction and Technology-II Studio</b>	0	0	3	25	0	0	25	2

The subject is a lab (studio) oriented subject and hence, the syllabus as specified in Building Construction and Technology-II (1212) will be the same. The works done as sessionals will be evaluated by internal and external examiners at the end semester examination. For conduction of the practical (viva-voce) examination one external and one internal examiner may be appointed for a group of 15-20 students.

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		L	T	P	ESE	FE / SE	TA		
1224	<b>Architectural Graphics Skills-II Studio</b>	0	0	3	25	0	0	25	2

The subject is a lab (studio) oriented subject and hence, the syllabus as specified in Architectural Graphics Skills-II (1214) will be the same. The works done as sessionals will be evaluated by internal and external examiners at the end semester examination. For conduction of the practical (viva-voce) examination one external and one internal examiner may be appointed for a group of 15-20 students.

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		L	T	P	ESE	FE / SE	TA		
1227	<b>Workshop Practice and Site Exposure-II</b>	0	0	2	0	0	20	20	1

The aim of the subject is to introduce to the students to the various tools used in painting and polishing, plumbing, metal work, electrical wiring etc. and get a reasonable skill in handling the materials and tools there off. The workshop should be directed to impart first hand experiences to students in construction of buildings like – preparing layouts for sites, marking for foundations, use of pipe level, spirit levels, plumb-bob, etc. Firsthand experience of plastering, casting concrete, etc.

Sessionals given in building construction also could be given as model making.

Model making of design problems introduced into the class.

**Painting and polishing:** Preparation of timber and metal surfaces, priming, painting by brush, spray, guns, polishing of timber surfaces, lamination to timber surfaces.

**Plumbing:** Introduction to various pipes and fittings, screwed joints, threads, bending and plumbers tools. Fixing of fixtures like traps, taps, wash basins, urinals, W.C., showers etc.

**Metal work:** Cutting, bending and jointing of (ferrous/non ferrous metals) sheets, flats, bars, wires etc.

**Electrical Wiring:** Basic electrical wiring systems like fitting of lights, geysers, one-way and two-way switches, regulators. MCB and electrical distribution system, earthing. Use of ammeters and voltmeters.

**Model making of design studio.** Making of models with detailing.

Note:

1. Site visits relating to the various works may be carried out for better exposure to the students.
2. Sessionals will be in the form of different jobs /projects in each trade and models prepared by students and the same will be subjected to internal examination.

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		L	T	P	ESE	FE / SE	TA		
1228	<b>Discipline</b>	–	–	–	–	–	20	20	1

The marks of this subject are based on the yearly performance, behavior, conduct, active participation, discipline and attendance of the students.