GATE 2022 General Aptitude

Q.1 – Q.5 Carry ONE mark each.

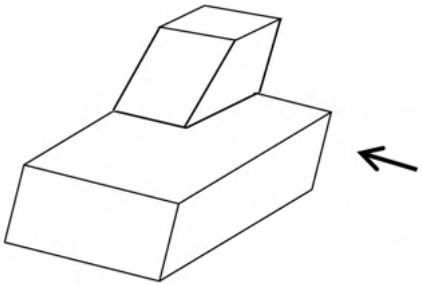
Q.1	After playing _____ hours of tennis, I am feeling _____ tired to walk back.
(A)	too / too
(B)	too / two
(C)	two / two
(D)	two / too

Q.2	The average of the monthly salaries of M, N and S is ₹ 4000. The average of the monthly salaries of N, S and P is ₹ 5000. The monthly salary of P is ₹ 6000. What is the monthly salary of M as a percentage of the monthly salary of P?
(A)	50%
(B)	75%
(C)	100%
(D)	125%

Q.3	A person travelled 80 km in 6 hours. If the person travelled the first part with a uniform speed of 10 kmph and the remaining part with a uniform speed of 18 kmph. What percentage of the total distance is travelled at a uniform speed of 10 kmph?
(A)	28.25
(B)	37.25
(C)	43.75
(D)	50.00

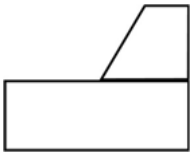
Q.4	Four girls P, Q, R and S are studying languages in a University. P is learning French and Dutch. Q is learning Chinese and Japanese. R is learning Spanish and French. S is learning Dutch and Japanese. Given that: French is easier than Dutch; Chinese is harder than Japanese; Dutch is easier than Japanese, and Spanish is easier than French. Based on the above information, which girl is learning the most difficult pair of languages?
(A)	P
(B)	Q
(C)	R
(D)	S

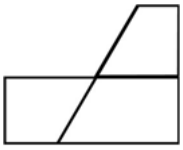
Q.5

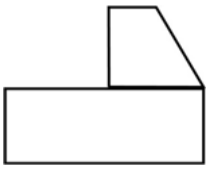


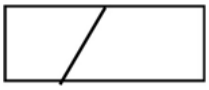
A block with a trapezoidal cross-section is placed over a block with rectangular cross section as shown above.

Which one of the following is the correct drawing of the view of the 3D object as viewed in the direction indicated by an arrow in the above figure?

(A) 

(B) 

(C) 

(D) 

Q. 6 – Q. 10 Carry TWO marks each.

Q.6	Humans are naturally compassionate and honest. In a study using strategically placed wallets that appear "lost", it was found that wallets with money are more likely to be returned than wallets without money. Similarly, wallets that had a key and money are more likely to be returned than wallets with the same amount of money alone. This suggests that the primary reason for this behavior is compassion and empathy. Which one of the following is the CORRECT logical inference based on the information in the above passage?
(A)	Wallets with a key are more likely to be returned because people do not care about money
(B)	Wallets with a key are more likely to be returned because people relate to suffering of others
(C)	Wallets used in experiments are more likely to be returned than wallets that are really lost
(D)	Money is always more important than keys

Q.7	A rhombus is formed by joining the midpoints of the sides of a unit square. What is the diameter of the largest circle that can be inscribed within the rhombus?
(A)	$\frac{1}{\sqrt{2}}$
(B)	$\frac{1}{2\sqrt{2}}$
(C)	$\sqrt{2}$
(D)	$2\sqrt{2}$

Q.8	An equilateral triangle, a square and a circle have equal areas. What is the ratio of the perimeters of the equilateral triangle to square to circle?
(A)	$3\sqrt{3} : 2 : \sqrt{\pi}$
(B)	$\sqrt{(3\sqrt{3})} : 2 : \sqrt{\pi}$
(C)	$\sqrt{(3\sqrt{3})} : 4 : 2\sqrt{\pi}$
(D)	$\sqrt{(3\sqrt{3})} : 2 : 2\sqrt{\pi}$

Q.9	Given below are three conclusions drawn based on the following three statements. Statement 1: All teachers are professors. Statement 2: No professor is a male. Statement 3: Some males are engineers. Conclusion I: No engineer is a professor. Conclusion II: Some engineers are professors. Conclusion III: No male is a teacher. Which one of the following options can be logically inferred?
(A)	Only conclusion III is correct
(B)	Only conclusion I and conclusion II are correct
(C)	Only conclusion II and conclusion III are correct
(D)	Only conclusion I and conclusion III are correct

Q.10	In a 12-hour clock that runs correctly, how many times do the second, minute, and hour hands of the clock coincide, in a 12-hour duration from 3 PM in a day to 3 AM the next day?
(A)	11
(B)	12
(C)	144
(D)	2

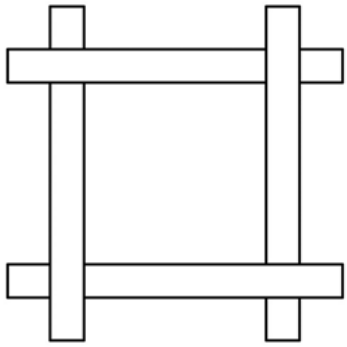
PART A: Common FOR ALL CANDIDATES

Q.11 – Q .28 Carry ONE mark Each

Q.11	The *concentric circles* in a sun-path diagram represent _____.
(A)	Altitude angle
(B)	Azimuth angle
(C)	Day of the year
(D)	Hour of the day
Q.12	The operational guidelines on Credit Linked Subsidy Scheme for Economically Weaker Sections (EWS), January 2017, by the erstwhile Ministry of Housing & Urban Poverty Alleviation, Government of India, defines *EWS households* as those having an annual income up to _____ (*in Indian Rupees*).
(A)	2,00,000
(B)	2,50,000
(C)	3,00,000
(D)	3,50,000

Q.13	Which of the following is a *Vector Graphics Software*?
(A)	Inkscape
(B)	Odeon
(C)	Adobe Dreamweaver
(D)	DesignBuilder
Q.14	The main cable of a suspension bridge supports the deck with hangars. These hangars are equidistant along the length of the bridge and represent a uniformly distributed load. Assuming the cable to be *weightless* as compared to the applied loading, the best approximation of the shape that the cable takes for this loading is a _____.
(A)	Catenary curve
(B)	Circular arc
(C)	Parabolic curve
(D)	Hyperbolic curve

