NEW STANDARD ACADEMY

REVIEW TEST - 01

Do not open this Test Booklet until you are asked to do so. **25-11-2024**

JEE(MAIN): 11th Undergoing Students

Read carefully the Instructions on the Back Cover of this Test Booklet.

Important Instructions :

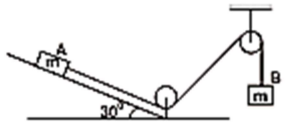
1. Immediately fill in the form number on this page of the Test Booklet with Blue/Black Ball Point Pen. Use of pencil is strictly prohibited.
2. The candidates should not write their Form Number anywhere else (except in the specified space) on the Test Booklet/Answer Sheet.
3. The Test Booklet consists of 90 questions.
4. There are three parts in the question paper 1,2,3 consisting of Physics, Chemistry and Mathematics having 30 questions in each subject and each subject having Two sections. (i) Section-I contains 20 multiple choice questions with only one correct option. Marking scheme : +4 for correct answer, 0 if not attempted and –1 in all other cases. (ii) Section-II contains 10 Numerical Value Type questions. Attempt any 5 questions. First 5 attempted questions will be considered for marking. Marking scheme : +4 for correct answer, 0 if not attempted and –1 in all other cases.
5. Use Blue/Black Ball Point Pen only for writting particulars/marking responses on Side –1 and Side–2 of the Answer Sheet. Use of pencil is strictly prohibited.
6. No candidate is allowed to carry any textual material, printed or written, bits of papers, mobile phone any electronic device etc, except the Identity Card inside the examination hall/room.
7. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
8. On completion of the test, the candidate must hand over the Answer Sheet to the invigilator on duty in the Room/ Hall. However, the candidate are allowed to take away this Test Booklet with them.

Name of the Candidate(In Capitals) _____

Date of Examintation _____

Candidate`s Signature:_____ Invigilator`s Signature: _____

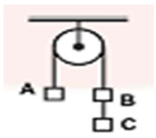
1. Two blocks A and B of same mass are connected through a string and arranged as shown in figure. When the system is released from rest and there is no friction, then



(A) Acceleration of A is g
(B) acceleration of A is $\frac{g}{2}$
(C) Tension in the string is zero
(D) tension in the string is $\frac{mg}{4}$

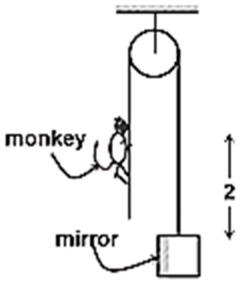
2. A block of mass 0.1 kg is held against a wall by applying a horizontal force of 5 N on the block. If the coefficient of friction between the block and the wall is 0.5, the magnitude of the frictional force acting on the block is
(A) 2.5 N (B) 0.98 N
(C) 4.9 N (D) 0.49 N

3. Three equal weights A, B and C of mass 2 kg each are hanging on a string passing over a fixed frictionless pulley as shown in the figure. The tension in the string connecting weights B and C is



(A) zero (B) 13.33 N
(C) 3.3 N (D) 19.6 N

4. In the adjacent figure, the monkey has a mass twice that of the block which has a plane mirror fixed on the monkey's side (as shown). Initially, the system is at rest and the vertical separation between the monkey and the mirror is 2 m. The speed of the monkey when he looks himself in the mirror is



(A) $\sqrt{\frac{2g}{3}}$ (B) $\sqrt{\frac{g}{3}}$
(C) $2\sqrt{\frac{g}{3}}$ (D) $\frac{\sqrt{g}}{3}$

5. The co-ordinates of a moving particle at any time t are given by $x = ct^2$ and $y = bt^2$. The speed of the particle is given by
(A) 2t (c + b)
(B) $2t\sqrt{(C^2 - b^2)}$
(C) $t\sqrt{(C^2 + b^2)}$
(D) $2t\sqrt{(C^2 + b^2)}$

6. A bus is moving with a constant velocity v1 along a horizontal road. A man standing inside the bus throws a ball upward with velocity v0 and catches the ball. The magnitude of displacement of the ball with respect to ground is
(A) $\frac{V_0^2}{g}$ (B) zero
(C) $\frac{2v_0v_1}{g}$ (D) $\frac{v_0v_1}{g}$

7. A body A is thrown vertically upward with initial velocity v_1. Another body B is dropped from a height h at time t = 0. Which equation represents correct relationship between distance of separation between the two particles (x) and time t (before they collide with ground)?
(A) $X = |h - v_1t|$
(B) $X = |h + v_1t|$
(C) $X = |v_1t + 1/2\ gt^2|$
(D) $X = |1/2\ gt^2 - v_1t|$

