General Aptitude

Q.1 – Q.5 Carry ONE mark Each

Q.1	Fish : Shoal :: Lion : _____ Select the correct option to complete the analogy.
(A)	Pride
(B)	School
(C)	Forest
(D)	Series

Q.2	Identify the grammatically correct sentence:
(A)	It is I who am responsible for this fiasco.
(B)	It is myself who is responsible for this fiasco.
(C)	It is I who is responsible for this fiasco.
(D)	It is I who are responsible for this fiasco.

Q.3	Two cars, P and Q, start from a point X in India at 10 AM. Car P travels North with a speed of 25 km/h and car Q travels East with a speed of 30 km/h. Car P travels continuously but car Q stops for some time after travelling for one hour. If both the cars are at the same distance from X at 11:30 AM, for how long (in minutes) did car Q stop?
(A)	10
(B)	12
(C)	15
(D)	18

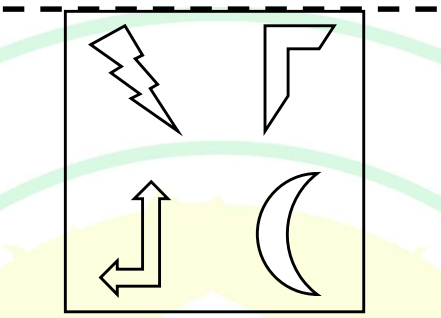
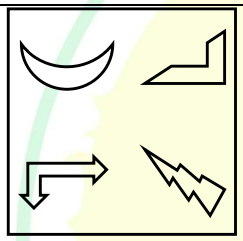
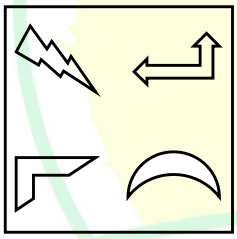
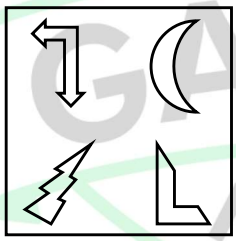
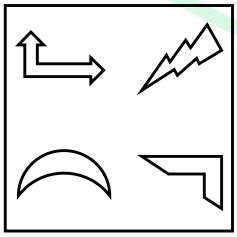
Q.4	The ceiling function of a real number x, denoted by $ce(x)$, is defined as the smallest integer that is greater than or equal to x. Similarly, the floor function, denoted by $fl(x)$, is defined as the largest integer that is smaller than or equal to x. Which one of the following statements is NOT correct for all possible values of x?
(A)	$ce(x) \geq x$
(B)	$fl(x) \leq x$
(C)	$ce(x) \geq fl(x)$
(D)	$fl(x) < ce(x)$

Q.5	P and Q play chess frequently against each other. Of these matches, P has won 80% of the matches, drawn 15% of the matches and lost 5% of the matches. If they play 3 more matches, what is the probability of P winning exactly 2 of these 3 matches?
(A)	$\frac{48}{125}$
(B)	$\frac{16}{125}$
(C)	$\frac{16}{25}$
(D)	$\frac{25}{48}$

Q.6 – Q.10 Carry TWO marks Each

Q.6	Identify the option that has the most appropriate sequence such that a coherent paragraph is formed: P. At once, without thinking much, people rushed towards the city in hordes with the sole aim of grabbing as much gold as they could. Q. However, little did they realize about the impending hardships they would have to face on their way to the city: miles of mud, unfriendly forests, hungry beasts and inimical local lords – all of which would reduce their chances of getting gold to almost zero. R. All of them thought that easily they could lay their hands on gold and become wealthy overnight. S. About a hundred years ago, the news that gold had been discovered in Kolar spread like wildfire and the whole State was in raptures.
(A)	P → Q → R → S
(B)	Q → S → R → P
(C)	S → Q → P → R
(D)	S → P → R → Q

Q.7	If HIDE and CAGE are coded as 19-23-7-11 and 5-2-17-11 respectively, then what is the code for HIGH?
(A)	5-17-1-2
(B)	17-19-13-17
(C)	13-3-1-2
(D)	19-23-17-19

Q.8	The given figure is reflected about the horizontal dashed line and then rotated clockwise by 90° about an axis perpendicular to the plane of the figure. Which one of the following options correctly shows the resultant figure? Note: The figures shown are representative.
	
(A)	
(B)	
(C)	
(D)	

Q.9	Which one of the following options has the correct sequence of objects arranged in the increasing number of mirror lines (lines of symmetry)?
(A)	Circle; Square; Equilateral triangle; Isosceles triangle
(B)	Isosceles triangle; Equilateral triangle; Square; Circle
(C)	Equilateral triangle; Isosceles triangle; Square; Circle
(D)	Isosceles triangle; Square; Equilateral triangle; Circle

Q.10	A final year student appears for placement interview in two companies, S and T. Based on her interview performance, she estimates the probability of receiving job offers from companies S and T to be 0.8 and 0.6, respectively. Let p be the probability that she receives job offers from both the companies. Select the most appropriate option.
(A)	$0 \leq p \leq 0.2$
(B)	$0.4 \leq p \leq 0.6$
(C)	$0.2 \leq p \leq 0.4$
(D)	$0.6 \leq p \leq 1.0$

