# **FIITJEE** Solutions to

NTSE – 2012 – Stage I (Andhra Pradesh State)

# (For class X Students)

# Paper – 1 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 SHADED on a SEPARATE OMR Answer sheet given, with HB pencil. Read the Instructions printed on the OMR 2 sheet carefully before answering the questions.

(i) Subjects Questions SI. No. and Marks allotted:-

(1) Physics	91 to 102 Questions	12 Marks
(2 Chemistry	103 to 113 Questions	11 Marks
(3) Biology	114 to 125 Questions	12 Marks
(4) Mathematics	126 to 145 Questions	20 Marks
(5) History	146 to 155 Questions	10 Marks
(6) Geography	56 to 165 Questions	10 Marks
(7) Political Science	166 to 175 Questions	10 Marks
(8) Economics	176 to 180 Questions	05 Marks

*(ii)* SHADE the circle having the correct alternative in the OMR sheet provided, from among the ones given against the corresponding question in the Question Paper Booklet. For shading the circles, use HE pencil.

## PHYSICS

91. One Newton is the force which produces an acceleration of			
	(1) 1 m. $s^{-2}$ on a body of mass 1 gm		(2) 1 cm. $s^{-2}$ on a body of mass 1 kg
	(3) 1cm. $s^{-2}$ on a	body of mass 1 gm	(4) $1 \text{m. s}^{-2}$ on a body of mass 1 kg
Sol.	4		
	F = ma		
	where	F = unbalanced for	orce applied
		m = mass of the b	ody
		a = acceleration o	f the body
	When m 1 ke and E 1N		

When m = 1 kg and F = 1 Nthen 1 N = 1 kg x a $\mathbf{a} = \frac{1N}{1kg}$  $1N = 1 \text{ kg ms}^{-2}$  $\therefore a = \frac{1 kg m s^{-2}}{1 kg}$  $\therefore a = 1ms^{-2}$ 

92. Two objects of mass ratio 1 : 4 are dropped from the same height. The ratio between their velocities when they strike the ground is

(1) Both objects will have the same velocity

(2) The velocity of the first object is twice that of the second one

(3) The velocity of the  $2^{nd}$  object is one fourth of that of the  $1^{st}$  object (4) The velocity of the  $2^{nd}$  object is 4 times that of the  $1^{st}$  one

Sol.

1

 $\therefore \frac{v_1}{v_2} = \frac{1}{1}$ 

Let the masses of the two objects be  $m_1, m_2$ .

Let  $u_1, u_2$  be their initial velocities respectively. Let h be the height from where the objects are dropped.

Let  $v_1, v_2$  be the their final velocities respectively.

Let  $t_1, t_2$  be the time taken to strike the ground

$$u_{1} = u_{2} = 0, \ h_{1} = h_{2} = h$$

$$h = \frac{1}{2} g t_{1}^{2} \qquad ----(1)$$

$$h = \frac{1}{2} g t_{2}^{2} \qquad ----(2)$$

$$\therefore \quad t_{1} = t_{2} = t = \sqrt{\frac{2h}{g}} \qquad ----(3)$$
now  $v_{1} = g t_{1} \qquad v_{2} = g t_{2}$ 
From equation (3)
$$v_{1} = v_{2} = g t$$

FIITJEE VIZAG Centre, # 47-7-47, 4th lane, Dwarakanagar, Visakhapatnam. Ph:0891-2555501,02 Fax:0891-2555503

93. The electromagnetic radiations used for taking photographs of objects in dark (1) X-rays (2) Infra-red rays (3)  $\gamma$ -rays (4) UV rays

#### Sol. 2

Infrared radiations find applications in physio – therapy and are used to take photographs of objects in darkenss.

- 94. The work done by a force on a body will be positive if the body (1) moves perpendicular to the direction of applied force (2) does not move(3) moves along the direction of applied force
  - (4) moves opposite to the direction of applied force

#### Sol.

3

Work done by	a force on a body = $Fs\cos\theta$
where	F = Force acting on the body
	s = Displacement due to the force applied
	$\theta$ = Angle between F and s
Work done wil	l be positive if $\cos\theta$ is positive i.e. $0 \le \theta < 90^{\circ}$
When the body	moves along the direction of applied force $\theta = 0^{\circ}$
	$\therefore \qquad \cos 0^\circ = 1$
	Work done $=$ Fs
	$\therefore$ Work done here is positive.

- 95. Identify the energy changes in the following two cases -
  - A : A car moving up a hill
  - B : Photographic film is exposed to sun-light

(1) In 'A' mechanical energy in moving car is converted to potential energy and in 'B' potential energy is converted to chemical energy

(2) In 'A' potential energy in moving car is converted to kinetic energy and in 'B' chemical energy is converted to light energy

(3) In 'A' kinetic energy in moving car is converted to potential energy and in 'B' potential energy is converted to light energy

(4) In 'A' kinetic energy in moving car is converted to potential energy and in 'B' light energy is converted to chemical energy

#### Sol. 4

A : A car moving up a hill

Moving car has kinetic energy, kinetic energy gets converted to potential energy B : Photographic film is exposed to sun – light

When photographic film is exposed to sun the silver bromide present in it decomposes such that the film cannot be developed.

:. Light energy gets converted to chemical energy.

96. The instrument that is based on the principle that when an object is placed between first principal focus and the optic centre of convex lens, an upright, virtual and enlarged image on the same side of the object is formed, is

(1) Telescope(2) Projector(3) Camera(4) Simple microscope

Sol. 4

In astronomical telescope 2 convex lens called eyepiece & objective lens are used and object is placed before eyepiece lens, such that final image inverted, a camera and eye also form inverted image on the screen. Whereas simple microscope gives an erect, virtual and enlarged image of the object placed between first principal focus and the optic nerve of the convex lens.



