

MAH M Arch CET Settlement Design and Planning

Sample Paper – 6

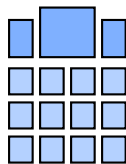
Total Questions	Total Marks	Duration	Exam Mode
10	20	12 Minutes	CBT (Online)

Instructions

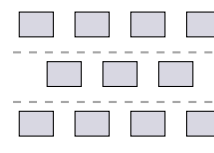
- This paper contains 10 Multiple Choice Questions (Single Correct Answer), modelled on the Settlement Design and Planning portion of MAH M Arch CET entrance.
- Each correct answer carries +2 marks. There is no negative marking for incorrect or unattempted answers.
- Only one option is correct. Choose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

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

Q1. The diagram below contrasts two urban development patterns. Which of the following statements **best describes the primary planning rationale** for promoting the **compact city model** over urban sprawl?



Pattern A: Compact City



Pattern B: Sprawl

- (A) Sprawl generates lower infrastructure costs per household because it spreads development evenly across a large service area, reducing congestion at central nodes.
- (B) Compact city development increases dependence on private automobiles by concentrating trip origins and destinations in a small area.



- (C) The compact city model minimises per-capita infrastructure costs, shortens travel distances, supports viable public transit through higher densities, and integrates mixed land uses that reduce the need for long commutes.
- (D) Sprawl is preferred by planning authorities because the larger land supply it creates consistently reduces land and property prices, making housing more affordable.

Q2. Under the Maharashtra Regional and Town Planning Act, 1966 (MRTP Act), a Town Planning (TP) Scheme is primarily:

- (A) A capital grant scheme by the Maharashtra government to upgrade notified slums within municipal corporation limits.
- (B) A five-year physical infrastructure programme for water supply and sewerage networks, funded directly from the State budget.
- (C) A heritage conservation framework for listing and protecting historic buildings and precincts in Maharashtra cities.
- (D) A land readjustment mechanism that pools fragmented undeveloped land from multiple private owners, provides planned infrastructure (roads, open spaces, utilities), and returns reconstituted plots to original owners after deducting a contribution area for public purposes and scheme costs.

Q3. Transfer of Development Rights (TDR), used widely in Indian cities including Mumbai and Pune, is best described as:

- (A) A mechanism by which a landowner who surrenders land for a public purpose (road widening, amenity space, reservation) receives a TDR certificate entitling them to construct additional floor space on another eligible receiving plot, in lieu of monetary compensation.
- (B) A zoning instrument that permanently reduces the permissible FSI on heritage-listed plots and transfers the development potential to the city's consolidated development fund for public housing.
- (C) A government scheme to transfer ownership of underutilised public land to private developers in exchange for constructing a fixed proportion of affordable housing units within the project.

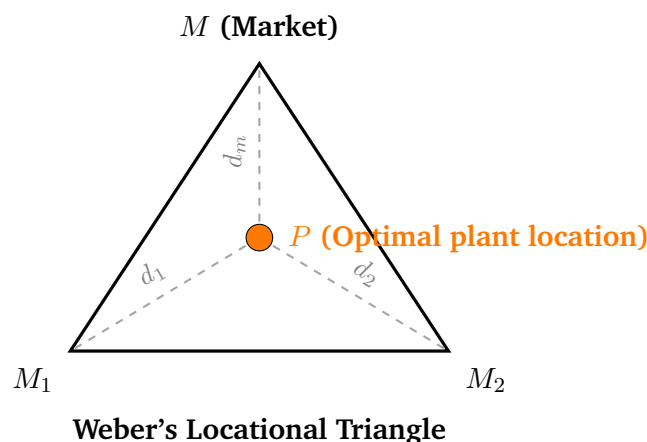


- (D) A legal provision enabling the State government to compulsorily acquire private land and transfer the development rights to a public authority without any form of compensation to the original landowner.

Q4. As per **IRC SP:41** (Guidelines for Design of At-Grade Pedestrian Facilities) and urban design standards, the **minimum clear walkway width** recommended for a heavily-used urban commercial street footpath to comfortably accommodate **two pedestrian streams passing simultaneously** is:

- (A) 0.60 m (600 mm) — the absolute minimum for a single pedestrian to edge through without obstruction.
- (B) 1.80 m — the minimum clear width to allow two pedestrian streams to pass in opposite directions simultaneously without conflict.
- (C) 4.50 m — the standard footpath width prescribed uniformly for all National Highway urban stretches regardless of pedestrian volume.
- (D) 0.90 m — the minimum wheelchair-accessible passage width specified in the Harmonized Guidelines for Barrier Free Built Environment, sufficient for two-way pedestrian flow.

