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ISAT

iQuest Scholarship Cum Admission Test

FOR MOVING TO CLASS 12TH (EXCEL)
SAMPLE TEST (NM)

Time: 1.5 Hrs | **Max Marks : 120**

SYLLABUS & SCHEME		
SUBJECTS	**Qs.**	**SYLLABUS**
PHYSICS	**10**	Class 11 syllabus till Gravitation
CHEMISTRY	**10**	Atomic, Periodic, Chemical Bonding, Redox, State of Matter Chemical and Ionic Equilibrium, Thermodynamics, Mole Concept
MATHEMATICS	**10**	Quadratic Equations, Sequence and Series, Trigonometry, Straight lines, Binomial Theorem

INSTRUCTIONS TO CANDIDATE

- Each subject in this paper consists of multiple choice questions with only one correct answer. ***+4 marks*** will be awarded for correct answer and ***–1 mark*** for wrong answer.
- Please read the instructions given for each question carefully and fill the correct answer against the question numbers on the answer sheet in the respective subject.
- Use blue or black ball point pen to darken the appropriate circle & mark should completely fill the circle.
- The Question paper contains blank spaces for your rough work. No additional sheet will be provided for rough work.
- Blank papers, Clipboards, Log Tables, Slide rule, Calculators, Cellular phones, Pagers and Electronic gadgets in any form are not allowed.
- Write your Name, Student ID in the block at the top of the Answer Sheet. Also write your Name & Student ID in the space provided on this cover page of question paper.
- **This is a Sample Test Paper. The actual Paper Pattern may vary in terms of duration and sections. However the syllabus will be same.**

Name:____________________________________**Student ID**________________

1. From the equation, $\tan\theta = \frac{rg}{v^2}$, one can obtain the angle of banking θ for a cyclist taking a curve. The symbols have their usual meanings. They say it is

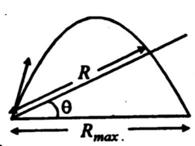
(A) both dimensionally and numerically correct
(B) dimensionally correct only
(C) numerically correct only
(D) neither numerically nor dimensionally correct

2. The distance between two moving cars A and B at a particular time is d. Their relative velocity is V with the component along AB being u perpendicular to AB being v. The time that elapses before they arrive at their nearest distance is

(A) $\frac{du}{V^2}$ (B) $\frac{dv}{V^2}$

(C) $\frac{d(u+v)}{V^2}$ (D) $\frac{dV}{(u+v)^2}$

3. A particle is projected for its maximum range $R_{\max}$. If an inclined plane whose inclination to the horizontal is 'θ', intercepts the parabolic path of the particle, then the range R along the plane will be



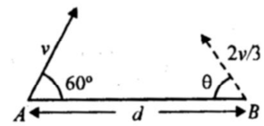
(A) $\sqrt{2}\,R_{\max}\frac{\sin(\pi/4-\theta)}{\cos^2\theta}$

(B) $2R_{\max}\frac{\cos(\pi/4-\theta),\sin\theta}{\cos^2\theta}$

(C) $2R_{\max}\frac{\sin(\pi/4-\theta).\cos\theta}{\sin^2\theta}$

(D) $2R_{\max}\frac{\sin(\pi/4-\theta).\cos\theta}{\sin\theta}$

4. A rat and a cat are at a distance d apart. The rat moves at a speed v, making an angle $60°$, to the line joining the rat 'A' and the cat 'B' at the same instant, the cat chases the rat with a speed $\frac{2v}{3}$ and angle θ to the line AB. Which of the following is true?



