PROPOSED CURRICULUM AND SYLLBUS FOR
DIPLOMA COURSE IN
ARCHITECTURE

SYLLABUS
(FOURTH SEMESTER)

WEST BENGAL STATE COUNCIL OF TECHNICAL EDUCATION

PREPARED BY:
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DIBYENDU BIKASH BHATTACHARYA, WOMEN’S POLYTECHNIC CHANDERNAGORE
MOUSUMI GUPTA, WOMEN’S POLYTECHNIC CHANDERNAGORE
SHARMISTHA DAS, SILIGURI GOVT. POLYTECHNIC
DR. SUCHANDRA BARDHAN, ASSOCIATE PROFESSOR, JADAVPUR UNIVERSITY
ARCHITECT SUBRATA GHOSH, INTEGRATED INFRASTRUCTURE SOLUTIONS, KOLKATA
DESIGN OF STRUCTURES — I

Subject Code: ARCH 4 / T1 / DOS1
Course offered in: Fourth Semester
Duration: 17 weeks
3 lecture contact periods per week
Full Marks: 100

OBJECTIVE
On satisfactory completion of the course, the students will:

(i) understand different types of load on structures;
(ii) have an idea of the working stress and limit state methods of design;
(iii) understand the specific use of steel in the field of structural construction, and, be able to solve simple design problems of steel beams, steel columns and steel column bases;
(iv) understand the specific use of timber in the field of structural construction, and be able to design simple timber beams and posts;
(v) have an idea regarding different types of rivets and riveted joints and be able to design simple riveted connections;
(vi) have an idea regarding different types of welds and their symbols and be able to design typical weld connections.

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Contact Periods: 45
Internal Assessment: 6
Total Periods: 51

EXAMINATION SCHEME

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D E T A I L   C O U R S E   C O N T E N T

GROUP – A
1.0 GENERAL CONCEPTS OF LOADS ON STRUCTURES
1.1 Introduction to IS : 875, 1987
1.2 Different TYPES OF LOADS: Dead, Super-Imposed, Live, Wind, Seismic and Moving
1.3 METHODS OF DESIGN: Working Stress and Limit State Methods with introduction to material behaviour

GROUP – B
2.0 STEEL DESIGN
2.1 Specific use of steel in the field of structural construction
2.2 PERMISSIBLE STRESS IN STEEL: Permissible stresses in flexure, shear, direct tension and compression
2.3 DESIGN OF STEEL BEAMS: Rolled Steel Beams in flexure and shear for a given span with the compression flange fully restrained against lateral buckling and without any restraining, checks — Reference to steel table in SP: 6 (1) — Simple problems
2.4 DESIGN OF STEEL COLUMNS: Slenderness ratio, effective length, permissible stress, design of axially loaded columns using I-section with or without cover plates — Design of column section for axial load and uniaxial bending with compression flange partially or fully restrained against lateral buckling — Steps using trial & error method for design — Simple problems
2.5 DESIGN OF STEEL COLUMN BASE: Design of axially loaded steel column base (slab base) subjected to axial load— Simple problems

GROUP – C
3.0 RIVETED CONNECTIONS
3.1 Types of rivets and riveted joints
3.2 Failure of rivets — Calculation of rivet value — Efficiency of joint
3.3 Design of simple riveted connections
3.4 Simple problems

4.0 WELDED CONNECTIONS
4.1 Types of weld and their symbols
4.2 Throat thickness — Size of weld — Length of weld
4.3 Simple problems

REFERENCE BOOK
1. CODE OF PRACTICE FOR GENERAL CONSTRUCTION IN STEEL (SECOND REVISION) [IS : 800 – 1984] / Bureau of Indian Standards
2. IS 875: 1987/ Bureau of Indian Standards
5. DESIGN OF STEEL STRUCTURES / V. N. Vazirani & M. M. Rathwani / Khanna Publishers, Delhi
6. DESIGN OF STEEL STRUCTURES / RAM CHANDRA / Standard Book House, New Delhi

HISTORY OF ARCHITECTURE — II

Subject Code: ARCH / 4 / T2 / HOA2
Course offered in: Fourth Semester
Duration: 17 weeks
4 lecture contact periods per week
Full Marks: 100

OBJECTIVE
On satisfactory completion of the course, the students should be in a position to understand the typical features of the:
(i) Architecture of ancient Indus Valley Civilization and Vedic Culture;
(ii) Stupa Architecture in India;
(iii) Rock-cut architecture in India from the Pillars through the Early Rock-cut, the Hinayana, the Orissan Group (Jain), the Mahayana to the Final Brahminical phases;
(iv) evolution of temple architecture of southern India (Dravidian style) pertaining to the Pallava, Chola, Pandya, Vijaynagar and Madura dynasties;
(v) evolution of temple architecture of northern India (Indo-Aryan style) pertaining to the Orissa & Khajuraho groups, the provincial style of Bengal and, the Jain temples;
(vi) Islamic architecture in India pertaining to the architecture of Delhi or Imperial style (through the Slave, Tughlaq and Sayyid & Lodi Dynasties); the architecture of Sher-Shah-Sur, provincial style of Bengal and that of the Mughal period (through the sandstone & marble phase)

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CONTACT PERIODS: 60  INTERNAL ASSESSMENT: 8  TOTAL PERIODS: 68
Module 1  ARCHITECTURE OF THE INDUS VALLEY CIVILIZATION  2
Prominent features of town planning: straight streets at right angles, main thoroughfare & principal buildings oriented towards cardinal points, public services system — Burnt-brick laid in mud-mortar in ‘English Bond’ — No instance of true arch: openings spanned by wooden lintels — Study of the (a) CITY OF MOHEN-JO-DARO with reference to the GREAT BATH, MOHEN-JO-DARO; (b) GRANARY, HARAPPAN

Module 2  ARCHITECTURE OF THE VEDIC CULTURE  1
Outcome of migration: unrelated to the Indus Valley Civilization — Elementary type of forest dwelling leading to TIMBER CONSTRUCTION — GRAMA (little collection of huts) protected by bamboo railing: THABA (post), SUCHI (needle), GAMADVARA (entrance), TORANA (gateway)

Module 3  STUPA ARCHITECTURE  2
Supreme sacred monument of Buddhism — Basic form: solid domical mound crowned by an chhatra (umbrella) — More monumental stupas: surrounded by vedika (railing) with toranas (gateways) at cardinal points — Detailed study of the GREAT STUPA (STUPA 1), SANCHI

