POTENTIAL & CONCEPT EDUCATIONS

Most Trusted Institute of North-East

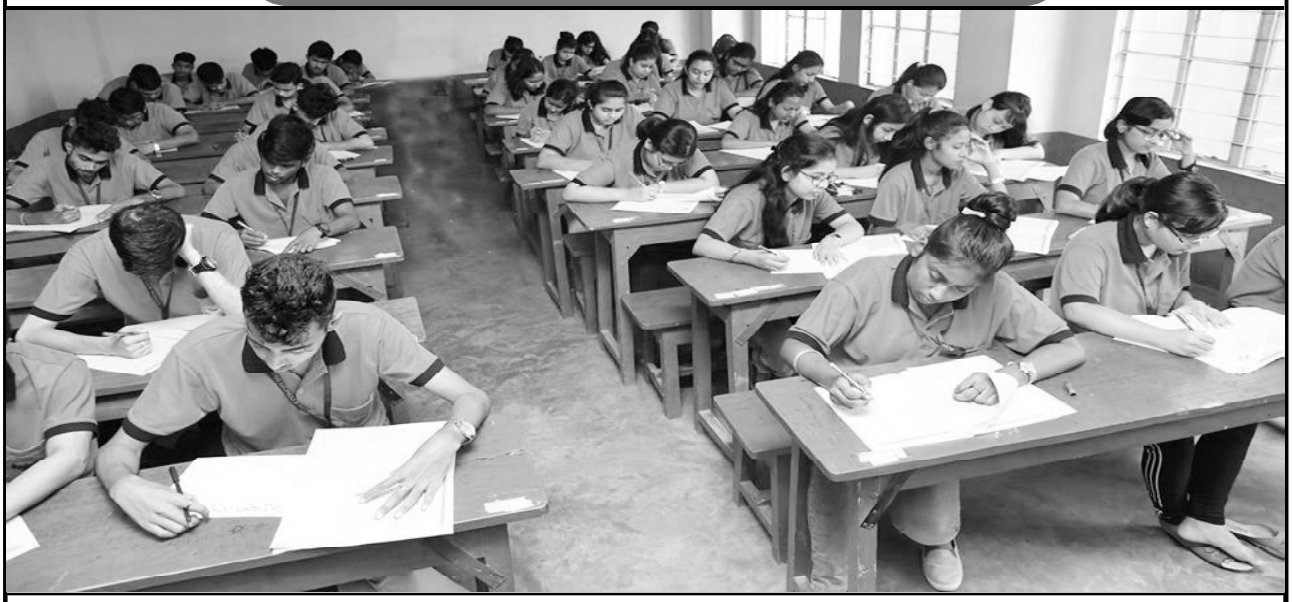
Academic Session : 2019 - 20

ANTS FULL TEST (TEST CODE) : FT # 30
(JEE-MAIN PATTERN)

Target : JEE-MAIN - 2020

Date : 23rd August, 2020 | Duration : 3 Hours | Max. Marks : 300

COURSE : Dropper, Target, DLP., ANTS



Please read the last page of this booklet for the instructions.

Potential & Concept Educations

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Note : For Answer keys and accurate Solutions please log on to www.potentialconcept.com

PHYSICS

1 A capillary tube of radius r is lowered into a liquid of surface tension T and density ρ. The angle of contact between the solid and the free surface of the liquid is $\theta = 0°$. During the process in which the liquid rises in the capillary, the work done by surface tension is

(Single option correct)

a $\frac{\pi T^2}{\rho g}$

b $\frac{4\pi T^2}{\rho g}$

c $\frac{T^2}{\rho g}$

d $\frac{2T^2}{\rho g}$

2 Assertion: The phase difference between any two points on a wave front is zero.

Reason: Light from the source reaches every point of the wave front at the same time. (Single option correct)

a If both Assertion and Reason are true and the Reason is correct explanation of the Assertion.

b If both Assertion and Reason are true but Reason is not explanation of the Assertion.

c If Assertion is true but the Reason is false.

d If Assertion is false but Reason is true.

