Aakash
Medical | IIT-JEE | Foundations
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Answers & Solutions
for
NTSE (Stage-I) 2018-19

PART-I : MENTAL ABILITY TEST (MAT)

1. Option : (2)

Sol.

A,	D,	I,	(?),	V
↓	↓	↓	↓	↓
1	4	9	16	25
↓	↓	↓	↓	↓
$(1)^2$	$(2)^2$	$(3)^2$	$(4)^2$	$(5)^2$

2. Option : (4)

Sol.

Y X,	U T,	Q P,	M L,	H
25,24	21,20	17,16	13,12	9, 8

−1 −3 −1 −3 −1 −3 −1 −3 −1

3. Option : (2)

Sol.

A C F	G I L	M O R	S O X
1 3 6	7 9 12	13 15 18	19,21,24

4. Option : (1)

Sol.

−2	−2	−2	−2	
Y B,	W D,	U F,	S H,	Q J
25, 2	23, 4	21, 6	19, 8	17, 10
27	27	27	27	27

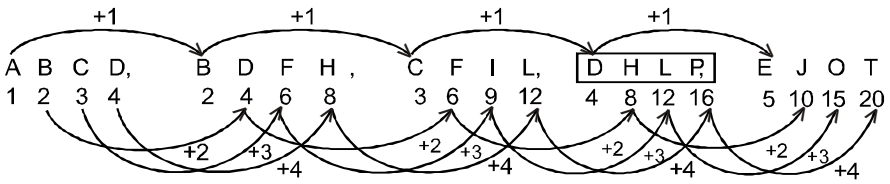
5. Option : (3)

Sol. First letter is vowel. Remaining letters are increases by + 1

A B C,	E F G,	I J K,	O P Q,	U V W
1, 2, 3	5, 6, 7	9, 10,11	15, 16,17	21, 22, 23

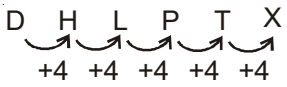
6. Option : (3)

Sol.



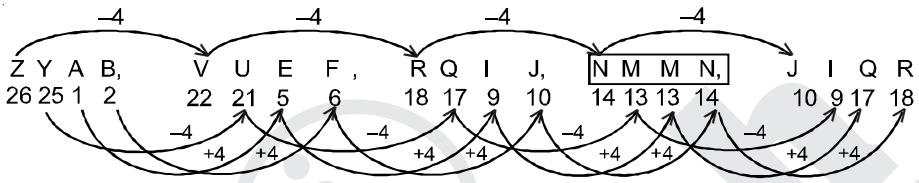
7. Option : (2)

Sol.



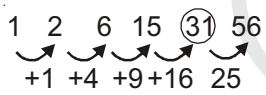
8. Option : (4)

Sol.



9. Option : (1)

Sol.



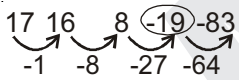
10. Option : (4)

Sol. $100,\ 50,\ 33\frac{1}{3},\ 25,\ 20$

$100,\ \frac{100}{2},\frac{100}{3},\frac{100}{4},\frac{100}{5},\frac{100}{6}$

11. Option : (3)

Sol.



12. Option : (3)

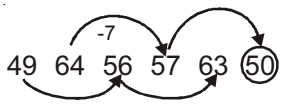
Sol. 6, 24, 60, 120, **210**

n^3-n

$2^3-2,\ 3^3-3\ \ 4^3-4\ \ 5^3-5\ \ 6^3-6$

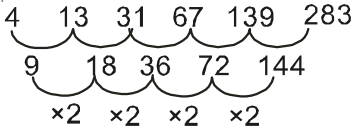
13. Option : (2)

Sol.



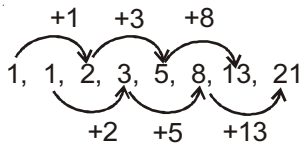
14. Option : (1)

Sol.



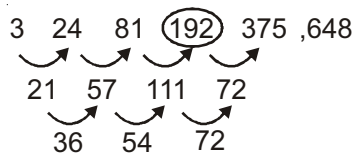
15. Option : (3)

Sol.



