

Paper Code:11E-S2611-P-A

SAMPLE PAPER

Class – XI ENG

Time: 2 Hour

M. Marks: 240

General Instructions:

1. Answers have to be marked on the OMR sheet.
2. The question paper consists of 60 multiple choice questions (single correct option) divided into five sections.
Section – A contains 20 questions (Q1 to Q20) of Physics.
Section – B contains 20 questions (Q21 to Q40) of Chemistry.
Section – C contains 20 questions (Q41 to Q60) of Mathematics.
3. Each question carries **+4** marks for correct answer and **–1** mark for wrong answer.
4. The Question Paper contains blank spaces for your rough work. No additional sheets will be provided for rough work.
5. Blank papers, clip boards, log tables, slide rule, calculator, cellular phones, pagers and electronic devices, in any form, are not allowed.
6. Write your Name, Father Name, Class, MSAT Roll No. and Date in the space provided at the bottom of this sheet.

NAME: _____

FATHER NAME: _____

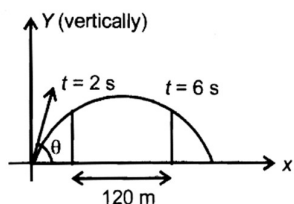
CLASS: _____

MSAT ROLL NO: _____

DATE: _____

PHYSICS

- The dimensional formula of wave number is
 (A) $[M^0 L^0 T^{-1}]$ (B) $[M^{-1} L^{-1} T^0]$
 (C) $[M^0 L^{-1} T^0]$ (D) $[M^0 L^0 T^0]$
- The percentage errors in the measurement of mass and speed are 2% and 3% respectively. How much will be the maximum error in the estimate of kinetic energy obtained by measuring mass and speed?
 (A) 11% (B) 8%
 (C) 5% (D) 1%
- A projectile is fired at some angle θ with speed v_0 such that it crosses two walls of equal height symmetrically as shown. The angle of projection with horizontal is

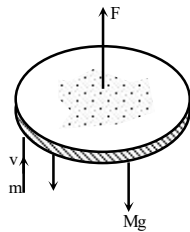


- (A) 53° (B) 37°
 (C) 45° (D) 60°
- If x denotes displacement in time t and $x = a \cos t$, then acceleration is:
 (A) $a \cos t$ (B) $-a \cos t$
 (C) $a \sin t$ (D) $-a \sin t$
- A balloon is rising vertically up at constant speed 10 m/s. A stone is dropped from it when the balloon is at a height of 40 m. Total distance covered by the stone before reaching the ground is (take $g = 10 \text{ m/s}^2$)
 (A) 40 m (B) 45 m
 (C) 50 m (D) 60 m

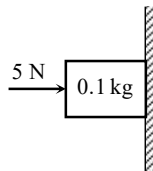
- With what speed should a body be thrown upwards so that the distances traversed in 5th second and 6th second are equal?
 (A) 58.4 ms^{-1}
 (B) 49 ms^{-1}
 (C) $\sqrt{98} \text{ ms}^{-1}$
 (D) 98 ms^{-1}
- The speed of a projectile at its maximum height is $\frac{\sqrt{3}}{2}$ times of its initial speed 'u' of projection. Its range on the horizontal plane is:
 (A) $\frac{\sqrt{3}u^2}{2g}$ (B) $\frac{u^2}{2g}$
 (C) $\frac{3u^2}{2g}$ (D) $\frac{3u^2}{g}$
- A projectile is thrown from a point in a horizontal plane such that its horizontal and vertical velocity components are 9.8 ms^{-1} and 19.6 ms^{-1} respectively. Its horizontal range is:
 (A) 4.9 m (B) 9.8 m
 (C) 19.6 m (D) 39.2 m
- A ball is thrown at different angles with the same speed u and from the same point; it has the same range in both the cases. If y_1 and y_2 be the heights attained in the two cases, then $y_1 + y_2 =$
 (A) $\frac{u^2}{g}$ (B) $\frac{2u^2}{g}$
 (C) $\frac{u^2}{2g}$ (D) $\frac{u^2}{4g}$

Space for rough work

10. Two bodies of masses 4 kg and 5 kg are acted upon by the same force. If the acceleration of lighter body is 2 m/s^2 , then the acceleration of the heavier body is:
 (A) 4.2 m/s^2 (B) 3.6 m/s^2
 (C) 2.4 m/s^2 (D) 1.6 m/s^2
11. A disc of mass 10 kg is kept floating horizontally in air by firing bullets of mass 0.5 kg each vertically at it, at the rate of 10 per second. If the bullets rebound with the same speed, the speed with which these are fired will be-