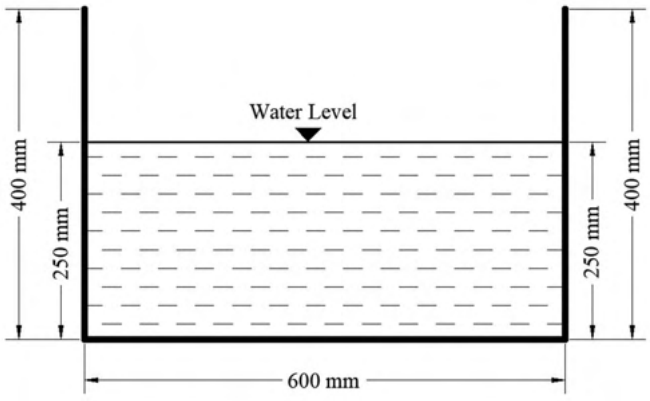
Q.15	Arrange the following road types in *descending order* of accessibility. (**P**) Arterial Road (**Q**) Expressway (**R**) Collector Road (**S**) Local Street
(A)	**Q-P-R-S**
(B)	**S-R-P-Q**
(C)	**S-P-R-Q**
(D)	**P-Q-S-R**

Q.16	The following *two-dimensional* visual composition represents _____.
	
(A)	Interlocking
(B)	Intersecting
(C)	Interlacing
(D)	Interpenetrating
Q.17	The *Golden Ratio* refers to _____.
(A)	$1:\sqrt{2}$
(B)	$2:(1+\sqrt{5})$
(C)	1:1
(D)	16:9

Q.18	Hogarth's *Line of Beauty* is a _____.
(A)	Horizontal straight line
(B)	Zigzag line
(C)	Vertical straight line
(D)	Serpentine line
Q.19	Which of the following sites were added to *Ramsar List* in the year 2020?
(A)	Ashtamudi Wetland
(B)	Asan Conservation Reserve
(C)	Chilika Lake
(D)	Lonar Lake

Q.20	Which of the following help(s) in keeping *direct solar radiation* out of the building?
(A)	*Mashrabiya*
(B)	*Badgir*
(C)	*Malquf*
(D)	*Chajja*
Q.21	As per the *Handbook of Professional Documents 2015*, Council of Architecture, India, architects are liable _____.
(A)	If the building is used for any other purpose than the one for which it was designed
(B)	If any unauthorised changes or illegal modifications are made by the owner(s)/occupant(s)
(C)	If the client suffers damage/loss due to lack of proper professional service
(D)	If the architect fails to attain the standard of care as prescribed by law

Q.22	As per the United Nations *Transforming our world: The 2030 agenda for sustainable development*, 2015, which of the following Sustainable Development Goals (SDGs) *directly address* water related issues?
(A)	SDG-1
(B)	SDG-4
(C)	SDG-6
(D)	SDG-14
Q.23	For a masonry section, the line of action of force shifts to incorporate the effects of lateral forces and induced moments. Consider a masonry section of width 600 mm. Assuming a *zero tensile stress capacity* and a linear stress-strain response for the entire domain of loading, the minimum value of *eccentricity* at which the section will crack (in mm, *rounded off to one decimal place*) is _____.
Q.24	The maximum and minimum indoor dry bulb temperature of a room are 38 ^{o}C and 34 ^{o}C, respectively. If the corresponding outdoor maximum and minimum dry bulb temperature are 42 ^{o}C and 30 ^{o}C, respectively, then the *thermal damping* of the room (in percentage, *rounded off to two decimal places*) is _____.
Q.25	A building site measures 96 sq.cm on a scale of 1:12500. The *actual area* it represents (in hectare, *in integer*) is _____.

Q.26	An off-street car parking lot contains a total of 75 bays. If the parking lot was used by 687 cars over a period of 12 hours, the *average parking turn-over* of the parking lot (in vehicles per hour per bay, *rounded off to two decimal places*) is _____.
Q.27	The *hydraulic radius* of the following rectangular open drainage section (in mm, *rounded off to two decimal places*) is _____.
	
Q.28	A town with 0.45 million population sends its *entire organic waste* to a composting site on a daily basis through a truck of 15 ton carrying capacity. Assume total waste generated per capita per day is 0.21 kg and 40% of the total waste is organic waste. The minimum number of *weekly round trips* required by the truck (*in integer*) will be _____.

Q.29 – Q .49 Carry TWO marks Each

Q.29	The correct sequence of the following *Construction Project Development stages*, as per the National Building Code of India 2016 is _____. (**P**) Resource Planning (**Q**) Project Inception (**R**) Commissioning and Handing over (**S**) Tendering (**T**) Site Survey and Soil Investigation (**U**) Selection of Construction Methodology
(A)	**P-Q-R-T-U-S**
(B)	**T-Q-R-U-S-P**
(C)	**Q-T-U-P-S-R**
(D)	**Q-T-P-S-U-R**

Q.30 Match the *aspects* in **Group I** with the corresponding *items* in **Group II**.

Group I		**Group II**	
(**P**)	Fire safety	(**1**)	Intruder alarm
(**Q**)	Seismic safety	(**2**)	Zero–strength barrier
(**R**)	Water efficiency	(**3**)	Stair lift
(**S**)	Accessible design	(**4**)	Aerator
		(**5**)	Auxiliary damper

(A) **P-4**, **Q-5**, **R-2**, **S-3**

(B) **P-5**, **Q-1**, **R-4**, **S-2**

(C) **P-2**, **Q-4**, **R-5**, **S-1**

(D) **P-2**, **Q-5**, **R-4**, **S-3**

Q.31 Match the *States* in **Group I** with the corresponding *Vernacular Building Typologies* in **Group II**

Group I		**Group II**	
(**P**)	Kerala	(**1**)	*Morung*
(**Q**)	Jharkhand	(**2**)	*Pol*
(**R**)	Nagaland	(**3**)	*Dhumkuria*
(**S**)	Gujarat	(**4**)	*Nalukettu*
		(**5**)	*Ghotul*

(A) **P-4**, **Q-5**, **R-3**, **S-2**

(B) **P-5**, **Q-1**, **R-2**, **S-4**

(C) **P-5**, **Q-3**, **R-1**, **S-4**

(D) **P-4**, **Q-3**, **R-1**, **S-2**

Q.32 Match the *examples* in **Group I** with their corresponding *typologies* in **Group II**.