Module 4  ROCK-CUT ARCHITECTURE  10
4.1 PILLARS: Plain unornamented circular shaft — campaniform capital — circular abacus with animal motif — Study of the LION CAPITAL, SARNATH, UTTAR PRADESH
4.2 EARLY ROCK-CUT ARCHITECTURE: Simple woodwork imitating forms — Study of the LOMASH RISHI CAVES, BARABAR HILLS, BIHAR
4.3 HINAYANA PHASE: Necessity of monasteries suitable for congregational worship, forbiddance of worship of Buddha’s image - leading to - Chaitanyakha & Vihara hewn out of rock, introduction of symbolic forms — translation of carpentry forms into stones, horseshoe-arch-gable — Study of the CHAITYA HALL, KARLI
4.4 ORISSA GROUP (JAIN): Monastic retreat only without any chaitya or stupa — semicircular arches with simple brackets — Study of the RANI GUMPHA, UDAYAGIRI
4.5 MAHAYANA PHASE: Influence of Hinduism — introduction of image — change in disposition of inner most cells of Vihara serving as monastery as well as sanctuary — Study of the AJANTA CAVE No. 9
4.6 FINAL PHASE (BRAHMINICAL): Gradual elaboration of interior from primitive singular cell to isolated cell with ambulatory – culmination in emulation of structural temple – Study of the KAILASA TEMPLES, ELLORA

Module 5  EARLIEST TEMPLES  2
Roof suggesting timber & thatch origin – later addition of tower & pillared porch – square shaft with ‘cushion’ capital — lack of proportion — Study of the LAH KHAN TEMPLE, AIHOLE — Evolution of structured temple – VIMANA (shrine) with SIKHARA (tower), GARbhAGRIHA (sanctum), MANDAPA (assembly hall), ANTARALA (vestibule), PRAkasha PASHA (ambulatory) — Two main styles: DRAVIDIAN & INDO-ARYAN

Module 6  TEMPLE ARCHITECTURE OF SOUTHERN INDIA (DRAVIDIAN STYLE)  6
6.1 PALLAVA: Origin from rock-cut architecture – mandapa or pillared hall with a cell — Study of the monolithic RATHAS, MAMALLAPURAM
6.2 CHOLA: Simplicity in treatment — lofty vimana — pillared mandapa aligned axially within walled enclosure – ‘kalasa’ capital replacing Pallava Lion capital
6.3 PANDYA: Concentric walls enclosing prakarana (open courtyards) – introduction of gopuram (temple portal)
6.4 VRIJNAGAR: Elaboration in ceremony — addition of Amman shrine & ‘Kalyan’ mandapa
6.5 MADURA: Two main temple formations: (a) inner flat-roofed courtyard with vimana thrusting above, and, (b) outer open courtyard – rectangular plan enclosed within high boundary wall with series of gopuram – interior pillars with foliated or gryphon brackets – Study of the SUNDARESWAR & MEENAKSHI TEMPLE, MADURA

Module 7 TEMPLE ARCHITECTURE OF NORTHERN INDIA (INDO-ARYAN STYLE) 15
7.1 ORISSA GROUP: Separate nomenclature (Rekha Deul, Pida Deul, Jagamohan, Rahapaga, Pista etc.) – Wall enclosing axially aligned structures without pillars – interiors devoid of ornamentations – exteriors decorated with figure sculptures – Study of the LINGARAJA TEMPLE, BHUBANESWARA
7.2 KHAJURAHO GROUP: Elegantly proportioned detached temples without enclosing wall in ‘Latin cross’ plans – separate domical roofs gradually increasing in height grouped centripetally – rich surface ornamentation – Study of the KANDARYA MAHADEVA TEMPLE
7.3 PROVINCIAL STYLES OF BENGAL: Origin in wooden houses & thatched bamboo huts – parabolic roofs and cornices or eaves suitable to drain rainwater – wide & short pillars with arched openings – square panelled terracotta relief – Study of the JOR-BANGLA TEMPLE, BISHNUPUR
7.4 JAIN TEMPLES: Exuberantly curved white marbles on vaulted ceilings surrounded by high enclosing walls of cells, enshrining statues of ‘Jina’ – open portico & vestibule leading to enclosed shrine with octagonal nave – obscured structural consideration – Study of the DILWARA TEMPLE, MOUNT ABU

GROUP C ISLAMIC ARCHITECTURE IN INDIA 22 PERIODS

Module 8 BEGINNING OF ISLAMIC ARCHITECTURE: THE DELHI OR IMPERIAL STYLE 4
Dominated by Persian style — Typical characteristics: Jami Masjid – Tomb – Pointed Arch – Dome – Stalactite corbel – External surface in coloured patterned tile work – Arabesque – Stone grille & Pierced screen — SLAVE DYNASTY: Built from relics of Hindu temple – Study of the QUTB MINAR – TUGHLAQ DYNASTY: Compromise between trabeated & arcuated styles in the form of beam at base of arch – pointed domed ceiling supported on squint arch — SAYYID & LODI DYNASTIES: Two forms of tombs – (a) single storied octagonal tomb surrounded by arched veranda, and, (b) two / three storied square tomb without veranda; both mounted by domes, range of pillared kiosk over parapet.

Module 9 THE BUILDINGS OF SHER SHAH SUR 2
STUDY OF THE TOMB OF SHER SHAH SUR: Grand fulfilment of the Lodi style – harmonious transition from square form of lower storeys to diminishing octagonal forms surmounted by circular base of crowning hemispherical dome with finial

Module 10 PROVINCIAL STYLE OF BENGAL 2
Brick structures necessitating arcuated style – short pillars supporting pointed ‘drop’ arches & vaults in brick – curvilinear form of roof originating from thatched bamboo hut facilitating water drainage – Study of the ADINA MASJID, PANDUA