PART A: Common FOR ALL CANDIDATES

Q.11 – Q.28 Carry ONE mark Each

Q.11	As per the United Nations Development Report, 1990, which of the following is NOT a *key indicator* of Human Development Index (HDI)?
(A)	Life Expectancy at Birth
(B)	Expected Years of Schooling
(C)	Per capita Gross National Income (GNI)
(D)	Mortality Rate

Q.12	As per the URDPFI Guidelines, 2015, the suggested population served by a *single unit of neighbourhood park* for plain areas is_____.
(A)	5000
(B)	15000
(C)	35000
(D)	50000
Q.13	As per the National Building Code of India, 2016, the *minimum clear opening width of a doorway* to allow single wheelchair access, is _____ mm.
(A)	600
(B)	900
(C)	1200
(D)	1500

Q.14	In landscaping, *Miyawaki* technique is used for _____.
(A)	creating waterbodies to stop rapid urbanization
(B)	pruning shrubs in urban plantation
(C)	creating dense forests with native plants
(D)	identifying sites for urban vertical gardens
Q.15	In Burgess's Concentric Zone model, 1920, _____ is characterized by *mixed residential and commercial establishments*.
(A)	Zone of better housing
(B)	Zone of independent working class
(C)	Zone of transition
(D)	Zone of high-class homes on outskirts of outer suburbs

Q.16	Identify the correct relationship with respect to *water quality* from the following options.
(A)	Total solids = Suspended solids + Dissolved solids + Colloidal solids
(B)	Total gases = Biological Oxygen Demand + Chemical Oxygen Demand + Dissolved Oxygen
(C)	Total solids = Suspended Solids + Dissolved solids
(D)	Total gases = Biological Oxygen Demand + Chemical Oxygen Demand
Q.17	As per the Solid Waste Management Rules, 2016, *co-processing* is the use of _____ and _____ solid waste having calorific value exceeding 1500 kcal/kg as raw material or as a source of energy, or both.
(A)	Non-biodegradable, Non-recyclable
(B)	Biodegradable, Recyclable
(C)	Non-biodegradable, Recyclable
(D)	Biodegradable, Non-recyclable

Q.18	For composting, the optimum Carbon to Nitrogen (C:N) ratio is closest to _____.
(A)	5:1
(B)	30:1
(C)	70:1
(D)	1:1
Q.19	Read the following statements and select the correct option. **P**: Strong axial layout, symmetry, proportion and infinite perspective of the 17th Century French Gardens reflects the wealth, power and rigid social structure of France. **Q**: Italian gardens of early renaissance period were designed as intellectual retreats where scholars and artists could work and debate.
(A)	**P** is true but **Q** is false
(B)	**P** is false but **Q** is true
(C)	Both **P** and **Q** are true
(D)	Both **P** and **Q** are false

Q.20	The concept of _____ is primarily used to describe an urban area with plenty of green spaces and waterbodies to retain and/or detain rain water.
(A)	Sponge City
(B)	Aerocity
(C)	15-minute City
(D)	Compact City
Q.21	Identify the correct *sequence of drawings* prepared by architects at various stages of building design and construction.
(A)	Working drawing; Statutory approval drawing; Conceptual design drawing; Completion drawing
(B)	Statutory approval drawing; Conceptual design drawing; Completion drawing; Working drawing
(C)	Conceptual design drawing; Statutory approval drawing; Working drawing; Completion drawing
(D)	Conceptual design drawing; Working drawing; Completion drawing; Statutory approval drawing

Q.22	As per the National Building Code of India, 2016, choose the correct option where materials are arranged in the increasing order of their *embodied energy*.
(A)	Medium Density Fibreboard < Aluminium < Float Glass < Fly-ash Bricks
(B)	Fly-ash Bricks < Medium Density Fibreboard < Float Glass < Aluminium
(C)	Medium Density Fibreboard < Fly-ash Bricks < Float Glass < Aluminium
(D)	Fly-ash Bricks < Aluminium < Medium Density Fibreboard < Float Glass
Q.23	Which one of the following *Universal Design* principles aims to "*minimise hazards and the adverse consequences of accidental or unintended actions*"?
(A)	Flexibility in use
(B)	Tolerance for error
(C)	Perceptible information
(D)	Simple and intuitive use

Q.24	Which one of the following buildings features an *Onion dome*?
(A)	Matrimandir, Auroville
(B)	Rashtrapati Bhavan, New Delhi
(C)	Taj Mahal, Agra
(D)	Victoria Memorial, Kolkata
Q.25	As per the UN's Sustainable Development Goals (SDGs), *urban health* is dealt with in SDG 3 and SDG 6 that are _____ and _____, respectively.
(A)	Good health and well-being; Clean water and sanitation
(B)	Reduced inequalities; High nutrition
(C)	Reduced inequalities; Sustainable cities and communities
(D)	Good health and well-being; High nutrition

Q.26	The 4th and 5th dimension of Building Information Modelling (BIM) are _____ and _____, respectively.
(A)	Facility management; Sustainability
(B)	Construction schedule; Construction costing
(C)	Sustainability; Construction schedule
(D)	Construction costing; Facility management
Q.27	Which of the following is/are likely to be caused by an earthquake?
(A)	Liquefaction
(B)	Heatwave
(C)	Tsunami
(D)	Tornado

Q.28	Which of the following cities predominantly has/have a *grid iron* street pattern?
(A)	Cairo
(B)	Chandigarh
(C)	Philadelphia
(D)	Venice

Q.29 – Q.49 Carry TWO marks Each

Q.29 Match the following *items of work* in **Group-I** with their corresponding *units of measurement* in **Group-II**.

