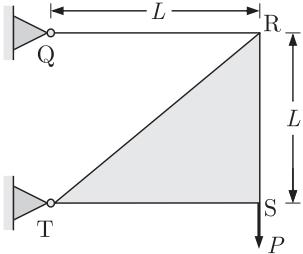# GATE SOLVED PAPER - CE

## 2010

**Q. 1 - Q. 25 carry one mark each.**

**Q. 1** The $\lim\limits_{x \to 0} \dfrac{\sin\left[\frac{2}{3}x\right]}{x}$ is

(A) $\dfrac{2}{3}$        (B) 1

(C) $\dfrac{3}{2}$        (D) $\infty$

**Q. 2** Two coins are simultaneously tossed. The probability of two heads simultaneously appearing is

(A) $\dfrac{1}{8}$        (B) $\dfrac{1}{6}$

(C) $\dfrac{1}{4}$        (D) $\dfrac{1}{2}$

**Q. 3** The order and degree of the differential equation $\dfrac{d^3y}{dx^3} + 4\sqrt{\left(\dfrac{dy}{dx}\right)^3 + y^2} = 0$ are respectively

(A) 3 and 2        (B) 2 and 3

(C) 3 and 3        (D) 3 and 1

**Q. 4** Two people weighing $W$ each are sittingon a plank of length $L$ floating on water at $L/4$ from either end. Neglecting the weight of he plank, the bending moment at the centre of the plank is

(A) $WL/8$        (B) $WL/16$

(C) $WL/32$        (D) zero

**Q. 5** For the truss shown in the figure, the force in the member QR is



(A) 0        (B) $\dfrac{P}{\sqrt{2}}$

(C) $P$        (D) $\sqrt{2}\,P$

**Q. 6** The major and minor principal stresses at a point are $3\,\text{MPa}$ and $-3\,\text{MPa}$ respectively. The maximum shear stress at the point is

(A) $0\,\text{MPa}$        (B) $3\,\text{MPa}$

(C) $6\,\text{MPa}$        (D) $9\,\text{MPa}$

**Q. 7**   The number of independent elastic constants for a linear elastic isotropic and homogeneous material is

(A) 4                                      (B) 3

(C) 2                                      (D) 1

**Q. 8**   The effective length of a column of length $L$ fixed against rotation and translation at one end and free at the other end is

(A) 0.5 L                                  (B) 0.7 L

(C) 1.414 L                                (D) 2 L

**Q. 9**   As per Indian standard code of practice for prestressed concrete (IS : 1343 - 1980) the minimum grades of concrete to be used for post-tensioned and pre-tensioned strural elements are respectively

(A) M20 for both                           (B) M 40 and M 30

(C) M 15 and M20                           (D) M 30 and M 40

**Q. 10**  A solid circular shaft of diameter $d$ and length $L$ is fixed at one end free at the other end. Atorque $T$ is applied at the free end. The shear modulus of the material is $G$. The angle of twist at the free end is

(A) $\dfrac{16\,TL}{\pi d^4 G}$                  (B) $\dfrac{32\,TL}{\pi d^4 G}$

(C) $\dfrac{64\,TL}{\pi d^4 G}$                  (D) $\dfrac{128\,TL}{\pi d^4 G}$

**Q. 11**  In a compaction test, $G$, $w$, $S$ and $e$ represent the specific gravity, water content, degree of saturation and void ratio of the soil sample, respectively. If $\gamma_w$ represents the unit weight of water and $\gamma_d$ represents the dry unit weight of the soil, the equation of zero air voids line is

(A) $\gamma_d = \dfrac{G\gamma_w}{1 + Se}$           (B) $\gamma_d = \dfrac{G\gamma_w}{1 + Gw}$

(C) $\gamma_d = \dfrac{Gw}{e + \gamma_w S}$          (D) $\gamma_d = \dfrac{Gw}{1 + Se}$

