FIITJEE Solutions to

NTSE-2012 –Stage-I (Delhi State)

(For Class X Students)

Paper-2 SAT

DATE OF EXAM : 18-11-2012

Time: 90 Minutes   **Max Marks: 90**

INSTRUCTIONS TO CANDIDATES

Read the following instructions carefully before you answer the question. Answers are to be given on a **SEPARATE ANSWER SHEET.** Use only **HB Pencil.**

1.   Write you Roll No. very clearly (only one digit in one block) on this booklet and on the **ANSWER SHEET.**

2.   This test consists of 90 questions of one mark each. All the questions are **COMPULSORY**.

3.   Answer to each question by filling the correct alternative among the four choices on the answer sheet.

Example:

Q.No.	Alternatives
Correct way: 1	① ② ● ④
Q.No.	Alternatives
Wrong way: 1	①̷ ②̶ ③√ ④

4.   Separate sheet has been provided for rough work in this test booklet.

5.   If you want to change your answer erase the earlier filled circle completely and than darken the circle of your choice.

6.   Now turn to the next page and start answering the questions.

91. In the given circuit voltmeter shows a reading of 4V, then the power developed across R resistance will be
    (1) 15 mW   (2) 14 mW
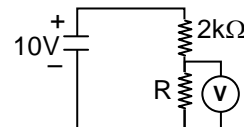   (3) 12 mW   (4) 10 mW
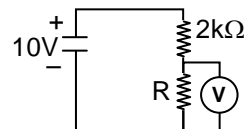
Sol. **3**

$6 = I \times 2000$

$I = \dfrac{6}{2000} = 3 \text{ mA}$

$P = VI$

$ = 4 \times 3 \text{ mW}$

$ = 12 \text{ mW}$

92. An electric iron draws a current of 15A from a 220 V supply. What is the cost of using iron for 30 min everyday for 15 days if the cost of unit (1 unit = 1 kW hr) is 2 rupees?
    (1) Rs. 49.5   (2) Rs. 60
    (3) Rs. 40   (4) Rs. 10

Sol. **1**

$I = 15A, V = 220V, t = 30 \text{ min}$

$\text{Energy} = P \times t = VI\,t$

$= 220 \times 15 \times \dfrac{30}{60} \times 15$

$= 3300 \times \dfrac{1}{2} \times 15 \text{ W hr}$

$= 3.3 \text{ kWx } 7.5 \text{ hr}$

$= 24.75 \text{ kW hr}$

$\text{Cost} = 24.75 \times 2 = 49.50 \text{ Rs.}$

93. Two different sources of light A and B have wavelength $0.7\,\mu\text{m}$ and $0.3\,\mu\text{m}$ respectively. Then which of the following statement is true
    (1) A has greater energy then B   (2) B has greater energy then A
    (3) Both has equal energy   (4) None of the above

Sol. **2**

$\lambda_A = 0.7 \times 10^{-6}\text{m},$

$\lambda_B = 0.3 \times 10^{-1}\text{m}$

$E = \dfrac{hc}{\lambda}$

$\lambda_A > \lambda_B$

Hence $E_A < E_B$

94. The type of radiation absorbed by CO_2 molecule in atmosphere are
    (1) X-rays   (2) Gamma rays
    (3) Infra-red rays   (4) UV-rays

Sol. **3**

CO_2 in the atmosphere does not allow infrared rays from the earth to escape causing green house effect.

95. The speed-time relation of a car whose weight is 1500 kg as shown in the given graph. How much braking force has been applied at the end of 7 sec. to stop the car in 2 sec?
(1) 2000 N
(2) 1200 N
(3) 4800 N
(4) 8400 N
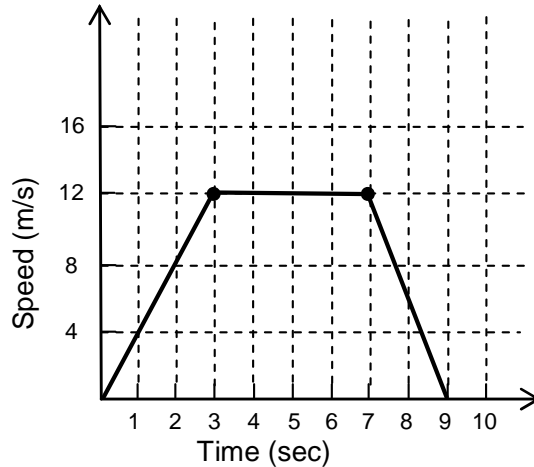
Sol. No option is matching
Correct answer is **9000 N**

Slope = $\dfrac{12}{2} = 6$ m/s^2

F = 1500 × 6 = **9000 N**

96. The distance covered by a body moving along X-axis with initial velocity 'u' and uniform acceleration 'a' is given by $x = ut + \dfrac{1}{2}at^2$. This result is a consequence of
(1) Newton's Ist law
(2) Newton's IInd law
(3) Newton's IIIst law
(4) None of the above

Sol. **4**
It is the fundamental equation of motion so it is not the consequence of Newton's Laws of motion.

