

MAH M Arch CET Settlement Design and Planning

Sample Paper – 3

Total Questions	Total Marks	Duration	Exam Mode
10	20	12 Minutes	CBT (Online)

Instructions

- This paper contains 10 Multiple Choice Questions (Single Correct Answer), modelled on the Settlement Design and Planning portion of MAH M Arch CET entrance.
- Each correct answer carries +2 marks. There is no negative marking for incorrect or unattempted answers.
- Only one option is correct. Choose carefully.
- Syllabus: Urban sprawl, housing schemes, slum rehabilitation, neighbourhood planning, transport networks, planning theories, and heritage conservation.
- Use of mobile phones, calculators, or electronic gadgets is strictly prohibited.

Section D | Settlement Design and Planning | 10 Questions × 2 Marks = 20 Marks

Q1. 'Ribbon development' is a pattern of urban growth characterised by which of the following?

- (A) Uniform outward expansion of the city in all directions, forming a concentric ring of new development around the existing built-up area.
- (B) Planned development of compact satellite townships connected to the main city by expressways, each functioning as an independent urban unit.
- (C) High-density redevelopment of inner-city areas along waterfront corridors, integrating commercial and residential uses on reclaimed land.
- (D) Linear extension of built-up development along major roads or highways radiating outward from the city, leaving undeveloped land between the ribbons and the hinterland.



Q2. Pradhan Mantri Awas Yojana – Urban (PMAY-U), launched in 2015, aims to provide ‘Housing for All’ by 2022 (subsequently extended). Which of the following is **NOT** one of the four original verticals (components) of PMAY-U through which housing is delivered?

- (A) In-Situ Slum Redevelopment (ISSR) using land as a resource with private sector participation.
- (B) Rental Housing for Urban Workers (RHUW) – a mass rental housing scheme for migrant workers funded 100% by the Central Government.
- (C) Affordable Housing in Partnership (AHP) with State/UT governments and private builders.
- (D) Beneficiary-Led Individual House Construction or Enhancement (BLC) for eligible urban poor on their own land.

Q3. Which of the following is a recognised advantage of ‘in-situ slum upgrading’ over ‘resettlement’ of slum dwellers to peripheral sites?

- (A) In-situ upgrading is invariably less expensive than resettlement because no new land acquisition is needed for the project.
- (B) Resettlement always results in better housing quality and residents are invariably satisfied with the new location and improved facilities provided.
- (C) In-situ upgrading retains existing social networks, livelihood linkages, and proximity to workplaces, avoiding the social and economic disruption caused by relocation.
- (D) In-situ upgrading completely avoids the need for State Government approval and is solely within the jurisdiction of the Municipal Corporation.



Q4. The 'Neighbourhood Unit' concept, proposed by Clarence Perry in 1929, was designed to create a safe, self-contained residential community. Which of the following correctly describes a key physical planning principle of Perry's Neighbourhood Unit?

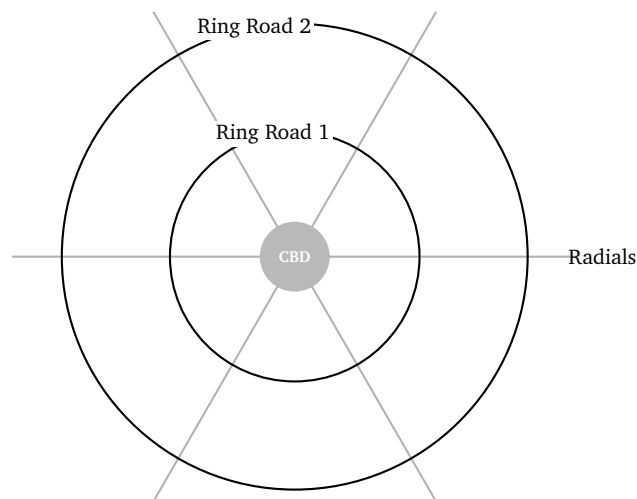
- (A) The neighbourhood is sized so that the elementary school at its centre is within a 400–800 m walking distance (approximately 5 minutes' walk) for all children, eliminating the need to cross arterial roads.
- (B) Arterial roads are planned to bisect the neighbourhood, providing efficient direct access to all residents and high visibility for commercial activity along the central spine.
- (C) The neighbourhood boundary is defined by a population of at least 50,000 persons to justify the provision of a secondary school, hospital, and district-level shopping centre.
- (D) All neighbourhood boundaries are defined by natural features such as rivers or forests, with no planned road perimeter surrounding the residential area.