**Q. 12**  A fine grained soil has liquid limit of 60 and plastic limit of 20. As per the plasticity chart, according to IS classification, the soil is represented by the letter symbols

(A) CL

(B) CI

(C) CH

(D) CL-ML

**Q. 13**  Quick sand condition occurs when

(A) the void ratio of the soil becomes 1.0

(B) the upward seepage pressure in soil becomes zero

(C) the upward seepage pressure in soil becomes equal to the saturated unit weight of the soil

(D) the upward seepage pressure in soil becomes equal to the submerged unit weight of the soil

**Q. 14**    The $e-\log p$ curve shown in the figure is representative of
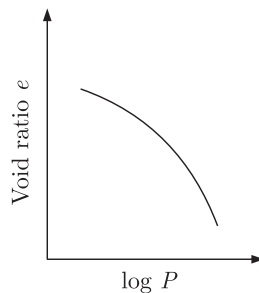


(A) Normally consolidated clay
(B) Over consolidated clay
(C) Under consolidated clay
(D) Normally consolidated clayey sand

**Q. 15**    If $\sigma_h$, $\sigma_v$, $\sigma_h$ and $\sigma_v$ represent the total horizontal stress, total vertical stress, effective horizontal stress and effective vertical stress on a soil element, respectively, the coefficient of earth pressure at rest is given by

(A) $\dfrac{\sigma_h}{\sigma_v}$                          (B) $\dfrac{\sigma_h}{\sigma_v}$

(C) $\dfrac{\sigma_v}{\sigma_h}$                          (D) $\dfrac{\sigma_v'}{\sigma_h}$

**Q. 16**    A mild-sloped channel is followed by a steep-sloped channel. The profiles of gradually varied flow in the channel are
(A) $M_3, S_2$                          (B) $M_3, S_3$
(C) $M_2, S_1$                          (D) $M_2, S_2$

**Q. 17**    The flow in a rectangular channel is subcritical. If width of the channel is reduced at a certain section, the water surface under no-choke condition will
(A) drop at a downstream section      (B) rise at a downstream section
(C) rise at an upstream section       (D) not undergo any change

**Q. 18**    The correct match of Group I Group II is

|    | Group I |    | Group II |
|----|---------|----|----------|
| P. | Evapotranspiration | 1. | Penman method |
| Q. | Infiltration | 2. | Snyder's method |
| R. | Synthetic unit hydrography | 3. | Muskingum method |
| S. | Channel Routing | 4. | Horton's method |

(A) P-1, Q-3, R-4, S-2              (B) P-1, Q-4, R-2, S-3
(C) P-3, Q-4, R-1, S-2              (D) P-4, Q-2, R-1, S-3

**Q. 19**    Group I gives a list of devices and Group II gives the list of uses.

|    | Group I |    | Group II |
|----|---------|----|----------|
| P. | Pitot tube | 1. | Measuring pressure in a pipe |
| Q. | Manometer | 2. | Measuring velocity of low in a pipe |
| R. | Venturimeter | 3. | Measuring air and gas velocity |
| S. | Anemometer | 4. | Measuring discharge in a pipe |

The correct match of Group I with Group II is
(A) P-1, Q-2, R-4, S-3          (B) P-2, Q-1, R-3, S-4
(C) P-2, Q-1, R-4, S-3          (D) P-4, Q-1, R-3, S-2

**Q. 20** A coastal city produces municipal solid waste (MSW) with high moisture content, high organic materials, low calorific value and low inorganic materials. The most effective and sustainable option for MSW management in that city is
(A) Composting                  (B) Dumping is sea
(C) Incineration                (D) Landfill

**Q. 21** According to the Noise Pollution (Regulation and Control) Rules, 2000, of the Ministry of Environment and Forests, India, the day time and night time noise level limits in ambient air for residential areas expressed in $d$B(A) Leq are
(A) 50 and 40                   (B) 55 and 45
(C) 65 and 55                   (D) 75 and 70