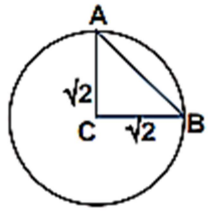
8. A projectile is thrown with a velocity u_0 at an angle θ with the horizontal. The ratio of the rate of change of speed w.r.t. time at the highest point to that at the point of projection is
(A) g sin θ
(B) −g sin θ
(C) zero
(D) g

9. A particle starts moving with constant acceleration and covers a distance x in first t seconds. The distance travelled by it in the next 2t seconds is
(A) 8x
(B) 3x
(C) x
(D) none of these

10. A particle moves in the x-y plane with a velocity $v_x = 8t - 2$ and $v_y = 2$. If it passes through the point x = 14 and y = 4 at t = 2 s, the equation of the path is
(A) $x = y^2 - y + 2$
(B) $x = y + 2$
(C) $x = y^2 + 2$
(D) $x = y^2 + y + 2$

11. A man starts running with constant speed along a circular path of radius $\sqrt{2}$ m. He completes two rounds in 16 seconds. The

magnitude of the average velocity in first 2 seconds is

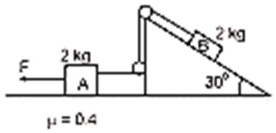


(A) 2 m/s
(B) 1 m/s
(C) 3 m/s
(D) 6 m/s

12. The velocity vector of a particle moving over a horizontal plane is given by v = 2t $\hat{\imath}$. The ratio of the magnitude of instantaneous acceleration of the particle at t = 2 sec to the magnitude of displacement of the particle during the interval of first 2 sec is
(A) ¾
(B) 4/3
(C) 5/4
(D) cannot be determined
13. A particle under the action of a constant force moves from rest upto 20 seconds. If distance covered in first 10 seconds is S_1 and that covered in next 10 seconds in S_2, then
(a) $S_1 = S_2$
(b) $S_2 = 3S_1$
(c) $S_2 = 2S_1$
(d) $S_2 = 4S_1$
14. Let $\vec{a} = \alpha\hat{\imath} + 2\hat{\jmath} - \hat{k}$ and $\vec{b} = -2\hat{\imath} + \alpha\hat{\jmath} + \hat{k}$, where $\alpha \in R$. If the area of the parallelogram whose adjacent sides are represented by the vectors $\vec{a}$ and $\vec{b}$ is $\sqrt{15(\alpha^2+4)}$, then the value of $2|\vec{a}|^2 + (\vec{a}.\vec{b})|\vec{b}|^2$ is equal to
(a) 10
(b) 7
(c) 9
(d) 1
15. Let $\vec{a} = = \alpha\hat{\imath} + 3\hat{\jmath} - \hat{k}$, $\vec{b} = 3\hat{\imath} - \beta\hat{\jmath} + 4k$ and $\vec{c} = \hat{\imath} + 2\hat{\jmath} - 2k$, $\alpha, \in R$, be three vectors. If the projection of $\vec{a}$ on $\vec{c}$ is 10 /3 and $\vec{b} \times \vec{c} = -6\hat{\imath} + 10\hat{\jmath} + 7\hat{k}$, then the value of $\alpha + \beta$ equal to :
(a) 3 (b) 4
(c) 5 (d) 6
16. Let $\vec{a} = 2\hat{\imath} - \hat{\jmath} + 5\hat{k}$ and $\vec{b} = \alpha\hat{\imath} + \beta\hat{\jmath} + 2\hat{k}$. If $(\vec{a} \times \vec{b} \times \hat{\imath})\,\hat{k} = 23/2$, then $|\vec{b} \times 2\hat{\jmath}$ is equal to
(a) 4 (b) 5
(c) $\sqrt{21}$ (d) $\sqrt{17}$
17. A small block of mass 2 kg is kept on a bigger block of mass M. The coefficient of friction between blocks M and m is 0.1. The bigger block M is given a constant acceleration 2 m/s^2. The acceleration of 2 kg block is
(A) 1 m/s^2 towards right
(B) 1 m/s^2 towards left
(C) 2 m/s^2 towards right
(D) 2 m/s^2 towards left
18. A simple pendulum hangs from the roof of train. The string is inclined towards the rear of the train. What is the nature of motion of the train?
(a) Uniform (b) Accelerated
(c) Retarded (d) At rest
19. A juggler throws balls into air. He throws one whenever the previous one is at its highest point. If he throws n balls each second, the height to which each ball will rise is
(a) g/ $2n^2$ (b) g/ n^2
(c) 2g/ n^2 (d) 2g/ n
20. Let $\vec{a} = \alpha\hat{\imath} + \hat{\jmath} + \beta\hat{k}$ ρ and $\hat{b} = 3\hat{\imath} - 5\hat{\jmath} + 4\hat{k}$ be two vectors, such that $\vec{a} \times \vec{b} = \hat{\imath} + 9\hat{\imath} + 12\hat{k}$. Then the projection of $\vec{b} - 2\vec{a}$ on $\vec{b} + \vec{a}$ is equal to
(a) 2 (b) 39/5
(c) 9 (d) 46 /5