Group I		**Group II**	
(**P**)	Navi Mumbai	(**1**)	Counter Magnet
(**Q**)	Hissar	(**2**)	Urban Agglomeration
(**R**)	Greater Mumbai	(**3**)	Satellite Town
(**S**)	Delhi-Mumbai Industrial Corridor	(**4**)	University Town
		(**5**)	Investment Region

(A) **P-2**, **Q-1**, **R-4**, **S-5**

(B) **P-4**, **Q-2**, **R-5**, **S-3**

(C) **P-3**, **Q-1**, **R-2**, **S-5**

(D) **P-3**, **Q-5**, **R-1**, **S-4**

Q.33 Match the *Place(s)/Event(s)* in **Group I** with the corresponding *Heritage Significance/Characteristics* in **Group II**.

Group I		**Group II**	
(**P**)	Chhatrapati Shivaji Terminus, Mumbai	(**1**)	A long interaction between people and the landscape
(**Q**)	Kumbh Mela	(**2**)	Cultural routes
(**R**)	Walled City of Jaipur	(**3**)	Victorian Gothic revival and traditional Indian features
(**S**)	Rock Shelters of Bhimbetka	(**4**)	Intangible cultural heritage
		(**5**)	Traditional human settlement, land use reflecting an interchange of ancient Hindu and Mughal ideas

(A) **P-1**, **Q-4**, **R-3**, **S-2**

(B) **P-3**, **Q-4**, **R-5**, **S-1**

(C) **P-2**, **Q-3**, **R-4**, **S-1**

(D) **P-3**, **Q-2**, **R-5**, **S-4**

Q.34 Match the *Urban Design Concepts* in **Group I** with their corresponding *Proponents* in **Group II**.

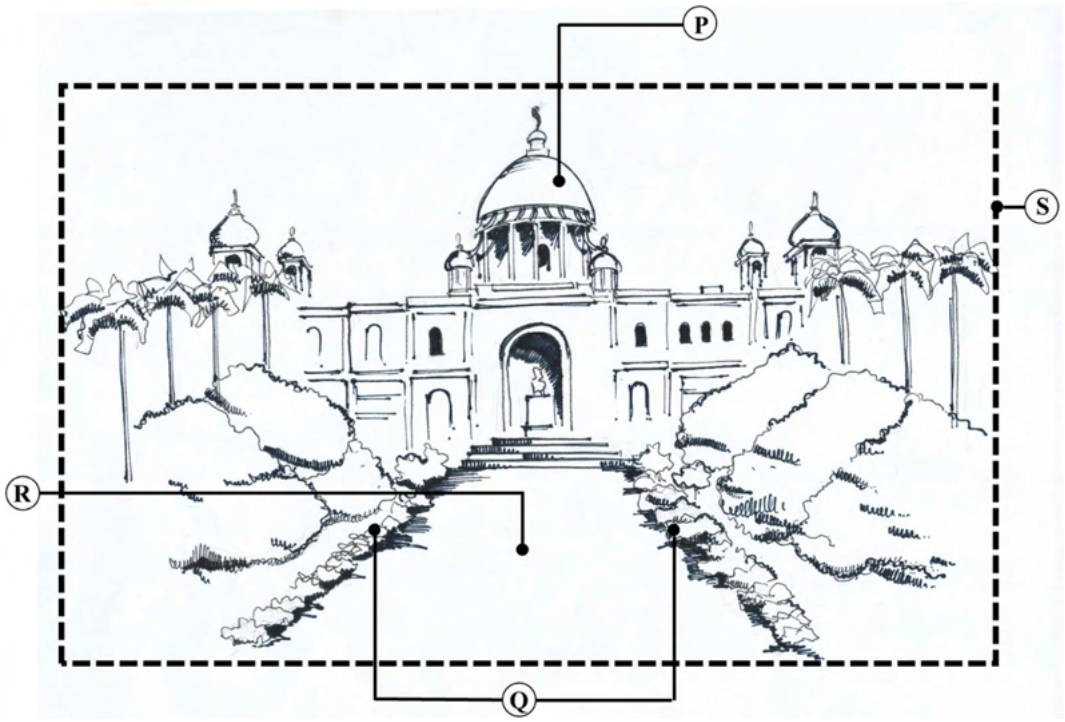
Group I		**Group II**	
(**P**)	Vertical theory of Urban Design	(**1**)	Ian Bentley
(**Q**)	Theory of Responsive Environments	(**2**)	Gordon Cullen
(**R**)	Serial Vision	(**3**)	Norman Pressman
(**S**)	Winter Urbanism	(**4**)	Ken Yeang
		(**5**)	Paul Oliver

(A) **P-1**, **Q-2**, **R-3**, **S-4**

(B) **P-4**, **Q-1**, **R-2**, **S-3**

(C) **P-4**, **Q-3**, **R-5**, **S-1**

(D) **P-5**, **Q-4**, **R-2**, **S-3**

Q.35	In the following sketch, **P**, **Q**, **R**, and **S** refer to *elements of an urban space*. Identify **P**, **Q**, **R**, **S**.
	
(A)	**P**-Path, **Q**-Vista, **R**- Edge, **S**-Landmark
(B)	**P**-Vista, **Q**-Edge, **R**- Landmark, **S**-Path
(C)	**P**-Landmark, **Q**-Vista, **R**- Path, **S**-Edge
(D)	**P**-Landmark, **Q**-Edge, **R**- Path, **S**-Vista

Q.36 As per the URDPFI Guidelines 2015, match the type of *Health Care Facilities* in **Group I** to the corresponding *population served per unit* in **Group II**.

Group I		**Group II**	
(**P**)	Multi-Speciality Hospital	(**1**)	15,000
(**Q**)	Dispensary	(**2**)	50,000
(**R**)	Veterinary Hospital	(**3**)	1,00,000
(**S**)	General Hospital	(**4**)	2,50,000
		(**5**)	5,00,000

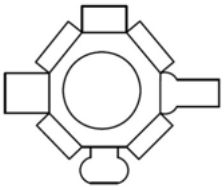
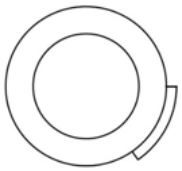
(A) **P-1**, **Q-2**, **R-3**, **S-4**

(B) **P-3**, **Q-1**, **R-5**, **S-4**

(C) **P-4**, **Q-3**, **R-5**, **S-2**

(D) **P-5**, **Q-1**, **R-2**, **S-3**

Q.37 Match the *plan forms* in **Group I** with their corresponding *project names* in **Group II**.