(A) For the cat to catch the rat in the least time, 'θ' should be $\sin^{-1}\left(\frac{3}{8}\right)$

(B) The least time in which the cat gets hold of the rat is $\frac{d}{2v}$

(C) Proceeding at $\theta = 30°$, the cat is able to catch the rat after $\frac{3d}{2v}$

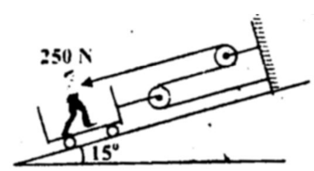
(D) The cat can never intercept the rat

5. A homogeneous chain of length L lies on a table. The coefficient of friction between the chain and the table is μ. The maximum length which can hang over the table in equilibrium is :

(A) $\left(\frac{\mu}{\mu+1}\right)L$ (B) $\left(\frac{1-\mu}{\mu}\right)L$

(C) $\left(\frac{1-\mu}{1+\mu}\right)L$ (D) $\left(\frac{2\mu}{2\mu+1}\right)L$

6. A trolley is being pulled up on incline plane by a man sitting on it (as shown in figure). He applies a force of $250\,N$. If the combined mass of the man and trolley is 100 kg, the acceleration of the trolley will be $\left(g = 10\,m/s^2,\ \sin 15° = 0.26\right)$



(A) 2.4 m/s^2

(B) 9.4 m/s^2

(C) 6.9 m/s^2

(D) 4.9 m/s^2

7. An asteroid of mass m is approaching earth, initially at a distance of $10R_e$ with speed v_i. It hits the earth with a speed v_f (R_e and M_e are radius and mass of earth), then

(A) $v_f^2 = v_i^2 + \frac{2Gm}{M_e R}\left(1 - \frac{1}{10}\right)$

(B) $v_f^2 = v_i^2 + \frac{2GM_e}{R_e}\left(1 + \frac{1}{10}\right)$

(C) $v_f^2 = v_i^2 + \frac{2GM_e}{R_e}\left(1 - \frac{1}{10}\right)$

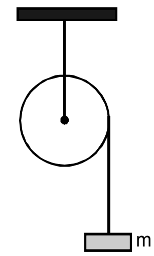
(D) $v_f^2 = v_i^2 + \frac{2Gm}{R_e}\left(1 - \frac{1}{10}\right)$

8. The M.I. of a cylinder about its own axis is equal to its M.I. about an axis passing through its centre and perpendicular to its length. Its length and radius are in the ratio -

(A) $[3]^{1/2} : 1$ (B) $1 : [3]^{1/2}$

(C) $[2]^{1/2} : 1$ (D) $1 : [2]^{1/2}$

9. In the following fig., a body of mass m is tied at one end of a light string and this string is wrapped around the solid cylinder of mass M and radius R. At the moment t = 0 the system starts moving. If the friction is negligible, angular velocity at time t would be



(A) $\frac{mgRt}{(M+m)}$

(B) $\frac{2Mgt}{(M+2m)}$

(C) $\frac{2mgt}{R(M-2m)}$ (D) $\frac{2mgt}{R(M+2m)}$

10. A cockroach of mass m is moving on rim of a disc of radius r with velocity v in anticlockwise direction. The moment of inertia of the disc about its own axis is I and it is rotating in the clockwise direction with angular speed w. If the cockroach stops moving then the angular speed of the disc will be-

(A) $\frac{I\omega}{I+mR^2}$ (B) $\frac{I\omega - mvr}{I+mr^2}$

(C) $\frac{2mg}{M+2m}$ (D) $\frac{M}{mg}$

11. An electron travels with a velocity of x ms^{-1}. For a proton to have the same de Broglie wavelength, the velocity will be aproximately?