Q5. The locational triangle below illustrates **Alfred Weber's Least-Cost Theory of Industrial Location**. M_1 and M_2 are raw material sources and M is the market. According to the theory, the **optimal plant location P** is the point where:



- (A) Maximum revenue from market M is achieved, irrespective of the transport costs for hauling raw materials from M_1 and M_2 .



- (B) The total distance from both raw material sources ($d_1 + d_2$) is minimised, without any consideration of the finished-goods transport distance (d_m) to market.
- (C) The total transport cost — combining the weighted cost of hauling all raw materials from M_1 and M_2 plus the cost of shipping finished goods to market M — is at a minimum.
- (D) The arithmetic centroid of the three vertices M_1 , M_2 , and M is located, as the centroid always represents equal distance to all three nodes.

Q6. Rajiv Awas Yojana (RAY), launched by the Government of India in 2013, was primarily designed to:

- (A) Construct new satellite townships on the periphery of all million-plus cities to provide planned housing for in-migrants from rural areas.
- (B) Provide free land titles and 50 m² plots to every urban homeless family across India as an outright grant within two years of scheme launch.
- (C) Upgrade urban roads and flyovers passing through slum-affected wards to improve emergency vehicle accessibility.
- (D) Achieve **slum-free cities** by upgrading existing slums in-situ with tenure security, basic services (water, sanitation, drainage), and improved housing, while preventing the formation of new slums through proactive urban planning and mandatory reservation of land for the urban poor.

Q7. In Indian regional planning practice, a **Metropolitan Region** (such as the Mumbai Metropolitan Region or the National Capital Region) is primarily delineated and administered to:

- (A) Coordinate land use, infrastructure investment, and economic development planning across a functionally integrated urban core and its surrounding commuter hinterland that spans multiple administrative jurisdictions such as municipal corporations, district boards, and panchayats.
- (B) Serve exclusively as a revenue-district boundary for property taxation purposes, with no planning or spatial development coordination responsibilities.



- (C) Restrict all new urban development strictly within the existing built-up agglomeration boundary and formally prohibit any peripheral greenfield expansion.
- (D) Transfer all planning powers from Municipal Corporations and Urban Local Bodies to the State government's revenue department to streamline development approval timelines.

Q8. In urban **Solid Waste Management (SWM)**, which of the following statements about **composting** as a waste processing technology is **CORRECT**?

- (A) Composting is the preferred technique for processing inert, non-biodegradable waste streams such as plastics, glass, and metals recovered from mixed municipal solid waste.
- (B) Composting is a biological decomposition process applied to segregated organic or biodegradable waste fractions; it produces a nutrient-rich soil amendment, diverts organic material from landfill, and reduces methane generation that would otherwise occur from anaerobic decomposition in landfills.
- (C) Incineration of mixed municipal solid waste invariably produces more toxic air emissions than uncontrolled open landfill fires, making composting the only legally permissible disposal method in all Indian cities.
- (D) Composting requires specialised high-temperature industrial equipment identical to waste-to-energy incineration plants and cannot be implemented at community or decentralised scale without such infrastructure.

Q9. The **Sendai Framework for Disaster Risk Reduction 2015–2030**, adopted by UN member states, establishes four priority areas for action. Which of the following is one of those priority areas **most directly applicable to urban planning practice**?

- (A) Eliminating all coastal urban settlements and relocating their entire populations to inland areas before 2030 to remove exposure to sea-level rise and storm surge risks.



- (B) Mandating that all new urban buildings in developing countries be constructed exclusively from reinforced concrete to resist seismic forces, irrespective of local material availability or cost.
- (C) Understanding disaster risk through systematic hazard identification, vulnerability mapping, exposure assessment, and risk-informed knowledge-sharing to guide urban land use planning, building regulations, and infrastructure investment decisions.
- (D) Replacing all national and state-level disaster management agencies with a single UN-administered global disaster response authority empowered to override domestic legislation.

Q10. Blue-green infrastructure (BGI) in urban planning refers to an interconnected network of natural and semi-natural water bodies, wetlands, and vegetation systems. Which of the following statements correctly identifies a **key bundle of ecosystem services** provided by urban wetlands and water bodies as part of BGI?