97. A Parachutist of weight W strikes the ground with his legs fixed and come to rest with an upward acceleration of magnitude 3g. Force exerted on him by the ground during landing is
(1) W
(2) 2W
(3) 3W
(4) None of the above

Sol. **4**
Mg = W
N – W = 3mg
N – W = 3W
N = 4W

98. The speeds of sound in air and sea-water are given to be 340 m/s and 1440 m/s. resp. A ship sends a strong Signal straight down and detects its echo after 1.5 secs. The depth of the sea at that point is
(1) 2.16 kms
(2) 1.08 kms
(3) 0.51 kms
(4) 0.255 kms

Sol. **2**
V_{air} = 340 m/s, V_{water} = 1440 m/s

$1440 = \dfrac{2d}{1.5} \Rightarrow d = \dfrac{1440 \times 1.5}{2} = 1080.0$ m = 1.08 kms

99. Three equal resistors connected in series across a source of e.m.f. dissipate 10 watts of power. What will be the power dissipated in watts if the same resistors are connected in parallel across the same source of e.m.f.?

    (1) 10 W

    (2) 30 W

    (3) 90 W

    (4) $\dfrac{10}{3}$ W

Sol. **3**

$R_1 = 3R$, $P = 10W$,

$P = \dfrac{V^2}{R_{series}} \Rightarrow 10 = \dfrac{V^2}{3R} \Rightarrow \dfrac{V^2}{R} = 30$

$P' = \dfrac{V^2}{R/3} = 3\dfrac{V^2}{R} = 3 \times 30 = 90W$

100. Eight identical spherical mercury drops charged to a potential of 20 v each are coalesced into a single spherical drop

    (1) The internal Energy of the system remains the same

    (2) The new potential of the drop is 80 v

    (3) Internal Energy of the system decreases

    (4) The potential remains the same i.e. 20 v

Sol. **2**

$V = \dfrac{kq}{r} = 20V$

$\dfrac{4}{3}\pi R^3 = 8 \times \dfrac{4}{3}\pi r^3 \Rightarrow R = 2r$

$Q' = 8q$

$V' = \dfrac{kQ'}{R} = \dfrac{K \times 8q}{2r} = \dfrac{4kq}{r} = 4 \times 20$

$V' = 80V$

101. A technician has 10 resistors each of resistance $0.1\,\Omega$. The largest and smallest resistance that he can obtain by combining these resistors are

    (1) $10\,\Omega$ and $1\,\Omega$ resp.

    (2) $1\,\Omega$ and $0.1\,\Omega$ resp

    (3) $1\,\Omega$ and 0.01 resp

    (4) $0.1\,\Omega$ and $0.01\,\Omega$ resp.

Sol. **3**

$R_s = 10 \times 0.1 = 1\Omega$ (largest)

$R_P = \dfrac{0.1}{10} = 0.01\Omega$ (smallest)

102. Two masses of 1 gm and 4 gm are moving with equal kinetic energies. The ratio of the magnitudes of their linear moments is

    (1) $4 : 1$

    (2) $\sqrt{2} : 1$
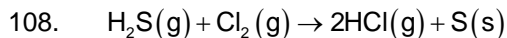
    (3) $1 : 2$

    (4) $1 : 6$

Sol. **3**

$K = \dfrac{1}{2}mv^2 \qquad mv^2 = 2K$

$P^2 = 2Km$

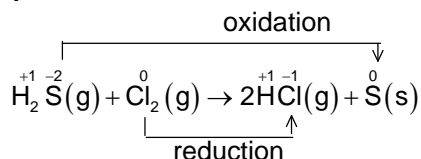$P = \sqrt{2Km} \qquad \Rightarrow P \propto \sqrt{m}$

$\dfrac{P_1}{P_2} = \sqrt{\dfrac{m_1}{m_2}} = \sqrt{\dfrac{1}{4}} = \dfrac{1}{2}$

103. If the quantity of metal in a metallic oxide is 60%, then its equivalent weight is:

(1) $\frac{1}{5}$ of molecular weight

(2) $\frac{1}{2}$ of molecular weight

(3) $\frac{3}{2}$ of molecular weight

(4) $\frac{3}{5}$ of molecular weight

Sol. **2**

Let the atomic weight of metal be 'x'

$\frac{x}{x+16} = \frac{60}{100}$ ⇒ x = 24, therefore the metal is Magnesium (Mg)

Equivalent weight $= \dfrac{\text{Molecular weight of metal oxide}}{\text{Charge on cation}}$

So, Equivalent weight of Magnesium Oxide $= \dfrac{\text{Molecular weight}}{2}$

104. The electronic configuration of an ion M^{2+} is 2, 8, 14. If its mass is 56, the number of neutrons in its nucleus is:

(1) 30   (2) 32

(3) 34   (4) 42

Sol. **1**

M^{2+} = 2, 8, 14; ⇒ Electronic Configuration of M = 2, 8, 16

So, Total electrons in M will be = 26

i.e., atomic number (Z) = 26, Mass number (given) = 56

∴ Number of neutrons = A – Z = 56 – 26 = 30

105. The normality of 0.3 M phosphoric acid is:

(1) 0.1   (2) 0.9

(3) 0.3   (4) 0.6

Sol. **2**

Normality = n–factor × Molarity

n–factor = 3(for H_3PO_4) and molarity = 0.3 M (given)

∴ Normality = 0.3 × 3 = 0.9

106. In the presence of H_2SO_4 concentrated sulphuric acid, acetic acid reacts with ethyl alcohol to produce:

(1) aldehyde   (2) alcohol

(3) ester   (4) carboxylic acid

Sol. **3**

$$CH_3COOH + C_2H_5OH \xrightarrow{\text{conc. } H_2SO_4} \underset{(ester)}{CH_3COOC_2H_5} + H_2O$$

This reaction is known as esterification.