3 An inverted bell, lying at the bottom of lake 47.6 m deep, has 50 cm^3 of air trapped in it. The bell is brought to the surface of lake. The volume of the trapped air will become (atmospheric pressure = 70 cm of Hg and density of Hg $= 13.6$g/cm^3) (Single option correct)

a 350 cm^3

b 300 cm^3

c 250 cm^3

d 22 cm^3

4 A radioactive sample S_1 having the activity A_1 has twice the number of nuclei as another sample S_2 of activity A_2. If $A_2 = 2A_1$, then the ratio of half-life of S_1 to the half-life of S_2 is (Single option correct)

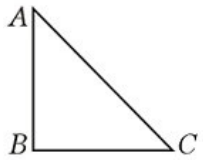
a 4

b 2

c 0.25

d 0.75

5 Three rods of identical cross-sectional area and made from the same metal form the sides of an isosceles triangle ABC right angled at B. The points A and B are maintained at temperatures T and $\sqrt{2}T$, respectively, in the steady-state. Assuming that only heat conduction takes place, the temperature of the point C is



(Single option correct)

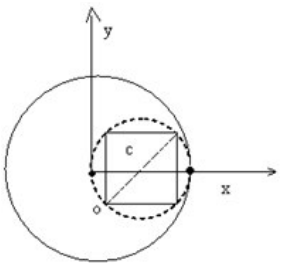
a $\frac{3T}{\sqrt{2}+1}$

b $\frac{T}{\sqrt{2}+1}$

c $\frac{T}{3\left(\sqrt{2}-1\right)}$

d $\frac{T}{\sqrt{2}-1}$

6 There is a thin uniform disc of radius $\mathbf{R}$ and mass per unit area $\boldsymbol{\sigma}$, in which a hole of radius $\mathbf{R/2}$ has been cut out as shown in the figure. Inside the hole, a square plate of same mass per unit area $\boldsymbol{\sigma}$ is inserted so that its corners touch the periphery of the hole. The distance of the centre of mass of the system from the origin is



(Single option correct)

a $\frac{R(2-\pi)}{2(3\pi+2)}$

b $\frac{R(1-\pi)}{2(2\pi+1)}$

c $\frac{2R\pi}{2(3\pi+2)}$

d $\frac{3R\pi}{2(2\pi+1)}$

7 Two cars $\mathbf{P}$ and $\mathbf{Q}$ start from a point at the same time in a straight line and their positions are represented by $X_P(t) = at + bt^2$ and $X_Q(t) = ft - t^2$. At what time do the cars have the same velocity? (Single option correct)

a $\frac{a-f}{1+b}$

b $\frac{a+f}{2(b-1)}$

c $\frac{a+f}{2(1+b)}$

d $\frac{f-a}{2(1+b)}$

8 Rain falls with velocity $7\hat{i} - 10\hat{j}$ where x-axis is horizontal and y-axis is vertical. With what velocity should a man run so that he sees rain falling vertically.

(Single option correct)

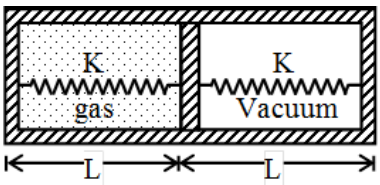
a $10\hat{i}$

b $7\hat{i}$

c $-10\,\hat{i}$

d $-7\,\hat{i}$

9 Area of piston is 1 m^2. When heat is supplied to the gas it expands and displaces piston by $\frac{L}{2}$ where L = 1 m. Natural length of springs is L = 1m. Spring constant K = 100 N/m. The pressure of gas in final situation is – (considering equilibrium)



(Single option correct)

a 50 N/m^2

b 100 N/m^2

c 200 N/m^2

d 400 N/m^2

10 The primary winding of a transformer has 100 turns and its secondary winding has 200 turns. The primary is connected to an AC supply of 120 V and the current flowing in it is 10 A. The voltage and the current in the secondary are (Single option correct)

a 240 V, 5 A

b 240 V, 10 A

c 60 V, 20 A

d 120 V, 20 A

11 A ball is dropped from the top of a building. The ball takes 0.5 s to fall past the 3 m length of a window some distance from the top of the building. If the speed of the ball at the top and at the bottom of the window are v_T and v_B respectively, then (take g = 10 m/s^2) : (Single option correct)

a $v_T + v_B = 12 \text{ms}^{-1}$

b $v_T v_B = 1 \text{ms}^{-1}$

c $\frac{v_B}{v_T} = 1 \text{ms}^{-1}$

d $v_T - v_B = 4.9 \text{m s}^{-1}$

12 A deflection magnetometer is adjusted in the usual way. When a magnet is introduced, the deflection observed is θ, and the period of oscillation of the needle in the magnetometer is T. When the magnet is removed, the period of oscillation is T_0. The relation between T and T_0 is (Single option correct)