In a projector, the image formed is real, inverted magnified on the other side of the lens. This inverted image is again inverted by the film.

97.A charge of 1000 C flows through a conductor for 3 minutes and 20 seconds. Find<br/>the magnitude of current flowing through the conductor<br/>(1) 5A(2) 2A(3) 0.5 A(4) 10 A

Sol. 1

Current flowing through a conductor is  $I = \frac{Q}{t}$ Where Q = net charge flowing, t = time taken for net charge to flow, Q = 1000 C t = 3 min 20 sec, 200 sec,  $\therefore I = \frac{1000C}{200 \text{ sec}} = 5\text{A}$ 

98. Three resistances A, B, C are connected as shown in the figure. Their resultant resistance is



Sol.

(1) 11Ω

2

Resistors B and C are in parallel connection  $\therefore$  Effective Resistance of B & C is  $1 \quad 1 \quad 1 \quad 1 \quad 1$ 

(2)  $7.2\Omega$ 

$$\frac{1}{R} = \frac{1}{B} + \frac{1}{C} = \frac{1}{3\Omega} + \frac{1}{2\Omega}$$
$$R = \frac{B \times C}{B + C} = \frac{3 \times 2}{3 + 2} = \frac{6}{5}\Omega$$

Resistor A is in series connection with B & C

:. Total effective resistance = A + R, =  $6\Omega + \frac{6}{5}\Omega$ , =  $\frac{36}{5}\Omega$ , = 7.2 $\Omega$ 

99. The particle with mass equal to  $9.1 \times 10^{-31}$  kg and charge equal to  $-1.6 \times 10^{-19}$  C is... (1)  $\beta$  (2)  $\alpha$  (3)  $\gamma$  (4) X

NTSE_X	_stage 1_2012 - 13	PAGE 5 OF 22		
Sol.	1 $\alpha$ – particle is a doubt Its mass is 4 times matrix Its charge is 2 times the $\beta$ – particles are elected Mass of an electron = Charge of an electron $\gamma$ – rays are not particles X – rays are not particles	bly ionized helium atom ass of proton = $6.68 \times 10^{-10}$ he charge of proton = trons originating in the = $9.1 \times 10^{-31}$ kg h = $-1.6 \times 10^{-19}$ C cles but radiations cles but EM radiation	n $\binom{4}{2}He$ ) $D^{-27}$ kg $3.2 \times 10^{-19}$ C e nucleus	
100.	The error and the corr a Screw gauge is abo (1) positive, negative (3) negative, positive	rection to be made who ve index line of the pit	en the zeroth division of ch scale respectively are (2) negative, negative (4) positive, negative	the head scale in
Sol.	3 In screw gauge Negative zero error – the error is said to be Positive zero error – the pitch scale, the er	If the zeroth division of negative and the corre If the zeroth division of the corre If the zeroth division of the positive	of the head scale is abov ction has to be positive. f the head scale is below e and the correction is n	e the index line the index line of egative.
101.	The isotopes that emission constant $(1) \beta$ – radiations	It these radiations are ut (2) $\gamma$ -radiations	sed as radioactive tracer (3) $\alpha$ – radiations	rs in medical (4) All the three
Sol.	2 $\gamma$ – radiation emitted sciences. $\gamma$ – being EM radiati unaffected by electric	by radio isotopes are to ons has more penetration and magnetic fields.	used as radioactive trace ng power than $\alpha$ and $\beta$	rs in medical
102.	The amount of heat e 1°C is (1) Calorie	nergy required to raise (2) Thermal capacity	<ul><li>the temperature of 1 kg</li><li>(3) Specific heat</li></ul>	of water through (4) Kilo calorie

#### Sol. 4

Calorie – The amount of heat energy required to raise the temperature of 1g of water through  $1^{\circ}C$  at a pressure of 1 atm.

Thermal capacity – The amount of heat energy required to produce a unit change of temperature in a unit mass of a substance.

Specific heat – The amount of heat energy required to raise the temperature of unit mass of a body through  $1^{\circ}C$ 

Kilo calorie – The amount of heat energy required to raise the temperature of 1 kg of water through  $1^{\circ}C$  at 1 atm.

### CHEMISTRY

		-
103	Which of the following is Aromatic Hydrocarbon	. ?
105.	which of the following is Afoliatic frydroearbon	L 4

(1)  $C_2H_2$  (2)  $C_3H_8$  (3)  $C_5H_{12}$  (4)  $C_6H_6$ 

Sol. 4

The general formula for aromatic hydro carbons having benzene rings is  $C_n H_{2n-6y}$ 

(where y: no. of benzene rings,  $n \ge 6$ )

If n = 6, y = 1 then  $C_n H_{2n-6y}$  become  $C_6 H_6$ So  $C_6 H_6$  is an aromatic hydrocarbon

∴ C<sub>2</sub>H<sub>6</sub> belongs to alkynes having general formula C<sub>n</sub>H<sub>2n-2</sub>
 C<sub>3</sub>H<sub>8</sub> belongs to alkanes having general formula C<sub>n</sub>H<sub>2n+2</sub>
 C<sub>5</sub>H<sub>12</sub> belongs to alkanes having general formula C<sub>n</sub>H<sub>2n+2</sub>

104. In the Periodic Table, the Ionisation potential in a group .... from top to bottom.(1) increases (2) decreases (3) does not change (4) can not be predicted

#### Sol. 2

Ionisation potential is inversely proportional to atomic size

$$I.P \propto \frac{1}{atomic \ size}$$

In the periodic table atomic size in a group increases from top to bottom.