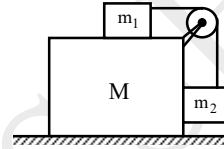


- (A) 0.098 m/s (B) 0.98 m/s
 (C) 9.8 m/s (D) 98.0 m/s
12. A boy of mass 40 kg is hanging from a horizontal branch of a tree. The tension in his arms is minimum when the angle between the arms is
 (A) 0° (B) 90°
 (C) 120° (D) 180°
13. A block of mass 0.1 kg is pressed against a wall with a horizontal force of 5N as shown in the figure. If the coefficient of friction between the wall and the block is 0.5 then the friction force acting on the block will be ($g = 9.8 \text{ m/s}^2$)



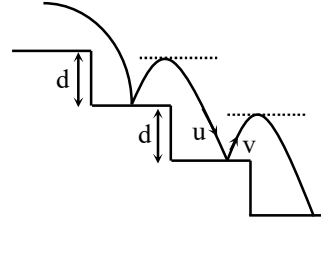
- (A) 9.8 N (B) 2.5 N
 (C) 0.98 N (D) 0.49 N

14. In the given arrangement all surfaces are smooth. What acceleration should be given to the system, for which the block m_2 doesn't slide down?



- (A) $\frac{m_2 g}{m_1}$ (B) $\frac{m_1 g}{m_2}$
 (C) g (D) $\frac{m_2 g}{m_1 + m_2}$

15. A tennis ball bounces down a flight of stairs, striking each step in turn and rebounding to the height of the step above. If the height of each step is d , the coefficient of restitution is



- (A) $\frac{1}{2}$ (B) $\frac{1}{\sqrt{2}}$
 (C) $\frac{1}{4}$ (D) 1

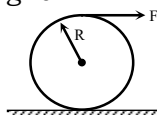
16. A system consists of mass M and m ($m \ll M$). The centre of mass of the system is
 (A) at the middle
 (B) nearer to M
 (C) nearer to m
 (D) at the position of larger mass

Space for rough work

17. A 50 gm bullet moving with a velocity of 10 m/s gets embedded into a 950 gm stationary body. The loss in kinetic energy of the system will be

(A) 5% (B) 50%
(C) 100% (D) 95%

18. A ring of mass m and radius R is acted upon by a force F as shown in figure. There is sufficient friction between the ring and the ground. The force of friction necessary for pure rolling is



(A) $\frac{F}{2}$ (B) $\frac{F}{3}$
(C) $\frac{F}{4}$ (D) Zero

19. A person of mass m is standing on one end of a plank of mass M and length L and floating in water. The person moves from one end to another and stops. The displacement of the plank is

(A) $\frac{Lm}{(m+M)}$ (B) $Lm(M+m)$
(C) $\frac{(M+m)}{Lm}$ (D) $\frac{LM}{(m+M)}$

20. A bomb of mass $m = 1$ kg thrown vertically upwards with a speed $u = 100$ m/s explodes into two parts after $t = 5$ s. A fragment of mass $m_1 = 400$ g moves downwards with a speed $v_1 = 25$ m/s, then speed v_2 and direction of another mass m_2 will be
- (A) 40 m/s downwards
(B) 40 m/s upwards
(C) 60 m/s upwards
(D) 100 m/s upwards

CHEMISTRY

21. Which of the following contains maximum number of oxygen atoms?

(A) 1 g of O
(B) 1 g of O_2
(C) 1 g of O_3
(D) all have the same number of atoms

22. 5.6 L of oxygen at NTP is equivalent to-

(A) 1 mol (B) $\frac{1}{2}$ mol
(C) $\frac{1}{4}$ mol (D) $\frac{1}{8}$ mol

23. A gas is found to have the formula $(CO)_x$. Its VD is 70. The value of x must be:-

(A) 7 (B) 4
(C) 5 (D) 6

24. The weights of two elements which combine with one another are in the ratio of their :-

(A) Atomic weight
(B) Molecular weight
(C) Equivalent weight
(D) None

25. Any nf -orbital can accommodate upto:

(A) 14 electron
(B) Six electrons
(C) Two electrons with parallel spin
(D) Two electrons with opposite spin

26. Third line of Balmer series is produced by which transition in spectrum of H-atom

(A) $n = 5$ to $n = 2$
(B) $n = 5$ to $n = 1$
(C) $n = 4$ to $n = 2$
(D) $n = 4$ to $n = 1$

