

GUJARAT TECHNOLOGICAL UNIVERSITY

BE-3 SEMESTER – OLD PAPER – S22 TO W25 – QUESTION BANK ANSWER

Subject Name & Code:

BUILDING AND TOWN PLANNING (3130609)

(Disclaimer: The purpose of these AI-generated responses is just education and reference. Utilize them to grasp topics and structure, but always rewrite in your own words and double-check)

UNIT 1 – Introduction to Buildings, Principles of Planning, Orientation, Architectural Composition, BIM

Q.1 – Enlist the principles of architectural composition. (4 marks)

Appeared in: S25 (3m), S23 (4m)

Ans:

- **Unity** – Harmony among all building parts.
- **Balance** – Symmetrical or asymmetrical visual equilibrium.
- **Rhythm** – Repetition of elements (windows, columns).
- **Scale** – Size relationship to human dimensions.
- **Proportion** – Ratio between different parts.
- **Contrast** – Juxtaposition of different elements (light/shadow, colour).
- **Emphasis** – Focal point (entrance, dome).

Real-world application: Used in iconic buildings like Taj Mahal (symmetry, emphasis) and Fallingwater (unity with nature).

Q.2 – Enlist the principles of planning and explain any one. (3 marks)

Appeared in: S24 (3m), W23 (3m)

Ans:

Principles of planning:

- Aspect
- Prospect
- Privacy
- Roominess
- Grouping
- Circulation
- Sanitation
- Flexibility

Explanation of *Aspect*:

- Positioning rooms to receive sunlight, ventilation, and views.
- Example: Kitchen facing east for morning sun; living room north for cool light.
- Ensures health, energy saving, and comfort.

Q.3 – What is BIM? Give advantages/importance of BIM. (4 marks)

Appeared in: S25 (4m), S24 (4m), W25 (3m), W23 (3m), W22 (3m)

Ans:

BIM (Building Information Modeling) is a digital representation of a building's physical and functional characteristics. It is a shared knowledge resource for decision-making from design to demolition.

Advantages / Importance:

- **Clash detection** – Identifies conflicts (e.g., pipe vs beam) before construction.
- **Cost estimation** – Automatic quantity take-offs.
- **Lifecycle management** – Maintenance schedules, energy analysis.

- **Collaboration** – All disciplines (architect, structural, MEP) work on one model.
- **Visualisation** – 3D walkthroughs and renderings.

Real-world application: Used in Burj Khalifa, London Crossrail – reduced rework by 30%.

Q.4 – Explain orientation of a building / factors affecting orientation. (4 marks)

Appeared in: W25 (4m), W24 (3m)

Ans:

Orientation means placing a building on its site to take maximum advantage of sun, wind, and surroundings.

Factors affecting orientation:

- **Sun path** – In India, longer walls face north-south to reduce heat gain.
- **Prevailing wind** – Windows on windward side for natural ventilation.
- **Topography** – Slope, existing trees, water bodies.
- **Surrounding structures** – Avoid overshadowing.
- **Function of rooms** – Living room north-east, kitchen east, bedrooms south-east.
- **Building bye-laws** – Setbacks, road alignment.

Real-world application: Traditional Jaipur houses (Havelis) oriented with courtyards to catch cool breezes.

Q.5 – Draw a residential building plan on a given plot as per building bye-laws and planning principles. (7 marks)

Appeared in: S25, S24, S23, W24, W23, W22 (all 7m)

Ans:

Given plot: 12 m × 18 m (East-facing road on west side).

Assumptions: FAR = 1.5, set-back = 3 m front, 2 m sides & rear. Ground floor only.

[DG PROMPT]

Title: Residential building plan (2 BHK)

Description:

- Draw a rectangle 12m (horizontal) × 18m (vertical).
- Mark road on left (west) side with arrow “Road”.
- Show set-back: left (front) 3m, right 2m, top & bottom 2m each.
- Inside buildable area (7m wide × 14m deep):
 - Entrance from left into a small foyer.
 - Foyer leads to living room (5m×4m) on left-front corner.
 - Behind living room (east side) – master bedroom (4m×4m) with attached toilet (2m×2m).
 - Right side from front: kitchen (3m×3m) with door to dining (3m×3m) adjacent.
 - Dining leads to rear verandah and utility.
 - Second bedroom (3.5m×3.5m) at rear-right.
 - Common toilet at rear-left.
 - Label all rooms, doors (swing arcs), windows (rectangles on external walls).
 - Show north direction arrow top-right.
 - Scale: 1:100.