Group-I		**Group-II**	
(P)	Honeycomb Brickwork	(1)	Running Meter
(Q)	Steel Reinforcement	(2)	Cubic Meter
(R)	Brick on Edge	(3)	Square Meter
(S)	Earthwork in Excavation	(4)	Kilogram
		(5)	Number

(A) P–1, Q–4, R–3, S–2

(B) P–3, Q–1, R–4, S–5

(C) P–5, Q–2, R–1, S–4

(D) P–3, Q–4, R–1, S–2

Q.30 Match the types of *water carriage system* in **Group-I** with their corresponding *functions* in **Group-II**.

Group-I		Group-II	
(P)	Combined system	(1)	Rain water from roof is allowed to enter the sewer carrying sewage and the remaining storm water flows separately
(Q)	Vacuum sewer system	(2)	Rain water from roof and sewage from buildings are taken along with storm water
(R)	Partially separate system	(3)	A pump is used to pump waste from the residences to the low pressure sewer line
(S)	Pressurized sewer system	(4)	The sewer is under negative pressure and it pulls sewage and air from different sources
		(5)	Sewage from buildings is taken in one set of sewers and storm water in another network

(A) P–2, Q–4, R–1, S–3

(B) P–2, Q–3, R–5, S–4

(C) P–1, Q–4, R–5, S–3

(D) P–1, Q–3, R–1, S–4

Q.31 Match the following *UNESCO World heritage sites* in **Group-I** with their relevant *historic significance* in **Group-II**.

Group-I		Group-II	
(P)	Walled City of Jaipur	(1)	A city from the Mughal era, planned as a whole with architectural ensembles constructed at the end of 16th Century
(Q)	Fatehpur Sikri	(2)	Timber based architecture of historic city, having exceptional significance from 15th Century Sultanate period
(R)	Group of Monuments at Hampi	(3)	Conceived in a single phase in the 18th Century with a gird-iron pattern inspired from *prastara* plan of *vāstushāstra*
(S)	Dholavira, Harappan city	(4)	Comprises mainly the remnants of the capital city of Vijayanagara Empire
		(5)	Proto-historic bronze age urban settlement

(A) P–1, Q–2, R–4, S–5

(B) P–5, Q–1, R–3, S–4

(C) P–3, Q–1, R–4, S–5

(D) P–3, Q–5, R–2, S–4

Q.32 Match the following *principles of design* in **Group-I** to their corresponding *descriptions* in **Group-II**.

Group-I		Group-II	
(P)	Datum	(1)	The use of recurring patterns to organize a series of like forms or spaces
(Q)	Symmetry	(2)	The balanced distribution of equivalent forms and spaces about a common line or point
(R)	Hierarchy	(3)	A line established by two points in space, about which forms and spaces can be arranged in a symmetrical or balanced manner
(S)	Rhythm	(4)	A line, plane or volume that by its continuity and regularity helps to organize a pattern of forms and spaces
		(5)	The significance of a form or space based in the size, shape or placement relative to other forms of the organization

(A) P–3, Q–2, R–5, S–1

(B) P–4, Q–1, R–3, S–5

(C) P–4, Q–2, R–5, S–1

(D) P–3, Q–4, R–2, S–5

Q.33 Match the following *Books* in **Group-I** with their corresponding *Authors* in **Group-II**.

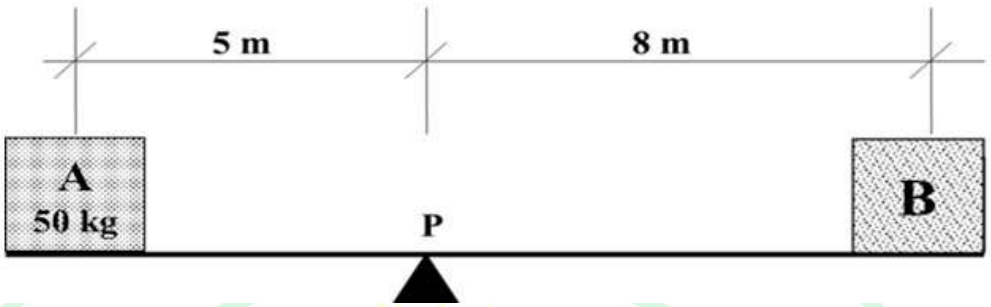
Group-I		**Group-II**	
(P)	Cities for People	(1)	Francis D. K. Ching
(Q)	Architecture: Form, Space, and Order	(2)	Jan Gehl
(R)	The Death and Life of Great American Cities	(3)	Kevin Lynch
(S)	The Image of the City	(4)	Jane Jacobs
		(5)	F. L. Wright