(A) $\frac{1840}{x}$ (B) $\frac{x}{1840}$

(C) $1840\,x$ (D) x

12. The compressibility factor of helium as a real gas is

(A) unity (B) $1-\frac{a}{RTV}$

(C) $1+\frac{Pb}{RT}$ (D) $\frac{RTV}{1-a}$

13. For the given equilibrium

$Ag^{+} + 2NH_3 \rightleftharpoons Ag(NH_3)_2^{+}$ $k_1 = 1.8 \times 10^7$

$Ag^{+} + Cl^{-} \rightleftharpoons AgCl$ $k_2 = 5.6 \times 10^9$

Than, what would be the equilibrium constant for process given below

$AgCl + 2NH_3 \rightleftharpoons [Ag(NH_3)_2]^{+} + Cl^{-}$

(A) 10^{-17} (B) 3.1×10^{-22}

(C) 3.2×10^{-3} (D) 10^{17}

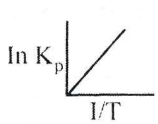
14. Equilibrium constant K_p for the reaction $CaCO_{3(s)} \rightleftharpoons CaO_{(s)} + CO_{2(g)}$ is 0.82 atm at 727° C.

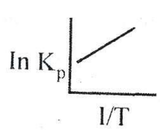
If 1 mole of $CaCO_3$ is placed in a closed container of 20L and heated to this temperature, what amount of $CaCO_3$ would dissociate at equilibrium?

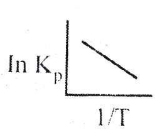
(A) 0.2 g (B) 80 g

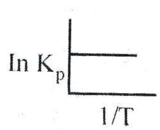
(C) 20 g (D) 50 g

15. An exothermic reaction is represented by the graph

(A) 

(B) 

(C) 

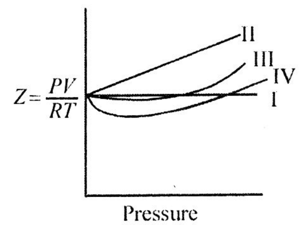
(D) 

16. Which of the following molecules has planar structure ?

(A) XeO_4 (B) XeF_4

(C) XeO_2F_2 (D) XeO_3F

17. For the non-zero volume of molecules having no forces of attraction, the variaion of compressibility factor $Z=\frac{PV}{RT}$ with pressure is given by the graph



(A) I (B) II

(C) III (D) IV

18. Enthalpy of combustion of carbon, hydrogen and C_3H_8 are x_1, x_2 and x_3 mol^{-1} respectively. Estimate the enthalpy of formation of C_3H_8

(A) $x_3 - x_1 - x_2$

(B) $x_3 - 3x_1 - 4x_2$

(C) $3x_1 + 4x_2 - x_3$

(D) $x_1 + x_2 - x_3$

19. Three solution A, B, C of HCl are mixed to produce 100 ml of 0.1 M solution. The molarities of A, B, C are 0.05 M, 0.10 M and 0.15 M respectively. In what ratio can they be mixed ?

(A) 55 ml, 20 ml, 25 ml

(B) 57 ml, 15 ml, 28 ml

(C) 54 ml, 23 ml, 23 ml

(D) 23 ml, 54 ml, 23 ml

20. 14 g of N_2 and 36 g of ozone are at the same pressure and temperature. Their volumes will be related as

(A) $2V_{N_2} = 3V_{O_3}$ (B) $3V_{N_2} = 2V_{O_3}$

(C) $3V_{N_2} = 4V_{O_3}$ (D) $4V_{N_2} = 3V_{O_3}$

21. The vertices of a triangle are $A(x_1, x_1 \tan\alpha)$, $B(x_2, x_2 \tan\beta)$ and $C(x_3, x_3 \tan\gamma)$. If the circumcentre of triangle ABC coincides with the origin and $H(a, b)$ be its orthocentre than $\frac{a}{b} =$

(A) $\frac{\cos\alpha + \cos\beta + \cos\gamma}{\cos\alpha.\cos\beta.\cos\gamma}$

(B) $\frac{\sin\alpha + \sin\beta + \sin\gamma}{\sin\alpha.\sin\beta.\sin\gamma}$

(C) $\frac{\tan\alpha + \tan\beta + \tan\gamma}{\tan\alpha.\tan\beta.\tan\gamma}$

(D) $\frac{\cos\alpha + \cos\beta + \cos\gamma}{\sin\alpha + \sin\beta + \sin\gamma}$