**Q. 22** An air parcel having $40°$C temperature moves from ground level to $500$ m elevation in dry air following the "adiabatic lapse rate". The resulting temperature of air parcel at $500$ m elevation will be
(A) $35°$C                      (B) $38°$C
(C) $41°$C                      (D) $44°$C

**Q. 23** Aggregate impact value indicates the following property of aggregates
(A) Durability                  (B) Toughness
(C) Hardness                    (D) Strength

**Q. 24** As per IRC : 67 : 2001, a traffic sign indicating the Speed Limit on a road should be of
(A) Circular Shape with white Background and Red Border
(B) Triangular Shape with White Background and Red Border
(C) Triangular Shape with Red Background and White Border
(D) Circular Shape with Red Background and White Border

**Q. 25** The local mean time at a place located in longitude $90°40'$ E when the standard time is 6 hours and 30 minutes and the standard meridian is $82°30'$ E is
(A) 5 hours, 2 minutes and 40 seconds
(B) 5 hours, 57 minutes and 20 seconds
(C) 6 hours and 30 minutes
(D) 7 hours, 02 minutes and 40 seconds

## Q. 26 - Q. 55 carry two marks each.

**Q. 26** The solution to the ordinary differential equation $\dfrac{d^2 y}{dx^2} + \dfrac{dy}{dx} - 6y = 0$ is
(A) $y = c_1 e^{3x} + c_2 e^{-2x}$          (B) $y = c_1 e^{3x} + c_2 e^{2x}$
(C) $y = c_1 e^{-3x} + c_2 e^{2x}$          (D) $y = c_1 e^{-3x} + c_2 e^{-2x}$

**Q. 27**  The inverse of the matrix $\begin{bmatrix} 3+2i & i \\ -i & 3-2i \end{bmatrix}$ is

(A) $\dfrac{1}{12}\begin{bmatrix} 3+2i & i \\ i & 3-2i \end{bmatrix}$  (B) $\dfrac{1}{12}\begin{bmatrix} 3-2i & -i \\ i & 3+2i \end{bmatrix}$

(C) $\dfrac{1}{14}\begin{bmatrix} 3+2i & -i \\ i & 3-2i \end{bmatrix}$  (D) $\dfrac{1}{14}\begin{bmatrix} 3-2i & -i \\ i & 3+2i \end{bmatrix}$

**Q. 28**  The table below gives values of a function $F(x)$ obtained for values of $x$ at intervals of 0.25.

| $x$ | 0 | 0.25 | 0.5 | 0.75 | 1.0 |
|---|---|---|---|---|---|
| $F(x)$ | 1 | 0.9412 | 0.8 | 0.64 | 0.50 |

The value of the integral of the function between the limits 0 to 1 using Simpson's rule is

(A) 0.7854  (B) 2.3562

(C) 3.1416  (D) 7.5000

**Q. 29**  The partial differential equation that can be formed from $z = ax + by + ab$ has the form (with $P = \dfrac{\partial z}{\partial x}$ and $q\dfrac{\partial z}{\partial y}$)

(A) $z = px + qy$  (B) $z = px + pq$

(C) $z = px + qy + pq$  (D) $z = qx + pq$

**Q. 30**  A parabolic cable is held between two supports at the same level. The horizontal span between the supports is $L$. The sag at the mid-span is $h$. The equation of the parabola is $y = 4h\dfrac{x^2}{L^2}$, where $x$ is the horizontal coordinate and $y$ is the vertical coordinate with the origin at the centre of the cable. The expression for the total length of the cable is

(A) $\displaystyle\int_0^L \sqrt{1 + 64\frac{h^2 x^2}{L^4}}\, dx$  (B) $\displaystyle\int_0^{L/2} \sqrt{1 + 64\frac{h^3 x^2}{L^4}}\, dx$

(C) $\displaystyle\int_0^{L/2} \sqrt{1 + 64\frac{h^2 x^2}{L^4}}\, dx$  (D) $\displaystyle\int_0^{L/2} \sqrt{1 + 64\frac{h^2 x^2}{L^4}}\, dx$