Module 11 THE MUGHAL PERIOD 14
11.1 EARLIER SANDSTONE PHASE: BABAR & HUMAYUN: Beginning of garden tomb – Study of the HUMAYUN’S TOMB — AKBAR: Style executed in red sandstone with insertion of marble – trabeated construction system with frequent use of four-centred arch giving visual impression of arcuated style – hollow dome – many sided pillars with bracket capital – carving or bold inlay ornamentation with occasional painted design – Study of the FATEHPUR SIKRI with (a) BULAND DARWAJA, (b) JAMI MASJID, and, (c) TOMB OF SALIM CHISTI
11.2 LATER MARBLE PHASE: JAHANGIR: Marked transition from sandstone to marble resulting change in method of decoration – Study of the TOMB OF IT-MAD-ULLAH — SHAJAHAN: Age of marble – fine & restrained moulding – inlaid pattern of decoration in coloured stone – dome assuming Persian bulbous form constricted at neck – system of true double doming – voluted bracket capital & foliated base of pilions – Study of the (a) RED FORT emphasising planning & design of DIWAN-i-AM; and, (b) TAJ MAHAL emphasising on both tomb and garden

REFERENCE BOOKS
3. Islamic Architecture in India / Satish Grover / Galgotia Publishing Company, New Delhi
4. Buddhist and Hindu Architecture in India / Satish Grover / CBS
5. A History of Architecture / Sir Banister Fletcher / Butterworth Heinemann (Hb), CBS (Pb)
OBJECTIVE

On satisfactory completion of the course, the students will:

(i) understand the constituents, properties, defects & curing measures and applications of principal types of concrete, and, non-conventional concretes like pre-cast concrete, pre-stressed concrete, FRC and Ferrocement;

(ii) understand the functions of different building types of building mortars;

(iii) have clear concepts regarding the purpose of the foundation with special reference to different types of shallow foundation;

(iv) have clear concepts regarding the purpose of the plinth and methods of its filling;

(v) understand the causes of dampness to foundations & basements of buildings and methods of prevention from the same;

(vi) understand different methods of spanning of openings using lintels and arches;

(vii) have knowledge regarding different design considerations for a good stair with special reference to the RCC stairs;

(viii) understand the different constructional methodology of water proofing treatment to flat roofs & terraces, parapet wall and window sill in detail.

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CONTACT PERIODS: 45  INTERNAL ASSESSMENT: 6  TOTAL PERIODS: 51

EXAMINATION SCHEME

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DETAIL COURSE CONTENT

GROUP - A MATERIALS  15 PERIODS

1.0 CEMENT CONCRETE

1.1 CONCRETE: Definition


1.3 PROPERTIES OF CONCRETE: Strength – Durability – Water-cement ratio – Workability
1.4 DEFECTS OF CONCRETE and their CURING MEASURES

1.5 PRINCIPAL TYPES OF CONCRETE: Plain Cement Concrete (PCC) & Reinforced Cement Concrete (RCC) — Their advantages & properties

2.0 NON-CONVENTIONAL CONCRETE

Pre-cast concrete – Pre-stressed concrete – FRC – Ferrocement (definitions and applications only)

3.0 BUILDING MORTARS

Classification of mortars on the basis of materials used and their functions: Cement mortar – Lime mortar – Mud mortar – Composite mortars (Lime-Cement mortar, Surki-Lime mortar) – Gypsum mortar

GROUP - B CONSTRUCTION

4.0 FOUNDATION & PLINTH

4.1 FOUNDATION: Definition – Purpose

4.2 CLASSIFICATION OF FOUNDATION: Shallow Foundation & Deep Foundation

4.3 SPREAD FOOTINGS: Wall Footings – Reinforced Concrete Footings – Inverted Arch Footings – Isolated Column Footings — COMBINED FOOTING — MAT OR RAFT FOUNDATION (Concepts with sketches)

4.4 TYPICAL DETAILS OF FOUNDATION: (i) Brick wall foundation & (ii) Isolated RCC column foundation

4.5 PLINTH: Definition – Purpose

4.6 FILLING OF PLINTH: Materials used – Methods of filling – Purpose of filling

5.0 DAMP PROOFING TREATMENT

5.1 DAMPNESS — CAUSES of dampness — DEFECTS caused by dampness

5.2 METHODS OF PREVENTION OF DAMPNESS: Membrane Damp Proofing – Integral Damp Proofing – Surface Treatment – Guniting – Cavity Wall Construction

5.3 DAMP PROOFING TREATMENT TO: (i) Foundation & plinth & (ii) Basement

6.0 SPANNING OF OPENINGS

6.1 Post & Lintel openings — Limitations of material — Arched openings

6.2 LINTEL AND ARCH: Definitions – Typical detail of a masonry window opening showing sill, lintel & chajja projection – Typical detail of an arched opening showing various parts

6.3 TYPES OF LINTEL: Brick lintel — RCC lintel — Precast concrete lintel (with or without chajja)

6.4 TYPES OF ARCHES: Semi-Circular Arches — Segmental Arches — Flat Arches

6.5 RELIEVING ARCHES

7.0 STAIRS

7.1 STAIRS: Definition – Technical terms used in stairs construction

7.2 LOCATION of Stairs

7.3 REQUIREMENT of a good stair

7.4 RISER & TREAD RELATIONSHIP

7.5 CLASSIFICATION of stairs on the basis of their forms

7.6 RCC STAIRS: Advantages of RCC stairs – Design Principle of RCC stairs

7.7 FIXING DETAILS: (i) Balusters (metal & wood) & (ii) Nosing to steps

8.0 WATER PROOFING TREATMENT

8.1 Water proofing treatment to FLAT ROOFS & TERRACES: (a) Grading of Bitumen: Four course treatment – Six course treatment — (b) Grading of other materials: Grading of lime concrete – Grading of lime concrete with tiles – Grading of mud pushka with tiles (brief description with detail sketch)

8.2 Water proofing treatment to PARAPET WALL: Detail of Coping, Drip course / Mould

8.3 Water proofing treatment to WINDOW SILL & CHAJJA: Detail of Drip course / Mould

REFERENCE BOOKS


2. The Construction of Buildings Volume 1, 2, 3, 4 & 5 / R. Barry / English Language Book Society

3. A Text Book of Materials and Construction / TTTI


5. Building Construction / Sushil Kumar / Standards Publishers Distributors, Delhi

BUILDING SERVICES & EQUIPMENTS — II

Subject Code: ARCH / 4 / T4 / BSE2
Course offered in: Fourth Semester
Duration: 17 weeks
Full Marks: 100

OBJECTIVE
On satisfactory completion of the course, the students should be in a position to:

(i) establish the ideas of natural and mechanical ventilation with respect to the orientation of building in order to achieve desirable comfort conditions;
(ii) understand the principles of lighting, daylighting and artificial lighting;
(iii) understand the considerations for the design & planning of an electrical installation in a building with respect to the substation & distribution of supply;
(iv) prepare typical distribution scheme (wiring diagram) in a residential building with separate circuits for lights, fans & power appliances with architectural symbols;
(v) understand the principles of acoustics and establish the constructional measures for sound insulation of buildings;
(vi) understand the design considerations for lift installation;
(vii) understand the general requirements of fire protection with emphasis to the exit requirements.