Group I		Group II	
(**P**)		(**1**)	New Parliament of Egypt, Cairo
(**Q**)		(**2**)	Apple Park Campus, California
(**R**)		(**3**)	Commerzbank, Frankfurt
(**S**)		(**4**)	30 St. Mary Axe, London
		(**5**)	Parliament Building, Dhaka

(A) **P-3**, **Q-5**, **R-4**, **S-2**

(B) **P-4**, **Q-2**, **R-1**, **S-5**

(C) **P-1**, **Q-2**, **R-3**, **S-4**

(D) **P-3**, **Q-5**, **R-1**, **S-2**

Q.38 Match the *Biosphere reserves* in India in **Group I** with their corresponding *locations* in **Group II.**

Group I		**Group II**	
(**P**)	Agasthyamala Biosphere Reserve	(**1**)	Western Himalayan region, Himachal Pradesh
(**Q**)	Nokrek Biosphere Reserve	(**2**)	Western Ghats, Kerala and Tamil Nadu
(**R**)	Cold desert Biosphere Reserve	(**3**)	Tura range, Meghalaya
(**S**)	Simlipal Biosphere Reserve	(**4**)	Kachchh, Rajkot, Surendranagar, and Patan districts, Gujarat
		(**5**)	Mayurbhanj district, Odisha

(A) **P-2**, **Q-1**, **R-4**, **S-3**

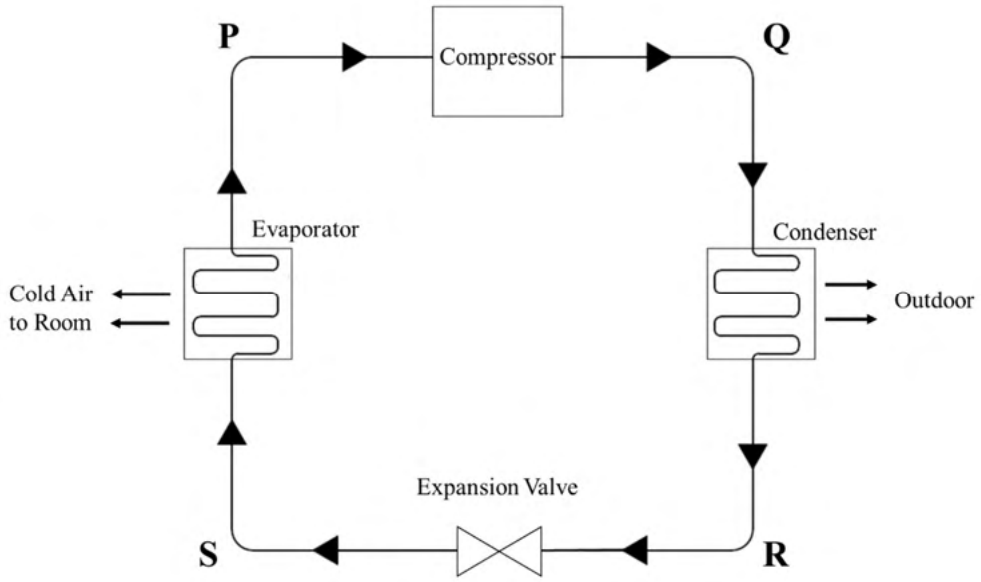
(B) **P-2**, **Q-3**, **R-1**, **S-5**

(C) **P-3**, **Q-1**, **R-4**, **S-5**

(D) **P-4**, **Q-5**, **R-1**, **S-3**

Q.39	In traditional Persian context, *qanat* system refers to
(A)	An underground water-way, tunnelled and channelled
(B)	A system where water is raised by a series of scoops fixed to a moving belt stretched between two wheels
(C)	A method of conducting water from a source-well rather than raising it
(D)	A system where water is conducted from enclosure to enclosure by straightforward gravity fall
Q.40	Which of the following is/are classified as the *Principles of Universal Design*?
(A)	Perceptible Information
(B)	Tolerance for Error
(C)	Occult Balance
(D)	Simple and Intuitive Use

Q.41	As per the URDPFI Guidelines 2015, which of the following Organoleptic and Physical parameters comply with the acceptable limit requirements of *drinking water quality*?
(A)	Colour: Maximum 5 Hazen units
(B)	Turbidity: Maximum 1 NTU
(C)	*p*H Value: Minimum 10
(D)	Total Dissolved Solids: Maximum 500 mg/l

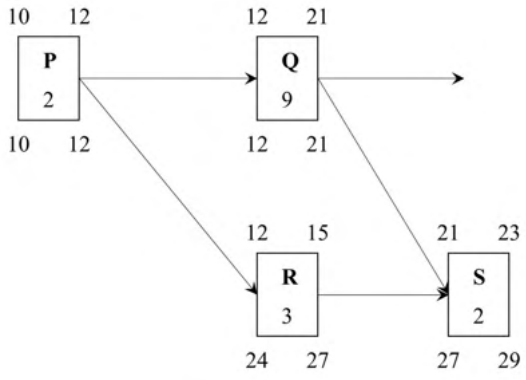
Q.42	In an ideal *air-conditioning cycle* shown below, which of the following statement(s) is/are *true* in the segments **P**, **Q**, **R**, **S**?
	