107. Arrange the following elements in order of their increasing ionization energies O, S, Se, Te, Po:

(A) Se, Te, S, Po, O   (B) O, S, Se, Te, Po

(C) Po, Te, Se, S, O   (D) Te, O, S, Po, Se

Sol. **3**

Ionization energy decreases from top to bottom in a group. So increasing order will be

Po < Te < Se < S < O

108. $H_2S(g) + Cl_2(g) \rightarrow 2HCl(g) + S(s)$

The reaction is interpreted as:
(1) H_2S is getting oxidized and Cl_2 is getting reduced
(2) H_2S is getting reduced and Cl_2 is getting oxidized
(3) Only H_2S is oxidized
(4) Both H_2S and Cl_2 are reduced

Sol. **1**

$$\overset{oxidation}{\overbrace{\overset{+1\ -2}{H_2 S}(g) + \overset{0}{Cl_2}(g) \rightarrow 2\overset{+1\ -1}{HCl}(g)}} + \overset{0}{S}(s)$$

reduction

109. Structures of nuclei of three atoms A, B and C are given below:
A has 90 protons and 146 neutrons
B has 92 protons and 146 neutrons
C has 90 protons and 148 neutrons
Based on the above data, which of these atoms are isotopes and which are isobars?
(1) A and C are isotopes; B and C are isobars
(2) A and B are isotopes; A and C are isobars
(3) B and C are isobars; A and B are isotopes
(4) A and C are isotopes; A and B are isobars

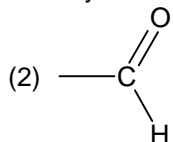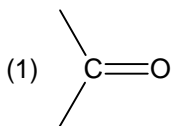**Sol.** **1**

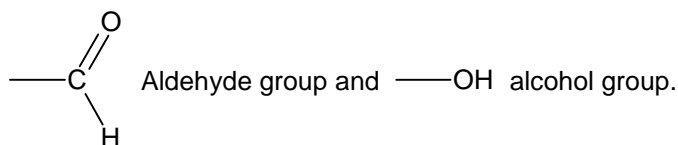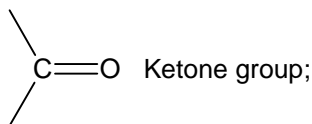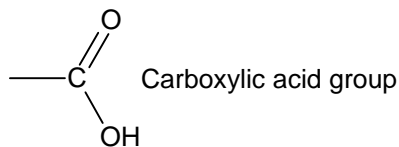$^{236}_{90}A$, $^{238}_{92}B$, $^{238}_{90}C$
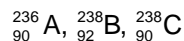
A and C are isotopes (having same atomic number)
B and C are isobars (having same mass number)

110. Which of the following is the functional group for carboxylic acids?

(1) $\underset{}{C}{=}O$

(2) $-\overset{O}{\underset{H}{C}}$

(3) $-OH$

(4) $-\overset{O}{\underset{OH}{C}}$

Sol. **4**

$-\overset{O}{\underset{OH}{C}}$ Carboxylic acid group $\underset{}{C}{=}O$ Ketone group;

$-\overset{O}{\underset{H}{C}}$ Aldehyde group and $-OH$ alcohol group.
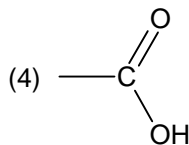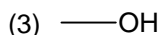
111. Which one of the following metal oxides shows both acidic and basic characters?
    (1) Na_2O
    (2) K_2O
    (3) CuO
    (4) Al_2O_3

Sol. **4**
Al_2O_3 is an amphoteric oxide. Rest of them are basic.

112. Which of the following will have equal number of electrons?
    (1) Cl^- and Br^-
    (2) Na^+ and Mg^{2+}
    (3) Ar and Ne
    (4) Mg^{2+} and Ca^{2+}

Sol. **2**
Na^+ and Mg^{2+} are isoelectronic in nature having 10 electrons each.

113. Which of the following gases is known as tear gas?
    (1) Methyl isocyanide
    (2) Sulphur dioxide
    (3) Chloropicrin
    (4) Nitrous oxide

Sol. **3**
Chloropicrin is commonly used as tear gas. Its chemical formula is CCl_3NO_2.

114. Mg has three natural isotopes whose isotopic masses and relative abundances are respectively 23.98(78.60%), 24.98(10.11%) and 25.98(11.29%). The atomic mass of Mg will be
    (1) 23.42
    (2) 24.31
    (3) 24.95
    (4) 23.95

Sol. **2**
$$\text{Atomic mass of Mg} = \left(23.98 \times \frac{78.6}{100}\right) + \left(24.98 \times \frac{10.11}{100}\right) + \left(25.98 \times \frac{11.29}{100}\right)$$
$$= 18.85 + 2.53 + 2.93 = 24.31$$

115. Mitosis
    (1) leads to recombinant daughter cells
    (2) is a reduction division
    (3) leads to formation of parental type of daughter cells
    (4) occurs in gametes

Sol. **3**
Daughter cells carry diploid no. of chromosomes after mitosis cell division so its known as equational division. There is no crossing over takes place in mitosis cell division.