Section –B

21. If $\vec{a} = 2\hat{\imath} + \hat{\jmath} + 3\hat{k}$, $\vec{b} = 3\hat{\imath} + 3\hat{\jmath} + \hat{k}$ and $\vec{c} = c_1\hat{\imath} + c_2\hat{\jmath} + c_3\hat{k}$ are coplanar vectors and $\vec{a} \cdot \vec{c} = 5$, $\vec{b} \perp \vec{c}$, then $122(c_1 + c_2 + c_3)$ is equal
22. . Let $\vec{a}, \vec{b}, \vec{c}$ be three non-coplanar vectors such that $\vec{a} \times \vec{b} = 4\vec{c}$, $\vec{b} \times \vec{c} = 9\vec{a}$ and $\vec{c} \times \vec{a} = \alpha\vec{b}$, $\alpha > 0$. If $|\vec{a}| + |\vec{b}| + |\vec{c}| = \frac{1}{36}$ then α is equal to……
23. A cricketer hits a ball in a vertical x-y plane from the ground level with a velocity $\vec{v}_0 = (10\sqrt{3}\hat{\imath} + 30\hat{\jmath})$ m/s. Find the time in which velocity vector makes an angle of 30° with horizontal x-axis. (Take g = 10 m/s^2 .)
24. A car accelerates from rest at a constant rate of 2 m/s^2 for some time. Then, its retards at a constant rate of 4 m/s^2 and comes to rest. What is the maximum speed attained by the car if it remains in motion for 3 seconds?
25. In the figure shown, coefficient of friction between block A and ground is 0.4 and that between wedge and block B is zero. The wedge is fixed. Find the tension in the string and acceleration of block A if F = 28 N.

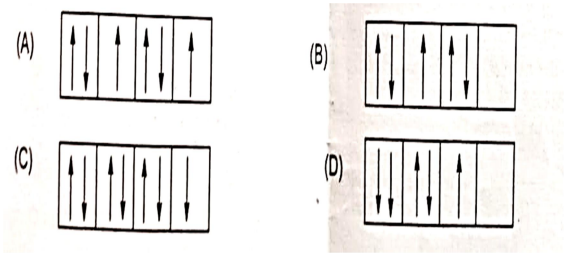


Chemistry

26. In an organic compound of molar mass 108 g/mol C,H and N atoms are present in 9:1:3.5 by weigth. Molecular formula can be:
    (A) $C_6H_8N_2$
    (B)$C_7H_{10}N$
    (C) $C_5H_6N_3$
    (D) $C_4H_{18}N_3$
27. What volume of hydrogen gas at 273K and 1 atm pressure will be consumed in obtaining 21.6gm of elemental boron (atomic mass=10.8) from the reduction of boron trichloride by hydrogen?
    (A) 44.8lit (B) 22.4 Lit
    (C) 89.6 lit (D) 67.2 lit.
28. A 5.2 molal aqueous solution of methyl alcohol CH_3OH is supplied .What is the mole fraction of Methyl alcohol in the solution
    (A) 0.86 (B) 0.086
    (c) 0.043 (D) 1.0
29. The number of protons electrons and neutrons in a molecule of heavy water are respectively
    (A) 8,10,11
    (B) 10,10,10
    (C) 10,11,10,
    (D) 11,10,10
30. 10 mL of 2M NaOH solution is added to 200 mL of 0.5 LM of NaOH solution . What is the final concentration?
    (A) 0.57M
    (B) 5.7 M
    (C) 11.4 M
    (D) 1.14 M
31. Which of the following sets of quantum numbers represents the 19th electron of chromium ?

	n	l	m	s
(A)	4	1	-1	½
(B)	4	0	0	½
(C)	3	2	-2	½
(D)	3	2	0	½

32. The mass of the proton is 1840 times of electron,its accelerated by a potential difference is 1kV. The kinetic energy of proton will be
    (A) 920 KeV
    (B)$\frac{1}{1840}$ keV
    (C) 1 keV
    (D) 1840 keV
33. The number of radial nodes in 5d is
    (A) 1 (B) 2
    (C) 3 (D) 4
34. According to Bohr's theory the angular momentum of an electron in 5th th orbit is
    (A) $25\frac{h}{\pi}$ (B) $1.0\frac{h}{\pi}$
    (C) $10\frac{h}{\pi}$ (D) $2.5\frac{h}{\pi}$
35. In which of the following orbital diagrams are both pauli's exclusion principle and Hund's rule violated?