(A)	**P**: Vapour at low pressure
(B)	**Q**: Vapour at low pressure
(C)	**R**: Liquid at high pressure
(D)	**S**: Liquid-Vapour mixture at low pressure

Q.43	Which of the following is/are the characteristic(s) of a *Mughal Garden*?
(A)	Symmetrical and geometrical
(B)	Fountain and channelled water
(C)	Winding road and untrimmed vegetation
(D)	Vista with terminal building
Q.44	As per the Central Pollution Control Board's National Air Quality Index (AQI) of India 2014, which of the following statement(s) is/are true?
(A)	AQI is computed considering 8-hourly value of CO
(B)	AQI is computed considering 2-hourly value of PM2.5
(C)	AQI considers the O_3 concentrations
(D)	AQI considers the CO_2 concentrations

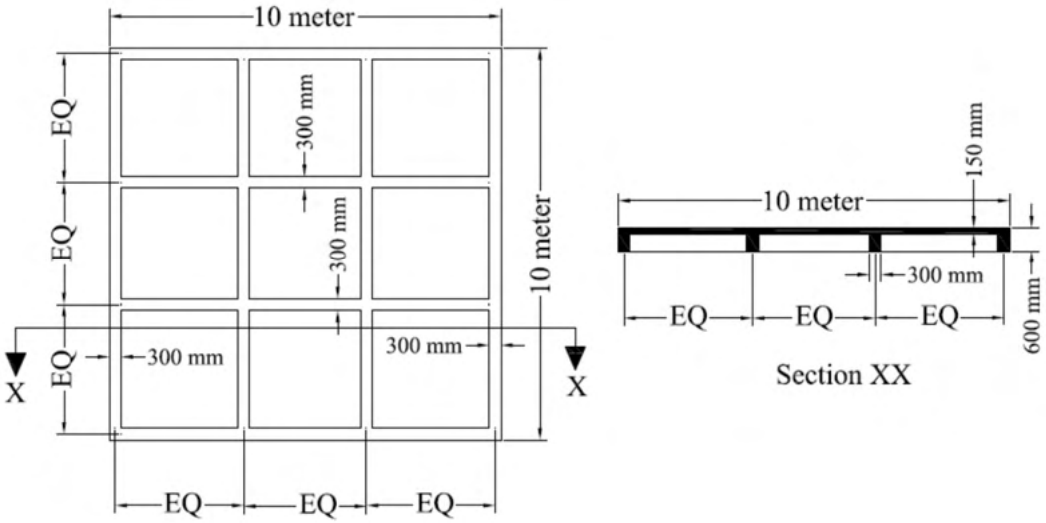
Q.45 The decadal population data of a city are given in the following Table. The domestic water consumption of the city is estimated to be 175 litres per capita per day in the year 2041. Considering 2011 population as the *base year* and using *arithmetic growth method of population forecasting*, the daily domestic water demand of the city in the year 2041 (in million litres per day, *rounded off to two decimal places*) will be _____.

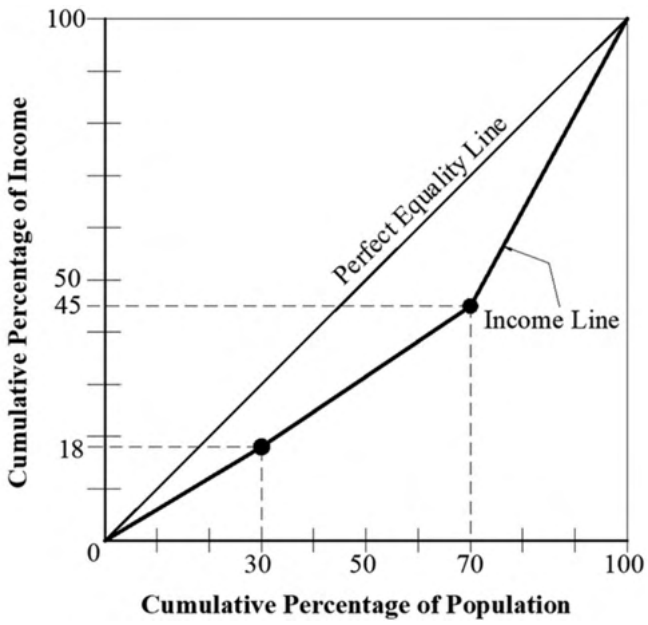
Year	1981	1991	2001	2011
Population	1,80,750	1,95,850	2,15,300	2,45,450

Q.46 The activity duration, early start, early finish, late start, and late finish (in weeks) for activities **P**, **Q**, **R**, and **S** are shown in the following figure. The *interfering float* of activity **R** (in weeks, *in integer*) is _____.



Q.47 A 230 mm thick brick wall of 10 m length and 3 m height is built using a *Flemish bond*. The size of the bricks used is 230 mm x 112.5 mm x 70 mm. Assuming a mortar thickness of 5 mm, the number of bricks required (*in integer*) is _____.

Q.48	The reflected ceiling plan and section of a reinforced cement concrete roof are shown in the following Figure. All the beams are 300 mm wide, 600 mm deep (including 150 mm slab) *equidistantly placed center to center*. Assuming 1% of concrete volume is occupied by reinforcement bars, the *volume of concrete* (in cubic meters, *rounded off to two decimal places*) is _____.
	

Q.49	The following graph represents the income distribution among the population of a country. The *Gini Coefficient* of the country (*rounded off to three decimal places*) is _____.
	

PART B1: FOR Architecture CANDIDATES ONLY

Q.50 – Q.56 Carry ONE mark Each

Q.50	Which of the following processes is used for *surface treatment of metals*?
(A)	Soldering
(B)	Thermoplating
(C)	Extrusion
(D)	Riveting
Q.51	Among the following monuments of ancient Greece, the only *Octastyle Peripteral temple with eight towering Doric columns lining both east and west facades* is _____.
(A)	Temple of Athena
(B)	Temple of Apollo
(C)	The Parthenon
(D)	Temple of Horus

Q. 52 An Ultrasonic Pulse Velocity (UPV) test was done on a hardened concrete element using a direct transmission method as per IS 516 (Part 5/Section 1): 2018. The distance between the transducer and receiver was 600 mm. The time taken for the induced wave to travel this distance is measured as 0.18 milliseconds. Based on the following Table, the *concrete quality grading* is _____.