Q5. Which of the following statements correctly distinguishes a 'separate sewerage system' from a 'combined sewerage system'?

- (A) A combined sewerage system treats all wastewater centrally at a wastewater treatment plant, while a separate system relies entirely on decentralised household septic tanks and soak pits.
- (B) A separate system is used exclusively in rural areas, while a combined system is mandated for all urban areas with a population above 1 lakh.
- (C) A separate sewerage system is cheaper to construct than a combined system because only one set of pipes is needed to carry all wastewater flows.
- (D) In a separate system, sewage (from toilets, kitchens, and bathrooms) and storm water runoff are conveyed in entirely independent pipe networks; in a combined system, both are carried together in a single set of sewers.



Q6. Study the road network pattern illustrated in the diagram below.



The road network pattern illustrated above is commonly called a 'ring-and-radial' or 'ring-radial' pattern. Which of the following is a recognised **disadvantage** of this pattern compared to a rectangular grid network?

- (A) Radial roads converge on the city centre, channelling all cross-city traffic through the CBD, creating severe congestion at the core.
- (B) The ring-radial pattern is unable to accommodate ring bus routes, since buses can only travel efficiently on straight roads.
- (C) The ring road component adds to total road length without serving any trip demand, making the network less efficient overall than a simple grid.
- (D) The ring-radial layout makes it impossible to define land use zones because the sector shapes between roads are too irregular to subdivide.

Q7. Ebenezer Howard's Garden City concept, first articulated in his book *To-morrow: A Peaceful Path to Real Reform* (1898), proposed a specific model for new town planning. Which of the following **most accurately** describes Howard's Garden City?

- (A) A high-density urban renewal project converting inner-city slums into green apartment towers surrounded by parkland, inspired by Le Corbusier's Radiant City ideas.



- (B) A planned self-contained town of limited population (around 32,000) surrounded by a permanent agricultural greenbelt, combining the benefits of town (employment, services) and country (nature, fresh air), with land held in public ownership to prevent speculation.
- (C) A linear city stretching along a high-speed transportation corridor, with residential zones on one side and industrial or agricultural zones on the other.
- (D) A satellite town built exclusively for government employees on the outskirts of a major metropolis, with housing allocated strictly by government agencies.

Q8. The Archaeological Survey of India (ASI) maintains a list of 'Centrally Protected Monuments' under the Ancient Monuments and Archaeological Sites and Remains (AMASR) Act. Within how many metres of a centrally protected monument is all construction, mining, excavation, or blasting expressly **prohibited** under the Act (the 'prohibited zone')?

- (A) 50 metres from the protected monument boundary.
- (B) 200 metres from the protected monument boundary.
- (C) 100 metres from the protected monument boundary.
- (D) 500 metres from the protected monument boundary.

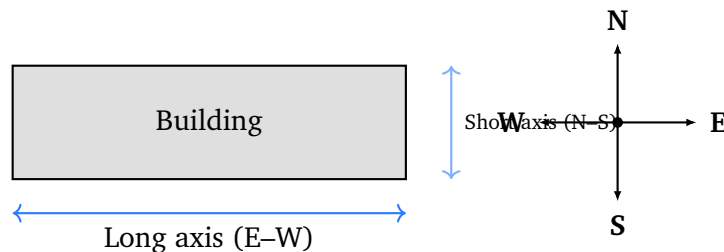
Q9. Transit-Oriented Development (TOD) is a planning strategy that organises high-density, mixed-use development around public transit stations. Which of the following features is **most characteristic** of a well-designed TOD node?

