

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

**Linked Answer Questions 52 & 53**

A doubly reinforced rectangular concrete beam has a width of 300mm and an effective depth of 500mm. the beam is reinforced with 2200mm<sup>2</sup> of steel in tension and 628mm<sup>2</sup> of steel in compression. The effective cover for compression steel is 50mm. 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 456:200.

52. The depth of neutral axis is  
(A) 205.30mm (B) 184.56mm (C) 160.91mm (D) 145.30mm
53. The moment of resistance of the section is  
(A) 206.00kN-m (B) 209.20 kN-m (C) 236.80 kN-m (D) 251.90kN-m,

**Statement for Linked Answer Questions: 54 & 55**

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

54. The value of cohesion for the clay is  
(A) zero (B) 13.5kPa (C) 27kPa (D)54kPa
55. If a square footing of size 4m x 4m 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) 1600kPa (B) 315kPa (C) 27kPa (D)54kPa

**Q. No. 56 - 60 Carry One Mark Each**

56. Which of the following options is closest in meaning to the word **Circuitous**.  
(A) cyclic (B) indirect (C) confusing (D) crooked
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.  
**Unemployed: Worker**  
(A) fallow: land (B) unaware: sleeper  
(C) wit: jester (D) renovated: house

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
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
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 hockey nor football is:  
(A) 2 (B) 17 (C) 13 (D) 3

**Q. No. 61 - 65 Carry Two Marks Each**

61. Hari (H), Gita (G), Irfan (I) and Saira (S) are siblings (i.e. brothers and sisters). All were born on 1<sup>st</sup> 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. Hari'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 no twins.  
In what order were they born (oldest first)?  
(A) H51G (B) 5GHI (C) IG5H (D) IH5G
62. 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 (B) 18 (C) 16 (D) 15
63. 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 in warfare would be undesirable
- (D) People in military establishments like to use chemical agents in war.

64. Given digits 2,2,3,3,4,4,4,4 how many distinct 4 digit numbers greater than 3000 can be formed?

- (A) 50
- (B) 51
- (C) 52
- (D) 54

65. If  $137+276=435$  how much is  $731+672$ ?

- (A) 534
- (B) 1403
- (C) 1623
- (D) 1513



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

**Common Data Questions: 48 & 49**

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

Ion	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Na <sup>+</sup>	HCO <sub>3</sub> <sup>-</sup>	SO <sub>4</sub> <sup>-</sup>	Cl <sup>-</sup>
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=32, O=16	Cl=35.5

48. Total hardness (mg/L as CaCO<sub>3</sub>) present in the above water sample is  
 (A) 205 (B) 250 (C) 275 (D) 308
49. Carbonate hardness (mg/L as CaCO<sub>3</sub>) present in the above water sample is  
 (A) 205 (B) 250 (C) 275 (D) 289

**Common Data Questions: 50 & 51**

The moisture holding capacity of the soil in a 100 hectare farm is 18cm/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 10hours a day, and water application efficiency is 75%. Details of crops planned for cultivation are as follows:

Crop	Root zone depth (m)	Peak rate of moisture use (mm/day)
X	1.0	5.0
Y	0.8	4.0

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