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CONTACT PERIODS: 45  INTERNAL ASSESSMENT: 6  TOTAL PERIODS: 51

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<td>ONE</td>
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<td></td>
<td>1 X 20 = 20</td>
<td>FOUR</td>
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<td></td>
<td></td>
<td></td>
<td>THREE</td>
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<td></td>
<td></td>
<td></td>
<td>TWO</td>
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<tr>
<td>B</td>
<td>3, 4</td>
<td>7</td>
<td>ANY FIVE, TAKING</td>
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<td></td>
<td></td>
<td>AT LEAST ONE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FROM EACH GROUP</td>
</tr>
<tr>
<td>C</td>
<td>5, 6</td>
<td>8</td>
<td>TEN</td>
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<tr>
<td></td>
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<td>10 X 5 = 50</td>
</tr>
</tbody>
</table>

DETAILED COURSE CONTENT

GROUP - A  16 PERIODS

Module 1  VENTILATION

1.1 ORIENTATION OF BUILDING  1
CLIMATE & WEATHER — BASIC CLIMATIC ZONES: Hot & Arid, Hot / Warm & Humid, Cold — CLIMATIC FACTORS: Solar Radiation & Temperature, Clouds, Relative Humidity, Prevailing wind; measuring instruments and SI units— ASPECTS OF DAYLIGHTING — PLANTATION OF TREES.

1.2 COMFORT: THE DESIRABLE CONDITIONS

REQUIREMENT OF VENTILATION — HEAT BALANCE OF BODY: Fanger’s comfort equation — AIR CHANGE PER HOUR — RECOMMENDED VALUES OF AIR CHANGES for 'bed rooms/ living rooms', 'bath rooms/ toilets', 'cafes/ restaurants', 'cinemas/ theatres (non-smoking)', 'class rooms', 'garages', 'hospital wards', 'kitchens (common)', 'kitchens (domestic)', 'laboratories' and 'offices' [values only]— METHODS OF VENTILATION.

1.3 NATURAL VENTILATION

WIND ACTION: $Q = KAV$ — STACK EFFECT: $Q = 7.0A \sqrt{h (t_1 - t_0)}$ — CROSS-VENTILATION — POSITION OF OPENINGS — SIZE OF OPENINGS — CONTROL OF OPENINGS: sashes, canopies, louvers — WIND SHADOW — HUMIDITY CONTROL: wind scoop

1.4 MECHANICAL VENTILATION

FAN: propeller & centrifugal — INSTALLATION OF FANS: local & central — SYSTEMS OF VENTILATION: exhaust, plenum (positive ventilation) & combined — MECHANICAL COOLING (HEAT- PUMP CIRCUIT): refrigerant, compressor, condenser, pressure release valve, evaporator — REFRIGERATOR & AIR COOLER — TON OF REFRIGERATION — SIMPLE AIR-CONDITIONER: propelling, filtering, washing, humidifying, cooling, dehumidifying, heating or re-heating

Module 2 — LIGHTING

2.1 PRINCIPLES OF LIGHTING

AIMS OF GOOD LIGHTING and realization of the same — PLANNING THE BRIGHTNESS PATTERN considering the VISUAL TASK, the immediate background of the task (CENTRAL FIELD & VISUAL FIELD) and the general surroundings (PERIPHERAL FIELD) — GLARE: direct, reflected & veiling — RECOMMENDED VALUES OF ILLUMINATION LEVEL for 'homes', 'restaurants', 'cinemas', 'theatres', 'schools & colleges', 'hospitals', 'offices' [values only].

2.2 DAYLIGHTING

SOURCES OF LIGHT OF A POINT INSIDE A BUILDING: skylight, externally reflected light, internally reflected light, direct sunlight — WORKING PLANE — DAYLIGHT FACTOR

2.3 ARTIFICIAL LIGHTING

NECESSITY OF ARTIFICIAL LIGHTING — SELECTION OF LIGHT SOURCES & LUMINAIRES depending on general lighting, direct lighting, localized or local lighting — TYPES OF LUMINAIRES: Incandescent & Fluorescent — ARRANGEMENT OF LUMINAIRES.

GROUP - B

Module 3 — ELECTRICAL INSTALLATION

3.1 CONSIDERATIONS FOR DESIGN & PLANNING OF AN ELECTRICAL INSTALLATION

3.2 SUBSTATION

LOCATION — LAYOUT — ROOM / SPACES required for supply company’s switchgear room, high voltage switchgear room (HT), transformer room, low voltage switchgear room (LT), standby generator room.

3.3 DISTRIBUTION OF SUPPLY

IDEA REGARDING SOME ACCESSORIES: cables – cleat; circuit – circuit breaker; fuse – fuse-element – fuse-switch; distribution board; energy meters; switch – switchboard; socket-outlet – schedule of socket-outlets in a residential building — MARKING OF APPARATUS for three-wire three-phase wiring (AC & DC) — VOLTAGE & FREQUENCY OF SUPPLY (values only).

3.4 ARCHITECTURAL SYMBOLS FOR ELECTRICAL INSTALLATION IN BUILDINGS


Module 4 — ACOUSTICS, SOUND INSULATION AND NOISE CONTROL

4.1 NOISE & TRANSMISSION OF SOUND

AUDIBLE RANGE OF SOUND — EFFECTS OF NOISE — NOISE IN FREE FIELD: effect of wind velocity & temperature gradient, acoustic shadow & diffraction at respectively high & low frequencies — INCIDENCE
4.2 **NOISE CONTROL**

**DISTANCING & SCREENING** — **SOUND ABSORBENTS:** porous absorbents, membrane absorbents, resonant absorbers (Helmholz resonators), perforated panel absorbents — **ACCEPTABLE INDOOR NOISE LEVELS** for ‘apartments, hotels & homes’, ‘restaurants’, ‘hospitals & cinema theatres’, ‘class rooms’, ‘conference rooms, small offices & libraries’, ‘large public offices, banks & stores’ [values only].