- (A) Large surface parking lots immediately adjacent to the transit station to maximise park-and-ride capacity and encourage car users to switch to transit.
- (B) A single-use residential zone around the station where commercial development is strictly prohibited to avoid congestion and maintain residential character.
- (C) Wide arterial roads connecting the transit station directly to the highway network to maximise bus feeder accessibility from surrounding areas.



- (D) High-density mixed-use development (residential + retail + offices) within a 500–800 m walkable catchment of a transit station, with pedestrian-priority streets and reduced surface parking.

Q10. Study the building orientation diagram shown below.



As shown in the diagram, orienting the long axis of a building in the East-West direction (with the longer façade facing North and South) is recommended in hot-dry and composite Indian climates primarily because:

- (A) East-west orientation maximises morning sunlight exposure on the long façade, which is essential for efficient solar panel installation on the roof.
- (B) The longer north and south façades receive less direct solar radiation than east- or west-facing façades, and the south-facing façade can be efficiently shaded by horizontal overhangs, minimising heat gain throughout the year.
- (C) Buildings oriented east-west collect more rainwater on their larger roof surface since the prevailing monsoon winds blow from west to east in India.
- (D) East-west orientation ensures that the primary entrance and exit face the prevailing wind direction, maximising natural cross-ventilation through the building.



Detailed Solutions

Sol. 1.

Solution

Difficulty: Beginner • Chapter: Urban Sprawl and Settlement Patterns

Quick Solution: Ribbon development is linear growth along highways radiating from the city, leaving undeveloped land between the ribbons — a finger pattern, not uniform expansion. Concentric growth describes the Burgess ring model; satellite towns are separate self-contained planned units. **Answer: (D).**

Ribbon development is the linear outward growth of a built-up area that follows major transport arteries – roads, highways, or railways – radiating from an urban core, rather than expanding uniformly in all directions. When viewed on a map, the settled area takes the shape of elongated fingers or tentacles pointing outward, with undeveloped (often agricultural) land remaining between the ribbons. This pattern became prominent in inter-war Britain as motor transport made fringe land along main roads attractive for housing and roadside commerce. It was one of the primary motivations for introducing greenbelt and ribbon-development-control provisions in the Town and Country Planning Act 1947.

Option (A) describes **concentric zone** expansion (Burgess model) – uniform radial growth, not ribbon. Option (B) describes **satellite towns**, which are distinct, planned, and separated from the main city by a greenbelt. Option (C) describes **waterfront regeneration** or urban infill – an inner-city phenomenon with no relation to fringe ribbon growth.

Answer: (D)

Solution

Difficulty: Beginner • Chapter: Government Schemes for Urban Development

Quick Solution: PMAY-U has four original verticals: ISSR, CLSS, AHP, and BLC. Rental Housing for Urban Workers (RHUW) was added separately in 2020 under Atmanirbhar Bharat — it was never an original PMAY-U vertical. **Answer: (B).**

PMAY-U was launched in June 2015 with **four original verticals**:

- Sol. 2.**
- (1) **ISSR** – In-Situ Slum Redevelopment using land as a resource.
 - (2) **CLSS** – Credit Linked Subsidy Scheme (interest subsidy on home loans).
 - (3) **AHP** – Affordable Housing in Partnership with States/UTs and private developers.



(4) **BLC** – Beneficiary-Led Individual House Construction or Enhancement.

Rental Housing for Urban Workers (RHUW) was introduced separately in June 2020 under the Atmanirbhar Bharat Abhiyan as a distinct scheme specifically for urban migrants and the urban poor seeking rental accommodation. It was **never** one of the four original PMAY-U verticals. Hence option (B) is the correct answer (the odd one out).

Options (A), (C), and (D) are genuine PMAY-U verticals, making them incorrect choices for the “NOT” question.

Answer: (B)

Sol. 3.