a $T^2 = T_0^2 \cos \theta$

b $T = T_0 \cos \theta$

c $T = \frac{T_0}{\cos \theta}$

d $T^2 = \frac{T_0^2}{\cos \theta}$

13 How many different wavelengths may be observed in the spectrum from a hydrogen sample if the atoms are excited to states with principal quantum number n ? (Single option correct)

a $\frac{n(n-1)}{2}$

b $\frac{n(n+1)}{2}$

c $\frac{n(n+2)}{2}$

d $\frac{n(n-2)}{2}$

14 Two gold pieces, each of mass 0.035 g, are placed in a box of mass 2.3 g. The total mass of the box with gold pieces is (Single option correct)

a 2.3 g

b 2.4 g

c 2.37 g

d 2.370 g

15 An electron having kinetic energy 10 eV is circulating in a path of radius 0.1 m in an external magnetic field of intensity 10^{-4} T. The speed of the electron will be (Single option correct)

a $1.76 \times (10^6)$ ms^{-1}

b $4.8 \times (10^6)$ ms^{-1}

c $2.0 \times (10^{12})$ ms^{-1}

d $4.8 \times (10^{12})$ ms^{-1}

16 A screen is placed 90 cm from an object. The image of an object on the screen is formed by a convex lens at two different locations separated by 20 cm . The focal length of the lens is (Single option correct)

a 18 cm

b 21.4 cm

c 60 cm

d 85.6 cm

17 The magnitude of the X and Y components of $\vec{A}$ are 7 and 6. Also the magnitudes of X and Y components of $\vec{A} + \vec{B}$ are 11 and 9 respectively. What is the magnitude of $\vec{B}$? (Single option correct)

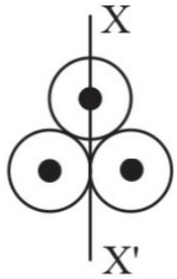
a 5

b 6

c 8

d 9

18 Three identical spherical shells, each of mass m and radius r are placed as shown in the figure. Consider an axis XX' which is touching the two shells and passing through diameter of the third shell. Moment of inertia of the system consisting of these three spherical shells about XX' axis is:



(Single option correct)

a $\frac{11}{5}mr^2$

b $3\,mr^2$

c $\frac{16}{5}mr^2$

d $4\,mr^2$

19 A pendulum has angular amplitude θ. Tension in the string at extreme position is T_1 and at bottom is T_2.

If $T_2 = 2T_1$, then θ is equal to (Single option correct)

a $\cos^{-1}\left(\frac{1}{3}\right)$

b $\cos^{-1}\left(\frac{2}{3}\right)$

c $\cos^{-1}\left(\frac{3}{4}\right)$

d $60°$

20 A shunt of resistance $\left(\frac{1}{m}\right)^{th}$ of the resistance of the galvanometer is used to convert it into an ammeter. The range of the ammeter becomes. (Single option correct)

a m times

b $(m+1)$ times

c $(m-1)$ times

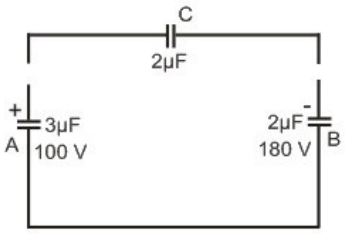
d m^2 times

21 A bullet of mass M is fired with a velocity 50 m/s at an angle θ with the horizontal. At the highest point of its trajectory, it collides head-on with a bob of mass 3M suspended by a massless string of length 10/3 m and gets embedded in the bob. After the collision the string moves through an angle of 120°. Find the angle θ.
(Take g = 10 m/s^2) (Subjective Numerical)

22 The equations of three waves are given by $y_1 = A_0 \sin(kx - \omega t)$, $y_2 = 3\sqrt{2}A_0 \sin(kx - \omega t + \phi)$ and $y_3 = 4A_0 \cos(kx - \omega t)$. Theses waves are in the same direction and are superimposed. The phase difference between the resultant-wave and the first wave is $\frac{\pi}{4}$ and $\phi = \frac{\pi}{n} \leq \frac{\pi}{2}$, then what is the value of n? (Subjective Numerical)