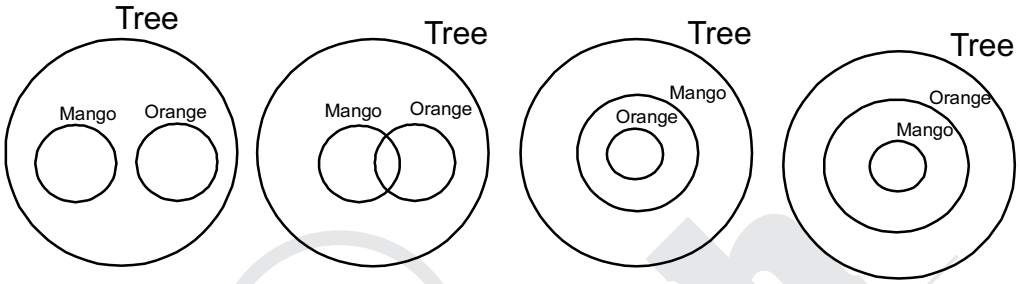
16. Option : (4)

Sol. 3, 24, 81,192, 375, 648



17. Option : (4)

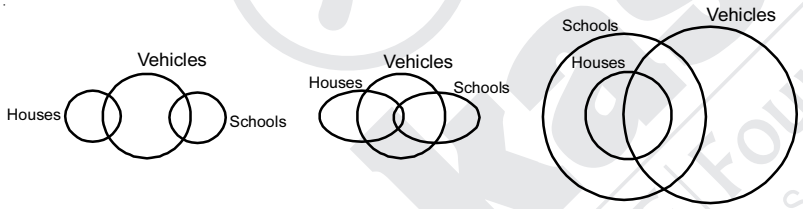
Sol.



18. Option : (4)

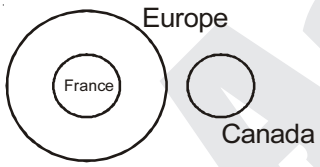
19. Option : (4)

Sol.



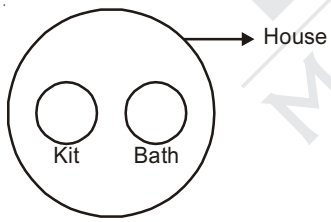
20. Option : (3)

Sol.



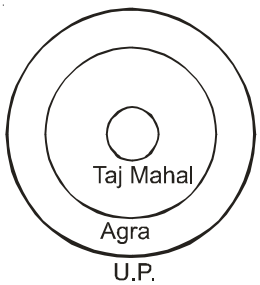
21. Option : (3)

Sol.



22. Option : (2)

Sol.



23. Option : (2)

Sol. $7 \times 4 - 8 \times 3 + 39 \div 3 = 17$

24. Option : (2)

Sol. 1 3 5

A C E

1^2 3^2 5^2

1 9 25

25. Option : (1)

26. Option : (4)

Sol N O R T H

H T R O N

27. Option : (1)

28. Option : (3)

29. Option : (3)

Sol. Number of rectangles = ${}^4C_2 \times {}^3C_2$

30. Option : (2)

31. Option : (2)

32. Option : (3)

33. Option : (4)

34. Option : (4)

35. Option : (1)

36. Option : (4)

37. Option : (2)

38. Option : (1)

39. Option : (4)

40. Option : (2)

41. Option : (1)

42. Option : (3)

43. Option : (3)

44. Option : (1)

45. Option : (4)

46. Option : (1)

47. Option : (1)

48. Option : (1)

49. Option : (3)

50. Option : (2)

51. Option : (4)

Sol. + comes in place of = and = moves ahed in the figures

52. Option : (4)

53. Option : (3)

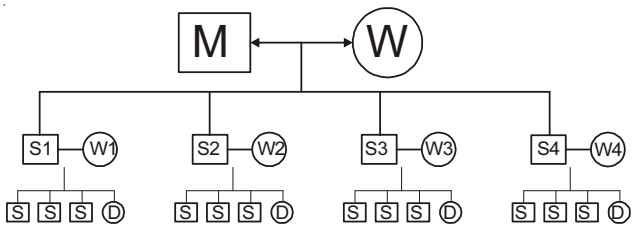
Rotation clockwise

54. Option : (2)

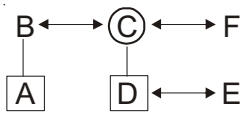
55. Option : (3)

56. Option : (4)

Sol.