**Q. 31**  Given a function $f(x, y) = 4x^2 + 6y^2 - 8x - 4y + 8$. The optimal value of $f(x, y)$

(A) is a minimum equal to $\dfrac{10}{3}$

(B) is a maximum equal to $\dfrac{10}{3}$

(C) is a minimum equal to $\dfrac{8}{3}$

(D) is a maximum equal to $\dfrac{8}{3}$

**Q. 32**  A double cover butt riveted joint is used to connect two flat of 200 mm width and 14 mm thickness as shown in the figure. There are twelve power driven rivets of 20 mm diameter at a pitch of 50 mm in both directions on either side of the plate. Two cover plates of 10 mm thickness are used. The capacity of the joint in tension considering bearing and shear ONLY, with permissible bearing and shear stresses as 300 MPa and 100 MPa respectively is
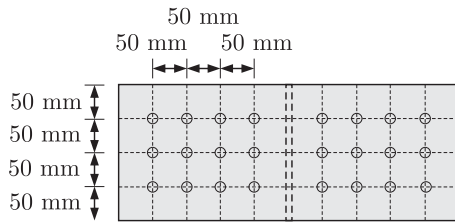
(A) 1083.6 kN  
(B) 871.32 kN  
(C) 541.8 kN  
(D) 433.7 kN

**Q. 33**   Two plates, subjected to direct ension, each of 10 mm thickness and having widths of 100 mm and 175 mm, respectively are to be fillet welded with an overlap of 200 mm. Given that the permissible weld stress is 110 MPa and the permissible stress in steel is 150 MPa, the length of the weld required using the maximum permissible weld size as per IS : 800-1984 is
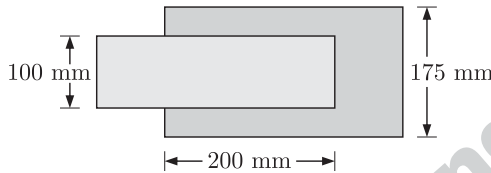


(A) 245.3 mm  
(B) 229.2 mm  
(C) 205.5 mm  
(D) 194.8 mm

**Q. 34**   For the simply supported beam of length $L$, subjected to a uniformly distributed moment $M$ kN-m per unit length as shown in the figure, the bending moment (in kN-m) at the mid-span of the beam is
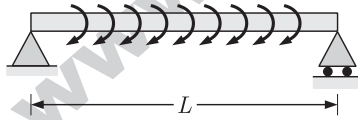


(A) 0  
(B) M  
(C) ML  
(D) M/L

**Q. 35**   A disc of radius $r$ has a hole of radius $\frac{r}{2}$ cut-out as shown. The centroid of the remaining disc (shaded portion) at a radial distance from the centre "O" is
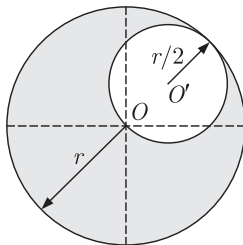


(A) $\frac{r}{2}$  
(B) $\frac{r}{3}$  
(C) $\frac{r}{6}$  
(D) $\frac{r}{8}$

Q. 36    A three hinged parabolic arch having a span of 25 m and a rise of 5 m carries a point load of 10 kN at quarter span from the left end as shown in the figure. The resultant reaction at the left support and its inclination with the horizontal are respectively



(A) 9.01 kN and 56.31°

(B) 9.01 kN and 33.69°

(C) 7.50 kN and 56.31°

(D) 2.50 kN and 33.69°

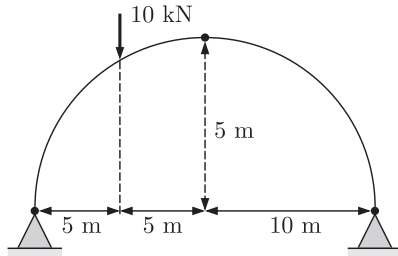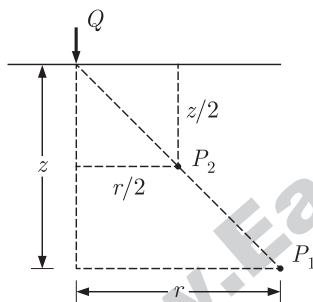Q. 37    The vertical stress at ppoint $P_1$ due to the point load $Q$ on the ground surface as shown in figure is $\sigma_z$. According to Boussinesq's equation, the vertical stress at point $P_2$ shown in figure will be