23 A particle of mass m is subjected to an attractive central force of magnitude $6\left(1\text{Fe}, 1\text{W} \text{ and } 4\text{O}\right)\frac{k}{r^2}$, k being a constant. If at instant when the particle is at an extreme position in its closed orbit, at a distance 'a' from the centre of force, its speed is $\sqrt{\left(\frac{k}{2ma}\right)}$, if the distance of other extreme position is b. The ratio of a/b is (Subjective Numerical)

24 Two capacitors A and B with capacities 3μF and 2μF are charged to a potential difference of 100 V and 180 V respectively. The plates of the capacitors are connected as shown in the figure with one wire of each capacitor free. The upper plate of A is positive and that of B is negative. An uncharged 2μF capacitor C with lead wires falls on the free ends to complete the circuit. Calculate the amount of electrostatic energy stored in the system after completion of the circuit.

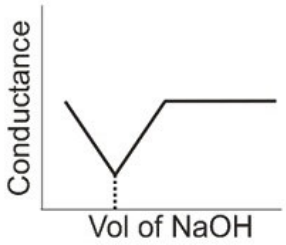


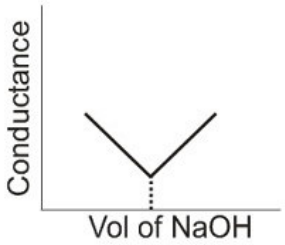
(Subjective Numerical)

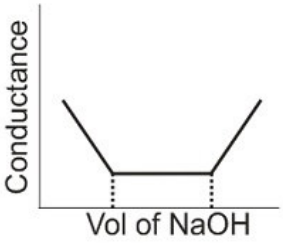
25 An uncalibrated spring balance is found to have a period of oscillation of 0.314 s, when a 1 kg weight is suspended from it, how much does the spring elongate (in cm), in when a 1 kg weight is suspended from it ? Take $\pi = 3.14$
(Subjective Numerical)

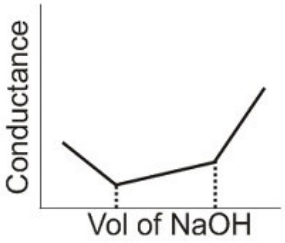
CHEMISTRY

1 Conductometric titration curve of an equimolar mixture of a HCl and HCN with NaOH(aq) is : (Single option correct)

a 

b 

c 

d 

2 Which of the following carbides produces propyne on reaction with water ? (Single option correct)

a CaC_2

b Be_2C

c Al_4C_3

d Mg_2C_3

3 An organic compound contains 49.3% carbon, 6.84% hydrogen and its vapour density is 73. What is the molecular formula of the compound ? (Single option correct)

a $C_4H_6O_2$

b $C_1H_5O_2$

c $C_6H_{10}O_4$

d $C_6H_5O_2$

4 The temperature, at which a gas shows maximum ideal behaviour, is known as (Single option correct)

a Boyle's temperature

b Inversion temperature

c Critical temperature

d Absolute temperature

5 Only Iodine forms Hepta-fluoride IF_7, but Chlorine and Bromine give Penta-fluorides. The reason for this is : (Single option correct)

a Low electron affinity of Iodine

b Unusual pentagonal bipyramidal structure of IF_7

c That the larger Iodine atom can accommodate more number of smaller Fluorine atom around it

d Low chemical reactivity of IF_7

6 The following data were obtained from the first order decomposition of $2\,A\,(g) \rightarrow B\,(g) + C(S)$ at a constant volume and at a particular temperature

S No.	Time	Total pressure in Pascal
1	At the end of 10 min	300
2	After completion	200

The rate constant in min^{-1} is (Single option correct)

a 0.0693

b 69.3

c 6.93

d 6.93×10^{-4}

7 Knowing that the chemistry of lanthanoids (Ln) is dominated by its +3 oxidation state, Which of the following statements is incorrect ? (Single option correct)

a Because of the large size of the Ln(III) ions the bonding in its compounds is predominantly ionic in character.

b The ionic sizes of Ln (III) decrease in general with increasing atomic number.

c Ln(III) compounds are generally colourless.

d Ln(III) hydroxides are mainly basic in character.