:. Ionisation potential in a group decreases from top to bottom.

105.	The electronic configuration of Potassium is		
	(l) $1s^2 2s^2 2p^6 3s^2 3p^3 4s^2 3d^2$	(2) $1s^2 2s^2 2p^6 3s^2 3p^5 4s^2$	
	$(3) 1s^22s^2 2p^63s^2 3p^63d^1$	(4) $1s^22s^2 2p^63s^2 3p^6 4s^1$	

Sol.

4

According to **Aufbau principle**, "orbitals are filled in order of their increasing energies". So orbital with lower (n + l) value is filled up first.

The order of filling of various orbitals is as follow

1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p, 5s, 4d, 5p, 6s, 4f .....

Where (n + l) for 3d is 3 + 2 = 5

(n + l) for 4s is 4 + 0 = 4

So electronic configuration for potassium (K) whose atomic number 19 is  $1s^22s^2 2p^63s^2 3p^6 4s^1$ 

106. Most Electronegative element is

(1) F (2) Cs (3) He (4) I

Sol. 1

Noble gases (He, Ne, Ar & Kr) have zero "electronegativities". In the periodic table **'electronegativity'** in periods increases left to right and in groups decreases top to bottom.

So halogens (F, Cl, Br, I) have high electronegativity in respective periods. Among them 'F' is most electronegative.

107. The amount of NaOH in 750 ml of 0.2 M solution (Molecular weight = 40) is –

(1) 2 gm (2) 4 gm (3) 6gm (4) 8 gm

Sol.

3

Molarity of a solution  $(M) = \frac{mass \ of \ solute}{molar \ mass \ of \ solute} \times \frac{1000}{volume \ of \ solution \ in \ mL}$ 

Given molarity of NaOH solution = 0.2 M

Volume of NaOH solution = 750 mL

So weight of NaOH =  $\frac{molar \ mass \ of \ solute \times molarity \times volume \ of \ solution \ in \ mL}{1000}$ 

$$=\frac{40\times0.2\times750}{1000}$$

108. Structure of Paracetamol is



Sol.

Paracetamol is "Para acetamido phenol"



109. Molecule with double bond

(1)  $H_2$  (2)  $F_2$  (3)  $Cl_2$  (4)  $O_2$ 

Sol. 4

The electronic configuration of hydrogen is 1s<sup>1</sup>
 Diatomic molecule of hydrogen (H<sub>2</sub>) is formed by s – s overlap leads to one σ-bond.

	2) The electronic configuration of fluorine is $1s^2 2s^2 2p^5$						
		Diatomic molecule of fluorine ( $F_2$ ) is formed by $p - p$ overlap leads to one					
		$\sigma$ -bond.					
	3)	The electronic con	nfiguration of Chlorine	e is $1s^2 2s^2 2p^6 3s^2 3p^5$			
		Diatomic molecul	e of chlorine (Cl <sub>2</sub> ) is f	ormed by p – p overla	p leads to one		
		σ-bond.					
	4)	The electronic con	nfiguration of oxygen	is $1s^2 2s^2 2p^4$			
		Diatomic molecul	e of oxygen (O <sub>2</sub> ) is for	rmed by one $p_z - p_z$ ov	erlap leads to one		
		$\sigma$ -bond and side $\sigma$	on overlap of $p_y - p_y$ le	ads to $\pi$ -bond.			
		So O <sub>2</sub> contains a c	louble bond.				
110.	Sh	aving soap contain	s excess of to slow	lather drying			
	(1)	) builders	(2) Stearic acid	(3) perfume	(4) Glycerol		
Sol.	2						
	Shaving soaps contain excess of stearic acid giving slow drying lather soap.						
111.	Acidity in the Sugarcane juice is removed by adding:						
	(1)	Ca(OH) <sub>2</sub>	(2) CO <sub>2</sub>	(3) SO <sub>2</sub>	(4) H <sub>2</sub> O		
Sol.	1						
	The juice obtained from sugar cane is slightly acidic & contain some impurities.						
	Ca	$Ca(OH)_2$ is added to precipitate the impurities as well as to neutralise the juice					
112.	The chemical formula of Dolomite is						
	(1)	$Be_3Al_2(SiO_3)_6$	$(2) MgCI_2.KCl.6H_2C$	(3) CaCO <sub>3</sub> ,MgCO <sub>3</sub>	$(4) MgSO_4.7H_2O$		
Sol.	3						
	Dolomite is a double salt of calcium carbonate and magnesium carbonate i.e						
	CaCO <sub>3</sub> ,MgCO <sub>3</sub>						
113.	If t	the pH of, a solutio	n is 8, .its [H <sup>+</sup> ] is				
	(1)	) log 10 <sup>-8</sup>	(2) $10^8$	$(3) 10^{-8}$	(4) 8		
Sol.	3						
	Given pH of solution is 8						
	pН	$\mathbf{I} = -\log_{10} \left[ H^+ \right] = 8$	3				
	log	$\mathbf{g}_{10} \Big[ \boldsymbol{H}^+ \Big] = -8$					
	$\left[H^+\right] = 10^{-8} mol/L$						