116. Wings of birds and insects are
    (1) vestigial organs
    (2) Homologous organs
    (3) Paralogous organs
    (4) Analogous organs

Sol. **4**
Analogous organs – they are similar in function but are anatomically different and unrelated.

117. Mitochondria and Chloroplasts are similar because
    (1) Both have nuclei
    (2) Both have 80s ribosomes
    (3) Both have DNA
    (4) Both have single membrane envelope

Sol. **3**
Both are semiautonomous organelles. Both of these possess circular DNA.

118. Cut leaves remain green for longer time if dipped in
    (1) Auxin   (2) Cytokinins
    (3) Ethylene   (4) Gibberellins

Sol.   2
Cytokinins delay senescence (ageing) so chrolophyll will be retained and leaves will remain green for longer time.

119. Neurons have a unique property that makes them to communicate with other cells via:
    (1) Nerve cords   (2) Glial cells
    (3) Synapses   (4) Schwann cells

Sol.   3
Synapses – It is a junction between two neurons.

120. Which layer of planet earth's atmosphere protects it from the harmful UV radiations of the Sun?
    (1) Stratosphere   (2) Ozonosphere
    (3) Troposphere   (4) Ionosphere

Sol.   1
Stratosphere has ozone which protects from harmful UV rays.

121. Cramps in the leg muscle after running a long distance are because of
    (1) Build up of acetic acid   (2) Build up of oxalic acid
    (3) Build up of lactic acid   (4) Build up of Pyruvic acid

Sol.   3
In scarcity of O_2, muscle cells undergo anaerobic respiration. In this type of respiration partial breakdown of glucose takes place and lactic acid is formed which leads to cramps.

122. The enzyme pepsin is secreted by
    (1) Inner lining of oesophagus   (2) Gastric lining of stomach
    (3) Inner lining of duodenum   (4) Gall bladder

Sol.   2
Chief cells are present in the lining of stomach which secrets pepsin enzyme.

123. Pick the odd one out
    (1) Down syndrome   (2) Haemophilia
    (3) Malaria   (4) Phenylketonuria

Sol.   3
Malaria is a communicable (protozoan) disease caused by Plasmodium vivax while others are congential (genetic) disorders.

124. Vegetative propagation refers to formation of new plants from:
    (1) Stem, roots and leaves   (2) Leaves, flowers and seeds
    (3) Stem, roots and seeds   (4) Fruits, seeds and spores

Sol.   1
Vegetative propagations refers to formation of new plants from vegetative (stem, leaves, root) of the plants.

125*. Which one of the following is a correct statement?
   (1) Dominant trait can be expressed in homozygoul condition only
   (2) Recessive trait can be expressed in homozygoul condition only
   (3) Dominant trait cannot be expressed in heterozygoul condition
   (4) Recessive trait cannot be expressed in heterozygoul condition

Sol (i). 2, 4
   According to Mendelian Inheritance an allele which cannot express itself in presence of other is recessive, hence can be expressed only in homozygous condition.

Sol (ii). 2
   Exceptions are there in non Mendelian Inheritance (incomplete dominance, co-dominance).

126. A shopkeeper mixes 80 kg sugar worth of Rs. 6.75 per kg with 120 kg of sugar worth of Rs. 8 per kg. He earns a profit of 20% by selling the mixture. He sells it at the rate
   (1) Rs. 7.50 per kg   (2) Rs. 9 per kg
   (3) Rs. 8.20 per kg   (4) Rs. 8.85 per kg

Sol.   2
   Total cost = 80 × 6.75 + 120 × 8 = Rs. 1500

   Selling price = $1500 \times \dfrac{120}{100}$ = Rs. 1800

   S.P. per kg = $\dfrac{1800}{200}$ = Rs. 9

127. A shopkeeper prefers to sell his goods at the cost price but uses a weight of 800 gm instead of 1 kg weight. He earns of profit of
   (1) 2%   (2) 8%
   (3) 20%   (4) 25%

Sol.   4
   Let CP of 1 gm = Rs 1
   Given he sells 800 gm instead of 1000 gm
   So CP of 800 gm = 800 Rs.
   SP of 800 gm = CP of 1000 gm = 1000 Rs.
   Profit $= 1000 - 800 = 200$

   Profit % = $\dfrac{200}{800} \times 100 = 25\%$

128. The compound interest on a certain sum for two years is Rs. 618 whereas the simple interest on the same sum at the same rate for two years is Rs. 600. The ratio of interest per annum is
   (1) 18%   (2) 9%
   (3) 6%   (4) 3%

Sol.   3

$$P\left(1+\dfrac{r}{100}\right)^2 - P = 618 \text{ and } \dfrac{P \times r \times 2}{100} = 600$$

$$P\left[1+\dfrac{r^2}{100 \times 100}+\dfrac{2r}{100}-1\right] = 618 \text{ and } P = \dfrac{600 \times 100}{2 \times r}$$

$$\dfrac{600 \times 100}{2 \times r} \times r\left[\dfrac{r}{100 \times 100}+\dfrac{2}{100}\right] = 618 \Rightarrow r = 6\%$$