8 s-electrons of the valence shell of some elements show reluctance in bond formation. Such elements are ..... and belong to ..... ; (Single option correct)

a Lighter, s-block

b Heavier, d-block

c Heavier, f-block

d Heavier, p-block

9 A new Iron containing compound can have either of the two possible formulae $K_3\left[Fe\left(C_2O_4\right)_3\right]$ or $K_2\left[Fe\left(C_2O_4\right)_2 \cdot \left(H_2O\right)_2\right]$. A 1.356 g of compound in acid is dissolved which converts oxalate to oxalic acid the solution required 34.5 mL of 0.108M $KMnO_4$ to reach point of equivalence. Which is correct formula of compound. Report its molar mass (Single option correct)

a 437

b 496

c 232

d 456

10 Which among the following statements is false ? (Single option correct)

a The correct order of osmotic pressure for 0.01 M aqueous solution of each compound is $BaCl_2 > KCl > CH_3COOH >$ Sucrose .

b The osmotic pressure(π) of a solution is given by the equation $(\pi = M\,R\,T$,where M is the molarity of the solution).

c Raoult's law states that the vapour pressure of a component over a solution is proportional to it's mole fraction.

d Two sucrose solutions of the same molality prepared in different solvents will have the same freezing point depression.

11 $_{90}Th^{228}$ emits four alpha and one beta particle. Number of neutrons in daughter element is (Single option correct)

a 129

b 190

c 232

d 138

12 What volume of $1.00\ mol\ L^{-1}$ aqueous sodium hydroxide is neutralized by $200\ mL$ of $2.00\ mol\ L^{-1}$ aqueous hydrochloric acid? Find the mass of sodium chloride produced. The Neutralization reaction is $NaOH\,(aq.) + HCl\,(aq.) \rightarrow NaCl(aq.) + H_2O(l)$. (Single option correct)

a 63.4 g

b 23.4 g

c 13.4 g

d 43.4 g

13 2-Methylpent-2-ene on reductive ozonlysis will give (Single option correct)

a Propanal only

b Propanal and ethanal

c Propanone & propanal

d Propan-2-ol and ethanal

14 Which one of the following constitutes a group of the isoelectronic species? (Single option correct)

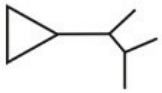
a C_2^{2-}, O_2^-, CO. NO

b CN^-, N_2, O_2^{2-}, C_2^{2-}

c NO^+, C_2^{2-}, CN^-, N_2

d N_2, O_2^-, NO^+, CO

15 The correct IUPAC name of the following compounds is



(Single option correct)

a 1,2-dimethylpropylcyclopropane

b 2-cyclopropyl-3-methylbutane

c 2-methyl-3-cyclopropylbutane

d isopentylcyclopropane

16 Which one of the following is manufactured by the electrolysis of fused sodium chloride (Single option correct)

a $NaOH$

b $NaClO$

c Na

d $NaClO_3$

17 The solubility product of $AgCl$ is 1.8×10^{-10}. Precipitation of $AgCl$ will occur only when equal volumes of which of the following solutions are mixed? (Single option correct)

a 10^{-4} M Ag^+ and 10^{-4} M Cl^-

b 10^{-7} M Ag^+ and 10^{-7} M Cl^-

c 10^{-5} M Ag^+ and 10^{-5} M Cl^-

d 10^{-10} M Ag^+ and 10^{-10} M Cl^-

18 A body centred cubic lattice is made up of hollow sphere of B. Sphere of solid A are present in hollow sphere of B. Radius of A is half of the radius of B. What is the ratio of total volume of sphere B unoccupied by A in unit cell and volume of unit cell? (Single option correct)

a $\frac{29\pi\sqrt{3}}{64}$

b $\frac{7\pi\sqrt{3}}{64}$

c $\frac{19\pi\sqrt{3}}{64}$

d $\frac{2\pi\sqrt{3}}{64}$

19 For an ideal gas $\frac{C_{p,m}}{C_{v,m}} = \gamma$. The molecular mass of the gas is M, its specific heat capacity at constant volume is : (Single option correct)

a $\frac{R}{M(\gamma-1)}$

b $\frac{M}{R(\gamma-1)}$

c $\frac{\gamma RM}{\gamma-1}$

d $\frac{\gamma R}{M(\gamma-1)}$

20 A sample of pure PCl_5 was introduced into an evacuated vessel at 473 K. After equilibrium was attained, concentration of PCl_5 was found to be 0.05 mol L^{-1}. If value of Kc is 8.3×10^{-3}, what are the concentration of PCl_3 and Cl_2 at equilibrium?