57. Option : (1)



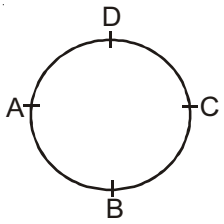
58. Option : (3)

59. Option : (3)

60. Option : (1)

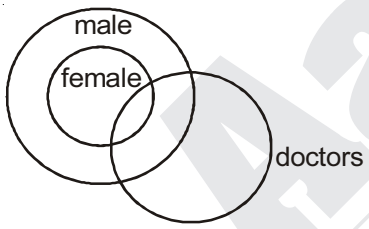
61. Option : (1)

Sol.



62. Option : (3)

63. Option : (2)



64. Option : (4)

65. Option : (2)

66. Option : (4)

67. Option : (3)

68. Option : (1)

Sol. 4,24,40,44,48,64,84

69. Option : (3)

Sol. 5 1 4 7 3 9 8 5 7 2 6 3 1 5 8 6 3 8 5 2 2 4 6 4 9 6

70. Option : (3)

71. Option : (4)

Sol. Total = Rank From Top + Rank From bottom – 1

49 = 18 + x – 1

x = 49 – 17 = 32

72. Option : (2)

Sol. odd day = 1 extra $\Rightarrow$ sunday

73. Option : (3)

Sol. April to July, odd day = 7 $\Rightarrow$ same calender

74. Option : (3)

75. Option : (2)

Sol. $26 \times 74 \div 4 - 5 + 2 = 465$

76. Option : (4)

Sol. $A + B > C + D$

$B + C > A + D$

add both $\Rightarrow$ $B > D$

77. Option : (1)

78. Option : (3)

79. Option : (2)

Sol. Volume of big cube = $5 \times 5 \times 5$ cm^3

Volume of small cube = $1 \times 1 \times 1$ cm^3

Total number of cubes having two sides painted balck = $12(n - 2) = 12 (5 - 2) = 36$

80. Option : (1)

Sol. $(n - 2)^3 = (3 - 2)^3 = 1$

81. Option : (2)

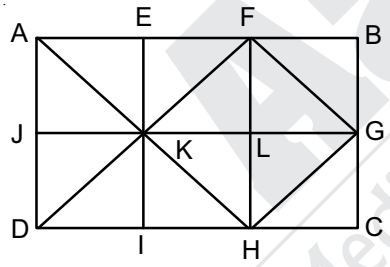
82. Option : (3)

83. Option : (3)

Sol. 18, 28, 58, 68, 78, 81, 82, 85, 86, 87,88

84. Option : (3)

Sol.



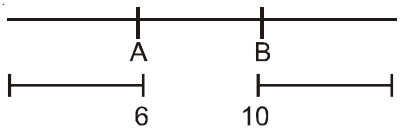
AEJK, EKFL, FLBG, JKDI, KILH, LHGC, AFMD, EBCI, FKHG

85. Option : (3)

Sol. $\frac{(36-4)\div 8-4}{4\times 8-2\times 16+1}=\frac{32\div 8-4}{32-32+1}=0$

86. Option : (2)

Sol.



Total = 6 + 8 + 10 = 24

87. Option : (4)

88. Option : (1)

89. Option : (4)

90. Option : (4)

91. Option : (4)

Sol. Circle - circumference

Square - Perimeter

92. Option : (3)

93. Option : (2)

94. Option : (2)

95. Option : (4)

Sol. sum of numbers = 8

96. Option : (2)

Sol. In option 1, 3 and 4, half part is painted and rest half part is unpainted.