22. Let p, q $\in \{1, 2, 3, 4\}$. The number of equations of the form $px^2 + qx + 1 = 0$ having real roots is -

(A) 15 (B) 9
(C) 7 (D) 8

23. The number of values of x in the interval $[0, 5\pi]$ satisfying the equation $3\sin^2 x - 7\sin x + 2 = 0$ is

(A) 0 (B) 5
(C) 6 (D) 10

24. Locus of centroid of the triangle whose vertices are $(a\cos t, a\sin t)$, $(b\sin t, -b\cos t)$ and $(1, 0)$, where t is a parameter, is

(A) $(3x+1)^2 + (3y)^2 = a^2 - b^2$

(B) $(3x-1)^2 + (3y)^2 = a^2 - b^2$

(C) $(3x-1)^2 + (3y)^2 = a^2 + b^2$

(D) $(3x+1)^2 + (3y)^2 = a^2 + b^2$

25. If non-zero numbers a, b, c are in H.P. the straight line $\frac{x}{a} + \frac{y}{b} + \frac{1}{c} = 0$ always passes through a fixed point. That point is

(A) $\left(1, -\frac{1}{2}\right)$ (B) $(1, -2)$

(C) $(-1, -2)$ (D) (- 1, 2)

26. The sum of the integers from 1 to 100 which are not divisible by 3 or 5 is

(A) 2489

(B) 4735

(C) 2317

(D) 2632

27. Let $f(x) = ax^2 + bx + c$, a b, $c \in \mathbf{R}$ and $a \neq 0$. Suppose $f(x) > 0$ for all $x \in \mathbf{R}$.

Let $g(x) = f(x) + f'(x) + f''(x)$. Then

(A) $g(x) > 0 \,\forall\, x \in \mathbf{R}$

(B) $g(x) < 0 \,\forall\, x \in \mathbf{R}$

(C) $g(x) = 0 \,\forall\, x \in \mathbf{R}$

(D) $g(x) = 0$ has real roots.

28. Value of the expression

$C_0^2 + 2C_1^2 + \ldots + (n+1)C_n^2$ is

(A) $(2n+1)\ ({}^{2n}C_n)$

(B) $(2n-1)\ ({}^{2n}C_n)$

(C) $\left(\frac{n}{2}+1\right)({}^{2n}C_n)$

(D) $\left(\frac{n}{2}+1\right)({}^{2n-1}C_n)$

29. $O(0, 0)$, $P(-2, -2)$ and $Q(1, -2)$ are the vertices of a triangle, R is a point on PQ such that $PR : RQ = 2\sqrt{2} : \sqrt{5}$, then OR is

(A) a median of the triangle

(B) an altitude of the triangle

(C) bisector of the angle at O

(D) none of these

30. On the portion of the straight line $x + y = 2$ which is intercepted between the axes, a square is constructed, away from the origin, with this portion as one of its side. If p denotes the perpendicular distance of a side of this square from the origin, then the maximum value of p is

(A) $2\sqrt{3}$ (B) $3\sqrt{2}$

(C) $2/\sqrt{3}$ (D) $3/\sqrt{2}$

ANSWER KEY

PHYSICS

1.	(B)	**2.**	(A)	**3.**	(A)	**4.**	(D)	**5.**	(A)	**6.**	(D)
7.	(C)	**8.**	(A)	**9.**	(D)	**10.**	(B)				

CHEMISTRY

11.	(B)	**12.**	(C)	**13.**	(C)	**14.**	(C)	**15.**	(B)	**16.**	(B)
17.	(B)	**18.**	(C)	**19.**	(D)	**20.**	(B)				

MATHEMATICS

21.	(D)	**22.**	(C)	**23.**	(C)	**24.**	(C)	**25.**	(B)	**26.**	(D)
27.	(A)	**28.**	(C)	**29.**	(C)	**30.**	(B)				