$PCl_5\,(g) \rightleftharpoons PCl_3\,(g) + Cl_2\,(g)$ (Single option correct)

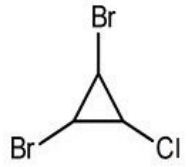
a 2.04×10^{-2} mol L^{-1}

b 1.06×10^{-1} mol L^{-2}

c 3.25×10^{-2} mol L^{-3}

d 4.12×10^{-3} mol L^{-1}

21 Number of stereoisomers possible for the following compound is



(Subjective Numerical)

22 In how many of the following reactions, one of the products obtained is a yellow coloured precipitate?

(i) $Pb^{2+} + KI \longrightarrow$

(ii) $Pb^{2+} + H_2SO_4 \longrightarrow$

(iii) $Al^{3+} + NaOH \longrightarrow$

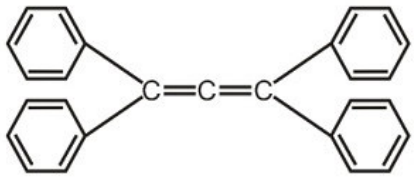
(iv) $Mg^{2+} + Na_2HPO_4 \longrightarrow$

(v) $Pb^{2+} + K_2CrO_4 \longrightarrow$

(vi) $I^- + AgNO_3 \longrightarrow$

(vii) $SO_4^{2-} + BaCl_2 \longrightarrow$ (Subjective Numerical)

23 How many 2^o carbon in the following ?



(Subjective Numerical)

24 The dipole moment of HBr is 1.6×10^{-30} Coloumb-metre and inter-atomic spacing is 1 $\mathring{A}$. The % ionic character of HBr is (Subjective Numerical)

25 How many complexes among the following are paramagnetic

$[Mn(CN)_6]^{3-}$ $[Cr(H_2O)_6]^{3+}$ $[Co(en)_3]^{3+}$

$[V(CO)_6]$, $[Ni(NH_3)_6]^{2+}$ $[Ni(dmg)_2]$

$[Pt(Cl)_2(NH_3)_2]$ $[Cu(NH_3)_4]^{2+}$ $[Cu(CN)_4]^{3-}$ (Subjective Numerical)

MATHEMATICS

1 If the cube roots of unity are $1, w, w^2$, then the roots of the equation $(x-1)^3+8=0$ are (Single option correct)

a $-1,\ 1+2w,\ 1+2w^2$

b $-1,\ 1-2w,\ 1-2w^2$

c $-1,-1,-1$

d $1,\ w, w^2$

2 $\frac{d}{dx}\left\{\begin{matrix}\tan^{-1}\left(\frac{2x}{1-x^2}\right)+\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)\\ -\tan^{-1}\left(\frac{4x-4x^3}{1-6x^2+x^4}\right)\end{matrix}\right\}$ is equal to $\left\{|x|<\sqrt{2}-1\right\}$ (Single option correct)

a $\frac{1}{\sqrt{1-x^2}}$

b $-\frac{1}{\sqrt{1-x^2}}$

c $\frac{1}{1+x^2}$

d $-\frac{1}{1+x^2}$

3 If $\tan\alpha=\left(1+2^{-x}\right)^{-1}, \tan\beta=\left(1+2^{x+1}\right)^{-1}$, then $(\alpha+\beta)$ can be equal to (Single option correct)

a $\frac{\pi}{6}$

b $\frac{\pi}{4}$

c $\frac{\pi}{3}$

d $\frac{\pi}{2}$

4 If $\tan^{-1}x+\tan^{-1}y=\frac{\pi}{4}$, then (Single option correct)

a $x+y+xy=1$

b $x+y-xy=1$

c $x+y+xy+1=0$

d $x+y-xy+1=0$

5 Let two numbers have an arithmetic mean 9 and geometric mean 4, then these numbers are the roots of the quadratic equation (Single option correct)

a $x^2+18x-16=0$

b $x^2-18x+16=0$

c $x^2+18x+16=0$

d $x^2-18x-16=0$

6 $\lim\limits_{x\to 0}\frac{\cos 2x-1}{\cos x-1}$ = (Single option correct)