Solution

Difficulty: Intermediate • Chapter: Slum Rehabilitation and Housing

Quick Solution: In-situ upgrading retains residents on site, preserving social networks and proximity to informal livelihoods. Resettlement to distant peripheral sites severs economic linkages, causes livelihood loss, and consistently produces high return rates in Indian case studies — the key advantage is social and livelihood continuity. **Answer: (C).**

In-situ slum upgrading improves housing and basic services *on the existing site*, allowing residents to remain in their established location. Its primary advantage over peripheral resettlement is the **preservation of social capital and livelihood access**: slum residents typically depend on proximity to informal employment opportunities in the city (domestic work, street vending, construction labour, rag-picking). Resettling them to distant peripheral colonies severs these economic lifelines and destroys informal support networks built over decades. Studies of resettlement in Mumbai (Dharavi), Delhi (Yamuna Pushta), and Chennai (Perumbakkam) consistently show high rates of return to the original site after resettlement, precisely because livelihoods are lost.

Option (A) is overstated and sometimes *false*: in-situ upgrading on high-value inner-city land can actually be *more* expensive than building new housing on cheaper peripheral land, especially when complex structural engineering or underground infrastructure is required. Option (B) is empirically incorrect – beneficiary satisfaction with peripheral resettlement is consistently poor. Option (D) is incorrect – in-situ upgrading of notified slums requires State-level approvals including change in land-use designation and grant of Transferable Development Rights (TDR).

Answer: (C)



Solution

Difficulty: Beginner • Chapter: Neighbourhood Planning and Urban Design

Quick Solution: Perry's Neighbourhood Unit (1929) is sized so the central elementary school is within 400–800 m of every resident — safe walkable distance without crossing arterial roads. Arterial roads form the neighbourhood boundary, not the internal spine. **Answer: (A).**

Clarence Perry published the **Neighbourhood Unit** concept in the 1929 *Regional Plan of New York and Its Environs*. The unit is designed around the **elementary school catchment**: the population (typically 5,000–6,000 persons) and physical area of the neighbourhood are determined by how many children need one elementary school, with the school positioned centrally so that *every child* lives within a safe, car-free walking distance of about 400–800 m (a 5-minute walk). The five other planning principles are:

- Sol. 4.**
- **Boundary:** arterial roads on all sides to discourage through-traffic inside.
 - **Open spaces:** parks and playgrounds providing roughly 10% of the area.
 - **Institution sites:** schools and churches near the geographic centre.
 - **Local shops:** at the periphery, at traffic junctions, to serve the neighbourhood and passing trade.
 - **Interior streets:** a differentiated system designed for internal circulation only.

Option (B) is the *opposite* of Perry's principle – arteries form the *boundary*, not the spine. Option (C) confuses neighbourhood (5,000–6,000 persons) with district or town scale (50,000 persons). Option (D) is incorrect – Perry *explicitly* used arterial roads as bounding edges; natural features may supplement but do not replace the road perimeter.

Answer: (A)

Solution

Difficulty: Intermediate • Chapter: Urban Infrastructure and Utilities

Quick Solution: A separate sewerage system uses two independent networks: one for sanitary sewage, one for storm water, preventing storm water from overloading the treatment plant. A combined system carries both in a single network, risking combined sewer overflow during heavy rainfall. **Answer: (D).**

The fundamental distinction between the two sewerage systems is the **number and purpose of pipe networks**:

- Sol. 5.**
- **Separate system:** two completely independent networks – one for *sanitary sewage* (domestic wastewater from toilets, kitchens, bathrooms) and



one for *storm water* (rainfall runoff from roads, roofs, and open areas). This prevents dilute storm water from overwhelming the sewage treatment plant during heavy rainfall events, and ensures that wastewater is always treated regardless of rain.

- **Combined system:** a single network carrying both sanitary sewage and storm water. During heavy rain, the combined flow can exceed treatment capacity, causing *combined sewer overflow* (CSO) – raw sewage discharging into water bodies.

Option (A) confuses *network design* with *treatment technology* – both system types can use centralised WTPs. Option (B) is false – both systems are used in cities of varying sizes; the choice depends on techno-economic and topographic factors. Option (C) is the *reverse* of the truth: a separate system *requires two* pipe networks (sanitary + storm), which is more expensive to construct than a single combined sewer, though operating costs may be lower since the treatment plant handles smaller, more consistent flows.