- (A) Urban wetlands function primarily as strategic land reserves to be reclaimed and developed for industrial or logistics uses once all residential zones within the city boundary are fully built out.
- (B) Blue-green infrastructure is relevant only in coastal cities that contain tidal wetland systems and has no applicable planning value in inland cities that lack direct access to the sea.
- (C) The principal function of urban water bodies in planning is to serve as legally definable natural boundary markers between adjoining municipal corporation limits and cantonment board areas.
- (D) Urban wetlands and water bodies simultaneously provide stormwater retention and flood peak attenuation, groundwater recharge, urban heat island mitigation, biodiversity habitat, water quality improvement through biofiltration, and recreational or cultural co-benefits — making their conservation a cornerstone of climate-resilient urban planning.



Detailed Solutions

Sol. 1.

Solution

Difficulty: Intermediate • Chapter: Urban Form and Compact City Planning

Quick Solution: The compact city reduces per-capita infrastructure costs, supports public transit viability, and shortens travel distances through density and mixed use. **Answer: (C).**

Concept — Compact City vs. Urban Sprawl: The compact city model, advocated since the 1970s (Dantzig & Saaty, 1973) and embedded in Smart Growth and New Urbanism frameworks, is premised on the principle that higher densities and mixed land uses generate economies of scale in infrastructure and reduce automobile dependence. **Urban sprawl** — low-density, single-use development spread over large areas — requires proportionally longer water mains, sewer lines, roads, and electricity networks per household, dramatically raising per-capita infrastructure capital and maintenance costs. By contrast, a **compact city** concentrates population close enough together to justify efficient bus and rail transit, allows residents to reach daily destinations on foot or by cycle, and supports ground-floor retail and services that reduce the need for long motorised trips. Mixed land use — placing residences, workplaces, retail, and services in the same neighbourhood — is central to this efficiency gain.

Analysis of each option:

- **(A) Sprawl lowers infrastructure cost per household:** Incorrect. This is the opposite of the empirically established relationship. Infrastructure runs longer per household in sprawled development, consistently producing higher per-unit service delivery costs.
- **(B) Compact city increases automobile dependence:** Incorrect. High density and mixed use are the preconditions for reducing automobile dependence, not increasing it. Compact cities are specifically designed to make non-motorised and transit modes viable.
- **(C) Compact city minimises per-capita costs, shortens travel, supports transit and mixed use:** Correct. This summarises the full suite of documented planning rationales for compact development.
- **(D) Sprawl consistently reduces property prices:** Incorrect. Sprawl can expand overall land supply at the periphery but does not reliably reduce land prices in central or well-located areas; infrastructure costs, commuting costs, and service deficits in sprawled peripheries often offset any price benefits.



Final Answer: Compact city → lower infrastructure costs per capita + mixed use + transit viability ⇒

Answer: (C) [Go Back to Q1](#)

Sol. 2.

Solution

Difficulty: Intermediate • Chapter: Urban Planning Legislation — Maharashtra

Quick Solution: A TP Scheme is a land readjustment mechanism that pools fragmented private land, installs infrastructure, and returns reconstituted plots to owners after deducting a contribution. **Answer: (D).**

Concept — Town Planning Schemes under the MRTP Act, 1966: The TP Scheme mechanism (Sections 59–91 of the MRTP Act, 1966) was adapted from the Bombay Town Planning Act, 1915 and is modelled on the *Betterment Levy / Plot Reconstitution* system. Its key features are:

- **Land pooling:** Multiple private owners in a notified scheme area contribute their land parcels to the scheme authority (typically the municipal corporation or town planning authority).
- **Infrastructure provision:** The pooled land is laid out with roads, drainage, open spaces, and utility lines according to the scheme plan.
- **Plot reconstitution and return:** Each original owner receives a reconstituted, serviced plot of smaller area in an improved location. The deducted land area goes towards roads, public open spaces, and a “contribution” plot auctioned to recover scheme costs.
- **Betterment levy:** Any increment in land value attributable to scheme improvements may be recovered from benefitting landowners.

The TP Scheme is therefore a powerful planning tool that converts unserviced, fragmented peri-urban land into planned layouts without the government having to make large up-front land acquisition payments.

Analysis of each option:

- **(A) Capital grant scheme for slum upgrading:** Incorrect. Slum upgrading is addressed under separate schemes such as BSUP, RAY, and PMAY-Urban. TP Schemes operate on unslummed peri-urban land being brought into planned development.