a 2

b 4

c 6

d 8

7 Area bounded by the curves $y=\log_e x$ and $y=\left(\log_e x\right)^2$ is (Single option correct)

a $(e-2)$ sq. units

b $(3-e)$ sq. units

c e sq. units

d $(e-1)$ sq. units

8 The solution of the differential equation $\frac{dy}{dx}+\frac{2x}{1+x^2}.y=\frac{1}{(1+x^2)^2}$ is (Single option correct)

a $y\left(1-x^2\right)=\tan^{-1}x+c$

b $y\left(1+x^2\right)=\tan^{-1}x+c$

c $y\left(1+x^2\right)^2=\tan^{-1}x+c$

d $y\left(1-x^2\right)^2=\tan^{-1}x+c$

9 Let AB be a given chord of the circle $x^2 + y^2 = r^2$ subtending a right angle at the centre. Then, the locus of the centroid of the ΔPAB as P moves on the circle is (Single option correct)

a A parabola

b A circle

c An ellipse

d A pair of straight lines

10 If A, B, C are the angles of a triangle and $\begin{vmatrix} 1 & 1 & 1 \\ 1+\sin A & 1+\sin B & 1+\sin C \\ \sin A+\sin^2 A & \sin B+\sin^2 B & \sin C+\sin^2 C \end{vmatrix} = 0$, then which of the following is never true for triangle ABC? (Single option correct)

a right angled isosceles

b isosceles

c equilateral

d scalene

11 The acute angle of intersection between the curves $y = \sin x$ and $y = \cos x$ is (Single option correct)

a $\tan^{-1}\left(2\sqrt{2}\right)$

b $\tan^{-1}\left(3\sqrt{2}\right)$

c $\tan^{-1}\left(3\sqrt{3}\right)$

d $\tan^{-1}\left(5\sqrt{2}\right)$

12 Let x, y and z be the respective sum of the first n terms, the next n terms and the next n terms of a geometric progression, then x, y, z are in (Single option correct)

a arithmetic progression

b geometric progression

c harmonic progression

d None of these

13 If ${}^{18}C_{15} + 2\left({}^{18}C_{16}\right) + {}^{17}C_{16} + 1 = {}^{n}C_3$, then n is equal to (Single option correct)

a 19

b 20

c 18

d 24

14 Through a point A on the x - axis a straight line is drawn parallel to y - axis so as to meet the pair of straight lines $ax^2 + 2hxy + by^2 = 0$ in B and C. If AB = BC then : (Single option correct)

a $h^2 = 4ab$

b $8h^2 = 9ab$

c $9h^2 = 8ab$

d $4h^2 = ab$

15 The greatest integer which divides the number $101^{100} - 1$ is (Single option correct)

a 100

b 1000

c 10000

d 100000

16 In an steamer there are stalls for 12 animals and there are horses, cows and calves (not less then 12 each) ready to be shipped. The number of ways, the ship load can be made is ... (Single option correct)

a $3^{12} - 1$

b 3^{12}

c $(12)^3 - 1$

d $(12)^3$

17 The domain of the function

$f(x) = \frac{\sin^{-1}(x-3)}{\sqrt{9-x^2}}$ is

(Single option correct)

a [2, 3]

b [2, 3)

c [1, 2]

d [1, 2)

18 Let $I = \int_0^1 \frac{\sin x}{\sqrt{x}}\,dx$ and $J = \int_0^1 \frac{\cos x}{\sqrt{x}}\,dx$. Then, which one of the following is true?

(Single option correct)

a $I > \frac{2}{3}$ and $J < 2$

b $I > \frac{2}{3}$ and $J > 2$

c $I < \frac{2}{3}$ and $J < 2$

d $I < \frac{2}{3}$ and $J > 2$

19 From a 60 meter high tower angles of depression of the top and bottom of a house are α and β respectively. If the height of the house is $\frac{60\sin(\beta-\alpha)}{x}$, then $x =$ (Single option correct)

a $\sin\alpha \sin\beta$

b $\cos\alpha \cos\beta$

c $\sin\alpha \cos\beta$

d $\cos\alpha \sin\beta$

20 Out of $3n$ consecutive natural numbers, 3 natural numbers are chosen at random without replacement. The probability that the sum of the chosen numbers is divisible by 3, is (Single option correct)

a $\frac{n(3n^2-3n+2)}{2}$

b $\frac{(3n^2-3n+2)}{2(3n-1)(3n-2)}$

c $\frac{(3n^2-3n+2)}{(3n-1)(3n-2)}$

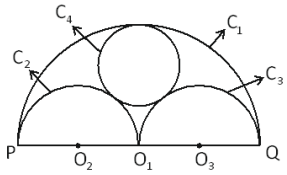
d $\frac{n(3n-1)(3n-2)}{3(n-1)}$

21 The area (in sq. units) bounded by the curve $y = \max.\ (x^3, x^4)$ and the x-axis from $x = 0$ to $x = 1$ is (Subjective Numerical)