Space for rough work



27. For any H like system, the ratio of velocities of electron in I, II & III orbit i.e., $V_1 : V_2 : V_3$ will be
(A) 1 : 2 : 3 (B) 1 : 1/2 : 1/3
(C) 3 : 2 : 1 (D) 1 : 1 : 1
28. The relative abundance of two rubidium isotopes of atomic weights 85 and 87 are 75% and 25% respectively. The average atomic weight of rubidium is:
(A) 75.5 (B) 85.5
(C) 86.5 (D) 87.5
29. The places that were left empty by Mendeleev's were, for:-
(A) Aluminium & Silicon
(B) Gallium and germanium
(C) Arsenic and antimony
(D) Molybdenum and tungsten
30. Predict which of the following reaction(s) has negative entropy change?
I $\text{CH}_{4(g)} + 2\text{O}_{2(g)} \rightarrow \text{CO}_{2(g)} + 2\text{H}_2\text{O}_{(l)}$
II $\text{NH}_{3(g)} + \text{HCl}_{(g)} \rightarrow \text{NH}_4\text{Cl}_{(s)}$
III $2\text{KClO}_{4(s)} \rightarrow 2\text{KClO}_{3(s)} + \text{O}_{2(g)}$
(A) III (B) II
(C) I and II (D) I
31. A system does 200 J of work and at the same time absorbs 150 J of heat. The magnitude of the change in internal energy is ----- J.
(A) 15 (B) 25
(C) 50 (D) 75
32. According to Slater's rule, order of effective nuclear charge for last electron in case of Li, Na and K:
(A) $\text{Li} > \text{Na} > \text{K}$ (B) $\text{K} > \text{Na} > \text{Li}$
(C) $\text{Na} > \text{Li} > \text{K}$ (D) $\text{Li} < \text{Na} = \text{K}$
33. The most covalent halide is:-
(A) AlF_3 (B) AlCl_3
(C) AlBr_3 (D) AlI_3
34. NH_3 has abnormally high boiling point because it has :
(A) Alkaline nature
(B) Distorted shape
(C) sp^3 -Hybridisation
(D) Hydrogen bonding
35. Which among the given pair of molecules consists only of $\text{Pi}(\pi)$ bonds?
(A) B_2 and F_2 (B) B_2 and C_2
(C) N_2 and O_2 (D) C_2 and N_2
36. PCl_5 is non polar because: -
(A) P-Cl bond is non-polar
(B) Its dipole moment is zero
(C) P-Cl bond is polar
(D) P and Cl have equal electronegativity
37. Two nodal planes are present in
(A) $\pi^* 2p_x$ (B) $\sigma 2p_z$
(C) $\pi 2p_x$ (D) $\pi 2p_y$
38. Density of ice is less than that of water because of
(A) Presence of hydrogen bonding
(B) crystal modification of ice
(C) open porous structure of ice due to hydrogen bonding
(D) different physical states of these
39. The first emission line in the H-atom spectrum in the Balmer series will have wave number:
(A) $\frac{5R}{36} \text{cm}^{-1}$ (B) $\frac{3R}{4} \text{cm}^{-1}$
(C) $\frac{7R}{144} \text{cm}^{-1}$ (D) $\frac{9R}{400} \text{cm}^{-1}$
40. What is the ratio of the de-Broglie wavelength for the electrons accelerated through 200 volts and 50 volts:
(A) 1 : 2 (B) 2 : 1
(C) 3 : 10 (D) 10 : 3