(A) $\dfrac{\sigma_z}{2}$                                           (B)  $\sigma_z$

(C) $2\sigma_z$                                                (D) $4\sigma_z$

Q. 38    An open ended steel barrel of 1 m height and 1 m diameter is filled with saturated fine sand having coefficient of permability of $10^{-2}$ m/s. The barrel stands on a saturated bed of gravel. The time required for the water level in the barrel to drop by 0.75 m is

(A) 58.9 s                                              (B)  75 s

(C) 100 s                                               (D)  150 s

Q. 39    The ultimate load capacity of a 10 m long concrete pile of square cross section $500 \times 500$ mm driven into a homogeneous clay layer having undrained cohesion value of 40 kPa is 700 kN. If the cross section of the pile is reduced to $250 \times 2500$ mm and the length of the pile is increased to 20 m, the ultimate load capacity will be

(A) 350 kN

(B) 632.5 kN

(C) 722.5 kN

(D) 1400 kN

**Q. 40** For a rectangular channel seetion, Group I lists geometrical elements and Group II gives proportions for hydraulically efficient section

| | Group I | | Group II |
|---|---|---|---|
| P. | Top width | 1. | $\frac{y_e}{2}$ |
| Q. | Perimeter | 2. | $y_e$ |
| R. | Hydraulic Radius | 3. | $2y_e$ |
| S. | Dydraulic Depth | 4. | $4y_e$ |

$y_e$ is the flow depth corresponding to hydraulically efficient section. The correct match of Group I with Group II is

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

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

**Q. 41** The Froude number of flow in a rectangular channel is 0.8. If te depth of flow is 1.5 m, the critical depth is

(A) 1.80 m          (B) 1.56 m

(C) 1.36 m          (D) 1.29 m

**Q. 42** A well of diameter 20 cm fully penetrates a confined aquifer. After a long period of pumping at rate of 2720 litres per minute, the observations of drawdown taken at 10 m and 100 m distances from the centre of the well are found to be 3 m and 0.5 m respectively. The transmissivity of the aquifer is

(A) 676 $m^2$/day          (B) 576 $m^2$/day

(C) 526 $m^2$/day          (D) 249 $m^2$/day

**Q. 43** If the BOD3 of a wastewater sample is 75 mg/L and reaction rate constant $k$ (base e) is 0.345 per day, the amount of BOD remaining in the given sample after 10 days is

(A) 3.21 mg/L          (B) 3.45 mg/L

(C) 3.69 mg/L          (D) 3.92 mg/L

**Q. 44** Consider the following statements in the context of geometric design of roads.

I : A simple parabolic curve is an acceptable shape for summit curves

II : Comfort to passengers is an important consideration in the design of summit curves.

The correct otption evaluating the above statements and their relationship is

(A) I is true, II is false

(B) I is true, II is true, and II is the correct reason for I

(C) I is true, II is true, and II is NOT the correct reason for I

(D) I is false, II is true

**Q. 45** The design speed for a two-lane road is 80 km/h. When a design vehicle with a wheelbase of 6.6 m is negotiating a borizontal curve on that road, the off-tracking is measured as 0.096 m. The required widening of carriageway of the two-lane road on the curve is approximately

(A) 0.55 m          (B) 0.65 m

(C) 0.75 m          (D) 0.85 m

**Q. 46**  Consider the following statements in the context of cement concrete pavements
I :  Warping stresses in cement concrete pavements are saused by the seasonal variation in temperature.
II : Tie bars are generally provided across transverse joints of cement concrete pavements.