(A) P–5, Q–2, R–4, S–3

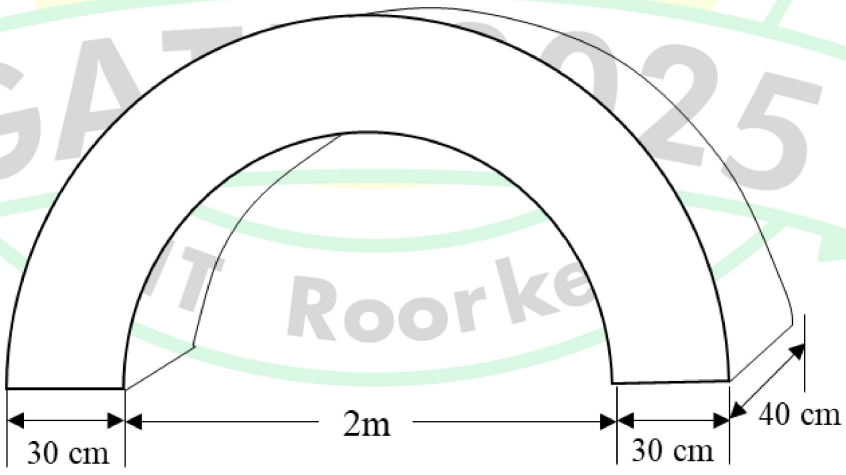
(B) P–2, Q–1, R–4, S–3

(C) P–3, Q–4, R–5, S–1

(D) P–2, Q–1, R–3, S–4

Q.34	In order to achieve the static equilibrium of the see-saw about the fulcrum **P**, shown in the figure, the weight of the Box **B** should be _____ kg, if weight of Box **A** is 50 kg.
	
(A)	50
(B)	31.25
(C)	80
(D)	61.25
Q.35	Which of the following is/are supply side intervention(s) to *improve housing affordability*?
(A)	Increase in availability of urban land for housing
(B)	Increase in Institutional Housing Finance
(C)	Reduction in Floor Area Ratio
(D)	Increase in Stamp Duty

Q.36	Which of the following method(s) is/are used for *desalination of water*?
(A)	Reverse Osmosis
(B)	Activated Sludge Process
(C)	Incineration
(D)	Distillation
Q.37	Identify the set(s) of *complimentary colours* based on RGB Model.
(A)	Yellow and Purple
(B)	Yellow and Orange
(C)	Blue and Orange
(D)	Blue and Purple
Q.38	A city has a population of 1,75,000. Using the *Kuichling's formula* the estimated fire demand for the city is _____ litres/min. (*rounded off to two decimal places*)

Q.39	A rectangular plot has the dimensions of 20 m × 15 m. A building on the plot fully utilizes both Floor Area Ratio (FAR) of 3.0 and ground coverage of 50%. Considering all floors having equal area, the maximum number of floors that can be built on the plot is _____. (*answer in integer*)
Q. 40	A real estate project on a 12 hectare site contains 6 buildings, each with ground coverage of 3 percent of the site area. The landscaped area is 40 percent of the site and rest of the area are roads. Assume coefficient of runoff for landscaped area and road area to be 0.15 and 0.6 respectively. Ignore the rainwater from the roof of the buildings and additional water from outside areas. Considering average rainfall intensity of 70 mm per hour, the estimated peak surface runoff rate from the site is _____m^3/s. (*rounded off to two decimal places*)
Q.41	In a regular semi-circular arch of 2 m clear span, the thickness of the arch is 30 cm and the breadth of the wall is 40 cm. The total quantity of brickwork in the arch is _____ m^3. (*rounded off to two decimal places*)
	

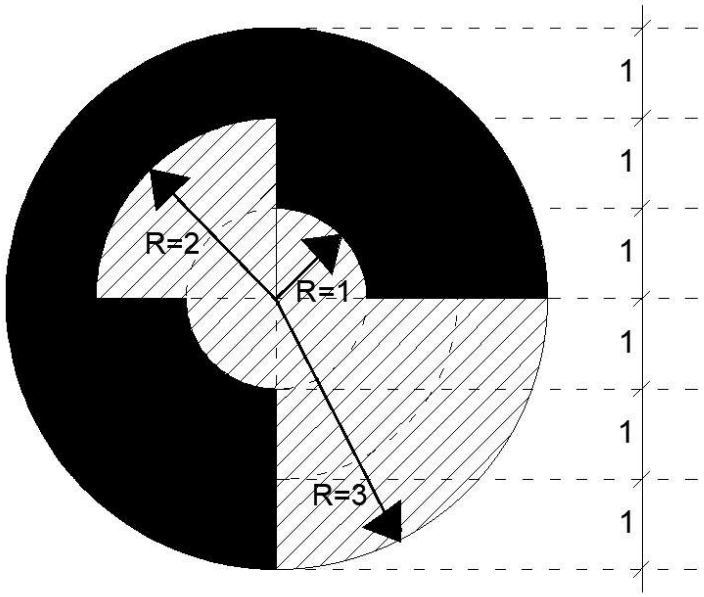
<table>
<tr><td>Q.42</td><td>A roof area of 6000 m^2 of a building is drafted on a drawing sheet as 240 cm^2. The scale used in the drawing sheet is 1:_____. (rounded off to the nearest integer)</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Q. 43</td><td>A housing property of INR 50 lakh is on sale either through a Full Down Payment (FDP) scheme with an 8% rebate OR a Deferred Payment Plan (DPP) as shown in the table. A customer after converting all the future payments in DPP using 10% annual discount rate, found the DPP scheme to be financially gainful. The customer would be able to save in INR _____ lakh, if DPP is chosen over FDP. (rounded off to two decimal places)</td></tr>
<tr><td></td><td>
<table>
<tr><td colspan="2">Deferred Payment Plan (DPP)</td></tr>
<tr><td>At the time of booking</td><td>INR 10 lakh</td></tr>
<tr><td>After one year</td><td>INR 15 lakh</td></tr>
<tr><td>After two year</td><td>INR 15 lakh</td></tr>
<tr><td>After three year</td><td>INR 10 lakh</td></tr>
</table>
</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Q.44</td><td>The population of a city in the year 2001, 2011, 2021 were recorded as 52,000, 76,000 and 1,20,000 respectively. Calculating the average growth rate using geometric mean, the estimated population of the city for 2031 using geometric increase method is _____. (rounded off to the nearest integer)</td></tr>
<tr><td></td><td></td></tr>
</table>