- **(B) Five-year budget infrastructure programme:** Incorrect. TP Schemes are a land management and spatial planning mechanism, not a State budget programme for water or sewerage networks.
- **(C) Heritage conservation framework:** Incorrect. Heritage listing and precinct conservation in Maharashtra is governed under the Maharashtra Heritage Regulation for Mumbai Metropolitan Region or relevant municipal bylaws, not TP Scheme provisions.
- **(D) Land readjustment mechanism with plot pooling, infrastructure, and reconstitution:** Correct. This precisely describes the legal and operational structure of a TP Scheme under the MRTP Act.

Final Answer: TP Scheme = land pooling + infrastructure + reconstituted plot return $\Rightarrow$ **D**

Answer: (D) [Go Back to Q2](#)

Sol. 3.

Solution

Difficulty: Intermediate • Chapter: Development Controls — TDR and FSI

Quick Solution: TDR converts a landowner's obligation to surrender land for public purposes into a tradeable certificate for additional built floor space on a receiving plot elsewhere. **Answer: (A).**

Concept — Transfer of Development Rights (TDR): TDR is a planning instrument that **separates development rights from land ownership**. When the planning authority needs private land for a public purpose — road widening, amenity space, heritage preservation, or a reservation in the Development Plan — instead of paying cash compensation (which strains public budgets), it issues the affected landowner a **TDR Certificate**. This certificate quantifies the development potential lost (in terms of equivalent built-up area) and entitles the holder to construct that additional floor space on an eligible “receiving” plot, which must satisfy conditions specified in the Development Control Regulations (e.g., the receiving plot must be beyond a specified ring road or in a designated receiving zone). In Mumbai, TDR is available for road surrender, slum rehabilitation contributions, heritage conservation, and green reservations. The certificate is freely tradeable in the market, creating a mechanism for private land assembly at public purposes without fiscal outlay.

Analysis of each option:



- **(A) TDR certificate for surrendered land enabling additional floor space on receiving plot:** Correct. This is the precise legal and planning definition of TDR as used in Maharashtra Development Control Regulations.
- **(B) Permanently reduces FSI on heritage plots and transfers value to a city fund:** Incorrect. While TDR can be used to protect heritage plots by reducing development pressure, it does not transfer value to a “development fund.” TDR certificates go to the individual landowner as compensation, not into a pooled public fund.
- **(C) Transfer of public land ownership to private developers for affordable housing:** Incorrect. This describes a public land disposition or public-private partnership mechanism, not TDR. TDR compensates *private* owners for losing land to *public* purposes.
- **(D) Compulsory acquisition without compensation:** Incorrect. This describes a breach of constitutional property rights under Article 300A. TDR is specifically an alternative to cash compensation — it replaces monetary payment with tradeable development capacity, ensuring landowners are compensated.

Final Answer: TDR = tradeable certificate for surrendered land → additional floor space on receiving plot ⇒ A

Answer: (A) [Go Back to Q3](#)

Sol. 4.

Solution

Difficulty: Beginner • Chapter: Pedestrian Infrastructure and Urban Design Standards

Quick Solution: IRC SP:41 recommends a minimum clear walkway width of 1.80 m to allow two pedestrian streams to pass simultaneously. **Answer: (B).**

Concept — Pedestrian Footpath Design Standards (IRC SP:41): Pedestrian infrastructure is designed to Level of Service (LOS) standards that ensure free pedestrian flow. The fundamental sizing criterion is the **effective clear walkway width** — the unobstructed path width after deducting space occupied by street furniture, trees, utility boxes, and vendor encroachments.



Width	Pedestrian Capacity	Context
0.60 m	Single pedestrian (edge passage)	Minimum absolute limit
0.90 m	Single pedestrian, comfortable	Wheelchair minimum
1.80 m	Two streams simultaneously	Urban commercial minimum
2.40 m	Comfortable two-way flow	Recommended for busy streets
3.60 m+	High-volume zones	Transit stations, CBDs

IRC SP:41 and the National Urban Transport Policy guidelines specify **1.80 m** as the minimum clear width for a heavily-used urban commercial footpath to maintain Level of Service B (free two-way flow). The 0.90 m wheelchair minimum from Harmonized Guidelines addresses only accessibility for a single user, not general pedestrian flow capacity.