# BIOLOGY

114.	The process which helps (1) Nutrition (2	in perpetuation of a ) Photosynthesis	a race (3) Excretion	(4) Reproduction	
Sol.	4 Reproduction is a life process, it maintains continuity of the species and a constant population number.				
115.	The product of Photosynthesis is transported from source of production to the storage organs through (1) Palisade tissue (2) Phloem tissue (3) Spongy tissue (4) Xylem tissue				
Sol.	2 The end product of photo transported to the storage tissue.	osynthesis is glucos e organs such as Fru	e $[C_6H_{12}O_6]$ synthesized nits, seeds and tubers through	in leaves and ough phloem	
116.	The cell organelle pertaining to energy release process is(1) Lysosome(2) Chloroplast(3) Mitochondria(4) Endoplasmic reticulum				
Sol.	3 In the Aerobic respiration the complete oxidation of glucose takes place in mitochondria and energy stored in the form of ATP				
117.	The circulatory system in Cockroach consists of(1) heart, sinuses and alary muscles(2) Cardiac muscle, heart, blood vessels(3) blood vessels, heart, atrium(4) Veins, heart and atrium			rrt, blood vessels ium	
Sol.	1 Open circulatory system is seen cockroach in which blood flows through 13 chambered heart and sinuses (Body cavities). Alary muscles helps in contraction and relaxation of sinuses as well as heart chambers.				
118.	The major natural Auxin (1) IBA (2	n is ) 2, 4D	(3) IAA	(4) NAA	
Sol.	3 IAA is a kind of Natural Auxin, 4-chloro IAA, and PAA are some other Natural Auxins. IBA, 2,4-D and NAA are the Synthetic Auxins commonly used in Horticulture industry.				
119.	The seat of intelligence, (1) Cerebrum (3) Cerebellum	thinking and judgm	ent in human brain is (2) Medulla oblongata (4) Mid brain	-	
Sol.	1 Cerebrum controls several functions of the body. In cerebral cortex there are centers to receive and Analyse information. Ex :- Visual (sight) Auditory (hearing) and olfactory (smell)				
120.	Ramu collected epiphyll these buds could be	ous buds from a pla	nt. The plant from whic	h he has collected	

(1) Murraya (2) Bryophyllum (3) Neem (4) Hibuscus

Sol.	2 Vegetative propagation done through various vegetative parts (stem, roots and leaf) of the plant body. The leaf margins of Bryophyllum contains "Epiphyllous buds". Which can develop in to new plant under favourable conditions.				
121.	<ul> <li>Identify the correct statement from below</li> <li>(1) The Zygote develops into embryo-sac</li> <li>(2) Synergids are situated near the chalazal end of embryosac</li> <li>(3) Mature embryo-sac has eight cells</li> <li>(4) Secondary nucleus in a mature embryo-sac is diploid</li> </ul>				
Sol.	4 Embryosac in Angiosperms is commonly 7 celled and 8 nucleated condition. Two Haploid nuclei in central cell (or) polar cell together form Diploid Secondary nucleus. In mature embryosac. This will fuse with second male gamete to form triploid endosperm nucleus.				
122.	One of the following is a wrong combination(1) Paramoecium - Exconjugats(2) Clitellum - Earthworm(3) Flies - Internal fertilization(4) Ampluxory pads - female frog				
Sol.	4 In male Frogs vocal sacs and Ampluxory pads are part of the reproduction. Vocal sacs are responsible for the croaking sounds in the breeding season to attract females. Ampluxory pads present on the index fingers of the fore limbs to push female frog Abdominal cavity during copulation.				
123.	An example for essential fatty acids is(1) Glutamic acid(2) Aspartic acid(3) Linoleic acid(4) Tartaric acid				
Sol.	3 The major two essential fatty acids are linolic acid and linolenic acid. Which are not synthesized in our body, commonly taken through our diet.				
124.	The cell-division which is also known as reduction cell-division is(1) Fission(2) Meiosis(3) Mitosis(4) Amitosis				
Sol.	2 Meiosis (or) Reduction division commonly takes place in reproductive cells. Daughter cells produce by this division are called gametes, commonly Haploid in condition.				
125.	In humans, disorders of nervous system are caused due to the deficiency of vitamin(1) Pyridoxine(2) Retinol(3) Phylloquinone(4) Ascorbic acid				
Sol.	1 Vitamin $B_6$ also known as Pyridoxine used in the metabolism of Amino Acids. Deficiency of $B_6$ results in Hypertension, Anaemia, Nausea and vomiting. In children pyridoxine deficiency causes convulsions.				

### **MATHEMATICS**

126. In the adjacent figure, if  $\angle AOC = 110^\circ$ , then the value of  $\angle D$  and  $\angle B$  respectively

D O O C B

(1) 55°,125° (2) 55°,110° (3) 110°, 25°

(4) 125°, 55°

Sol.

1

Given  $|AOC| = 110^{\circ}$ |AOC| = 2|ADC| $\Rightarrow |ADC| = 55^{\circ}$  $|B| + |D| = 180^{\circ}$  $\Rightarrow |B| = 125^{\circ}$ 

127. If  $a = \frac{9}{\sqrt{11} - \sqrt{2}}$ ;  $b = \frac{6}{3\sqrt{3}}$ , then the relation between *a* and *b* is .... (1) a < b (2) a > b (3) a + b > 1 (4)  $a \le b$ 

Sol.

2

$$a = \frac{9}{\sqrt{11} - \sqrt{2}} \times \frac{\sqrt{11} + \sqrt{2}}{\sqrt{11} + \sqrt{2}} = \sqrt{11} + \sqrt{2}$$
$$b = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$
clearly a > b

128. In a  $\Delta XYZ$ , if the internal bisector of  $\angle X$  meets YZ at 'P', then ....



Sol.