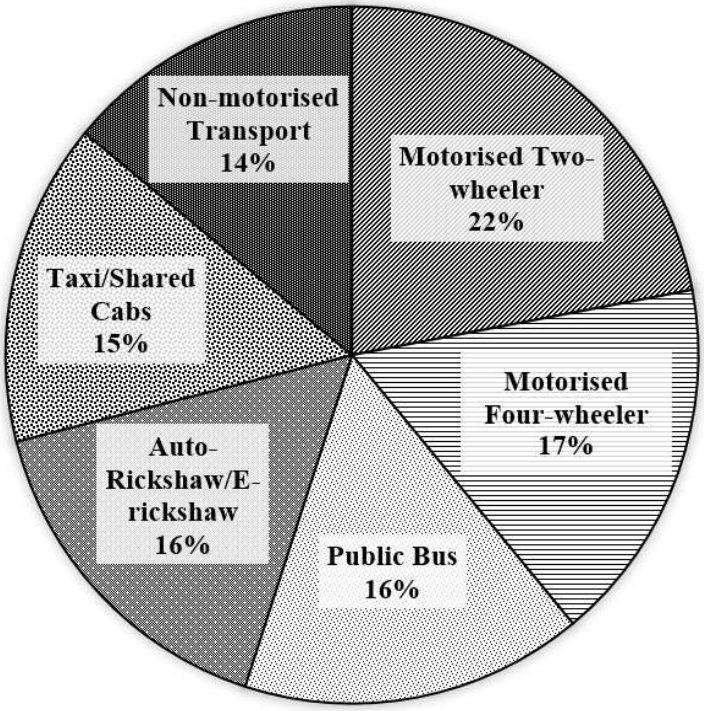
Q.45 A room having dimension of 12 m × 8 m and height 4 m, stores a certain combustible material of volume 80 m^3. The density and calorific value of the combustible material are 3.0 kg/m^3 and 4000 kcal/kg, respectively. The fire load of the room is _____ $kcal/m^2$. (*rounded off to the nearest integer*)

Q.46 A construction project consists of four activities. The duration, relationship and cost parameters are given in the table. The indirect cost of the project is INR 5000/- per week. If the project has to be completed by 12 weeks, the total project cost will be, INR_____. (*Answer in integer*)

Activity	Immediate Predecessor Activity	Normal Duration (Weeks)	Crash Duration (Weeks)	Normal Cost (INR)	Crash Cost (INR)
P	Nil	8	5	20,000	26,000
Q	Nil	5	2	30,000	33,000
R	P	6	4	40,000	52,000
S	Q	4	3	10,000	13,000

Q.47 A 24 cm line AB is vertically standing on a horizontal plane. The station point is located 18 cm above ground and 15 cm in front of the line AB. The picture plane is located in between the line AB and station point perpendicular to the sight line. The distance between the picture plane and the station point is 9 cm. The *height* of the perspective view of the line AB is _____ cm. (*rounded off to one decimal place*)

Q.48	The view from ground to sky of a location is projected on a plane as shown in the figure. The hatched and the solid black portion of the diagram represent the sky and the obstructions, respectively. The radius of the whole circle shown in the figure is 3 units and other dimensions are provided in the figure. The Sky View Factor (SVF) of this location is _____. (*rounded off to two decimal places*)
	

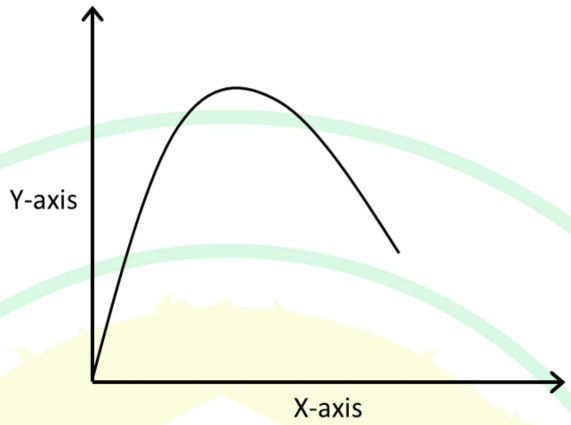
Q. 49	A city aims to introduce Metro rail as a sustainable public transport, with a projected daily ridership of 3,67,200 which is expected to shift 18% of the daily trips from other existing modes. The existing modal share (in percentage) is shown in the figure. If half of the above modal shift is expected to replace trips by Motorised Two-wheeler and Motorised Four-wheeler in 2:1 ratio, the trips only by Motorised Two-wheeler, post modal shift to Metro is _____. (*answer in integer*)
	