97. Option : (3)

Sol. Pea

98. Option : (1)

Sol. Number divisible by 13

99. Option : (3)

Sol. T T A (T is not vowel)

100. Option : (2)

Sol. Carrom : (Indor game)

PAPER-II : SCHOLASTIC APTITUDE TEST (SAT)

1. Option : (4)

Sol. Inertia depends on mass of body.

2. Option : (2)

Sol. Area under velocity time graph gives displacement. Since the motion of the object is in straight line and in same direction so displacement will be equal to distance.

Area under graph= area of triangle

distance = $\frac{1}{2}$xBxH

$=\frac{1}{2}$x3x30=45 m

3. Option : (3)

Sol. $F = \frac{Gm_1m_2}{r^2}$

r' = r/2

$F'=\frac{Gm_1m_2}{(r/2)^2} = \frac{4Gm_1m_2}{r^2}$ = 4F

4. Option : (2)

Sol. 'g' is inversely proportional to square of radius of earth. Since the radius of earth in less on poles than equatorial circle hence 'g' is more on poles than equatorial circle.

5. Option : (2)

Sol. SONAR uses ultrasound waves

6. Option : (1)

Sol. Given

Speed of wave (v)=350m/s

Wavelength(λ) =70 cm or 0.7 m

v = λ x f

f = v/ λ = 350/0.7 = 500Hz

7. Option : (4)

Sol. Astigmatism arises due to irregularities in spherical shape of cornea

8. Option : (2)

Sol. Given

Focal length (f)= 40cm or 0.4m

Power = (1/focal lengh)

=1/(0.40) = +2.5 D

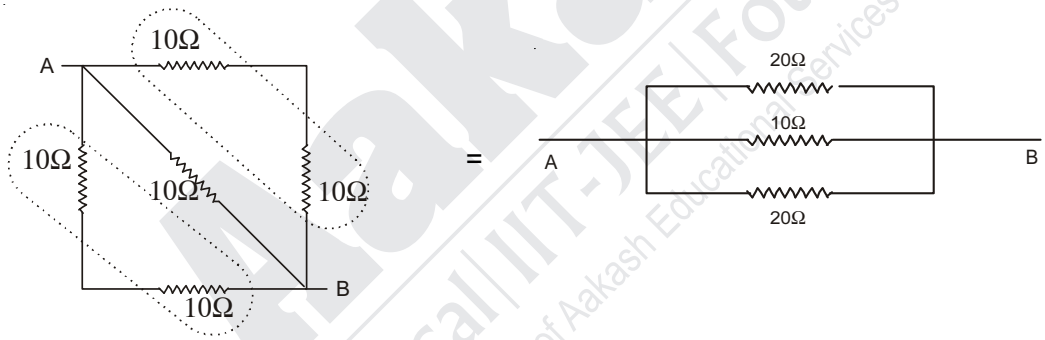
9. Option : (4)

10. Option : (2)

Sol. Slip rings are part of Alternating Current Generator.

11. Option : (3)

Sol.



$$\frac{1}{R_{eq}} = \frac{1}{20} + \frac{1}{10} + \frac{1}{20} = \frac{4}{20}$$

$$R_{eq} = 5\Omega$$

12. Option : (1)

Sol. Given

Extension in spring (x) =4cm or 0.04 m

Energy stored Option : (E)= 4 J

$$E = \frac{1}{2}kx^2$$

$$4 = \frac{1}{2}k(0.04)^2$$

K = $5x10^3$ N/m

13. Option : (3)

Sol. LED has more use time and less electricity consumption.

14. Option : (4)

Sol. Air is a homogeneous mixture of gases like N_2, O_2, Ar etc.

15. Option : (4)

Sol. Camphor is a substance that sublimes.