4.3 **CONSTRUCTIONAL MEASURES FOR SOUND INSULATION OF BUILDINGS**

**HOLLOW & COMPOSITE WALL CONSTRUCTION** — **SOUND INSULATION OF FLOORS & CEILINGS:** Using a resilient surface material on floors; Providing a floating floor construction — (a) Concrete floors, (b) Wooden Floors; Using a suspended ceiling with air-space — **SOUND INSULATION OF SKIRTING** — **TREATMENT OF WINDOWS & VENTILATORS**

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**GROUP - C**

**Module 5 INSTALLATION OF LIFTS**

5.1 **LIFT: ESSENTIAL PARTS**


5.2 **CLASSIFICATION OF LIFT**

Passenger Lift – Goods Lift – Hospital Lift – Service Lift (Dumb waiter) – Fireman’s Lift

5.3 **DESIGN CONSIDERATIONS**

**NUMBER OF LIFTS & CAPACITY:** Occupant load, Quantity of service, Quality of service, Car speed — **POSITIONING OF LIFTS** — **SHAPE & SIZE OF LIFT CAR** — **ACCESS TO MACHINE ROOM & LIFT PITS** — **SAFETY MEASURES**

5.4 **INFORMATION TO BE PROVIDED IN DRAWING(S)**

**Module 6 FIRE PROTECTION**

6.1 **GENERAL CLASSIFICATION OF BUILDINGS BASED ON OCCUPANCY**

Criteria of Fire Resistance — Combustible Material — OCCUPANCY or Use Group — TYPES OF CONSTRUCTION

6.2 **GENERAL REQUIREMENTS OF FIRE PROTECTION**

**MAXIMUM HEIGHT — FAR — OPEN SPACES:** additional provisions for high rise buildings, MIXED OCCUPANCY — **FIRE WALL, FIRE STOP OR ENCLOSURE** of all openings — **AUTOMATIC FIRE DETECTION & ALARM SYSTEM** — **FIXED FIRE FIGHTING INSTALLATIONS/ REQUIREMENTS** for A, B & C occupancy buildings: Wet riser, Wet riser-cum-downcomer, Automatic sprinkler installation, Static reservoir, Dry riser.

6.3 **EXIT REQUIREMENTS**

**TYPES OF FIRE EXITS** — **GENERAL EXIT REQUIREMENTS** — OCCUPANT LOAD — CAPACITY OF EXITS — ARRANGEMENT OF EXITS: travel distance — **DOORWAYS** — **CORRIDORS & PASSAGeways** — **INTERNAL STAIRCASES** — **FIRE ESCAPES OR EXTERNAL STAIRS** — **ROOF EXIT** — **HORIZONTAL EXITS** — **FIRE TOWER** — **RAMPS**

**REFERENCE BOOKS**

1. SP 7 (4) : 2005 NATIONAL BUILDING CODE OF INDIA GROUP 4 — PART VIII BUILDING SERVICES / Bureau Of Indian Standards
SESSIONAL COURSES OFFERED IN 4TH SEMESTER, PART - II

DEVELOPMENT OF LIFE SKILLS – II

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Course offered in</th>
<th>Course Duration</th>
<th>2 lecture contact periods per week</th>
<th>Full Marks</th>
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<tbody>
<tr>
<td>ARCH / 4 / S1 / DLS2</td>
<td>Fourth Semester</td>
<td>17 weeks</td>
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NOTE: SYLLABUS CONTENTS SIMILAR TO OTHER DISCIPLINES.

AUTO CAD LAB

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Course offered in</th>
<th>Full Marks</th>
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<tr>
<td>ARCH / 3 &amp; 4 / S2 / ACAD</td>
<td>Part – II</td>
<td>100</td>
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OBJECTIVE

AutoCAD, developed by the AutoDesk Inc., is the most popular PC-CAD system available in the market. Over one million people in 80 countries around the world use AutoCAD to generate various kinds of drawings. In 1997 the market share of AutoCAD grew to 78%, making it the worldwide standard for generating drawings. Also, AutoCAD’s open architecture has allowed third-party developers to write application software that has significantly added to its popularity. This course is compatible to the latest version of AutoCAD.

On satisfactory completion of the course AutoCAD Lab (Group – A), the students should be in a position to solve two dimensional drafting and design problems by being able to use AutoCAD commands to make a drawing, create text, dimension a drawing, hatch patterns and make & insert symbols. They will also be able to plot drawings.

On satisfactory completion of the course AutoCAD Lab (Group – B), the students should be in a position to draw isometric drawings, create three-dimensional objects & solid models and render the same, view the solids thus created from changing positions, and, will be able to establish link with other application software to embed objects into it.

COURSE & EXAMINATION SCHEDULE

<table>
<thead>
<tr>
<th>NAME OF THE COURSES</th>
<th>COURSES OFFERED IN</th>
<th>MARKS ALLOTMENT</th>
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<tbody>
<tr>
<td>AutoCAD LAB (GROUP – A)</td>
<td>Third Semester</td>
<td>Continuous Internal Assessment of 50 Marks is to be carried out by the teachers throughout the two semesters where marks allotted for assessment of sessional work undertaken in each semester is 50. DISTRIBUTION OF MARKS: FIRST SEM. – LAB. NOTEBOOK -25 SECOND SEM. – LAB. NOTEBOOK 25</td>
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<tr>
<td>AutoCAD LAB (GROUP – B)</td>
<td>Fourth Semester</td>
<td>External Assessment of 50 Marks shall be held at the end of the second semester on the entire syllabus of AutoCAD lab (Parts – A &amp; B). One assignment per student from any one of the assignments done is to be performed. Assignments are to be set by lottery system. DISTRIBUTION OF MARKS:LAB. NOTEBOOK–20; ON SPOT JOB–20; VIVA-VOCE –10.</td>
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AUTO CAD LAB (GROUP – B)

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<th>Course offered in</th>
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<td>Fourth Semester</td>
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MODULAR DIVISION OF THE SYLLABUS