129. If $x + \dfrac{1}{x} = 3$, then the value of $x^6 + \dfrac{1}{x^6}$ is

(1) 927   (2) 114

(3) 364   (4) 322

Sol. **4**

$x + \dfrac{1}{x} = 3$

$x^3 + \dfrac{1}{x^3} + 3\left(x + \dfrac{1}{x}\right) = 27$

$x^3 + \dfrac{1}{x^3} = 27 - 9 = 18$

$\left(x^2 + \dfrac{1}{x^3}\right)^2 = \left(x^6 + \dfrac{1}{x^6} + 2\right)$

Now $x^6 + \dfrac{1}{x^6} + 2 = 324$

$x^6 + \dfrac{1}{x^6} = 322$

130. If $\log_{12} 27 = a$, then $\log_6 16$ is

(1) $\dfrac{4(3-a)}{(3+a)}$ (2) $\dfrac{4(3+a)}{(3-a)}$

(3) $\dfrac{(3+a)}{4(3-a)}$ (4) $\dfrac{(3-a)}{4(3+a)}$

Sol. **1**

$\log_{12} 27 = a$

$\dfrac{\log 27}{\log 12} = a$

$= 3\log 3 = a[2\log 2 + \log 3]$

$= 3\log 3 - a\log 3 = 2a \log 2$

$= \log 3 = \dfrac{2a \log 2}{3 - a}$ ..... (1)

Now $\log_6 16 = \dfrac{\log 16}{\log 6}$

$= \dfrac{4\log 2}{\log 2 + \log 3}$ ..... (2)

$= \dfrac{4\log 2}{\log 2 + \dfrac{2a \log 2}{3 - a}}$ {By (1) and (2)}

$= \dfrac{4(3 - a)}{3 + a}$

131. If the zeros of the polynomial $f(x) = k^2x^2 - 17x + k + 2$, $(k > 0)$ are reciprocal of each other, then the value of k is

(1) 2   (2) −1

(3) −2   (4) 1

Sol. 1

$\alpha, \dfrac{1}{\alpha}$ are the roots of $k^2x^2 - 17x + (k + 2)$

$\alpha \times \dfrac{1}{\alpha} = \dfrac{k + 2}{k^2}$

$\Rightarrow k^2 = k + 2$

$\Rightarrow k^2 - k - 2 = 0$

$\Rightarrow k = 2$ and $k = -1$

But $k > 0 \therefore k = 2$

132. A bag contains 20 balls out of which x are black. If 10 more black balls are put in the box, the probability of drawing a black ball is double of what it was before. The value of x is
(1) 0 (2) 5
(3) 10 (4) 40

Sol. 2

Probability of black balls = $\dfrac{x}{20}$

Probability of black balls (New) = $\dfrac{x + 10}{30}$

$\dfrac{x + 10}{30} = \dfrac{2x}{20}$ (Given)

$\Rightarrow x = 5$

133. For the distribution

Marks	Number of students
Below 5	10
Below 10	25
Below 15	37
Below 20	57
Below 25	66

the sum of the lower limits of the median class and the modal class is
(1) 15 (2) 25
(3) 30 (4) 35

Sol. 2

Marks	f	cf
0 – 5	10	10
5 – 10	15	25
10 – 15	12	37
15 – 20	20	57
20 – 25	9	66

Median class is 10 – 15
Modal class is 15 – 20
Sum of lower limits = 25

134. The sum of all two digit numbers each of which leaves remainder 3 when divided by 5 is
(1) 952 (2) 999
(3) 1064 (4) 1120

Sol. 2

13, 18, ... 98
In this A.P. we have 18 terms

$$S_{18} = \frac{18}{2}[2 \times 13 + 17 \times 5] = 999$$

135. If cosA + cos^{2}A = 1, then the value of sin^{2}A + sin^{4}A is
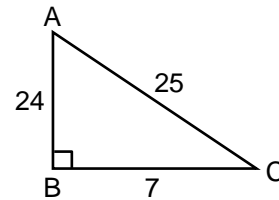
(1) 1

(2) $\frac{1}{2}$

(3) 2

(4) 3

Sol. **1**

$\cos A + \cos^2 A = 1$

$\cos A = 1 - \cos^2 A = \sin^2 A$

Now $\sin^2 A + \sin^4 A = \sin^2 A + (\sin^2 A)^2 = \sin^2 A + \cos^2 A = 1$

136. In right triangle ABC, BC = 7 cm, AC − AB = 1 cm and ∠B = 90º. The value of cos A + cos B + cos C is

(1) $\frac{1}{7}$

(2) $\frac{32}{24}$

(3) $\frac{31}{25}$

(4) $\frac{25}{31}$

Sol. **3**

$AC^2 = AB^2 + 49$

$(AC - AB)(AC + AB) = 49$

$AC + AB = 49$

$AC = 25, AB = 24$

$\cos A + \cos B + \cos C = \frac{24}{25} + 0 + \frac{7}{25} = \frac{31}{25}$

137. The angles of elevations of the top of the tower from two points in the same straight line and at a distance of 9 m. and 16 m. from the base of the tower are complementary. The height of the tower is