16. Option : (1)

Given weight = 32g of O_2

no. of moles Option : (n) = $\frac{\text{Given Weight}}{\text{Molar Mass}}$

Molar mass of O_2 = 32g

n= $\frac{32}{32}$ = 1 mole O_2

Number of molucules in 1 mole of O_2 = 1xN_A

= 6.022x10^{23} Molecules of O_2

17. Option : (3)

Tritium is $^{3}_{1}H$

Mass number Option : (A) = Number of neutron + proton = 3

Atomic number Option : (Z) = number of proton = 1

No. of neutron = A-Z

=3-1

=2

18. Option : (3)

Sol. $XCl_3 \longrightarrow X^{+3} \swarrow\!\!\!\searrow Cl^{-1}$

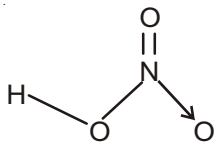
So, charge on cation X = +3

And its oxide will be $X^{+3} \swarrow\!\!\!\searrow O^{-2}$

X_2O_3

19. Option : (2)

Sol. The structure of HNO_3 is



Thus it contains 1 coordinate covalent bond.

20. Option : (1)

Sol. pH of pure water is 7

pH = - log[H^+]

- log[H^+] = 7

Taking antilog

[H^+] = 10^{-7} mol/L

= 1x10^{-7} mol/L

21. Option : (3)

Sol. $Mg(OH)_2$ i.e. Milk of magnesia is used as antacid

22. Option : (4)

Sol. $CaSO_4.2H_2O \xrightarrow{\triangle} CaSO_4.1/2H_2O \xrightarrow{\triangle} CaSO_4$

Gypsum Plaster of Paris Dead Burnt Plaster

23. Option : (2)

Sol. Glycerol is used to prevent decomposition of H_2O_2

So act as negative catalyst for the given reaction.

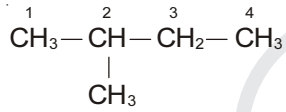
24. Option : (1)

Sol. Atomic size decreases as we go from left to right in a period

So the trend of atomic size will be

Li> Be> B> C

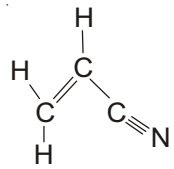
25. Option : (3)

Sol. 

Isopentane

IUPAC Name - 2-Methylbutane.

26. Option : (3)

Sol. 

Vinly cyanide

It is also known as acrylonitrile . It is monomer of polymer of acrylonitrile.

27. Option : (3)

Sol. de Duve discovered lysosome in 1955.

28. Option : (4)

Sol. Segetaria & Trapa are aquatic, hence categorised as hydrophytes

29. Option : (2)

Sol. Pollen grain divides to form 2 male gametes in pollen tube

30. Option : (1)

Sol The method by which yeast commonly reproduce is BUDDING

31. Option : (1)

Sol. Biosphere reserves established in INDIA by goverment is 18

32. Option : (2)

Sol. Bark of Terminalia arjuna has medicinal importance.

33. Option : (2)

Sol. Goverment established ISRO in 1969.

34. Option : (3)

Sol. Tuberculosis is caused by Mycobacterium tuberculi Option : (Bacteria)

35. Option : (2)

Sol. Bee keeping is scientifically termed as APICULTURE.

36. Option : (4)

Sol Calciferol is vitamin D, its deficiency causes RICKETS

37. Option : (2)

Sol Blood Group "O" do not have any anitigen on the surface of RBC.

38 Option : (1)

Sol Skeletal Muscle are attached to bones

39 Option : (2)

Sol Water vascular system is feature of ECHINODERMATA.

40 Option : (3)

Sol Ovary produces female gamete (Ova/Egg), hence known as female primary sexual organ.

41. Option : (4)

Sol. $\frac{2\sqrt{11}}{7\sqrt{11}} = \frac{2}{7}$ is rational number.

42. Option : (2)

Sol. By remainder theorem,

$\text{Remainder} = P(1) = (1)^4 - 4(1)^2 + (1)^3 + 2(1) + 1$
$= 1 - 4 + 1 + 2 + 1 = 1$

43. Option : (1)

Sol. Let the number be $(10x + y)$, $x + y = 14$

& $10x + y - 18 = 10y + x$

$x = 8, y = 6$

$\therefore$ number is 86

44. Option : (2)

Sol. $\angle ABC + \angle DEF = 180^\circ$

45. Option : (3)

Sol. $1\ m^3 = 1$ klt.