Answer: (D)

Sol. 6.

Solution

Difficulty: Intermediate • Chapter: Urban Transportation Planning and Road Networks

Quick Solution: In a ring-radial network, all radial roads converge on the CBD, so cross-city trips between non-adjacent suburbs must route through or near the city centre, causing severe CBD congestion — the primary structural disadvantage compared to a rectangular grid. **Answer: (A).**

The **ring-and-radial** network pattern (as illustrated) is highly efficient for *radial* trips – moving from suburb to city centre – but has a well-known structural weakness: **all radial roads converge at the CBD**. Any cross-city trip between two suburbs that do not share a radial must either route through or very near the city centre, adding to CBD congestion. Ring roads mitigate this by allowing *circumferential* travel without entering the centre, but if ring roads are few or congested, the CBD becomes a major bottleneck. In cities like London, Paris, and many Indian metropolitan areas (e.g., Mumbai's radial pattern), CBD congestion attributable to convergence of radials is a recognised and ongoing planning challenge.

Option (B) is false – ring roads are the natural alignment for circular bus routes (e.g., orbital bus services in Delhi, London Orbital). Option (C) is false – ring roads carry substantial circumferential demand; they actively *reduce* CBD congestion for trips that would otherwise cross the centre. Option (D) is false –



sector-shaped land parcels between radials and rings are a well-understood and widely used urban form for zoning (e.g., Chandigarh's sectors, many garden-city radial layouts).

Answer: (A)

Solution

Difficulty: Beginner • Chapter: Urban Planning Theories and Concepts

Quick Solution: Howard's Garden City is a self-contained planned town of ~32,000 persons surrounded by a permanent agricultural greenbelt, with land held in public trust — combining town amenities with rural environment and preventing land speculation and sprawl. **Answer: (B).**

Ebenezer Howard (1850–1928) proposed the **Garden City** as a 'third magnet' – an alternative to both the overcrowded industrial city and the depopulated countryside – combining the best attributes of each. The key elements of his model:

- Sol. 7.**
- **Limited population:** approximately 32,000 in the town; 2,000 on the surrounding agricultural belt.
 - **Permanent greenbelt:** a ring of agricultural and green land that prevents outward sprawl and provides food, recreation, and rural employment.
 - **Public land ownership:** all land held in trust by the municipality; rising land values return to the community rather than private landowners.
 - **Self-contained economy:** local industry and commerce provide employment, reducing commuting to the parent city.

Letchworth (1903) and Welwyn Garden City (1920) in England were the two realised Garden Cities. Howard's ideas profoundly influenced New Town legislation worldwide.

Option (A) describes Le Corbusier's *Ville Radieuse* (Radiant City) – high-density tower blocks in parkland, an urban-core intervention antithetical to Howard's decentralist vision. Option (C) describes Arturo Soria y Mata's *Ciudad Lineal* (Linear City, 1882) – a linear corridor concept. Option (D) mischaracterises Howard's inclusive, multi-class, multi-industry town as a mono-functional government housing colony.

Answer: (B)



Solution

Difficulty: Beginner • Chapter: Heritage Conservation and Urban Legislation

Quick Solution: The AMASR Act 1958 (amended 2010) establishes a 100 m prohibited zone around centrally protected monuments where all construction, mining, and blasting are absolutely banned. The 100–200 m band is the regulated zone requiring NMA/ASI approval. **Answer: (C).**

The **Ancient Monuments and Archaeological Sites and Remains (AMASR) Act, 1958**, as significantly amended in 2010, establishes two concentric buffer zones around each *centrally protected monument*:

- Sol. 8.** (1) **Prohibited Zone** – extends **100 metres** from the protected limit of the monument. Within this zone, *no construction, reconstruction, repair, renovation, mining, quarrying, excavation, or blasting* is permitted (Section 20A). This is an absolute prohibition; no ASI permit can override it.
- (2) **Regulated Zone** – extends from 100 m to **200 m** from the protected limit. Construction *may* be allowed here with prior approval of the National Monuments Authority (NMA) and ASI, subject to conditions.