(1) 18 m

(2) 16 m

(3) 10 m

(4) 12 m

Sol. **4**

$\tan\theta = \frac{h}{9}$

$\tan(90 - \theta) = \frac{h}{16}$

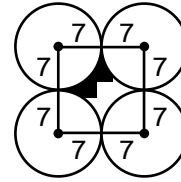$\tan\theta \times \cot\theta = \frac{h^2}{9 \times 16}$

h = 3 × 4 = 12
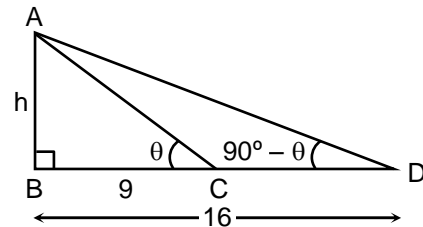
138. Four circular cardboard pieces, each of radius 7 cm. are placed in such a way that each piece touches the two other pieces. The area of the space enclosed by the four pieces is

(1) 21 cm^2

(2) 42 cm^2

(3) 84 cm^2

(4) 168 cm^2

Sol. **2**

Area of space enclosed by the circles
= Area of square of side 14 cm
– 4 (Area of quadrant of radius 7 cm)

$= (14)^2 - 4 \times \dfrac{1}{4} \times \dfrac{22}{7} \times 7 \times 7$

$= 196 - 154 = 42$ cm^2

139. $\triangle ABC \sim \triangle PQR$ and $\dfrac{\text{area } \triangle ABC}{\text{area } \triangle PQR} = \dfrac{16}{9}$. If PQ = 18 cm and BC = 12 cm. then AB and QR are respectively
(1) 9 cm, 24 cm
(2) 24 cm, 9 cm
(3) 32 cm, 6.75 cm
(4) 13.5 cm, 16 cm

Sol. **2**

$\dfrac{16}{9} = \left(\dfrac{AB}{PQ}\right)^2 = \left(\dfrac{BC}{QR}\right)^2$

$\Rightarrow \dfrac{16}{9} = \left(\dfrac{AB}{18}\right)^2$ and $\dfrac{16}{9} = \left(\dfrac{12}{QR}\right)^2$

$\Rightarrow \dfrac{4}{3} = \dfrac{AB}{18}$ and $\dfrac{4}{3} = \dfrac{12}{QR}$

$\Rightarrow AB = 24$ cm QR = 9 cm

140. E and F are respectively, the mid points of the sides AB and AC of $\triangle ABC$ and the area of the quadrilateral BEFC is k times the area of $\triangle ABC$. The value of k is
(1) $\dfrac{1}{2}$
(2) 3
(3) $\dfrac{3}{4}$
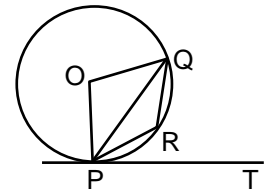(4) 4

Sol. **3**

$\triangle ABC \sim \triangle AEF$

$\dfrac{\text{ar. } (\triangle AEF)}{\text{ar. } (\triangle ABC)} = \left(\dfrac{AE}{AB}\right)^2 = \dfrac{1}{4}$

$\Rightarrow$ Area of quadrilateral BEFC = ar. ($\triangle ABC$) – Ar. ($\triangle AEF$)

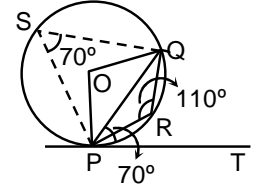$= $ Ar. ($\triangle ABC$) $- \dfrac{1}{4}$ ar. ($\triangle ABC$)

$= \dfrac{3}{4}$ ar. ($\triangle ABC$)

141. In the figure, PQ is a chord of a circle with centre O and PT is the tangent at P such that $\angle QPT = 70^\circ$. Then the measure of $\angle PRQ$ is equal to
(1) 135º
(2) 150º
(3) 120º
(4) 110º

Sol. **4**

∠PSQ = ∠QPT = 70º
(Angles in alternate segment of circle are equal)
∴ ∠PRQ = 180º − ∠PSQ
= 180º − 70º = 110º

142. AB and CD are two parallel chords of a circle such that AB = 10 cm and CD = 24 cm. If the chords are on the opposite sides of the centre and the distance between them is 17 cm, the radius of the circle is

(1) 14 cm
(2) 10 cm
(3) 13 cm
(4) 15 cm

Sol. **3**

$r^2 = x^2 + 25$
$r^2 = (17 - x)^2 + 144$
Now $x^2 + 25 = (17 - x)^2 + 144$
$\Rightarrow$ x = 12
$r^2 = 144 + 25$
r = 13 cm
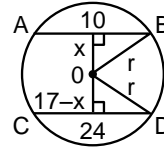
143. From a 25 cm × 35 cm rectangular cardboard, an open box is to be made by cutting out identical squares of area 25 cm² from each corner and turning up the sides. The volume of the box is

(1) 3000 cm³
(2) 1875 cm³
(3) 21875 cm³
(4) 1250 cm³

Sol. **2**

Length of box = 25 cm
Breadth of box = 15 cm
Height of box = 5 cm
Volume of box = 15 × 25 × 5
= 1875 cm³
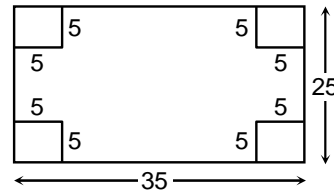
144. Let P(4, k) be any point on the line y = 6 − x. If the vertical segment PQ is rotated about y–axis, the volume of the resulting cylinder is

(1) 32 Π
(2) 16 Π
(3) $\dfrac{32}{3}$ Π
(4) 8 Π
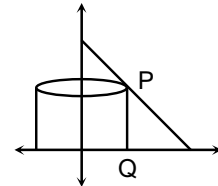
Sol. **1**