<table>
<thead>
<tr>
<th>MODULE</th>
<th>TOPIC</th>
<th>CONTACT PERIODS</th>
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<tbody>
<tr>
<td>1</td>
<td>VIEWPORTS &amp; MODEL SETTING</td>
<td>Lecture 3</td>
</tr>
<tr>
<td>2</td>
<td>DRAWING 3D SURFACES</td>
<td>Session 6</td>
</tr>
<tr>
<td>3</td>
<td>3D VIEWS</td>
<td>Lecture 4</td>
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<tr>
<td>4</td>
<td>SOLID MODELLING</td>
<td>Session 6</td>
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<tr>
<td>5</td>
<td>SOLID EDITING</td>
<td>Lecture 3</td>
</tr>
<tr>
<td>6</td>
<td>USER CO-ORDINATE SYSTEM</td>
<td>Session 4</td>
</tr>
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<td>7</td>
<td>OBJECT LINKING AND EMBEDDING</td>
<td>Lecture 4</td>
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<tr>
<td>8</td>
<td>RENDERING</td>
<td>Session 4</td>
</tr>
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</table>

CONTACT PERIODS: L-30 & S-45 = 75

INTERNAL ASSESSMENT: 10
TOTAL PERIODS: 85

DETAIL COURSE CONTENT

Module 1  VIEWPORTS & MODEL SETTING  3 LECTURE & 6 SESSIONAL PERIODS
Model Space Viewports – Displaying viewports as tiled areas: VPORTS command – Making a viewport current – Joining two adjacent viewports – Model space: MSPACE command – Paper space: PSPACE command – Editing the viewports: Controlling the display of the objects in the viewport, Locking the display in the viewports, Controlling the display of the hidden lines in the viewports, Clipping the existing viewports – PAGESETUP command – MVSETUP command

Module 2  DRAWING 3D SURFACES  4 LECTURE & 6 SESSIONAL PERIODS

Module 3  3D VIEWS  4 LECTURE & 6 SESSIONAL PERIODS
VPOINT command – Plan View – Top – Bottom – Left – Right – Front – Back – 3D Orbit

Module 4  SOLID MODELLING  4 LECTURE & 6 SESSIONAL PERIODS
About solid modelling – Predefined solid primitives – Creating solid objects: BOX, CONE, CYLINDER, SPHERE, TORUS, WEDGE commands – Constructing a Region: Creating a 2D Region: REGION command – Subtracting Regions: SUBTRACT command – Creating an extruded solid: EXTRUDE command

Module 5  SOLID EDITING  3 LECTURE & 6 SESSIONAL PERIODS
Constructing a composite solid: UNION, SUBTRACT, INTERSECT, REVOLVE, FILLET, CHAMFER commands – Slicing solids: SLICE, SECTION commands

Module 6  USER CO-ORDINATE SYSTEM  4 LECTURE & 4 SESSIONAL PERIODS
World Co-ordinate System (WCS) – User Co-ordinate System (UCS) – UCSICON command – UCS command

Module 7  OBJECT LINKING AND EMBEDDING  4 LECTURE & 4 SESSIONAL PERIODS
OLE feature – Clipboard – Object Embedding: COPYCLIP command – Linking objects: COPYLINK command

Module 8  RENDERING  4 LECTURE & 6 SESSIONAL PERIODS
Rendering – Loading and unloading AutoCAD Render – Elementary Rendering – Selecting different properties for rendering: Rendering type, Rendering option, Rendering procedures, Destination, Sub sampling, Background, Fog / Depth cue – Inserting and modifying lights – Defining and rendering a scene – Attaching and detaching materials – Saving a Rendering

REFERENCE BOOKS / CD
1. AutoCAD 14 for Windows – Bible (with Applications) / Sham Tickoo / Galgotia Publications pvt. Ltd.
2. Advanced AutoCAD / Robert M. Thomas / Sybex BPD
3. AutoCAD Part – 1 & 2: Banglay Prokashito Tutorial / CD Media / Sonolite, 55, Elliot Rd, Kolkata – 16
ARCHITECTURAL GRAPHICS

Subject Code: ARCH / 3 & 4 / S3 / SAGR
Course offered in: Part – II
Course Duration: 34 weeks
4 sessional & 1 tutorial contact periods per week
Full Marks: 250

OBJECTIVE
On satisfactory completion of the course, the students will be able to: —
(i) understand the Basic Principles of Sciography;
(ii) draw sciography on the orthographic projections of three dimensional objects like right regular solids, buildings etc.;
(iii) understand the Basic Principles of Perspective Projection;
(iv) draw one & two point perspective projections of simple interior spaces like a living room, an office interior, a kitchen, a toilet etc with sciography showing all furniture & fixtures;
(v) draw two point perspective projections of exteriors of buildings showing landscaping elements, cars and human figures.

MODULAR DIVISION OF THE SYLLABUS

<table>
<thead>
<tr>
<th>GROUP</th>
<th>MODULE</th>
<th>TOPIC</th>
<th>CONTACT PERIODS</th>
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<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>BASIC PRINCIPLES OF SCIOGRAPHY</td>
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<tr>
<td></td>
<td>2</td>
<td>ORTHOGRAPHIC PROJECTIONS OF POINTS AND STRAIGHT LINES WITH SCIOGRAPHY</td>
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<td>3</td>
<td>ORTHOGRAPHIC PROJECTIONS OF LAMINA WITH SCIOGRAPHY</td>
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<td>4</td>
<td>ORTHOGRAPHIC PROJECTIONS OF RIGHT REGULAR SOLIDS WITH SCIOGRAPHY</td>
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<td>5</td>
<td>ORTHOGRAPHIC PROJECTIONS OF BUILDINGS WITH SCIOGRAPHY</td>
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<td>B</td>
<td>6</td>
<td>BASIC PRINCIPLES OF PERSPECTIVE PROJECTION</td>
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<td>7</td>
<td>TWO-POINT PERSPECTIVE PROJECTIONS OF SIMPLE RIGHT REGULAR SOLIDS</td>
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<td>C</td>
<td>8</td>
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<td>9</td>
<td>TWO-POINT PERSPECTIVE PROJECTIONS OF COMBINATION OF SOLIDS</td>
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<td>D</td>
<td>10</td>
<td>ONE-POINT PERSPECTIVE PROJECTION OF INTERIORS</td>
<td>8</td>
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<td></td>
<td>11</td>
<td>TWO-POINT PERSPECTIVE PROJECTIONS OF INTERIORS</td>
<td>8</td>
</tr>
<tr>
<td>E</td>
<td>12</td>
<td>PERSPECTIVE VIEW OF EXTERIORS (for Architecture only)</td>
<td>20</td>
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<tr>
<td></td>
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<td>OR PERSPECTIVE VIEW OF INTERIORS (for Interior Decoration, Handicrafts &amp; Furniture Design only)</td>
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<tr>
<td>F</td>
<td>13</td>
<td>TUTORIAL FOR 3RD SEMESTER</td>
<td>15</td>
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<td>TUTORIAL FOR 4TH SEMESTER</td>
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CONTACT PERIODS: 150
INTERNAL ASSESSMENT: 20 PERIODS
TOTAL PERIODS: 170