Compliance with bye-laws:

- Minimum set-backs observed.
- Windows on opposite walls for cross ventilation.
- Kitchen near east for morning sun.
- Bathrooms ventilated to rear/ side.

Planning principles applied:

- Aspect – Living room north-facing window.
- Privacy – Bedrooms away from main entrance.
- Circulation – Corridor connecting all rooms.
- Sanitation – Toilets on rear side.

Other Important Questions (Unit 1)

Q.6 – Compare principles of planning with principles of architecture in terms of final design of building. (3 marks)

Appeared in: W22 (3m)

Ans:

Aspect	Principles of Planning	Principles of Architecture
Focus	Functionality, comfort, health	Aesthetics, expression, form
Examples	Aspect, privacy, circulation	Unity, rhythm, scale
Final design impact	Room sizes, window placement, orientation	Façade treatment, material texture, ornamentation
Outcome	Liveable, efficient space	Visually appealing, iconic building

Both sets complement each other – a building must be functional (planning) and beautiful (architecture).

Q.7 – Define terms: FAR, Set back, Control Line, Light Plane, Mezzanine Floor. (4 marks)

Appeared in: S25, S23, W24, W23 (all 4m)

Ans:

- **FAR (Floor Area Ratio)** = Total covered area on all floors ÷ Plot area. Example: FAR 1.5 on 100 m² plot → max built-up = 150 m².
- **Set back** – Minimum distance between building line and plot boundary. Required for light, ventilation, privacy.
- **Control line** – Line beyond which no construction is allowed (e.g., near airports, rivers, highways).
- **Light plane** – An imaginary inclined plane originating from opposite side of road; no building shall project into it to ensure light reaches road.
- **Mezzanine floor** – An intermediate floor between two main floors, covering ≤ 1/3 of the room area. Not counted as a full storey.

Q.8 – Explain the scope/objectives of building bye-laws. (3 marks)

Appeared in: S25 (3m), W24 (3m)

Ans:

Scope:

- Apply to all new constructions, additions, alterations.
- Cover residential, commercial, industrial, public buildings.

Objectives:

1. **Health & safety** – Fire escapes, structural stability, sanitation.
2. **Orderly development** – Prevent haphazard construction.
3. **Amenity** – Ensure light, air, open spaces.
4. **Convenience** – Road widths, parking, access.
5. **Economy** – Optimal land use via FAR, set-backs.

Q.9 – Explain the necessity of National Building Code (NBC). (3 marks)

Appeared in: S23 (3m)

Ans:

Necessity of NBC:

- Provides **uniform guidelines** for design, construction, and maintenance across India.
- Ensures **minimum standards** for safety (structural, fire, electrical).
- **Helps municipalities** frame their own bye-laws.
- **Reduces disputes** between owners, builders, and authorities.

- **Promotes disaster resilience** (earthquake, wind, flood) through updated provisions (NBC 2016).

Without NBC, each city would follow arbitrary rules, compromising safety.

Q.10 – What is difference between NBC and local building bye-laws? (4 marks)

Appeared in: W22 (4m)

Ans:

Basis	NBC (National Building Code)	Local Building Bye-laws
Authority	Bureau of Indian Standards (BIS)	Municipal Corporation / Urban Body
Applicability	Entire India (advisory, not legally binding unless adopted)	Specific city or region (legally enforceable)
Scope	Comprehensive – all aspects of building (structural, fire, plumbing, etc.)	Focus on local issues – setbacks, parking, land use, plot sizes
Flexibility	General guidelines, updated periodically	Can be stricter (e.g., higher set-back in flood zone)
Example	NBC 2016 recommends 1.5 m set-back	Ahmedabad bye-laws may require 3 m set-back on main road

Local bye-laws are derived from NBC but tailored to local needs.

Q.11 – Explain elements of BIM. (3 marks)

Appeared in: W22 (3m)

Ans:

Elements of BIM:

1. **3D Geometry** – Digital model of walls, slabs, roofs, etc.
2. **Data / Attributes** – Material, cost, manufacturer, fire rating, U-value.
3. **Relationships** – How elements interact (e.g., door hosted by wall).
4. **Views & Sheets** – Plans, sections, elevations, schedules automatically derived.
5. **Process** – Collaboration, version control, clash detection.

Together these enable a “digital twin” of the building.