Analysis of each option:

- **(A) 0.60 m:** Incorrect. This is the absolute physical minimum for a single pedestrian to pass through a constrained gap and is wholly inadequate for a commercial street with bidirectional pedestrian flow.
- **(B) 1.80 m:** Correct. IRC SP:41's recommended minimum clear width for a heavily-used commercial footpath supporting two-way pedestrian movement simultaneously.
- **(C) 4.50 m:** Incorrect. While 4.50 m may be aspired to on premium corridors, it is not the minimum standard; prescribing it universally for all National Highway urban stretches would make most existing footpaths non-compliant and is not the IRC minimum.
- **(D) 0.90 m:** Incorrect. The 0.90 m figure from Harmonized Guidelines for Barrier-Free Built Environment addresses wheelchair minimum passage, not the two-stream pedestrian flow width. At 0.90 m, two pedestrians cannot comfortably pass simultaneously.

Final Answer: Minimum clear width for two-stream commercial footpath = 1.80 m $\Rightarrow$ **B**

Answer: (B) [Go Back to Q4](#)



Sol. 5.

Solution

Difficulty: Intermediate • Chapter: Industrial Location Theory

Quick Solution: Weber's theory locates the plant where total transport costs for raw material assembly plus finished goods delivery are minimised. **Answer:** (C).

Concept — Alfred Weber's Least-Cost Theory of Industrial Location (1909): Alfred Weber's *Über den Standort der Industrien* (1909) was the first rigorous mathematical framework for industrial location. Weber assumed: (1) a uniform, featureless plain with fixed raw material source locations M_1 , M_2 and a fixed market location M ; (2) known, weight-based transport costs per unit distance; (3) rational, profit-maximising entrepreneurs. His central proposition: the optimal plant location P minimises the **total transport cost** defined as:

$$TC = w_1 \cdot d(P, M_1) + w_2 \cdot d(P, M_2) + w_f \cdot d(P, M)$$

where w_1, w_2 are the weights of raw materials from M_1, M_2 per unit of output, w_f is the weight of finished goods, and $d(\cdot)$ denotes transport distance. The weights are determined by the **material index** $= (w_1 + w_2)/w_f$: industries with material index > 1 (weight-losing raw materials, e.g. iron ore) locate near the raw material source; those with material index ≈ 1 (weight-gaining, e.g. bottling) locate near the market; those with index $= 1$ may locate anywhere on an isodapane. Weber also identified secondary locational forces: **agglomeration economies** (pull towards industrial clusters) and **labour costs** (a pull away from the transport-optimal point if cheap labour more than offsets extra transport cost). The locational triangle is a geometric device used to find P through the Varignon frame (mechanical analogue using weights).

Analysis of each option:

- **(A) Point of maximum revenue from market, ignoring raw material costs:** Incorrect. Maximising market revenue while ignoring raw material transport costs is not Weber's model. Weber is a *cost-minimisation* framework, not a revenue-maximisation framework (the latter is described by Loschian market-area analysis).
- **(B) Minimise distance from M_1 and M_2 only, ignoring d_m :** Incorrect. Weber explicitly includes the transport cost of delivering finished goods to market M in the objective function. Ignoring d_m would give a location biased entirely toward raw material sources irrespective of how far they are from the market.



- **(C) Minimum of total weighted transport cost for raw materials and finished goods:** Correct. This is precisely Weber's least-cost formulation: the sum of all weighted transport costs — input assembly plus output distribution — is minimised.
- **(D) Arithmetic centroid of M_1, M_2, M :** Incorrect. The centroid (average of vertex coordinates) has no special transport-cost significance. The centroid minimises the sum of squared distances, not the sum of weighted distances. Only when all weights are equal and transport costs are uniform would the centroid approximate the Weberian optimum, and even then only approximately.

Final Answer: Weber's P minimises total weighted transport cost for inputs and output $\Rightarrow$ C

Answer: (C) [Go Back to Q5](#)

Sol. 6.