COURSE & EXAMINATION SCHEDULE

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<th>SUBJECT CODE</th>
<th>NAME OF THE COURSES</th>
<th>COURSES OFFERED IN</th>
<th>MARKS ALLOTTED</th>
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<td>ARCH / 3 &amp; 4 / S3 / SAGR</td>
<td>Architectural Graphics (S) (Group – A)</td>
<td>Third Semester</td>
<td>Continuous internal assessment of 75 marks is to be carried out by the teachers throughout the two semesters where marks allotted for assessment of sessional work undertaken in 3rd semester is 35 &amp; 4th semester is 40. External assessment of 75 marks shall be held at the end of the Part – II Second Semester on the entire syllabus of Architectural Graphics (Parts – A &amp; B). DISTRIBUTION OF MARKS: DRAWING SHEETS – 50, VIVA-VOCE – 25.</td>
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<tr>
<td>ARCH / 4 / TS / AGR</td>
<td>Architectural Graphics</td>
<td>Fourth Semester</td>
<td>A four-hour examination of 100 marks will be held during the Part – II Second Semester examinations on the entire syllabus.</td>
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## Scheme for the Four Hour Fourth Semester Examination

<table>
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<tr>
<th>Group</th>
<th>Module</th>
<th>Objective Questions</th>
<th>Subjective Questions</th>
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<td>To Be Answered</td>
</tr>
<tr>
<td>A</td>
<td>1, 2, 3, 4, 5</td>
<td>For 9 Marks</td>
<td>For 1 or 2 Marks</td>
</tr>
<tr>
<td>B &amp; C</td>
<td>6, 7, 8, 9</td>
<td>For 8 Marks</td>
<td>For 20 Marks</td>
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<tr>
<td>D</td>
<td>10, 11, 12</td>
<td>For 4 Marks</td>
<td>—</td>
</tr>
<tr>
<td>E</td>
<td>13</td>
<td>For 4 Marks</td>
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</table>

## Detail Course Contents

**Module 8 Two-Point Perspective Projections of Combination of Solids**  
Any two or three solids mentioned above in combination, the solids being positioned concentrically and in isolation.

**Module 9 Two-Point Perspective Projections of Combination of Solids with Sciography**  
Sciography on any two or three solids mentioned above in combination, the solids being positioned concentrically and in isolation.

### Group – C Perspective Projections of Interiors 16 Periods

**Module 10 One-Point Perspective Projections of Interiors**  
At least one projection of a simple interior space* showing all furniture and fixtures.

**Module 11 Two-Point Perspective Projections of Interiors**  
At least one projection of a simple interior space* showing all furniture and fixtures.

*N.B. The interior spaces (Modules – 10 & 11) may be living room, a bedroom, a kitchen, a toilet etc. Two different interior spaces should be dealt with in the two different projections mentioned above. Necessary plans(s), elevation(s), section(s) etc. shall be provided by the teacher concerned.

### Group – D Perspective View 20 Periods

**Module 12 Perspective View of Exteriors (for Architecture only)**

(a) A two-point perspective projection of the exterior of any one building designed by the student in the subject ARCHITECTURAL DESIGN & DRAWING – I in Part – II or may be supplied by the teacher concerned.

(b) A perspective view of the above with sciography showing landscaping elements, cars and human figures in a different sheet (opaque/ transparency/ photocopy) in colour.

**OR**

**Perspective View of Interiors (for Interior Decoration, Handicrafts & Furniture Design only)**

(a) A perspective projection of any one interior space designed by the student in the subject INTERIOR DESIGN & DRAWING – I in Part – II or may be supplied by the teacher concerned.

(b) A perspective view of the above showing furniture, fixture & accessories, human figures, interior landscaping elements in a different sheet (opaque/ transparency/ photocopy) in colour.
SCHEDULE OF PLATES

ARCHITECTURAL GRAPHICS (GROUP – B) FOURTH SEMESTER

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<th>SHEET NO.</th>
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<tr>
<td>1.</td>
<td>TWO-POINT PERSPECTIVE PROJECTIONS OF COMBINATION OF SOLIDS based on Module VIII</td>
<td>HALF IMPERIAL</td>
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<td>2.</td>
<td>TWO-POINT PERSPECTIVE PROJECTIONS OF COMBINATION OF SOLIDS WITH SCIOGRAPHY based on Module IX</td>
<td>HALF IMPERIAL</td>
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<td>3.</td>
<td>ONE-POINT PERSPECTIVE PROJECTION OF AN INTERIOR based on Module X</td>
<td>HALF IMPERIAL</td>
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<td>4.</td>
<td>TWO-POINT PERSPECTIVE PROJECTION OF AN INTERIOR based on Module XI</td>
<td>HALF IMPERIAL</td>
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<tr>
<td>5.</td>
<td>TWO-POINT PERSPECTIVE PROJECTION OF A BUILDING based on Module XII (A)</td>
<td>FULL IMPERIAL</td>
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<td>PERSPECTIVE PROJECTION OF AN INTERIOR SPACE based on Module XII (A)</td>
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<td>6.</td>
<td>PERSPECTIVE VIEW OF A BUILDING WITH SCIOGRAPHY &amp; LANDSCAPING ELEMENTS based on Module XII (B) (FOR ARCHITECTURE ONLY)</td>
<td>FULL / HALF IMPERIAL</td>
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<td>PERSPECTIVE VIEW OF AN INTERIOR SPACE based on Module XIII (B)</td>
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<td>(FOR INTERIOR DECORATION, HANDICRAFTS &amp; FURNITURE DESIGN)</td>
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REFERENCE BOOKS