$\therefore$ 100 klt $= 100\ m^3 = 100 \times 10^6\ cm^3 = 10^8\ cm^3$

46. Option : (1)

Sol. $t_5 = 10 + t_3$

$\Rightarrow a + 4d = 10 + 2d$

$\Rightarrow d = 5$

$t_9 - t_6 = 3d = 15$

47. Option : (3)

Sol. $\tan A = \frac{\sqrt{2}-1}{1} = \frac{p}{b}$

$\Rightarrow h^2 = p^2 + b^2 = 2\sqrt{2}(\sqrt{2}-1)$

so, $\sin A.\cos A = \frac{1}{2\sqrt{2}}$

48. Option : (3)

Sol. Required numbers $= 2 \times 3 \times 5 \times 7 = 210$

49. Option : (1)

Sol. put x = 1

so, required solution , x = 1, 1

$\therefore$ sum of the roots = 2 = $\frac{-(c-a)}{b-c}$

$\therefore$ 2b = c + a

50. Option : (2)

Sol. for no solution

$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

$\frac{1}{2} = \frac{1}{k} \neq \frac{4}{3} \Rightarrow$ k = 2

51. Option : (4)

Sol. Area of rhombus = $\frac{1}{2} \times d_1 d_2$

$\Rightarrow \frac{1}{2} \times 4 \times d_2 = 2 \times \frac{\sqrt{3}}{4} \times 4^2 \Rightarrow d_2 = 4\sqrt{3}$

52. Option : (1)

Sol. Mean = $\frac{0+1+2+.....+16}{17} = \frac{16\times17}{2\times17} = 8$

53. Option : (1)

Sol. As 3 surfaces are removed and 3 new surfaces of same surface area are formed.

So, total surface area remains unaffected.

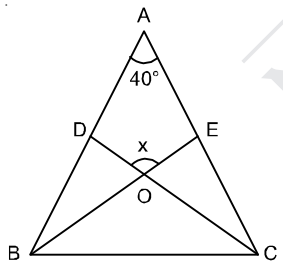
54. Option : (2)

Sol. Required area = area of sector – area of triangle

$= \frac{\pi r^2}{4} - \frac{1}{2} \times r^2 = 4(\pi - 2)$

55. Option : (3)

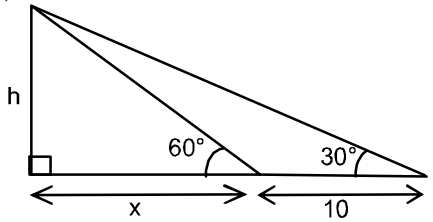
Sol.



$\angle OBC + \angle OCB = x$

$\therefore$ x = 110°

56. Option : (1)



$\tan 30^\circ = \frac{h}{10+x} = \frac{1}{\sqrt{3}}$; $\tan 60^\circ = \frac{h}{x} = \sqrt{3}$

$\therefore$ h = $5\sqrt{3}$ m

57. Option : (2)

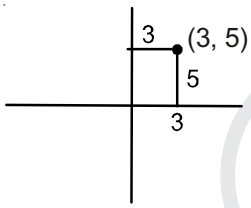
Sol. P (number less than 4) = $\frac{3}{6} = x$

P (number greater than 4) = $\frac{2}{6} = y$

$\therefore$ $x - y = \frac{1}{6}$

58. Option : (4)

Sol.



59. Option : (1)

Sol. Given expansion = $(x - 2y + 3z)^2$

60. Option : (4)

Sol. AB + BC + CD + DA < 2AC

61. Option : (3)

Sol. Magadha empire's capital was Rajgriha

Kashi's capital was Varanasi

Surasena's capital was Mathura

Gandhara's capital was Taxila

62. Option : (1)

Sol. Coronation of Chhatrapati Shivaji was held in Raygarh fort on 16 th June 1674.

63. Option : (4)

Sol. Abhinav Bharat was founded by Vinayak Damodar Sarvarkar in 1904.

64. Option : (2)

Sol. Water frame was invented by Richard Arkwright in 1768 .

65. Option : (1)

Sol. Quit India Movement's proposal was passed on 8th August, 1942 in Bombay Session.

66. Option : (2)

Sol. Kalibanga is situated in Hanumangarh district of Rajasthan.