Solution

Difficulty: Beginner • Chapter: Urban Development Schemes (Government of India)

Quick Solution: RAY aimed for slum-free cities by upgrading existing slums in-situ with tenure, services, and housing while preventing new slum formation through planned land reservation for the urban poor. **Answer: (D).**

Concept — Rajiv Awas Yojana (RAY), 2013: Rajiv Awas Yojana was notified by the Ministry of Housing and Urban Poverty Alleviation (now MoHUA) in 2013 as the successor to the Basic Services for Urban Poor (BSUP) component of JNNURM. Its defining goal was a **slum-free India** achieved through two simultaneous strategies:

- **Slum redressal:** In-situ upgrading or relocation of existing slums with (a) *tenure security* — assignment of property rights or long-term occupancy certificates to slum dwellers; (b) *basic services* — water supply, sanitation, drainage, solid waste management, internal roads; and (c) *housing improvement or reconstruction*.
- **Slum prevention:** Proactive planning through reservation of land in Master Plans and local area plans for affordable housing for the Economically Weaker Section (EWS) and Low Income Group (LIG), so incoming migrants are guided to planned affordable housing rather than informal settlements.



RAY also mandated Slum-Free City Plans of Action (SFCPoA) as eligibility conditions. It was subsequently subsumed into **PMAY-Urban (2015)** under the In-Situ Slum Redevelopment (ISSR) vertical.

Analysis of each option:

- **(A) Satellite townships for migrants on city periphery:** Incorrect. RAY focused on upgrading existing slums where slum dwellers already lived, not on creating new peripheral townships for in-migrants.
- **(B) Free 50 m² land titles to all urban homeless families within two years:** Incorrect. RAY prioritised in-situ tenure security for existing slum dwellers and was not a free plot distribution scheme with a uniform 50 m² standard or a two-year blanket timeline.
- **(C) Road and flyover upgrades in slum wards:** Incorrect. RAY was a housing and tenure programme, not a road infrastructure scheme. Road upgrades in slum areas may accompany RAY projects but are not the primary purpose.
- **(D) Slum-free cities via in-situ upgrade with tenure, services, housing + prevention through planned land reservation:** Correct. This accurately captures RAY's dual strategy of redressal and prevention.

Final Answer: RAY = in-situ slum upgrade (tenure + services + housing) + slum prevention planning ⇒ D

Answer: (D) [Go Back to Q6](#)

Sol. 7.

Solution

Difficulty: Intermediate • Chapter: Regional Planning and Metropolitan Governance

Quick Solution: Metropolitan Regions are delineated to coordinate planning and infrastructure across a functionally integrated urban core and its multi-jurisdictional hinterland. **Answer: (A).**

Concept — Metropolitan Region Planning in India: A metropolitan city's functional influence extends well beyond its administrative boundary into surrounding districts, generating daily commuter flows, supply chains, and service dependencies that cross jurisdictional lines. Individual municipal corporations, district boards, and gram panchayats are each too limited in scope to plan and manage this wider urban system. Metropolitan planning is therefore mandated under **Article 243ZE** of the Constitution of India (74th Amendment), which



requires the constitution of a **Metropolitan Planning Committee (MPC)** for every metropolitan area (population ≥ 10 lakh). The MPC's mandate is to:

- Prepare a **draft development plan** for the metropolitan region as a whole;
- Coordinate plans prepared by municipalities and panchayats in the region;
- Allocate investments in regional infrastructure (expressways, mass transit, water supply reservoirs, regional parks);
- Manage land use at the urban–rural fringe where development pressures are highest.

Examples include the Mumbai Metropolitan Region Development Authority (MMRDA) covering approximately 4,355 km² across Mumbai, Thane, Raigad, and Palghar, and the National Capital Region Planning Board covering approximately 55,083 km² across Delhi, Haryana, Uttar Pradesh, and Rajasthan.

Analysis of each option:

- **(A) Coordinating land use, infrastructure and economic planning across a functionally integrated multi-jurisdictional hinterland:** Correct. This is the constitutional mandate and operational purpose of metropolitan region governance in India.
- **(B) Revenue-district boundary for taxation with no planning role:** Incorrect. Revenue districts are fiscal and administrative units; metropolitan regions are specifically spatial planning units. The two often overlap geographically but have entirely different legal mandates.
- **(C) Restricting all development to within the existing agglomeration:** Incorrect. Metropolitan regional planning actively *guides and manages* peripheral development through planned growth nodes, new towns, and transit-oriented corridors — it does not prohibit peripheral growth.
- **(D) Transferring all planning powers from ULBs to the State revenue department:** Incorrect. The 74th Amendment specifically directs devolution of planning powers *down* to elected ULBs and MPCs. Transferring powers to the revenue department would reverse this constitutional direction.

Final Answer: Metropolitan Region = coordinated multi-jurisdictional land use + infrastructure planning $\Rightarrow$ A

Answer: (A) [Go Back to Q7](#)



Sol. 8.