P(4, k) lies on y = 6 − x
∴ k = 2
Volume of cylinder = $\pi \times (4)^2 \times 2 = 32\pi$

145. Coordinates of P and Q are (4, −3) and (−1, 7). The abscissa of a point R on the line segment PQ such that $\dfrac{PR}{PQ} = \dfrac{3}{5}$ is

(1) $\dfrac{18}{5}$
(2) $\dfrac{17}{5}$
(3) 1
(4) $\dfrac{17}{8}$

Sol. **3**
P(4, –3) and Q(–1, 7)
PR : RQ = 3 : 2
Abscissa = $\dfrac{4 \times 2 + (-1) \times 3}{3 + 2} = 1$

146. 'When France Sneezes, the rest of Europe catches cold'. This was the remark of?
(1) Bismarck   (2) Metternich
(3) Mazzini   (4) Napoleon

Sol. **2**
Metternich said this and he meant that whatever happens in France, affects the rest of Europe.

147. Until medieval times Jews lived in separately marked areas known as:
(1) Ghettos   (2) Lebensraum
(3) Synagogues   (4) Gas Chambers

Sol. **1**
A part of the city which is predominantly occupied by an ethnic group.

148. In 1860 the famous expedition of the thousand to South Italy was led by:
(1) Mazzini   (2) Garibaldi
(3) Victor Emmanuel II   (4) Count Cavour

Sol. **2**
Garibaldi led thousands of armed volunteers in 1860 to south Italy

149. The Dutch started 'Scientific forestry' at:
(1) Sumatra   (2) Kalimantan
(3) West Irian   (4) Java

Sol. **4**
The Dutch started scientific forestry at Java

150. The 'slavs' belong to a geographical region:
(1) Russia   (2) Balkans
(3) Hungary   (4) Germany

Sol. **2**
The people living in Balkan region where known as "Slavs"

151. In 1940 Vietnam was occupied by
(1) China   (2) France
(3) Japan   (4) Germany

Sol. **3**
Japan, during the Second World War attacked and occupied Vietnam in 1940.

152. A city that was a group of seven Islands under Portuguese control in the Seventeenth century:
(1) Surat   (2) Bombay
(3) Calcutta   (4) Madras

Sol. **2**
Bombay was occupied by the Portuguese initially and later on handed over to the British.

153. The novel that deals with Indian Peasantry:
(1) Godan   (2) Rangbhoomi
(3) Anandmath   (4) Padmarag

Sol. **1**
Godan, written by Premchand dealt with the life of an Indian peasant.

154. Samburu National Park is in:
(1) Kenya
(2) Tanzania
(3) Namibia
(4) Zimbabwe

Sol. **1**
Sambru National Park is in Kenya

155. The 'Swaraj flag' designed by Gandhiji consorted of following three colours:
(1) red, green and white
(2) red, white and green
(3) red, yellow and green
(4) red, white and yellow

Sol. **1**
By 1921, Gandhiji had designed the Swaraj flag. It was again a tricolour (red, green and white) and had a spinning wheel in the centre, representing the Gandhian ideal of self-help. Carrying the flag, holding it aloft, during marches became a symbol of defiance.

156. Which of the following common foods did not come from the 'New World'?
(1) Potatoes and Tomatoes
(2) Maize and Chillies
(3) Groundnut and Sweet Potatoes
(4) Sugarcane and shali variety of rice

Sol. **4**
Potatoes, tomatoes, chilies, groundnuts, maize and sweet potatoes were introduced by the travelers and explorers.

157. Indicate the correct chronological order in which of the following artisans helped in cloth production?
A. Stapler
B. Weavers
C. Fullers
D. Spinners
E. Dyers
(1) A – E – B – D – C
(2) A – C – B – E – D
(3) A – B – C – E – D
(D) A – D – B – C – E

Sol. **4**
A merchant clothier in England purchased wool from a wool **stapler**, and carried it to the **spinners**; the yarn (thread) that was spun was taken in subsequent stages of production to **weavers**, **fullers**, and then to **dyers**.

158. Which of the following countries does not share its boundaries with India?
(1) Bhutan
(2) Tajikistan
(3) Bangladesh
(4) Nepal

Sol. **2**
Tajikistan is the only country which does not share its boundary with India.

159. The Eastern most longitude of India is
(1) 97° 25′ E
(2) 77° 6′ E
(3) 68° 7′ E
(4) 82° 32′ E

Sol. **1**
97° 25′ E is the Eastern most longitude of India.

160. Under which of the following type of resources can tidal energy be classified?
    (1) Replenishable   (2) Human made
    (3) Abiotic   (4) Non Recyclable

Sol. **1**
    Tidal energy is renewable as long as long as we have the ocean water and the moon.

161. Which one of the following is a leguminous crop?
    (1) Jowar   (2) Pulses
    (3) Millets   (4) Sesamum

Sol. **2**
    Pulses are an example of leguminous crops.

162. Which of the following rivers flows through a rift valley?
    (1) Mahanadi   (2) Tungabhadra
    (3) Krishna   (4) Narmada

Sol. **4**
    Narmada is the only river in India which flows through a rift valley.