The correct option evaluating the above statements is
(A) I true II False            (B) I False II True
(C) I True II True             (D) I False II False

**Q. 47**  A bench mark has been established at the soffit of an ornamental arch at the known elevation of 100.0 m above mean sea level. The back sight used to establish height of instrument is a inverted staffreading of 2.105 m. A forward sight reading with normally held staff of 1.105 m is taken on a recently constructed plinth. The elevation of the plinth is
(A) 103.210 m                  (B) 101.000 m
(C) 99.000 m                   (D) 96.790 m

## Common Data Questions

### Common Data For Questions. 48 and 49 :

Ion concentration obtained for a groundwater sample (having pH = 8.1) are given below

| Ion | $Ca^{2+}$ | $Mg^{2+}$ | $Na^+$ | $HCO_3^-$ | $SO_4^{2-}$ | $CI^-$ |
|---|---|---|---|---|---|---|
| Ion concentration (mg/L) | 100 | 6 | 15 | 250 | 45 | 39 |
| Atomic Weight | Ca = 40 | Mg = 24 | Na = 23 | H = 1, C = 12, O = 16 | S = 12, O = 16 | CI = 35.5 |

**Q. 48**  Total hardness (mg/L as $CaCO_3$) present in the above water sample is
(A) 205                        (B) 250
(C) 275                        (D) 308

**Q. 49**  Carbonate hardness (mg/L as $CaCO_3$) presnt in the above water sample is
(A) 205                        (B) 250
(C) 275                        (D) 289

### Common Data For Questions. 50 and 51 :

The moisture holding capacity of the soil in a 100 hectare farm is 18 cm/m. The field is to be irrigated when 50 percent of the available moisture in the root zone is depleted. The irrigation water is to be supplied by a pump working for 10 hours a day, and water application efficiency is 75 percent. Details of crops planned for cultivation are as follows

| Crop | Root zone depth | Peak rate of mosture use (mm/day) |
|---|---|---|
| $X$ | 1.0 | 5.0 |
| $Y$ | 0.8 | 4.0 |

**Q. 50**    The capacity of irrigation system to irrigate crop '$X$' in 36 hectares is
        (A) 83 liters/sec                  (B) 67 literse/sec
        (C) 57 liters/sec                  (D) 53 liters/sec

**Q. 51**    The area of crop '$Y$' that can be irrigated when the available capacity of irrigation system is 40 litres/sec is
        (A) 40 40 hectares               (B) 36 hectares
        (C) 30 hectares                  (D) 27 hectares

## Linked Answer Question

### Statement For Linked Answer Q. 52 and 53 :

A doubly reinforced rectangular concrete beam has a width of 300 mm and an effective depth of 500 mm. The beam is reinforced with 2200 mm$^2$ of steel in tension and 628 mm$^2$ of steel in compression. the effective cover for compression steel is 50 mm. Assume that both tension and compression steel yield. The grades of concrete and steel used are M20 and Fe250, respectively. The stress block parameters (rounded off to first two decimal places) for concrete shall be as per IS 456 : 2000.

**Q. 52**    The depth of neutral axis is
        (A) 205.30 mm                (B) 184.56 mm
        (C) 160.91 mm                (D) 145.30 mm

**Q. 53**    The moment of resistance of the section is
        (A) 206.00 kN-m             (B) 209.20 kN-m
        (C) 236.80 kN-m             (D) 251.90 kN-m

### Statement For Linked Answer Q. 54 and 55 :

The unconfined compressive strength of a saturated clay sample is 54 kPa.