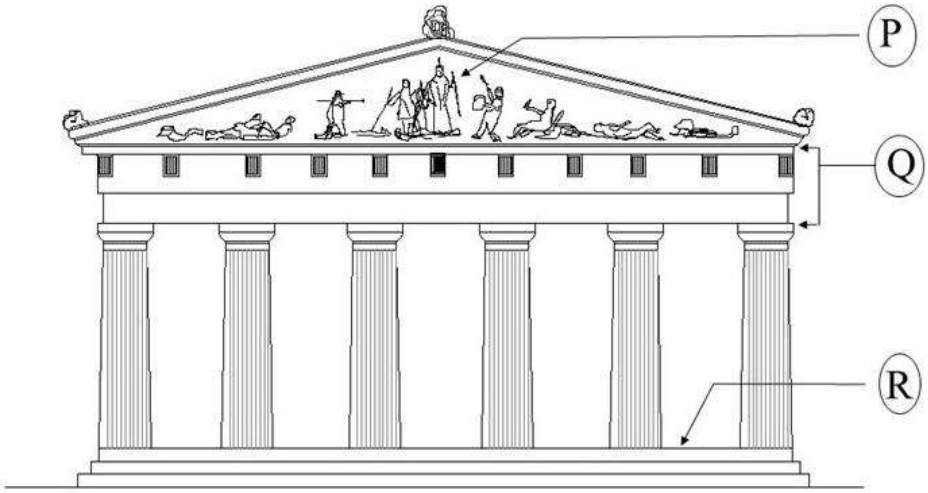
PART B1: FOR Architecture CANDIDATES ONLY

Q.50 – Q.56 Carry ONE mark Each

Q.50	With reference to *Squinch* adopted in dome construction, choose the correct option related to statements **P** and **Q**.
	P: Squinch is a structural element used to support the base of a circular or octagonal dome that surmounts a square hall. **Q**: Squinch is a double layered dome comprising of an inner and an outer layer of masonry.
(A)	Both **P** and **Q** are true
(B)	**P** is true but **Q** is false
(C)	**P** is false but **Q** is true
(D)	Both **P** and **Q** are false
Q.51	In Heating Ventilation and Air Conditioning (HVAC) systems, *HVAC dampers* are essentially _____.
(A)	valves that regulate the airflow as per the air-conditioned zone requirements
(B)	valves that regulate the refrigerant flow as per the air-conditioned zone requirements
(C)	desiccants which are used to absorb the moisture and dehumidify the air-conditioned zone
(D)	metal-based sheets to absorb heat and to cool the air-conditioned zone

Q.52	_____ increases the spreading quality of paints and helps to achieve desired consistency.
(A)	Base
(B)	Vehicle
(C)	Paint Drier
(D)	Solvent

Q.53	The graph shows the typical test result of a property of a building material. Identify *the test and the variables* represented on the X-axis and Y-axis from the given options.
	
(A)	Workability test of concrete; X-Axis: water-cement ratio; Y-Axis: amount of slump
(B)	Cube test of concrete; X-Axis: water-cement ratio; Y-Axis: 28-days compressive strength
(C)	Ultrasonic pulse velocity test; X-Axis: pulse velocity; Y-Axis: compressive strength
(D)	Bulking test of sand; X-Axis: moisture percentage; Y-Axis: percentage increase in volume

Q.54	A typical *Classical Greek temple* with *Doric order columns* is illustrated in the figure. Identify the *correct terms* corresponding to **P**, **Q** and **R** marked in the figure.
	
(A)	**P-**Cella; **Q-**Entablature; **R-**Tympanum
(B)	**P-**Tympanum; **Q-**Entablature; **R-**Stylobate
(C)	**P-**Tympanum; **Q-**Acroterium; **R-**Stylobate
(D)	**P-**Cella; **Q-**Stylobate; **R-**Acroterium

Q.55	Which of the following is/are example(s) of *Concrete Cased Pile*?
(A)	Raymond Pile
(B)	Swage Pile
(C)	Vibro Pile
(D)	Simplex Pile
Q.56	For a given location, the Sun's position is at 40° Altitude angle and 130° N Azimuth angle. The Zenith Angle of the Sun (*in degree*) at that given location is _____.

Q.57– Q.65 Carry TWO marks Each

Q.57 Match the *items* in **Group-I** with the corresponding *items* in **Group-II**.

Group-I		**Group-II**	
(P)	Garmet	(1)	Lock
(Q)	Aldrop	(2)	Screw
(R)	Mortise	(3)	Bolt
(S)	Gusset	(4)	Hinge
		(5)	Plate

(A) P–4, Q–3, R–1, S–5

(B) P-5, Q-3, R-4, S–2

(C) P–4, Q–1, R–3, S–5

(D) P–3, Q–2, R–1, S–4

Q.58 Match the *statements* in **Group-I** with the corresponding *names of architects* in **Group-II**.

Group-I		Group-II	
(P)	*Form Follows Function*	(1)	Ludwig Mies van der Rohe
(Q)	*Less is More*	(2)	Louis H. Sullivan
(R)	*Architecture should speak of its time and place, but yearn for timelessness*	(3)	Antoni Gaudi
(S)	*There are no straight lines or sharp corners in nature*	(4)	Frank O. Gehry
		(5)	Adolf Loos

(A) P–1, Q–2, R–4, S–5

(B) P–2, Q–3, R–1, S–4

(C) P–2, Q–1, R–4, S–3

(D) P–5, Q–1, R–2, S–3

Q.59 Match the *items* in **Group-I** with the corresponding *statements* in **Group-II**.