Velocity (km/s) – cross probing	**Concrete quality grading**
Above 4.4	Excellent
3.75 – 4.4	Good
3.0 – 3.75	Doubtful
Less than 3.0	Poor

(A) Excellent

(B) Good

(C) Doubtful

(D) Poor

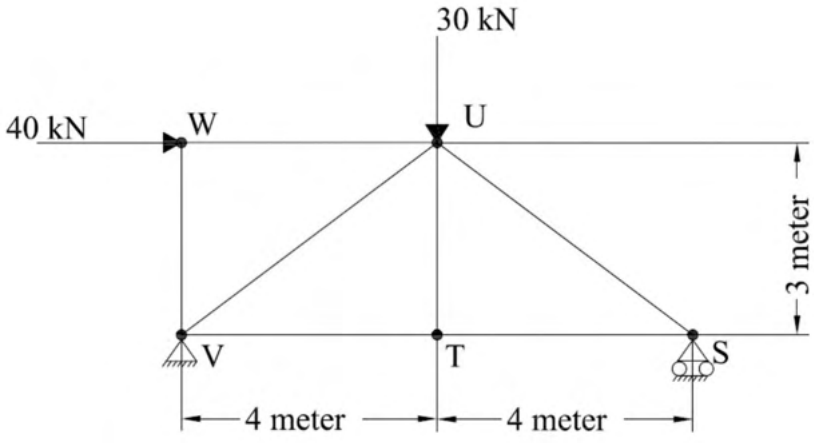
Q.53 Which of the following is/are example(s) of *Tomb Architecture* of Ancient Egypt?

(A) Step Pyramid of Zoser, Sakkara

(B) Great Temple of Abu-Simbel

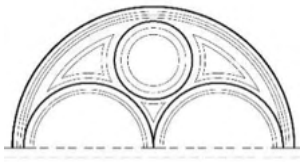
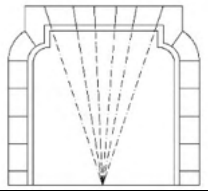
(C) Temple of Khons, Karnak

(D) Mastabas of Gizeh

Q.54	If *Aluminium : Anodisation :: Glazing : X*, which of the following choices represent X?
(A)	Hard coating
(B)	External cement plastering
(C)	Tempering
(D)	Free-standing vertical greening
Q.55	A blackbody radiant heating panel of 5 m^2 surface area at 35 °C surface temperature is located 1 m away from a 1 m^2 surface at 20 °C. The Stefan-Boltzmann constant is 5.6703×10^{-8} W m^{-2} K^{-4}. The rate of radiant heat emission by the radiant heating panel (in W, *rounded off to two decimal places*) is _____.
Q.56	A hypothetical truss comprising of *weightless members* is shown in the following Figure. Assuming tension to be positive and compression to be negative, the value of force in member TU (in kN, rounded off to one decimal place) is _____.
	

Q.47 – Q .55 Carry TWO marks Each

Q.47 Match the illustrations of *Arch Types* in **Group I** with their corresponding *names* in **Group II**.

Group I		Group II	
(P)		**(1)**	Venetian Arch
(Q)		**(2)**	Ogee Arch
(R)		**(3)**	Moorish Multifoil Arch
(S)		**(4)**	Corbelled Arch
		(5)	Shouldered Arch

(A) **P-2, Q-3, R-1, S-4**

(B) **P-3, Q-1, R-2, S-5**

(C) **P-3, Q-2, R-5, S-4**

(D) **P-5, Q-4, R-3, S-1**

Q.58 Match the *architectural projects* in **Group I** with *their corresponding architects* in **Group II**.

Group I		**Group II**	
(**P**)	Indian Institute of Management Bangalore	(**1**)	Revathi Kamath
(**Q**)	Osho International Meditation Resort, Pune	(**2**)	Brinda Somaya
(**R**)	Nalanda International School, Vadodara	(**3**)	Roger Anger
(**S**)	Matrimandir, Auroville	(**4**)	B. V. Doshi
		(**5**)	Hafeez Contractor

(A) **P-4**, **Q-5**, **R-2**, **S-3**

(B) **P-4**, **Q-1**, **R-5**, **S-2**

(C) **P-2**, **Q-4**, **R-5**, **S-1**

(D) **P-3**, **Q-5**, **R-1**, **S-2**

Q.59 Match the *structural joining systems* in **Group I** with the corresponding *materials* for which they are commonly used in **Group II**.

Group I		**Group II**	
(**P**)	Welding	(**1**)	Glass
(**Q**)	Spider Connector	(**2**)	Plastic
(**R**)	Mortise and Tenon	(**3**)	Brick
(**S**)	Mortar	(**4**)	Steel
		(**5**)	Timber

(A) **P-4**, **Q-1**, **R-2**, **S-5**

(B) **P-3**, **Q-5**, **R-1**, **S-2**

(C) **P-2**, **Q-3**, **R-5**, **S-1**

(D) **P-4**, **Q-1**, **R-5**, **S-3**

Q.60 Match the *Instruments* in **Group I** with the corresponding *climate parameters* in **Group II**.

Group I		**Group II**	
(**P**)	Pyranometer	(**1**)	Humidity
(**Q**)	Disdrometer	(**2**)	Wind
(**R**)	Hygrometer	(**3**)	Solar Radiation
(**S**)	Anemometer	(**4**)	Pressure
		(**5**)	Precipitation

(A) **P-3**, **Q-5**, **R-1**, **S-2**

(B) **P-3**, **Q-4**, **R-5**, **S-2**

(C) **P-5**, **Q-3**, **R-2**, **S-4**

(D) **P-1**, **Q-2**, **R-3**, **S-5**

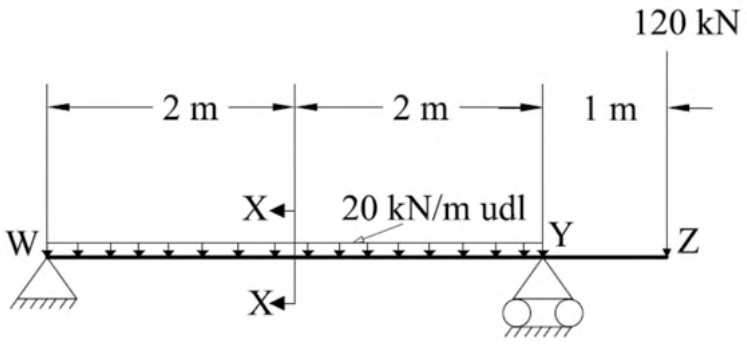
Q.61 In traditional *Indian temple architecture*, which of the following statement(s) is/are true?

(A) *Jagamohana* refers to a dancing hall

(B) *Gopuram* refers to an entrance tower

(C) *Char-chala* refers to a roof composed of four triangular segments

(D) *Vimana* refers to the structure over the *Garbhagriha*

Q.62	Which of the following factors impact *Daylight Autonomy* of a built space?
(A)	Orientation of building
(B)	Glare caused by daylight
(C)	Latitude and longitude of building location
(D)	Fenestration size
Q.63	For the beam shown in the following Figure, assuming a sagging moment (generating tensile stresses at the bottom fibre) as positive and a hogging moment (generating tensile stresses at the top fibre) as negative, the bending moment (in kN.m, *rounded off to one decimal place*) at section X-X is _____.
	