The internal bisector of |X| meets YZ at P

$$\frac{XY}{XZ} = \frac{YP}{PZ}$$
$$\Rightarrow \frac{XY}{XZ} + 1 = \frac{YP}{PZ} + 1$$
$$\Rightarrow \frac{XY + XZ}{XZ} = \frac{YP + PZ}{PZ} = \frac{YZ}{PZ}$$

- 129. Two poles of height 6 m and 11 m stand vertically upright on a plane ground. If the distance between their feet is 12m, the distance between their tops is ......
  (1) 12 m
  (2) 14 m
  (3) 13 m
  (4) 11 m
- Sol.

Let AB and CD be two poles such that AB = 6m, CD = 11mGiven AC = 12 m

ABEC is a rectangle, CE = 6m, ED = 5m and BE = 12m



 $\triangle BED$  is a right angle triangle,  $BD^2 = BE^2 + ED^2$  $BD^2 = 12^2 + 5^2$ BD = 13m

130. If 'r' and 's' are the roots of the equation  $ax^2 + bx + c = 0$ , then the value of  $\frac{1}{r^2} + \frac{1}{s^2}$  is....

(1) 
$$b^2 - 4ac$$
 (2)  $\frac{b^2 - 4ac}{2a}$  (3)  $\frac{b^2 - 4ac}{c^2}$  (4)  $\frac{b^2 - 2ac}{c^2}$ 

Sol.

4

r and s are the roots of equation  $ax^2 + bx + c = 0$ 

$$r + s = \frac{-b}{a}, \quad rs = \frac{c}{a}$$
  
Now,  $\frac{1}{r^2} + \frac{1}{s^2} = \frac{s^2 + r^2}{(rs)^2}$ 
$$= \frac{(s+r)^2 - 2rs}{(rs)^2} = \frac{\frac{b^2}{a^2} - 2\frac{c}{a}}{\frac{c^2}{a^2}} = \frac{b^2 - 2ac}{c^2}$$

- 131. When the sum of the first ten terms of an A.P. is four times the sum of the first five terms. Then the *k* term is .....
  (1) a(2k+1)
  (2) a(2k-1)
  (3) 2k+1
  (4) 2k+3
- Sol.

2

Let 'a' be the first term and 'd' be the common difference of an A.P. Sum of first ten terms =  $4 \times$  sum of first five terms

$$\frac{10}{2} [2a + (10 - 1)d] = 4 \times \frac{5}{2} [2a + (5 - 1)d]$$

$$2a + 9d = 4a + 8d$$

$$2a = d \qquad \dots(1)$$
k<sup>th</sup> term of an A.P. is  $a + (k - 1)d$ 
 $a + (k - 1)2a \qquad (by (1))$ 
 $2ak - a = a(2k - 1)$ 

 $a^8$ 

(4)  $a^4$ 

132. The value of 
$$\left[\sqrt[3]{\sqrt[6]{a^9}}\right]^4 \left[\sqrt[6]{\sqrt[3]{a^9}}\right]^4$$
 is ....  
(1)  $a^{16}$  (2)  $a^{12}$  (3)

Sol.

$$\begin{bmatrix} \sqrt[3]{a^{\%}} \end{bmatrix}^4 \begin{bmatrix} \sqrt[6]{a^{\%}} \end{bmatrix}^4 \\ \begin{bmatrix} a^{\%} & \sqrt[4]{a^{7}} \end{bmatrix}^4 \\ \begin{bmatrix} a^{\%} & \sqrt[4]{a^{7}} \end{bmatrix}^4 \begin{bmatrix} a^{\%} & \sqrt[4]{a^{7}} \end{bmatrix}^4 \\ a^2 \cdot a^2 = a^4 \end{bmatrix}$$

133. If the ratio of the legs of a right-angled triangle is 1:2, then the ratio of the corresponding segments of the hypotenuse made by a perpendicular upon it from the vertex will be

(1) 1: 4 (2)  $1:\sqrt{2}$  (3) 1: 2 (4)  $1:\sqrt{5}$ 

Sol.

1

Given 
$$\frac{AB}{BC} = \frac{1}{2}$$
  
 $AB = x, BC = 2x$   
 $\Delta ABC$  right angle,  $AC = \sqrt{5}x$  and  $BD \perp AC$ ,  
Let  $CD = a, AD = b$  and  $BD = h$   
 $a + b = \sqrt{5}x$  ....(1)  
 $A = \sqrt{5}x$  ....(1

$$\Rightarrow 3x^{2} = (b-a)\sqrt{5}x \quad (by (1))$$
$$\frac{3}{\sqrt{5}}x = b-a \qquad \dots (2)$$
$$b = \frac{4x}{5}, a = \frac{x}{5} \Rightarrow \frac{a}{5} = \frac{1}{5}$$

from (1) & (2),  $b = \frac{4x}{\sqrt{5}}, a = \frac{x}{\sqrt{5}} \Rightarrow \frac{a}{b} = \frac{1}{4}$ 

134. The sum of three numbers is 98. The ratio of the first to the second term is  $\frac{2}{3}$  and the ratio of the second to the third is  $\frac{5}{8}$ . Then the second number is (1) 15 (2) 20 (3) 30 (4) 32 Sol. 3

. 3 Let a, b, c be three numbers Given a+b+c=98 ....(1)

and 
$$\frac{a}{b} = \frac{2}{3}, \frac{b}{c} = \frac{5}{8}$$
  
 $a = \frac{2b}{3}, c = \frac{8b}{5}$   
by (1),  $\frac{2b}{3} + b + \frac{8b}{5} = 98$   
 $\frac{10b + 15b + 24b}{15} = 98$   
 $49b = 98 \times 15$   
 $b = 30$ 

135. A cylindrical pencil of diameter 1.2 cm has one of its ends sharpened into a conical shape of height 1.4 cm. The volume of the material removed is (in cub. cms) .... (1) 4.224(2) 1.056 (3) 10.56 (4) 42.24

2



APB

Volume of the material removed = Volume of cylinder ABCD – volume of cone

$$= \pi r^{2}h - \frac{1}{3}\pi r^{2}h$$
$$= \pi r^{2}\left(\frac{2h}{3}\right)$$
$$= \pi \left(\frac{6}{10}\right)^{2}\left(\frac{2}{3} \times \frac{14}{10}\right) = 1.056$$

If  $f: R \to R$ ;  $g: R \to R$  are functions defined by f(x) = 3x - 1;  $g(x)\sqrt{x+6}$ , then the 136. value of  $(gof^{-1})(2009)$  is

Sol.