Group-I		Group-II	
(P)	Suction lift	(1)	Difference between point of discharge and the pump
(Q)	Discharge lift	(2)	Filling pump casing with air to remove trapped air inside
(R)	Rotary pump	(3)	Difference between low water level and pump
(S)	Priming of pump	(4)	Water is carried upwards around the side of the casing and pushed through discharge pipe
		(5)	Work done by a pump in raising the water

(A) P–3, Q–1, R–4, S–2

(B) P–4, Q–5, R–3, S–1

(C) P–3, Q–1, R–5, S–4

(D) P–1, Q–5, R–4, S–2

Q.60 Match the following *Indian Temples* in **Group-I** with their relevant *descriptions* in **Group-II**.

Group-I		**Group-II**	
(P)	Kailasa Temple, Ellora	(1)	Temple from Chandella culture
(Q)	Shore Temple, Mamallapuram	(2)	Temple from late Gupta period entirely built in brick
(R)	Mahabodhi Temple, Bodh Gaya	(3)	Pallava temple constructed of dressed stone
(S)	Brihadisvara Temple, Thanjavur	(4)	Brahmanical rock-cut architecture, constructed by excavating out of the hill site
		(5)	One of the largest Chola temples

(A) P–1, Q–3, R–2, S–4

(B) P–4, Q–2, R–5, S–3

(C) P–3, Q–4, R–1, S–5

(D) P–4, Q–3, R–2, S–5

Q.61	Which of the following tall building(s) is/are having *bundled-tube structural system*?
(A)	Sears Tower, Chicago
(B)	The 42, Kolkata
(C)	O-16 Building, Dubai
(D)	Bank of China, Hong Kong
Q.62	A simply supported beam is under a uniformly distributed load (UDL) along the full span. The mid-span deflection is measured as 24 mm. If the length and depth of the beam is doubled while keeping other parameters unchanged, the mid-span deflection is _____ mm. (*answer in integer*)
Q.63	A rectangular RCC beam section of 250 mm width and 400 mm effective depth is under a factored Shear Force of 120 kN. The design shear strength (τ_c) of concrete is 0.35 N/mm^2. Two-legged, 8 mm diameter stirrups are used for the shear reinforcement. Assuming the Yield Stress of Steel, f_y = 415 N/mm^2, the design spacing (c/c) of the stirrups is _____ mm. (*rounded off to the nearest integer*)
Q.64	A source of light is located at point C. Point A is 1.75 m vertically below point C. Point B is situated horizontally 1.0 m right of point A. If the illumination level at point A due to the light source at point C is 300 Lux, then the illumination level at point B is _____ Lux. (*rounded off to the nearest integer*)

Q.65	There are 16 similar machines located radially and equally distanced from a fixed sound receiver. While operating, each machine records 60 dB sound level at the receiver. Assuming 70 dB to be the highest sound level allowed as per the industrial sound pollution norms, the total number of machines allowed to operate simultaneously without violating the norms is _____. (*rounded off to the nearest integer*)

PART B2: FOR Planning CANDIDATES ONLY

Q.66 – Q.72 Carry ONE mark Each

Q.66	*Affordable Housing in Partnership* (AHP) is one of the verticals of Pradhan Mantri Awas Yojana (PMAY) of Government of India. In AHP, the partnership was envisaged between _____.
(A)	States/UTs/ULBs/Parastatals and Academic Institutions
(B)	States/UTs/ULBs/Parastatals and Private Developers
(C)	Non-Government Organisation (NGO) and Private Developers
(D)	Non-Government Organisation (NGO) and Academic Institutions
Q.67	Which are the two wavelength bands of light spectrum used to calculate the *Normalised Difference Vegetation Index* (NDVI) in remote sensing?
(A)	Green and Blue
(B)	Green and Near Infrared
(C)	Near Infrared and Red
(D)	Red and Green

Q.68	_____ refers to the benefits when industries/firms cluster together resulting in reduced production cost, improved availability of skilled labor, and increased flow of information and knowledge sharing.
(A)	Industrial ecology
(B)	Agglomeration of economies
(C)	Behavioural economics
(D)	Industrial engineering
Q.69	As per the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013, the _____ determines the _____ for compensation for land acquisition.
(A)	Collector; market value
(B)	Planning Officer; market value
(C)	Collector; circle rate
(D)	Planning Officer; circle rate

Q.70	*Total Station* is an equipment used for _____.
(A)	measurement of rainfall intensity
(B)	noise level measurement
(C)	air quality measurement
(D)	determination of coordinates of unknown points relative to a known coordinate
Q.71	Select the correct statement(s) with regard to *Traffic Analysis Zones* (TAZs).
(A)	TAZs are not determined based on physical barriers like rivers, mountains and forest.
(B)	Demographic characteristics of a TAZ will change with new residents moving into the TAZ.
(C)	'Cordon line' helps in defining the study area within which TAZs are located.
(D)	TAZs cannot include multiple wards.

Q.72	As per the Census of India, 2011, choose the correct statement(s), regarding the definition of a *Census Town*.
(A)	The minimum population size is 5000.
(B)	The population density of at least 400 persons per square kilometer.
(C)	55 percent of the male working population are not engaged in agriculture.
(D)	The population density of at least 250 persons per square kilometer.