163. Which one of the following is the main cause of land degradation in Punjab?
    (1) Deforestation   (2) Over Irrigation
    (3) Over grazing   (4) Intensive cultivation

Sol. **4**
    Intensive cultivation enhanced by excessive use of chemical fertilizers has caused land degradation in Punjab.

164. Which one of the following is a non-metallic mineral?
    (1) Lead   (2) Copper
    (3) Tin   (4) Limestone

Sol. **4**
    Lime stone is a non metallic mineral

165. Which of the following agencies markets steel for the public sector plants?
    (1) HAIL   (2) SAIL
    (3) Tata Steel   (4) MMTC

Sol. **2**
    SAIL is responsible for the marketing of steel for the public sectors in India.

166. Which of the following is an Inland Riverine Port?
    (1) Kandla   (2) Kolkata
    (3) Mumbai   (4) Tuticorin

Sol. **2**
    Kolkata is an inland riverine port

167. Which of the following states is not connected with the Hazira-Vijaypur-Jagdishpur (H. V. J.) Pipeline?
    (1) Madhya Pradesh   (2) Maharashtra
    (3) Gujarat   (4) Uttar Pradesh

Sol. **2**
HVJ pipeline starts from Hazira in Gujarat via Vijaypur in Madhya Pradesh to Jagdishpur in Uttar Pradesh.

168. In which of the following States is Black soil found?
(1) Jammu and Kashmir (2) Rajasthan
(3) Maharashtra (4) Jharkhand

Sol. **3**
Black soil is mainly found in Maharashtra

169. Which type of drainage pattern is formed when the river channel follows the slope of the terrain?
(1) Radial (2) Rectangular
(3) Trellis (4) Dendritic

Sol. **4**
The **dendritic** pattern develops where the river channel follows the slope of the terrain. A river joined by its tributaries, at approximately right angles, develops a **trellis** pattern. A **rectangular** drainage pattern develops on a strongly jointed rocky terrain. The **radial** pattern develops when streams flow in different directions from a central peak or dome like structure.

170. The constitution of India declares India to be:
(1) India is a Union of States (2) India is a federation
(3) India is a Unitary States (4) India is a Union of provinces

Sol. **1**
The constitution of India declares India to be a Union of States

171. Which of the following states enjoy special status according to the constitution?
(1) Jammu and Kashmir (2) Punjab
(3) Tamil Nadu (4) Kerala

Sol. **1**
Under Article 370 of the constitution J & K enjoys a special states.

172. Which institution of the following institutions reserves seat for women?
(1) Lok Sabha (2) Rajya Sabha
(3) Vidhan Sabha (4) Panchayat

Sol. **4**
50% seats are reserved for women in Panchayats.

173. Coalition Government means:
(1) Government formed by two or more parties
(2) Government that remains in power for five years
(3) Government formed with the State parties
(4) Government that makes law with consensus

Sol. **1**
A coalition government, or coalition cabinet, is a cabinet of a parliamentary government in which several parties cooperate.

174. Party that remained in power for 30 years without any break and believes in Marxism:
(1) Communist Party of India
(2) Communist Party of India Marxist
(3) Communist Party of India Marxist Leninist
(4) Communist Alliance

Sol. **2**
Communist Party of India Marxist has remained in power in West Bengal for 30 years and Jyoti Basu as the longest serving Chief Minister of any State of India.

175. What do you understand by the term 'defection'?
    (1) Change of party allegiance from the party on which a person got elected to a legislation body to a different party
    (2) Change of the preference of the voters
    (3) Internal politics of Party
    (4) Change of the party before election

Sol. **1**
In politics, a **defector** is a person who gives up allegiance to one party in exchange for allegiance to another, in a way which is considered illegitimate by the first party.

176. Who was the Chairperson of the Drafting Committee of the Constituent Assembly of India?
    (1) Dr. BR Ambedkar   (2) Pt. Jawaharlal Nehru
    (3) Abdul Kalam Azad   (4) Dr. Rajendra Prasad

Sol. **1**
Dr. BR Ambedkar was the Chairperson of the Drafting Committee of the Constituent Assembly of India.

177. Who is the Chairman of the Planning Commission of India?
    (1) President of India   (2) Prime Minister
    (3) Member of Parliament   (4) Chief Justice of India

Sol. **2**
Prime Minister is the Ex-officio chairman of the Planning Commission of the India.

178. How many Fundamental Rights are there in Indian Constitution?
    (1) 4   (2) 5
    (3) 6   (4) 7

Sol. **3**
The Fundamental Rights in the Indian Constitution include: 1. Right to Equality, 2. Right to Freedom, 3. Right against Exploitation, 4. Right to Freedom of Religion, 5. Cultural and Educational Rights, 6. Right to Constitutional Remedies

179. Which article of the Indian Constitution is regarded as the Soul of Indian Constitution?
    (1) Art. 21   (2) Art. 31
    (3) Art. 19   (4) Art. 32

Sol. **4**
Dr. B R Ambedkar, the chairman of the Drafting committee called **Art. 32 the Fundamental Right to Constitutional Remedies** as the heart and soul of the Indian constitution. According to this right, a person can move the Supreme Court in case of violation of their fundamental rights.

180. What does the term 'Secular' mean in the Indian Context?
    (1) No State Religion   (2) One State Religion
    (3) No Religion   (4) Sarvadharma Sambahav

Sol. **1**
'Secular' means in the Indian Context that there is no official religion for the Indian state.