67. Option : (4)

Sol. Triratnas of Jainism includes Right Faith, Right Knowledge , Right Conduct.

68. Option : (3)

Sol. Champa is the older name of Vietnam

69. Option : (2)

Sol. Raja Ram Mohan Roy established Vedanta College but Satyarth Prakash was written by Swami Dayanand Saraswati .

70. Option : (3)

Sol. Tsar Nicolas 2 ruled over Rusia from 1894 to 1917.

71. Option : (4)

Sol. Hindu Patriot was published by Harishchandra Mukherjee in 1853.

72. Option : (3)

Sol. Narmada river flows towards western coast while Krishna , Godavari and Kaveri flow on eastern coastal plain.

73. Option : (2)

Sol. Uparmaal plateau is between Bhainsrorgarh and Bijauliya .

74. Option : (4)

Sol. Dal Lake in Jammu and Kashmir is fresh water lake.

75. Option : (3)

Sol. As per IMD, Summer season is from March to Mid- June and Mid-June to September is Advancing Monsoon Season.

76. Option : (1)

Sol. Amrita Devi sacrificed her life in 1730 to save Green trees in Khejarli Village of Jodhpur district.

To honour her name the Sanctuary in developed in Jodhpur.

77. Option : (4)

Sol. Sardar sarovar project on Narmada river is a joint project of Gujrat , Madhya Pradesh , Maharashtra and Rajasthan.

78. Option : (2)

Sol. Ana Sagar lake is in Ajmer

Tordi sagar lake is in Tonk

Sardar Samnad Lake is in Pali

Navalakha Lake is in Bundi

79. Option : (3)

Sol. Magnetite iron ore has 60-70% of iron content

80. Option : (1)

Sol. Nimbahera town of Chittorgarh city makes Chittorgarh, Cement city of Rajasthan.

81. Option : (4)

Sol. Ganganagar with growth rate of 10.04% is the district having lowest population growth rate.

82. Option : (2)

Sol. Uni Gauge project was started in 1992 by Indian Railways.

83. Option : (3)

Sol. Switzerland has direct democracy as its governing system.

84. Option : (2)

Sol. President of India can promulgate ordinance when the parliament is not in session.

85. Option : (3)

Sol. Governor holds office during the pleasure of president.

86. Option : (2)

Sol. The retirement age of Supreme court's judge is 65 years.

87. Option : (2)

Sol. Term of Indian president is 5 years as per Indian constitution.

88. Option : (4)

Sol. Constituation of India is adopted on 26th November 1949.

89. Option : (3)

Sol. Right against ExploitationOption : (article 23and 24) prohibits Forced Labour.

90. Option : (1)

Sol. 42 nd amendment,1976 which is known as mini constitution added fundamental duties to Indian constitution.

91. Option : (1)

Sol. Nasirabad cantonment board was established in 1818 and is the oldest cantonment board of rajasthan

92. Option : (1)

Sol. Panchsheel is based on Buddhist philosophy which includes following five principles

1. No killing	**Respect for life**
2. No stealing	**Respect for others' property**
3. No sexual misconduct	**Respect for our pure nature**
4. No lying	**Respect for honesty**
5. No intoxicants	**Respect for a clear mind**

93. Option : (4)

Sol. Nagar Nigam, Zilla Parishad, Panchayat Samiti, Gram panchayat are headed by Mayor, Zilla pramukh, Pradhan & Sarpanch respectively.

94. Option : (2)

Sol. China is a socialist economy while Japan,France and USA are capitalist economies.

95 Option : (3)

Sol. Maize is a kharif crop while wheat,barley and gram are rabi crops.

96. Option : (4)

Sol. Commercial Banks accept people's deposits while all the three remaining options are functions of RBI

97. Option : (1)

Sol. When Total national income is divided by total population of the country ,we get per capita income

98 Option : (4)

Sol. Indian economy is characterised by low per capita income

99. Option : (1)

Sol. Dadabhai Naoroji made the First effort to measure poverty in India.

100. Option : (3)

Sol. 24 december is celebrated as consumer day in India

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