Solution

Difficulty: Beginner • Chapter: Urban Infrastructure — Solid Waste Management

Quick Solution: Composting is a biological process for biodegradable waste that yields a soil amendment, diverts organics from landfill, and reduces landfill methane. **Answer: (B).**

Concept — Composting in Solid Waste Management: The **Solid Waste Management Rules, 2016** (Government of India) mandate source segregation of municipal solid waste into wet (organic/biodegradable) and dry (recyclable and inert) fractions. **Composting** is a biological aerobic decomposition process applied to the **organic/wet fraction**: food waste, garden waste, market waste, and other biodegradable materials. Microorganisms break down organic matter under controlled conditions of moisture, aeration, and carbon-to-nitrogen ratio, converting it into **compost** — a humus-like soil amendment that improves soil structure, moisture retention, and fertility. Its planning significance:

- **Landfill diversion:** Organic waste constitutes 40–60% of Indian MSW. Composting this fraction can halve the volume requiring landfilling, significantly extending landfill life.
- **GHG reduction:** Organic waste in anaerobic landfill conditions generates methane (CH_4), a potent greenhouse gas. Aerobic composting converts carbon to CO_2 (much lower global warming potential) and eliminates methane.
- **Scalability:** Composting works at community scale (ward-level vermicomposting) as well as at large centralised composting plants.

Analysis of each option:

- **(A) Composting for plastics, metals, and glass:** Incorrect. These are inert, non-biodegradable materials that microorganisms cannot decompose. Composting is strictly a biological process limited to organic/biodegradable fractions; plastics and metals require recycling or incineration with energy recovery.
- **(B) Biological decomposition of organic waste → soil amendment + landfill diversion + reduced methane:** Correct. This accurately describes the process, output, and twin environmental benefits of composting.
- **(C) Incineration always produces more toxic emissions than open landfill fires:** Incorrect. Modern incineration with emission control technology (scrubbers, bag filters) is demonstrably cleaner than uncontrolled



open burning or anaerobic landfill. The absolute claim is factually wrong, and “mandatory composting” is not prescribed law for all Indian cities.

- **(D) Composting requires high-temperature industrial equipment identical to incineration:** Incorrect. Composting is a low-technology, low-temperature (typically 50–70°C for thermophilic aerobic composting) process that can be implemented with minimal equipment — turning equipment or simple windrow management — at community, ward, or block scale without industrial capital investment.

Final Answer: Composting = biological treatment of organic waste → soil amendment + landfill diversion + less methane ⇒ **B**

Answer: (B) [Go Back to Q8](#)

Sol. 9.

Solution

Difficulty: Intermediate • Chapter: Disaster Risk Reduction and Urban Resilience

Quick Solution: The Sendai Framework’s Priority 1 is *Understanding Disaster Risk* — systematic hazard and vulnerability assessment to inform planning.

Answer: (C).

Concept — Sendai Framework for Disaster Risk Reduction 2015–2030: Adopted in March 2015 at the Third UN World Conference in Sendai, Japan, the framework replaces the Hyogo Framework for Action (HFA 2005–2015). It sets a global roadmap to reduce disaster risk and losses in lives, livelihoods, and health by 2030. Its **four priority areas** are:

- Priority 1 — Understanding disaster risk:** Developing a knowledge base on hazard characteristics, exposure, vulnerability, and capacity across sectors — directly applicable to land use planning, building codes, and infrastructure siting.
- Priority 2 — Strengthening disaster risk governance:** Institutional frameworks, legislation, policy coordination across national to local levels.
- Priority 3 — Investing in DRR for resilience:** Pre-disaster structural and non-structural mitigation investments in infrastructure, urban systems, and social protection.
- Priority 4 — Enhancing disaster preparedness for effective response:** Early warning, contingency planning, response capacity building.



For urban planners, Priority 1 is most directly applied through **risk-informed master planning**: identifying seismic zones, flood plains, landslide-prone slopes, cyclone exposure zones, and heat islands, and using this mapping to guide land use zoning, building regulation, and infrastructure investment decisions. The National Disaster Management Act, 2005 (India) and the guidelines of the NDMA embed Sendai's principles.

