SAMPLE PAPER

Aakash
NATIONAL
TALENT HUNT EXAM

ANTHE
2019

Class XI Studying Students for Engineering

Aakash
Medical | IIT-JEE | Foundations
(Divisions of Aakash Educational Services Limited)

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Aakash National Talent Hunt Exam 2019

(For XI Studying - Engineering)

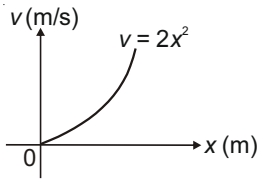
(The questions given in sample paper are indicative of the level and pattern of questions that will be asked in ANTHE-2019)

SECTION-A : PHYSICS

1. A particle has initial velocity, $\vec{v} = (9\hat{i} - 6\hat{j})$ m/s and a constant force $\vec{F} = (2\hat{i} + 3\hat{j})$ N acts on the particle. The path of particle will be
   (1) Straight line
   (2) Parabolic
   (3) Circular
   (4) Elliptical

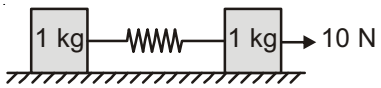
2. A position dependent force, $F = (7 - 2x + 3x^2)$ N acts on a small body of mass 2 kg and displaces it from $x = 0$ to $x = 5$ m. The work done (in joule) is
   (1) 70 (2) 270
   (3) 35 (4) 135

3. The velocity-position graph of a particle moving in a straight line along x-axis is given below. Acceleration of particle at $x = 2$ m is



   (1) 8 m/s^2 (2) 16 m/s^2
   (3) 64 m/s^2 (4) 32 m/s^2

4. A force of 10 N is applied on the right block of a system of two blocks of 1 kg mass each, on a rough horizontal plane. Coefficient of friction is $\mu = 0.2$ for both blocks. The spring is initially in relaxed state. Acceleration of centre of mass at initial instant will be ($g = 10$ m/s^2)



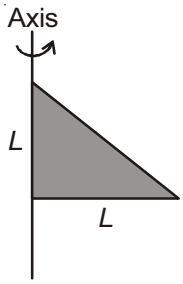
   (1) 5 m/s^2 (2) 4 m/s^2
   (3) 3 m/s^2 (4) 2 m/s^2

5. Particles A and B of masses m_1 and m_2 are moving under mutual force only. $\vec{F}$ on A is applied by B and $(-\vec{F})$ on B is applied by A. Acceleration of A relative to B is given by
   (1) $\dfrac{\vec{F}}{\dfrac{m_1 m_2}{(m_1 + m_2)}}$
   (2) $\dfrac{-\vec{F}}{\left(\dfrac{m_1 m_2}{m_1 + m_2}\right)}$
   (3) $\dfrac{2\vec{F}}{m_1 m_2}(m_1 + m_2)$
   (4) $\dfrac{-2\vec{F}}{m_1 m_2}(m_1 + m_2)$

6. A ball-A suffers an oblique perfectly elastic collision with a ball-B which is at rest initially. If their masses are same, then after the collision
   (1) They will move in opposite direction
   (2) Ball-A continues to move in original direction
   (3) Ball-A comes to rest
   (4) They will move in mutually perpendicular directions

Space for Rough Work

7. The moment of inertia of a uniform triangular plate of mass M about the axis shown in the figure is



(1) $\frac{ML^2}{3}$ (2) $\frac{ML^2}{6}$

(3) $\frac{ML^2}{12}$ (4) $\frac{2ML^2}{3}$

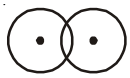
8. A rigid body is rolling without slipping on a horizontal surface. If the translational kinetic energy is twice of rotational kinetic energy then the rigid body may be

(1) Disk (2) Ring

(3) Solid sphere (4) Hollow sphere

SECTION-B : CHEMISTRY

9. Which of following is not the correct representation of sigma bond?

(1) 

(2) 

(3) 

(4) 

10. The threshold energy of a metal is 10 eV. Identify the incorrect option. (E = energy of one photon)

(1) If E = 12 eV, photoelectric effect occurs

(2) If E = 15 eV, kinetic energy of electron is more than option (1)

(3) If intensity of photon increase but energy remain same, then kinetic energy of photoelectron remain same

(4) If intensity of photon increase but energy remain same, then kinetic energy of photoelectron increase