Space for rough work

**MATHEMATICS**

41. The number of 5-digit even number that can be made with the digit 0, 1, 2 and 3 is
(A) 384 (B) 192
(C) 768 (D) none of these
42. A teacher takes 3 children from her class to the zoo at a time as often as she can, but she does not take the same three children to the zoo more than once. She finds that she goes to the zoo 84 times more than a particular child goes to the zoo. The number of children in her class is
(A) 12 (B) 10
(C) 60 (D) none of these
43. ABCD is a convex quadrilateral. 3, 4, 5 and 6 points are marked on the sides AB, CD and DA respectively. The number of triangles with vertices on different sides is
(A) 270 (B) 220
(C) 282 (D) none of these
44. In a polygon the number of diagonals is 54. The number of sides of the polygon is
(A) 10 (B) 12
(C) 9 (D) none of these
45. If $n!$, $3 \times n!$ and $(n + 1)!$ are in GP then $n!$, $5 \times n!$ and $(n + 1)!$ are in
(A) AP (B) GP
(C) HP (D) none of these
46. The minimum number of terms of $1 + 3 + 5 + 7 + \dots$ that add up to a number exceeding 1357 is
(A) 15 (B) 37
(C) 35 (D) 17
47. The 10th common term between the series $3+7+11+\dots$ and $1+6+11+\dots$ is
(A) 191
(B) 193
(C) 211
(D) none of these
48. If three numbers are in GP then the numbers obtained by adding the middle number to each of the three numbers are in
(A) AP (B) GP
(C) HP (D) none of these
49. The number of values of a for which $(a^2-3a+2)x^2 + (a^2-5a+6)x + a^2-4 = 0$ is an identity in x if
(A) 0 (B) 2
(C) 1 (D) 3
50. If a and b are the roots of the equation $x^2 - 7x - 1 = 0$, then the value of $\frac{a^{21} + b^{21} + a^{17} + b^{17}}{a^{19} + b^{19}}$ is equal to.....
(A) 51 (B) 34
(C) 17 (D) 68
51. The number of real solutions of the equation $\log_{0.5} x = |x|$ is
(A) 1
(B) 2
(C) 0
(D) none of these
52. The equation $x^2 - 6x + 8 + \lambda(x^2 - 4x + 3) = 0$, $\lambda \in \mathbb{R} - \{-1\}$, has
(A) real and unequal roots for $\lambda \in \mathbb{R} - \{-1\}$
(B) real roots for $\lambda < 0$ only
(C) real roots for $\lambda > 0$ only
(D) real and unequal roots for $\lambda = 0$ only

Space for rough work

53. If $\sin 2\theta = \cos 3\theta$ and θ is an acute angle, then $\sin \theta$ equals

- (A) $\frac{\sqrt{5}-1}{4}$
 (B) $-\left(\frac{\sqrt{5}-1}{4}\right)$
 (C) $\frac{\sqrt{5}+1}{4}$
 (D) $\frac{-\sqrt{5}-1}{4}$

54. If $\operatorname{cosec} \theta = \frac{p+q}{p-q}$ then $\cot\left(\frac{\pi}{4} + \frac{\theta}{2}\right)$ is equal to

- (A) $\sqrt{p/q}$ (B) $\sqrt{q/p}$
 (C) $\sqrt{pq}$ (D) pq

55. Let $f_k(x) = \frac{1}{k}(\sin^k x + \cos^k x)$ where $x \in R$ and $k \geq 1$ then $f_4(x) - f_6(x)$ equals

- (A) $1/6$ (B) $1/3$
 (C) $1/4$ (D) $1/12$

56. If A and B are two sets then $(A - B) \cup (B - A) \cup (A \cap B)$ is equal to

- (A) $A \cup B$ (B) $A \cap B$
 (C) A (D) B'

57. $96 \cos \frac{\pi}{33} \cos \frac{2\pi}{33} \cos \frac{4\pi}{33} \cos \frac{8\pi}{33} \cos \frac{16\pi}{33}$ is equal to

- (A) 4 (B) 3
 (C) 2 (D) 1

58. If $7^{\log_7(x^2-4x+5)} = (x-1)$, Then $x \in$

- (A) $\{1, 2\}$ (B) $\{2, 3\}$
 (C) $\{3, 4\}$ (D) none of these

59. If $A = \sin^2 \theta + \cos^4 \theta$ then for all real values of θ

- (A) $1 \leq A \leq 2$ (B) $\frac{3}{4} \leq A \leq 1$
 (C) $\frac{13}{16} \leq A \leq 1$ (D) $\frac{3}{4} \leq A \leq \frac{13}{16}$

60. The value of

- $\sin^2 \frac{\pi}{8} + \sin^2 \frac{3\pi}{8} + \sin^2 \frac{5\pi}{8} + \sin^2 \frac{7\pi}{8}$ is
 (A) 1 (B) 2
 (C) $1\frac{1}{8}$ (D) $2\frac{1}{8}$

Space for rough work

ANSWER KEY

PHYSICS		CHEMISTRY		MATHEMATICS	
Q. NO.	Ans.	Q. NO.	Ans.	Q. NO.	Ans.
1.	C	21.	D	41.	A
2.	B	22.	C	42.	B
3.	A	23.	C	43.	D
4.	B	24.	C	44.	B
5.	C	25.	D	45.	A
6.	B	26.	A	46.	B
7.	A	27.	B	47.	A
8.	D	28.	B	48.	C
9.	C	29.	B	49.	C
10.	D	30.	C	50.	A
11.	C	31.	C	51.	A
12.	A	32.	D	52.	A
13.	C	33.	D	53.	A
14.	A	34.	D	54.	B
15.	B	35.	B	55.	D
16.	B	36.	B	56.	A
17.	D	37.	A	57.	B
18.	D	38.	C	58.	B
19.	A	39.	A	59.	B
20.	D	40.	A	60.	B