1. Geometrical Drawing for Students / L. H. Morris
2. Manual of Rendering with Pen and Ink / Robert W. Gill / Thames and Hudson
3. Art of Perspective Drawing / Simon Graco

WORKING DRAWING – I

Subject Code
ARCH / 3 & 4 / S4 / SWKD1
Course offered in
Part – II
Full Marks
150

COURSE SCHEDULE

<table>
<thead>
<tr>
<th>NAME OF THE COURSES</th>
<th>COURSES OFFERED IN</th>
<th>MARKS ALLOTTED</th>
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<tbody>
<tr>
<td>Working Drawing – I (Group – A)</td>
<td>Third Semester</td>
<td>Continuous internal assessment of 75 marks is to be carried out by the teachers throughout the two semesters where marks allotted for assessment of sessional work undertaken in 3rd semester is 35 &amp; 4th semester is 40. External assessment of 75 marks shall be held at the end of the Part – II Second semester on the entire syllabi of Working Drawing – I (Groups - A &amp; B). Distribution of marks: Drawing sheets – 50, Viva-voce – 25.</td>
</tr>
<tr>
<td>Working Drawing – I (Group – B)</td>
<td>Fourth Semester</td>
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WORKING DRAWING – I (GROUP – B)

Course offered in
Fourth Semester
Course Duration
17 weeks
4 sessional & 1 Tutorial contact periods per week

OBJECTIVE

On satisfactory completion of Group – B of the course, the students will be in a position to prepare a set of working drawing of a simple double storied load bearing structure drawn manually.
MODULAR DIVISION OF THE SYLLABUS

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<td>GROUND FLOOR PLAN</td>
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<td>FIRST FLOOR PLAN</td>
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CONTACT PERIODS: 75  INTERNAL ASSESSMENT: 10  TOTAL PERIODS: 85

DETAIL COURSE CONTENTS

A set of working drawings in 1:50 scale drawn manually based on a simple double storied load bearing structure. Relevant drawings are to be supplied by teacher.

**Sheet No. 1 Trench Plan**
Showing plot line, width of foundation trench, construction of wall, proper dimensions. Footing detail of steps (in 1:20 scale) from Ground Level to Plinth Level, staircase, toe beam, load bearing brick wall, schedule of windows – same as that of door with addition of sill height.

**Sheet No. 2 Ground Floor Plan**
Showing dimensions of all walls, door & windows, width of flight, tread, landing, number of treads, width of stairwell (if any), inner & outer plaster line, overall dimension.

**Sheet No. 3 First Floor Plan**
Same as above.

**Sheet No. 4 Roof Plan**
Showing ghundi, ridgeline, slope line, position & size of Rain Water Pipe, thickness of parapet wall, roof projection (if any), sectional plan of stair room with its roof projection (if any).

**Sheet No. 5 Elevations**

**Topic A: One Road Side Elevation**

**Topic B: One Lateral Elevation**

Showing Ground Level, Plinth Level, First Floor level, Roof level, Mumpty Room Roof level, Sill & Lintel levels in one storey only, Height of parapet wall – specification of all other non-structural elevational feature.

**Sheet No. 6 Sectional Elevations**
Two sectional elevations through staircase, kitchen, toilet & front window or veranda – showing Ground Level, Plinth Level, First Floor level, Roof level, Entrance to roof, Sills, Lintel, Floor slabs at all levels, Flat Brick Soling, Damp Proof Course, Parapet wall.

ARCHITECTURAL DESIGN & DRAWING - I

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<th>SUBJECT CODE</th>
<th>NAME OF THE COURSES</th>
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<tr>
<td>ARCH / 3 &amp; 4 / S5 / SAD1</td>
<td>Architectural Design &amp; Drawing (S) – I (Group – A)</td>
<td>Third Semester</td>
<td>Continuous internal assessment of 75 marks is to be carried out by the teachers throughout the two semesters where marks allotted for assessment of sessional work undertaken 3rd semester is 35 &amp; in 4th semester is 40. Distribution of</td>
</tr>
</tbody>
</table>
Course offered in
Fourth Semester
Course Duration
17 weeks
4 sessional & 1 Tutorial contact periods
per week

OBJECTIVE
On satisfactory completion of Group – B of the course, the students should be in a position to:

(i) understand the standards of individual units of housing schemes for the EWS, the LIG, MIG and HIG;
(ii) understand the definitions of different parts of a residential apartment building;
(iii) develop the architectural design of a ‘G + 4’ residential apartment building in sketch-wise phases;
(iv) draw the developed architectural design.

MODULAR DIVISION OF THE SYLLABUS

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<th>MODULE</th>
<th>TOPIC</th>
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<tr>
<td></td>
<td>TUTORIALS</td>
<td>15</td>
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CONTACT PERIODS: 75  INTERNAL ASSESSMENT: 10  TOTAL PERIODS: 85

DETAIL COURSE CONTENT

Module 1  STUDY SHEETS OF HOUSING UNITS
Preparing study sheets of individual units of some standard housing designs for Economically Weaker Sections (EWS), Lower Income Groups (LIG), Middle Income Groups (MIG) and Higher Income Groups (HIG).

Module 2  UNDERSTANDING PARTS OF A RESIDENTIAL BUILDING
Definitions of the terms "apartment" and "means of access" as per the CMC bye-laws; definitions of the terms "BUILDING, HEIGHT OF", "CARPET AREA", "HABITABLE ROOM", "LEDGE OR TAND", "LIFT", "LOFT" and "MEZZANINE FLOOR" as per the NBC.

Module 3  ARCHITECTURAL DESIGN
Architectural design of a ‘G + 4’ residential apartment building in sketch-wise phases keeping in mind the provisions of bye-laws regarding “Height Limitations”; and, minimum floor area, minimum width & minimum height of designed spaces.

Module 4  ARCHITECTURAL DRAWING
The design should be presented through a set of architectural drawings in a suitable scale consisting of at least the following sheets:-
(a) site layout showing means of access, approach to the designed building, open parking spaces (if any), planting and landscaping;
(b) plans showing furniture layout, parking spaces (if any), planting and landscaping (wherever applicable);
(c) elevation(s);
(d) minimum two sectional elevations cutting at least the toilet(s), stairs and any other service area (if any).

The drawings should be suitably rendered in pen and ink or colour or any other suitable medium on transparent sheets.