**Q. 54**    The value of sobesion for the clay is
        (A) 0 kPa                     (B) 13.5 kPa
        (C) 27 kPa                    (D) 54 kPa

**Q. 55**    If a squre footing of size $4 \times 4$ m is resting on the surface of a deposit of the above clay, the ultimate bearing capacity of the footing (as per Terzaghi's equation) is
        (A) 1600 kPa                  (B) 316 kPa
        (C) 200 kPa                   (D) 100 kPa

## General Aptitude (GA) Questions

### Q. 56 to Q. 60 carry one mark each

**Q. 56**    Which of the following options is the closest in meaning to the word below:
        (A) cyclic                     (B) indirect
        (C) confusing                 (D) crooked

**Q. 57**   The question below consists of a pair of related words followed by four pairs of words. Select the pair that best expresses the relation in the original pair.
(A) fallow : land                          (B) unaware : sleepar
(C) wit : jester                           (D) renovated : house

**Q. 58**   Choose the most appropriate word from the options given below to complete the following sentence:
If we, manage to ____ our natural resources, we would leave a better planet for our children.
(A) uphold                                 (B) restrain
(C) cherish                                (D) conserve

**Q. 59**   Choose the most appropriate word from the options given below to complete the following sentence:
His rather casual remarks on politics ____ his lack of seriousness about the subject.
(A) masked                                 (B) belied
(C) betrayed                               (D) suppressed

**Q. 60**   25 persons are in a room. 15 of them play hockey, 17 of them play football and 10 of them play both hockey and football. Then the number of persons playing neither nor football is:
(A) 2                                      (B) 17
(C) 13                                     (D) 3

## Q. 61 to Q. 65 carry two marks each

**Q. 61**   Modern warfare has changed from large scale clashes of armies to suppression of civilian populations. Chemical agents that do their work silently appear to be suited to such warfare; and regretfully, there exist people in military establishments who think that chemical agents are useful tools for their cause.
Which of the following statements best sums up the meaning of the above passage:
(A) Modern warfare has resulted in civil strife
(B) Chemical agents are useful in modern warfare
(C) Use of chemical agents i warfare would be undesirable
(D) People in military establishments like to use chemical agents in war.

**Q. 62**   If $137 + 276 = 435$ how much is $731 + 672$?
(A) 534                                    (B) 1403
(C) 1623                                   (D) 1513

**Q. 63**   5 skilled workers can build a wall in 20 days; 8 semi-skilled workers can build a wall in 25 days; 10 unskilled workers can build a wall in 30 days. If a team has 2 skilled, 6 semi-skilled and 5 unskilled workers, how long will it take to build the wall?
(A) 20 days                                (B) 18 days
(C) 16 days                                (D) 15 days

**Q. 64**      Given digits 2, 2, 3, 3, 3, 4, 4, 4, 4 ho many distinct 4 digit numbers than 3000 can be formed?

(A) 50                              (B) 51

(C) 52                              (D) 54

**Q. 65**      Hari (H), Gita (G), Irfan (I) and Saira (S) are siblings (i.e. brothers and sisters). All were born on 1$^{st}$ January. The age difference between any two successive siblings (that is born one after another) is less than 3 years. Given the following facts:

I :   Hair's age + Gita's age > Irfan's age + Saira's age

II :  The age difference between Gita and Saira is 1 year. However, Gita is not the oldest and Saira is not the youngest

III: There are not twins

(A) HSIG                          (B) SGHI

(C) IGSH                          (D) IHSG

**********

ANSWER KEY

| 2010 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| (A) | (C) | (A) | (D) | (C) | (B) | (C) | (D) | (D) | (B) |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| (B) | (C) | (D) | (B) | (B) | (D) | (A) | (B) | (C) | (A) |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| (B) | (A) | (B) | (A) | (D) | (C) | (B) | (A) | (C) | (D) |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| (A) | (B) | (B) | (A) | (C) | (A) | (D) | (B) | (B) | (C) |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| (D) | (B) | (C) | (A) | (C) | (D) | (D) | (C) | (A) | (B) |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| (D) | (C) | (B) | (C) | (C) | (B) | (A) | (D) | (B) | (D) |
| 61 | 62 | 63 | 64 | 65 | | | | | |
| (C) | (A) | (D) | (B) | (B) | | | | | |