Q.64 The acoustical absorption of a wall panel in each octave band is tabulated below. The *Noise Reduction Coefficient* of the wall panel (*rounded off to two decimal places*) is _____.

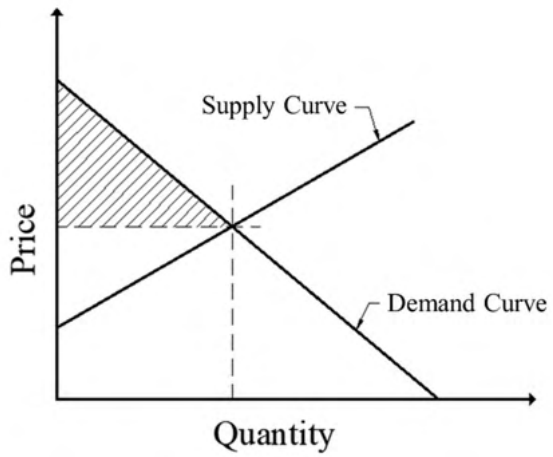
63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	16000 Hz
0.1	0.2	0.5	0.5	0.7	0.8	0.8	0.9	0.9

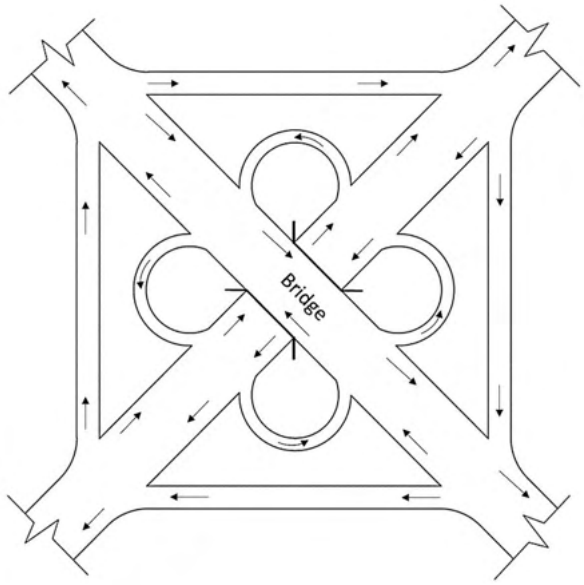
Q.65 A room is maintained at a wet bulb temperature of 25 ºC, globe temperature of 30 ºC, and air velocity of 0.5 m/s. The *decrease in Tropical Summer Index* when the air velocity is increased to 3 m/s (in ºC, *rounded off to two decimal places*) is _____.

PART B2: FOR Planning CANDIDATES ONLY

Q.66 – Q.72 Carry ONE mark Each

Q.66	Which of the following is the *National Electronic Toll Collection* System implemented by the National Payment Corporation of India?
(A)	e-Pass
(B)	E-ZPass
(C)	HashTag
(D)	FASTag

Q.67	The shaded area in the following demand-supply graph is known as _____.
	
(A)	Consumer Surplus
(B)	Consumer Deficit
(C)	Producer Surplus
(D)	Producer Deficit

Q.68	Identify the following *traffic interchange*.
	
(A)	Directional
(B)	Trumpet
(C)	Clover-Leaf
(D)	Diamond

Q.69	Which of the following is/are *Value Capture Method(s)*?
(A)	Building construction fees
(B)	Fees for changing agricultural to non-agricultural land use
(C)	User charge
(D)	Premium on additional FSI/FAR
Q.70	Which among the following is/are model(s) of *Public-Private Partnership* (PPP) used for infrastructure projects?
(A)	BOLD
(B)	BOLT
(C)	BOOT
(D)	BPOT
Q. 71	The measured *spot speeds* (in km/h) of 10 vehicles from a traffic stream are 45, 35, 25, 51, 45, 38, 61, 42, 47, and 49. The *Time Mean Speed* of the traffic stream (in km/h, *rounded off to one decimal place*) is _____.

Q. 72	In a township, the price of each house was 25,00,000 (in Indian Rupees) last month. The number of houses sold in a month (Q in thousands) is sensitive to the price of the house (P in Indian Rupees) and establishes a relationship as Q = 6685 – 0.00158P. If the price of each house increases by 20% in the current month, then the decrease in sale of the houses (in percentage, *rounded off to two decimal places*) compared to last month will be _____.

Q.73 – Q.81 Carry TWO marks Each

Q.73 Match the *models* in **Group I** with their corresponding *applications* in **Group II.**

Group I		**Group II**	
(**P**)	Logit model	(**1**)	Trip assignment
(**Q**)	Greenshield model	(**2**)	Modal split
(**R**)	Gravity model	(**3**)	Traffic flow
(**S**)	Multiple regression model	(**4**)	Trip generation
		(**5**)	Trip distribution

(A) **P-2**, **Q-1**, **R-5**, **S-4**

(B) **P-1**, **Q-5**, **R-2**, **S-3**

(C) **P-2**, **Q-3**, **R-5**, **S-4**

(D) **P-5**, **Q-3**, **R-4**, **S-2**

Q. 74 Match the *proponents* in **Group I** with the corresponding *theories* in **Group II**.

Group I		**Group II**	
(P)	James Q Wilson and George K. Kelling	**(1)**	Creative Class
(Q)	Sherry Arnstein	**(2)**	Right to City
(R)	Henry Lefebvre	**(3)**	Drive-in Culture
(S)	Richard Florida	**(4)**	Ladder of Citizen Participation
		(5)	Broken Window

(A) **P-2**, **Q-4**, **R-3**, **S-5**

(B) **P-4**, **Q-2**, **R-5**, **S-1**

(C) **P-5**, **Q-4**, **R-2**, **S-1**

(D) **P-3**, **Q-5**, **R-2**, **S-4**

Q.75 Match the *Artists/Scientists* in **Group I** with their corresponding *contributions* in **Group II.**