Given 
$$f(x) = 3x - 1$$
,  $g(x) = \sqrt{x + 6}$   
Let  $y = f(x)$   
 $y = 3x - 1$   
 $\Rightarrow f^{-1}(y) = x = \frac{y + 1}{3}$   
 $\Rightarrow f^{-1}(x) = \frac{x + 1}{3}$  and  $g(x) = \sqrt{x + 6}$   
 $(gof^{-1}) (2009) = g(f^{-1}(2009)) = g(\frac{2009 + 1}{3}) = g(\frac{2010}{3})$   
 $= \sqrt{\frac{2010}{3} + 6} = \sqrt{\frac{2028}{3}} = 26$ 

AB

Ъ

137. In the diagram, a squared ABCD has a side with a length of 6 cm. Circular arcs of radius 6 cm are drawn with centres B and D. What is the area of the shaded region in sq. cm. ?

	(1) $18\pi$	(2) $36\pi$	(3) $18\pi - 24$	(4) $18\pi - 36$
Sol.	4 area of sector BAC area of sector DAC required area	$= 9\pi$ = 9\pi = sum of area of two = $(9\pi + 9\pi) - 36$	sectors – area of square = $18\pi - 36$	
138.	How many numbers 7 and 8; no digits bei	between 3000 and 400 ng repeated in any nur	0 can be formed from the	e digits 3, 4, 5, 6,
	(1) 20 Nos.	(2) 15 Nos.	(3) 60 Nos.	(4) 120 Nos.
Sol.	3 3 The first place filled Second place Third place Fourth place Total numbers	with 3 $= 1 \times 5 \times 4 \times 3 = 60$	- 1 way - 5 ways - 4 ways - 3 ways	
139.	If $\log_{10} 2 = 0.3010$ , the (1) 120	en the number of digits (2) 121	s in $256^{50}$ is (3) 256	(4) 50
Sol.	2 Let number of digits in 2	$x = 256^{50}$ $\log x = 50 \ \log_{10} 256$ $\log x = 50 \log_{10} 2^{8}$ $= 400 \log_{10}^{2}$ $= 400 \times (0.3010)$ $\log x = 120.4$ $256^{50} \text{ is } 120 + 1 = 121.$		
140.	If sin A, $\cos A$ and ta (1) 2	n A are in Geometric 1 (2) 4	Progression, then $\cot^6 A$ -(3) 3	$-\cot^2 A$ is (4) 1
Sol.	4 Given sin A, cos A a $\cos^2 A = \sin A \cdot \tan A$ $\Rightarrow \cos^3 A = \sin^2 A$ $\Rightarrow \cot^3 A = \operatorname{cosec} A$ squaring on both side $\cot^6 A = \operatorname{cosec}^2 A$ $\cot^6 A = 1 + \cot^2 A$ $\cot^6 A - \cot^2 A = 1$	nd tan A are in G.P.		

- 141. A chess-board contains 64 equal squares and the area of each square is 6.25 cm<sup>2</sup>. An inside border round the board is 2 cm. wide. The length of the chess-board is ....
  - (1) 8 cm (2) 24 cm (3) 12 cm (d) 16 cm
- Sol.

Area of each square is  $6.25 \text{ cm}^2$ 

Let 'x' be the side of each square ,  $x^2 = \frac{625}{100}$ 



Length of the chess board =  $2 \times$  border round wide +  $8 \times$  each square length

 $x = \frac{5}{2}$ 

$$= 2 \times 2 + 8 \times \frac{5}{2} \text{ cm}$$
$$= 4 + 20 \text{ cm}$$
$$= 24 \text{ cm}$$

142. The value of 
$$\log_{\sqrt{2}} \sqrt{2\sqrt{2\sqrt{2\sqrt{2}}}}$$
 is....  
(1)  $\frac{31}{32}$  (2)  $\frac{31}{4}$  (3)  $\frac{31}{8}$  (4) None

Sol.

3

$$\sqrt{2\sqrt{2\sqrt{2\sqrt{2....n} \text{ times}}}} = 2^{1-\frac{1}{2^n}}$$
$$\log_{2^{1/2}}^{2^{1-\frac{1}{2^n}}} = \log_{2^{1/2}}^{\frac{31}{32}} = \frac{31}{32} \times 4\log_2^2$$
$$= \frac{31}{8}$$

143. Equation of the line passing through (-1,2) and perpendicular to x - y + 2 = 0 is ....

(1) x + y = 1 (2) x - y = 1 (3) x + y = 2 (4) x - y + 1 = 0

Sol.

1

Slope of given line x - y + 2 = 0 is 1 Slope of required line is -1 The equation of line passing through (-1,2) having slope -1 is y - 2 = -1(x+1)x + y = 1 144. If  $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$  and  $A^2 - 4A - nI = 0$ , then 'n' is equal to....