11. A sample of H_2SO_4 is 80% by mass and shows density of 1.78 g/ml. What is the molarity of acid?

(1) 17.8 M (2) 1.45 M

(3) 15.6 M (4) 14.5 M

12. In which of the following transition, emitted frequency of photon is minimum in H atom?

(1) 4^{th} orbit to 3^{rd} orbit

(2) 5^{th} orbit to 4^{th} orbit

(3) 3^{rd} orbit to 2^{nd} orbit

(4) 3^{rd} orbit to 1^{st} orbit

13. The molecules in which central atom is sp^3 hybridised and molecule is non-polar, are

(i) CF_3H (ii) CH_3F

(iii) CF_4 (iv) NH_3

(v) PCl_3 (vi) CH_4

(1) (i), (ii) and (vi) only

(2) (iii) and (vi) only

(3) (ii), (v) and (vi) only

(4) (i) and (vi) only

14. Calculate the volume required of 63% (by mass) solution of HNO_3 in water to react completely with 100 ml 5 molar solution of NaOH. (Given density of HNO_3 solution is 1.5 g/cm^3)

(1) 50 ml

(2) 40 ml

(3) 23.34 ml

(4) 33.34 ml

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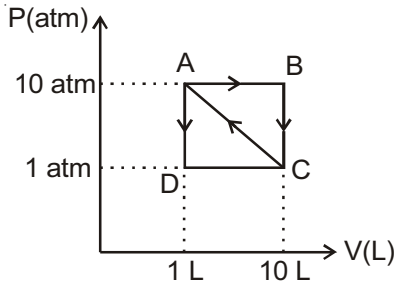
15. 1 mol of monoatomic gas undergo the following processes



For which path ΔS is positive?

(1) A to B

(2) B to C

(3) C to A

(4) A to D

16. The alkali metal in aqueous medium having highest reducing property is

(1) Li (2) K

(3) Na (4) Cs

SECTION-C : MATHEMATICS

17. The number of possible arrangements of the letters of word, 'NINETEEN' in which no two E's are together is

(1) $\frac{8!}{3!3!}$ (2) $\frac{5!}{3! \times {}^6C_2}$

(3) $\frac{5!}{3!} \times {}^6C_3$ (4) $\frac{8!}{5!} \times {}^6C_3$

18. The smallest value of $|z|^2 + |z-3|^2 + |z-6i|^2$ where $z \in C$ occurs for z equal to

(1) Zero (2) $1 + 2i$

(3) $1 + 3i$ (4) $1 + 6i$

19. Coefficient of x^{11} in $(1 + x)^{10} + (1 + x)^{11} + \ldots\ldots + (1 + x)^{25}$ is

(1) ${}^{26}C_{10}$ (2) ${}^{25}C_{11}$

(3) ${}^{26}C_{10} - {}^{11}C_{10}$ (4) ${}^{26}C_{12}$

20. Number of solution(s) of the equation $e^x.|\ln(|x| - 1)| = 1$ is

(1) 1 (2) 2

(3) 3 (4) Zero

21. If $[\sin x] + [\sqrt{2}\cos x] = -3$ then the range of the function $f(x) = \cos x$ is (where $[\cdot]$ denotes the greatest integer function)

(1) $[-1, 1]$ (2) $\left(-1, -\frac{1}{2}\right)$

(3) $\left(-\frac{1}{\sqrt{2}}, 0\right)$ (4) $\left(-1, -\frac{1}{\sqrt{2}}\right)$

22. Let α and β be the zeros of $f(x) = ax^2 + bx + c$, $a \neq 0$ and $\Delta = b^2 - 4ac$. If $\alpha + \beta$, $\alpha^2 + \beta^2$ and $\alpha^3 + \beta^3$ are in G.P., then

(1) $\Delta \neq 0$ (2) $b.\Delta = 0$

(3) $c \cdot \Delta = 0$ (4) $bc \neq 0$

23. If $\prod_{k=1}^{22} \cos(4k^\circ) = 2^{-n}$, then the value of n is

(1) 11 (2) 22

(3) 44 (4) Zero

24. The A.M. of a set of 50 numbers is 38. If two numbers of set, namely 55 and 45 are discarded, then A.M. of remaining set of numbers is

(1) 38.5 (2) 37.5

(3) 36.5 (4) 36

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Note : Answer key of Sample Paper is available at www.aakash.ac.in & www.anthe.in

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188 in NTSE
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157 Classroom + 31 Distance

576 in NSEs
2018
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481 in IMO
Level-I 2018-19
466 Classroom + 15 Distance

791 in NSO
Level-I 2018-19
776 Classroom + 15 Distance

585 in KVPY
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457 Classroom + 128 Distance

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ANSWERS

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1.	(2)	7.	(2)	13.	(2)	19.	(4)
2.	(4)	8.	(1)	14.	(4)	20.	(3)
3.	(3)	9.	(4)	15.	(1)	21.	(4)
4.	(2)	10.	(4)	16.	(1)	22.	(3)
5.	(1)	11.	(4)	17.	(3)	23.	(2)
6.	(4)	12.	(2)	18.	(2)	24.	(2)