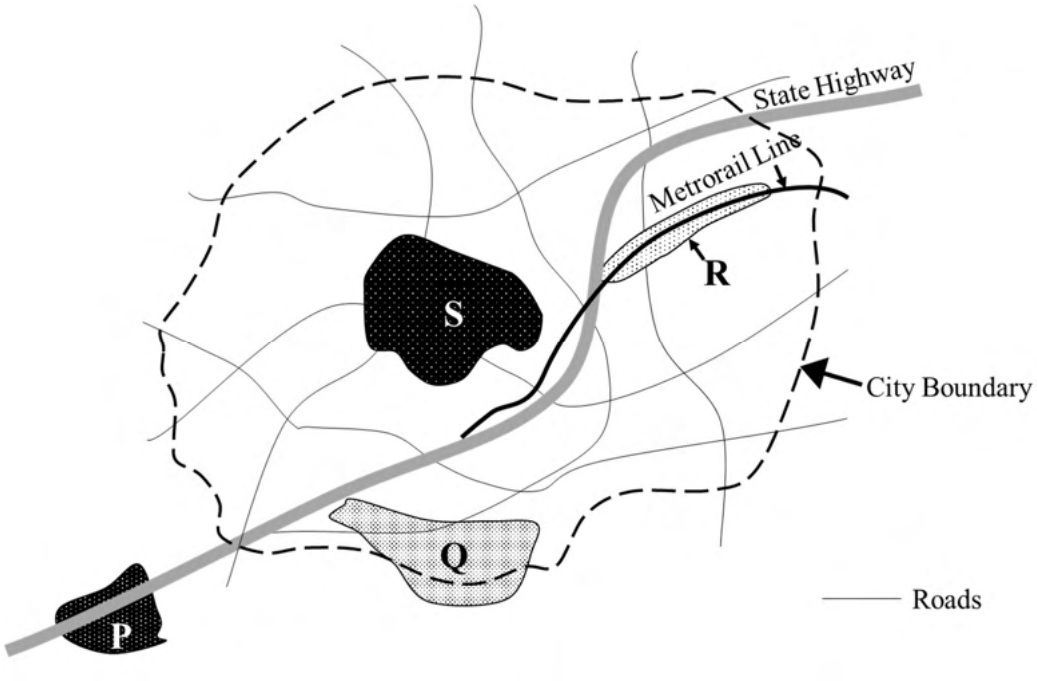
Group I		**Group II**	
(**P**)	Robert Park and Louis Wirth	(**1**)	Poverty Map
(**Q**)	Jacob August Riis	(**2**)	Cholera Map
(**R**)	Charles Booth	(**3**)	Tenement Shelter Photography
(**S**)	John Snow	(**4**)	Urban Ethnography
		(**5**)	Underground Sewerage Systems

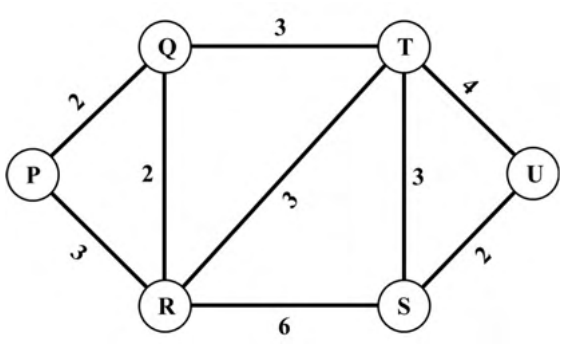
(A) **P-4**, **Q-3**, **R-1**, **S-2**

(B) **P-4**, **Q-1**, **R-5**, **S-2**

(C) **P-5**, **Q-3**, **R-1**, **S-4**

(D) **P-4**, **Q-3**, **R-5**, **S-1**

Q.76	In the conceptual diagram of the city given below, **P**, **Q**, **R**, and **S** refer to urban patterns. Among the choices given below, the correct association is
	
(A)	**P**-Satellite town, **Q**-Urban fringe, **R**-TOD, **S**-Central Business District
(B)	**P**-Central Business District, **Q**-Satellite town, **R**-TOD, **S**-Urban fringe
(C)	**P**-Urban fringe, **Q**-TOD, **R**-Satellite town, **S**-Central Business District
(D)	**P**-Satellite town, **Q**-Central Business District, **R**-TOD, **S**-Urban fringe

Q.77	Which among the following is/are the component(s) of the assimilative *carrying capacity* of urban environment?
(A)	Air
(B)	Water
(C)	Economy
(D)	Soil
Q. 78	In the transportation network given below, **P**, **Q**, **R**, **S**, **T**, and **U** are the nodes and values mentioned on the links denote time in minutes. Which of the following options represent the *minimum spanning tree*?
	
(A)	**PQ**, **QR**, **QT**, **TS**, **SU**
(B)	**PR**, **QR**, **RT**, **TU**, **SU**
(C)	**PQ**, **QR**, **RT**, **TS**, **SU**
(D)	**PQ**, **QR**, **RS**, **ST**, **TU**

Q.79 A vehicle count survey (in Passenger Car Unit) is conducted on a mid-block section of a road at regular intervals of 15 minutes from 8:00 AM to 10:00 AM. Based on the data given in Table below, the *Peak Hour Factor* (*rounded off to two decimal places*) for the given survey duration is _____.

Time Interval	Passenger Car Unit
8:00 AM – 8:15 AM	212
8:15 AM – 8:30 AM	248
8:30 AM – 8:45 AM	272
8:45 AM – 9:00 AM	315
9:00 AM – 9:15 AM	337
9:15 AM – 9:30 AM	405
9:30 AM – 9:45 AM	320
9:45 AM – 10:00 AM	267

Q.80 A land owner has shown interest in a Town Planning Scheme. Based on the details of the scheme given in the following Table, the estimated *Net Benefit* to the land owner after land development (in Indian Rupees, *in integer*) is _____.

Original plot size	500 Sq. m
Original land value	1200 Indian Rupees per Sq.m
Plot deduction for development	40%
Developed land value	2800 Indian Rupees per Sq.m
Total betterment cost to be paid by the land owner	50% of the increased total land value

Q.81 The year-wise cash flows (in Indian Rupees) of a construction project are given in the following Table. If the annual discount rate for the project is assumed to be 12%, the *Net Present Value* (in Indian Rupees, *rounded off to two decimal places*) for the project will be _____.

Year	Annual Cash Outflow	Annual Cash Inflow
0	5,00,000	0
1	0	0
2	0	0
3	50,000	1,80,000
4	50,000	2,20,000
5	50,000	2,90,000
6	0	3,30,000