(1) 3 (2) -3 (3) 
$$\frac{1}{3}$$
 (4)  $\frac{-1}{3}$ 

Sol.

2

$$A^{2} = A \cdot A$$

$$= \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix} \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$$

$$= \begin{bmatrix} 5 & -4 \\ -4 & 5 \end{bmatrix}$$

$$A^{2} - 4A = \begin{bmatrix} 5 & -4 \\ -4 & 4 \end{bmatrix} - 4 \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$$

$$= \begin{bmatrix} 5 & -4 \\ -4 & 5 \end{bmatrix} - \begin{bmatrix} 8 & -4 \\ -4 & 8 \end{bmatrix}$$

$$= \begin{bmatrix} -3 & 0 \\ 0 & -3 \end{bmatrix}$$

$$= -3I$$

$$A^{2} - 4A + 3I = 0 \Rightarrow n = -3$$

145. If A(-2,5) and B(3,2) are the two points on a straight line. If  $\overline{AB}$  is extended to 'C' such that AC = 2BC, then the co-ordinates of 'C' are ....

(1) 
$$\left(\frac{1}{2}, \frac{3}{2}\right)$$
 (2)  $\left(\frac{7}{2}, \frac{1}{2}\right)$  (3) (8,-1) (4) (-1,8)

Sol.

3

Given 
$$\frac{AC}{BC} = \frac{2}{1}$$
 where  $A(-2,5)$  and  $B(3,2)$ 

'C' divides the line  $\overline{AB}$  externally in the ratio 2 : 1

$$C\left(\frac{2(3)-1(-2)}{2-1},\frac{2(2)-1(5)}{2-1}\right)$$
  
C(8,-1)

# HISTORY

- 146.He was known as the father of history writing<br/>(1) Thucidydes(2) Plutarch(3) Herodotus(4) Democritis
- Sol. 3
  - Herodotus was known as the father of history and the other options are incorrect.
- 147. "Crusader", means
  - (1) A procedure adopted to propagate religion

(2) Priests

- (3) Local Governors during Roman's period
- (4) Religious wars fought between Christians and Muslims
- Sol. 4

These are the religious wars fought between Christians and Muslims and other options are incorrect. These wars happened in medieval period.

148. The picture given below relates to



(3) Panch Mahal

(2) Akbar's tomb(4) Diwan-a-Khas

Sol.

3

1

The given picture is Panch Mahal built during Akbar period.

 149.
 In western countries the influence of Renaissance took place between

 (1) 500 - 1500 A.D.
 (2) 500 - 1800 A.D.

 (3) 1300 - 1500 A.D.
 (4) 1300 - 1800 A.D.

Sol.

Renaissance took place in western countries between 500 - 1500 AD and eastern countries between 500 - 1800 AD

150. "Boston tea party" means

(1) A party unloading a ship containing tea at Boston

(2) The event where the ship containing tea was unloaded on the orders of Governor of Boston duly throwing the crates of tea in sea

- (3) A tea party arranged by a group of people dressed as Red Indians at Boston
- (4) A tea party arranged by the Governor of Boston in honour of Red Indians.
- Sol. 2

It was an event held just before the American war of independence, infact its not a party, historians described it since the tea chests were thrown in sea.

- 151. This was not the guiding principle of Congress of Vienna
  - (1) Restoration and legitimacy(3) Rewards and punishments
- (2) Balance of power and compensation
- (4) Principles and feelings of Nationality

Sol.

4

Principles & feelings of Nationality was not the principle it should be compensation.

152.	He entered Prussian civil service, but returned out with the remark, "deficiency in regularity and discipline"				
	(1) Napoleon	(2) Karl Marx	(3) Bismarck	(4) Louis Blanc	
Sol.	3 Bismarck was only the right option, the rest people were not form Prussia.				
153.	This was not one of the factors in the rise of Imperialism(1) Political unrest(2) Search for Raw material(3) Search for markets(4) National pride				
Sol.	1 Political uprast was n	ot the factor, it must b	a political factor		
154.	The immediate cause (1) Aggressive Nation (3) Secret alliance (4) Murder of the crow	for the First World W nalism wn prince of Austria	ar (2) Imperialism		
Sol.	4 Since the asked question is was immediate cause so it must be 4 <sup>th</sup> option, other options are other causes of world war I.				
155.	Europeans were attract (1) It is a small count (3) Majority of the po	cted to Indonesia for th ry pulation are muslims	nis reason (2) It has rich spic (4) It has a large n	e products umber of ethnic groups	
Sol.	2 Since the Europeans required spice products, they were available in plenty in Indonesia.				
		GEOGRA	РНҮ		
156.	The 'Monsoons' prov (1) The trade winds (3) The seasonal wind	ide the best example f ls	For (2) The westerlies (4) The local wind	ls	
Sol.	3 Monsoon are seasonal winds, the word monsoon is derived from Arabic which means season				
157.	The conventional symbol used in weather reports for Thunderstorm (1)				
Sol.	1 R It is correct, others are incorrect				
158.	The largest producer (1) Indonesia	of Sulphur in the Worl (2) Mexico	ld (3) Malaysia	(4) Brazil	
Sol.	2 Mexico – Sulphur, In	donesia – Rubber, Ma	laysia – Tin, Brazil	- Coffee	
159.	The primitive tribe th (1) The Semang	at is found in hot dese (2) The Pygmies	rts (3) The Sakai (4	) The Bushmen	
Sol.	4 Bushmen in Kalahari	and the rest are in equ	atorial region		