Option (A) – 50 m – is sometimes associated with *State*-protected monuments under certain State Acts, not the ASI central prohibition distance. Option (B) – 200 m – is the outer edge of the *regulated* zone (construction permitted with NMA/ASI approval), not the *prohibited* zone. Option (D) – 500 m – is not a standard ASI demarcation; neither zone extends this far by default under the AMASR Act.

Answer: (C)

Solution

Difficulty: Intermediate • Chapter: Urban Transportation Planning and TOD

Quick Solution: A well-designed TOD node places high-density mixed-use development (residential, retail, offices) within 500–800 m walkable catchment of a transit station, with pedestrian-priority streets and minimal surface parking — reinforcing transit use rather than car access or single-use zoning. **Answer: (D).**

Transit-Oriented Development (TOD) is a planning and urban design strategy that creates compact, walkable, mixed-use communities centred on high-quality public transit stations (metro, BRT, suburban rail). The defining physical characteristics of a well-designed TOD node are:

- Sol. 9.** • **Catchment radius:** 400–800 m (a 5–10 minute walk) from the station – the “quarter-mile” or “half-mile” catchment.



- **High density:** maximises ridership, justifies transit investment, and makes efficient use of prime walkable land.
- **Mixed uses:** residential, retail, office, civic – generating round-the-clock footfall and reducing the need for vehicle trips.
- **Pedestrian and cycle priority:** wide, shaded footpaths; cycle lanes; safe crossings; minimal surface parking.
- **Reduced parking:** limiting surface parking discourages private car use and frees valuable land near the station for development.

India's National TOD Policy (2017) endorses these principles, and cities such as Delhi (around metro stations), Ahmedabad (BRTS corridors), and Pune are implementing TOD frameworks.

Option (A) describes *park-and-ride*, the antithesis of TOD – it prioritises the car over the pedestrian and consumes scarce walkable land. Option (B) contradicts the mixed-use principle. Option (C) describes car-oriented, highway-focused access, undermining pedestrian connectivity.

Answer: (D)

Solution

Difficulty: Intermediate • Chapter: Climatic Responsive Architecture and Passive Design

Quick Solution: Orienting a building's long axis East–West places the larger façades facing North and South. In hot-dry climates, the south face is easily shaded by horizontal overhangs (high summer sun altitude); the north face receives negligible direct solar radiation year-round, minimising heat gain. **Answer: (B).**

In **hot-dry and composite Indian climates** (prevalent in cities such as Delhi, Jaipur, Nagpur, and Hyderabad), solar heat gain through building envelope is the dominant thermal discomfort driver. Orienting a building's **long axis East–West** (larger façades facing North and South) provides two critical passive solar benefits:

- Sol. 10.**
- **South-facing façade:** receives useful winter sun (solar altitude is lower) but can be entirely shaded in summer with a *simple horizontal overhang*, because summer sun altitude is high. Horizontal overhangs are structurally simple and cost-effective.
 - **North-facing façade:** in the Northern Hemisphere, the north side receives negligible direct solar radiation throughout the year, making it naturally cool and suitable for diffuse-light apertures.

By contrast, **east- and west-facing façades** are problematic: the morning and



afternoon sun is *low* on the horizon, making horizontal overhangs ineffective. Only deep or complex vertical fins can shade these faces, and they simultaneously reduce daylight penetration.

Option (A) confuses *roof* orientation (south-facing pitched surface) for solar panels with *plan* orientation of the building footprint – unrelated concepts. Option (C) invents a spurious link between plan orientation and rainwater catchment area, which depends on roof *footprint area*, not orientation. Option (D) confuses plan orientation with the *placement of openings* for cross-ventilation, which depends on analysing local prevailing wind direction, not on the E-W orientation rule.

Answer: (B)

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	D	2	B	3	C	4	A	5	D
6	A	7	B	8	C	9	D	10	B