Q.73– Q.81 Carry TWO marks Each

Q.73 Match the following *Planning Strategies* in **Group-I** to their corresponding *descriptions* in **Group-II**.

Group-I		**Group-II**	
(P)	Urban Sprawl	(1)	Redeveloping previously utilized land, often resulting in a change in land-use and land cover
(Q)	Smart Growth	(2)	Development on previously undeveloped land
(R)	Greenfield Development	(3)	Concentrating development in compact, walkable urban centres to improve health and natural environment
(S)	Brownfield Development	(4)	Expansion of urban areas into rural areas, typically characterized by low-density development
		(5)	Allocating specific areas for industrial activities to minimize environmental impacts and segregate them from residential areas

(A) P–4, Q–2, R–5, S–1

(B) P–1, Q–2, R–3, S–4

(C) P–4, Q–3, R–2, S–1

(D) P–1, Q–3, R–2, S–5

Q.74 Match the following *sub categories of urban land use* in **Group-I** with their corresponding *broad land use categories* in **Group-II** as per URDPFI Guidelines, 2015.

Group-I		**Group-II**	
(P)	Sports complex	(1)	Protective and undevelopable use zone
(Q)	Water bodies	(2)	Recreational
(R)	Poultry and dairy farming	(3)	Special area
(S)	Police station	(4)	Primary Activity
		(5)	Public and Semi-Public

(A) P–2, Q–1, R–4, S–5

(B) P–3, Q–2, R–1, S–3

(C) P–4, Q–2, R–3, S–5

(D) P–2, Q–4, R–5, S–3

Q.75 Match the following *Curves* in **Group-I** with their corresponding *uses* in **Group-II.**

Group-I		**Group-II**	
(P)	Mass Curve	(1)	A graphical representation of income or wealth inequality
(Q)	Lorenz Curve	(2)	A graphical representation of cumulative inflow (supply) and outflow(demand) over time
(R)	Density Curve	(3)	Shows the relationship between the price of a good or service and the quantity demanded within a specified time frame
(S)	Horizontal Curve	(4)	Provides a transition between tangent strips of roadway allowing a vehicle to negotiate a turn
		(5)	An idealised representation of distribution in which the area under the curve is defined to be 1

(A) P–2, Q–3, R–4, S–5

(B) P–3, Q-1, R–5, S–2

(C) P–1, Q–2, R–3, S–4

(D) P–2, Q–1, R–5, S–4

Q.76 Match the following *types of migration* in **Group-I** to their corresponding *descriptions* in **Group- II.**

Group-I		**Group-II**	
(P)	Involuntary migration	(1)	When a migrant follows a path or series of stages towards a final destination
(Q)	Step migration	(2)	Repetitive movement of a migrant worker between home and destination areas
(R)	Circular migration	(3)	Forced displacement from their origin to destination areas
(S)	Chain migration	(4)	Immigrants from a particular area follow others from that area to a particular destination
		(5)	Relocation or process of people leaving one country to reside in another

(A) P–2, Q–3, R–4, S–1

(B) P–3, Q–1, R–2, S–4

(C) P–3, Q–1, R–5, S–4

(D) P–1, Q–4, R–2, S–3

Q.77	Which of the following characteristics of a house or land is/are considered in *hedonic price function*?
(A)	Quality of the view from the house
(B)	Low crime rate in the surrounding area
(C)	Number of bedrooms in the house
(D)	Household size
Q.78	Which of the following is/are the characteristics of *urban agglomeration* as per the Census of India, 2011?
(A)	A continuous urban spread constituting a town and its adjoining outgrowths
(B)	Urban settlements combined with one rural settlement
(C)	Two or more contiguous towns together with or without outgrowths
(D)	Urban villages engulfed within a metropolitan area
Q.79	The spot speeds (in km/h) of eight vehicles in a traffic stream are 42, 52, 56, **X**, 53, 62, 65, and 48. **X** is the spot speed of the fourth vehicle. The Time Mean Speed of the traffic stream is 56.25 km/h. After determining the value of **X**, the calculated *Space Mean Speed* of the traffic stream is _____ km/h. (*rounded off to two decimal places*)

Q.80 An individual chooses a transport mode for a particular trip based on three attributes i.e., cost of journey (X), In-vehicle travel time to reach destination (Y), and Out-of-vehicle time taken to access mode at respective stops (Z). The values for these attributes for three modes Rail, Bus and Para-transit are given in the table. If the general utility (U) equation is $U = -0.5\times X - 0.3\times Y - 0.4\times Z$, using Logit model, the estimated probability of choosing Bus is _____. (*rounded off to two decimal places*)

Mode	X= Cost of journey (in INR)	Y= In-Vehicle travel time (in min)	Z= Out-of-Vehicle travel time (in min)
Rail	20	20	10
Bus	10	40	7.5
Para-transit	15	35	5

Q.81	A four-arm uncontrolled un-signalized urban intersection of both way traffic is illustrated in the figure. Vehicles approaching the intersection from the directions A, B, C, and D can move to either left, right, or continue in straight direction. No U-turn is allowed. In the given situation, the maximum number of *vehicular crossing conflict* points for this intersection is _____. (*answer in integer*)