22 If the value of $(1+\tan 1^o)(1+\tan 2^o)(1+\tan 3^o)\ldots\ldots\ldots(1+\tan 44^o)(1+\tan 45^o)$ is $2^\lambda, \lambda \in N$ then sum of digits of number λ is (Subjective Numerical)

23 Let $f(x) = \frac{9x}{25} + c, c > 0$. If the curve $y = f^{-1}(x)$ passes through $\left(\frac{1}{4}, -\frac{5}{9}\right)$ and $g(x)$ is the antiderivative of $f^{-1}(x)$ such that $g(0) = \frac{5}{2}$, then the value of $[g(1)]$ is, (where $[.]$ represents the greatest integer function) (Subjective Numerical)

24 In the figure PQ, PO_1 and O_1Q are the diameters of semicircles C_1, C_2 and C_3 with centres at O_1, O_2 and O_3 respectively and the circle C_4 touches the semicircles C_1, C_2 and C_3. If $PQ = 24$ units and the area of the circle C_4 is A sq. units, then the value of $\frac{8\pi}{A}$ is equal to (here, $PO_1 = O_1Q$)



(Subjective Numerical)

25 Let f, g and h are differentiable functions. If $f(0) = 1$; $g(0) = 2$; $h(0) = 3$ and the derivatives of their pair wise products at $x = 0$ are $(fg)'(0) = 6$; $(gh)'(0) = 4$ and $(hf)'(0) = 5$, then the value of $(fgh)'(0)$ is (Subjective Numerical)

Date : 23 - 08 - 2020	ANTS FULL TEST (TEST CODE) : FT # 30 (JEE MAIN PATTERN) Target : JEE Main - 2020	

IMPORTANT INSTRUCTIONS

1. Immediately fill the particulars on this page of the Test Booklet with Blue/Black Point Pen. Use of Pencil is strictly prohibited.
2. When you are directed, fill in the particulars of the Answer Sheet carefully.
3. The test is 3 hours duration.
4. The Test Booklet consists of **75** questions. The maximum marks are **300**.
5. There are **3** parts in the question paper **Physics**, **Chemistry** and **Mathematics** having **25** questions each.
6. In each of the above three parts 20 questions will be MCQs and 5 questions will have answer to be filled as numerical value.
7. **Marking Scheme**

(i)	Marking Scheme for MCQs -	Correct Answer	Four Mark (+4)
		Incorrect Answer	Minus one Mark (–1)
		Unanswered/Marked for Review	No mark (0)
(ii)	Marking Scheme for questions for which answer is numerical value		
		Correct Answer	Four Mark (+4)
		Incorrect Answer	No mark 0)
		Unanswered/Marked for Review	No mark (0)

Filling the ORS (Optical Response Sheet) :

Use only Black ball point pen only for filling the ORS. Do not use Gel/Ink pen as it might smudge the ORS.

8. Write your Roll no. in the books given. Also darken the corresponding bubbles with Black ball point pen only. Also fill your roll no in the space provided.
9. **Fill your Paper Code as mentioned on the Test Paper.**
10. If student does not fill his/her roll no. and paper code correctly and properly, then his/her marks will not be displayed and 5 marks will be deducted (paper wise) from the total.
11. Since it is not possible to erase and correct pen filled bubble, you are advised to be extremely careful while darkening the bubble corresponding to your answer.
12. Neither try to erase/rub/scratch the option nor make the Cross(X) mark on the option once filled. Do not scribble, smudge, cut, tear, or wrinkle the ORS. Do not put any stray marks or whitener anywhere on the ORS.
13. If there is any discrepancy between the written data and the bubbled data in your ORS the bubbled data will be taken as final.

Name of the candidate

Roll Number :

I have read all the instructions and shall abide by them ..... Signature of the Candidate	I have read all the instructions and shall abide by them ..... Signature of the Candidate