Analysis of each option:

- **(A) Eliminating all coastal urban settlements by 2030:** Incorrect. The Sendai Framework does not mandate relocation of all coastal populations. It calls for risk reduction and resilience building in situ, with managed retreat as one tool only where risk is extreme and other measures are insufficient.
- **(B) Mandating reinforced concrete for all new buildings in developing countries:** Incorrect. No such blanket material mandate exists in Sendai. The framework calls for risk-appropriate building standards and hazard-resistant construction, but recognises local material diversity and affordability constraints.
- **(C) Understanding disaster risk through hazard mapping, vulnerability assessment, and knowledge-sharing to guide urban planning:** Correct. This is Sendai Priority 1 as directly applied to urban planning and development decisions.
- **(D) Replacing national DM agencies with a single UN global authority:** Incorrect. The Sendai Framework explicitly strengthens national and sub-national institutions. It has no provision for, and would be politically incompatible with, replacing sovereign national agencies with an overriding UN body.

Final Answer: Sendai Priority 1 = understanding risk via mapping + assessment → informing urban planning ⇒ C

Answer: (C) [Go Back to Q9](#)



Sol. 10.

Solution

Difficulty: Intermediate • Chapter: Blue-Green Infrastructure and Urban Ecology

Quick Solution: Urban wetlands and water bodies provide stormwater attenuation, groundwater recharge, heat island mitigation, biodiversity habitat, water quality improvement, and recreational co-benefits simultaneously. **Answer: (D).**

Concept — Blue-Green Infrastructure (BGI) in Urban Planning: Blue-green infrastructure (BGI) refers to the planned integration of natural hydrological (“blue”) and vegetated (“green”) systems into the urban fabric to deliver multiple ecosystem services alongside hard engineered infrastructure. Key elements include rivers, lakes, wetlands, retention ponds, bioswales, green roofs, urban forests, and constructed wetlands. Their planning significance has grown substantially as Indian cities face escalating flood risk, water scarcity, urban heat, and biodiversity loss:

- **Stormwater retention and flood attenuation:** Urban wetlands store excess runoff during monsoon events, significantly reducing peak flood flows in downstream drains and preventing urban inundation (as demonstrated by Bengaluru’s lakes and Hyderabad’s Hussain Sagar system when intact).
- **Groundwater recharge:** Permeable wetland soils and shallow water bodies enable percolation that replenishes urban aquifers, improving dry-season water security.
- **Urban heat island mitigation:** Evapotranspiration from water surfaces and riparian vegetation cools the urban microclimate, reducing peak air temperatures by 2–5 °C in adjacent areas.
- **Biodiversity habitat:** Wetlands support disproportionately high urban biodiversity — birds, amphibians, invertebrates, aquatic plants — relative to their area.
- **Water quality:** Wetland phytoremediation filters nutrients, heavy metals, and pathogens from stormwater and wastewater before they reach receiving water bodies.
- **Recreational and cultural co-benefits:** Waterfronts and lakes provide urban open space, mental health benefits, tourism, and cultural continuity.

The National Wetland Conservation Programme (MoEFCC) and several High Court orders in India have recognised urban water bodies as critical infrastructure, requiring their protection in Development Plans.



Analysis of each option:

- **(A) Wetlands as land reserves for future industrial development:** Incorrect. This represents the historically destructive approach (e.g., filling of Bengaluru's lakes for IT campuses, Mumbai's mangrove encroachments) that has caused catastrophic urban flooding and biodiversity loss. Conservation law and planning guidance have progressively reversed this position.
- **(B) BGI relevant only in coastal cities:** Incorrect. All cities with catchment hydrology benefit from BGI. Inland cities such as Bengaluru (1,000+ historic lakes), Hyderabad (Hussain Sagar, Osman Sagar), and Pune (Mula-Mutha rivers) demonstrate the equal relevance of BGI in non-coastal contexts.
- **(C) Water bodies as boundary markers between municipal jurisdictions:** Incorrect. While rivers and lakes sometimes coincide with administrative boundaries, this is not their planning function. Treating water bodies as boundary markers rather than ecological assets has historically led to jurisdictional paralysis in their management.
- **(D) Stormwater attenuation + groundwater recharge + heat island mitigation + biodiversity + water quality + recreation:** Correct. This multifunctional ecosystem services bundle is the established rationale for BGI conservation and integration in urban master plans.

Final Answer: Urban wetlands = multi-service BGI: flood attenuation + recharge + cooling + biodiversity + water quality + recreation ⇒ D

Answer: (D) [Go Back to Q10](#)

Answer Key

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