160.	The grasslands of I (1) Veldts	Eurasia are called as (2) Pampas	(3) Downs	(4) Steppes
Sol.	4 Steppes – Eurasia, Veldts – South Africa, Downs – Australia, Pampas – South America			
161.	In Indo-Gangetic p (1) Bhanger	lains, the older alluviu (2) Khadar	m of flood plain is cal (3) Terai	lled as (4) Babar
Sol.	1 Older flood plain - Newer flood plain	- Bhangar	Jerai – Marshy tra	ck.
162.	The soil that has vo (1) Alluvial soils (3) Laterite soils	ery poor fertility status	<ul><li>(2) Black cotton of</li><li>(4) Red soils</li></ul>	r regular soils
Sol.	3 The rest soils are g	ood in fertility		
163.	The multipurpose (1) Damodar valles (3) Kosi project	project that is administ y project	ered by Madhya Prade (2) Chambal proje (4) Hirakund proje	esh and Rajasthan ect ect
Sol.	2 Chambar project – Kosi – Bihar	MP, Rajasthan	Damodar – WB Hiracud - Orissa	
164.	The non-metallic r (1) Graphite	nineral among the follo (2) Chromite	owing (3) Bauxite	(4) Tungston
Sol.	1 The other options a	are metallic		
165.	This is the single la (1) Fertilisers (3) Petroleum	argest item of import	(2) Newsprint (4) Machinery equ	lipment
Sol.	3 The other options a	are small items of impo	ort	
		POLITICAL	SCIENCE	
166.	The example for th (1) Health life	e subject included in the (2) Forests	he concurrent list (3) Education	(4) Protection of
Sol.	3 The rest are added	in state list.		
167.	This was added in amendment (1) Socialist	the preamble to the con	nstitution through 42 <sup>nd</sup>	<sup>1</sup> constitutional (4) Republic
Sol.	1 The rest ideals we	re in constitution from	its force i.e. 26 Jan 19	50.

168.	The names of States and allocation of seats to each state are given below in a jumbled manner						
	State		Lok Sabha seats				
	(i) Andhra Pradesh		(a) 48				
	(ii) Bihar		(b) 39				
	(iii) Tamil Nadu		(c) $40$				
	(iv) Maharashtra	. 1	(d) 42				
	Identify the correct	match					
	(1)(111) - (b)	(2)(1V) - (C)	(3)(11) - (0)	(4)(1) - (a)			
Sol.	1 AP – 42, TN – 39, N	Maharashtra – 48, Bil	nar – 40				
169.	Among the nine signals used to regulate flow of traffic, the picture given below relates to						
	(1) Second signal	(2) First signal	(3) Fourth signal	(4) Third signal			
Sol.	4 It is used to stop the vehicles coming from front & behind (third no.)						
170.	The population of a village is between 500 to 1500. The number of members to be						
	elected to the gram (1) 5	panchayat (b) 7	(c) 9	(d) 11			
Sol.	3 As per electoral division, it is correct						
171.	<ul> <li>Rule of laws means</li> <li>(1) Law spelt out in terms of rules and regulation</li> <li>(2) Equal law related to the whole country</li> <li>(3) Law related to judiciary</li> <li>(4) Law that does not recognized any special privilege based on birth or wealth</li> </ul>						
Sol.	4 All are equal no special previlige based birth & wealth, all are equal						
172.	In India, the first ge (1) 1951	neral elections were l (2) 1952	held in this year (3) 1950	(4) 1947			
Sol.	2 Based on the UAF, in 1952 held						
173.	<ul> <li>The term 'Third World' represents</li> <li>(1) A large number of newly independent and developing nations</li> <li>(2) A large number of developed nations</li> <li>(3) A large number of socialist countries</li> <li>(4) A large number of western group of nations</li> </ul>						
Sol.	1 The other options are $1^{st} \& 2^{nd}$ world countries.						
174.	The international co (1) New York	ourt of Justice is locat (2) Paris	ed in this place (3) Hague	(4) Yugoslavia			
Sol.	3 It is located in the H	lague in Netherland					

175.	<ul> <li>This was not the reason for Indo-China war in 1962</li> <li>(1) Border dispute between two countries</li> <li>(2) Chineese regarded India as their main rival in Asia</li> <li>(3) Growing friendship between India and former Soviet Union</li> <li>(4) Growing friendship between India and U.S.A.</li> </ul>					
Sol.	4 It is not a reason at all					
		ECONOM	IICS			
176.	Micro Economics is a (1) Income theory theory	llso known as (2) Price theory	(3) Expenditure theory	(4) Savings		
Sol.	2 Micro Eco – price theory, Macro – Income theory					
177.	This is not a social and demographic indicator under Economic development(1) Literacy rate(2) Urbanisation(3) Increase in employment(4) Life expectancy					
Sol.	3 It is economic indicator					
178.	<ul><li>This is an example for direct taxation</li><li>(1) Customs - Imports</li><li>(3) Excise - Manufacturing</li></ul>		<ul><li>(2) Wealth – Profits</li><li>(4) Turn-over - Sale</li></ul>			
Sol.	2 The rest are indirect taxes					
179.	This economist terme drain" (1) Kautilya	ed continuous exploitat	tion of economic resourc (3) Dadabhai Naoroji	es as "Economic (4) D.R.Gadgil		
Sol.	4 Dadabhai – Plunder of economic wealth.					
180.	Under this system, the land belonged to a small group of family who are usually powerful in the region (1) Mahalwari (2) Rayatwari (3) Zamindari (4) Kouldari					
Sol.	1 The rest are incorrect because under Zamindari – Landlord, under Rayatwari, directly by the peasant.					