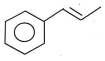


36. The correct order of second ionization potential of carbon nitrogen oxygen and fluorine is
    (A) C> N>O>F
    (B) O>N >F>C
    (C) O> F>N>C
    (D)F> O >N>C
37. Atomic radii of fluorine and neon in Angstrom units are respectively given by
    (A) 0.72,1.60
    (B) 1.60, 1.60
    (C) 0.72,0.72
    (D) none of these
38. The first ionization potential of Na ,Mg,Al and Si Are in the order
    (A) Na< Mg>Al< Si
    (B) Na<Mg<Al > Si
    (C) Na>Mg>Al>Si
    (D) Na > Mg > Al<Si
39. Which has most stable +2 oxidation state?
    (A) Sn (B) Pb
    (C) Fe (D) Ag
40. The setsrepresenting the correct order of first ionization potential is
    (A) K>Na<Li
    (B) Be>Mg>Ca
    (C) B>C>N
    (D) Ge> Si>C
41. Which of the following has sp^3 - hybridization?
    (a) BBr_3
    (b) XeF_4
    (c) BCI_3
    (d) XeO_3
42. Which of the following compounds, shows ionic, covalent and coordinate bonds?
    (A) NaCl

(B) HCI
(C) $CuOS_4 : 5H_2O$
(D) $CaSO_4;5H_2O$

43. In $O_2^-.O_2$, and O_2^{2-} molecular species, the total number of antibonding electrons respectively are
(a) 8,6,8
(b) 6,6,6
(c) 1,0,2
(d) 7,6,8

44. Increasing order of electronegativity of the hybrid orbitals is
(a) $sp<sp^2<sp^3$
(b) $sp^2<sp<sp^3$
(c) $sp^3<sp^2<sp$
(d) $sp^2<sp^3<sp$.

45. How many **C – C** bonds are there in  ?
(A) $14\sigma, 8\pi$
(B) $18\sigma, 8\pi$
(C) $9\sigma, 4\pi$
(D) $14\sigma, 2\pi$

46. Numbers of mole of electrons in 0.5 mole of N^{3-} will be_____

47. The maximum number of electrons that can have principal quantum number, n=3 and spin quantum number,$m_s = -\frac{1}{2}$,_____

48. Total number of elements which have only single oxidation state (other than zero) in their corresponding stable compounds.
(1) B, (2) TI , (3) Cs , (4) F , (5) Al, (6) Zn
(7) Ga, (8) Pb,(9) At, (10) Fr

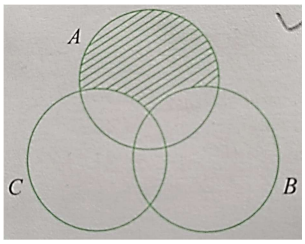
49. Based on VSEPR theory, the number of 90° F - Br - F angles in a molecules of BrF_5, is_____

50. Among the triatomic molecules/ions, $BeCl_2$, N_3^- ,N_2O, NO_2^+ , O_3 SCI_2, IC l_2^- I_3^- and XeF_2, the total number of linear molecule(s)/ion(s) where the hybridization of the central atom does not have contribution from the d-orbital(s) is ___

Maths

51. If aN ={ax:x∈ N} then the set 4n ∩ 6N is
(a) 8N (b) 10N
(c) 12N (d) none of these

52. The shaded region in the given figure is



(a) A∩ $(B \cup C)$
(b) A∪ $(B \cap C)$
(c) A∩ $(B - C)$
(d) A-(B∪ C)

53. If n>0 and exactly 15 integers satisfy (x+6) (x-4) (x-5)(2x-n)
$\leq 0, then\ sum\ of\ digitd\ of\ the$ least possible value of n is
(a) 10 (b) 12
(c) 14 (d) 16

54. The complete solution set of inequality
$$\frac{(x-5)^{1005}(x-3)^{1008}(x-1)}{x^{1006}(x-2)^3(x-3)^5(x-6)(x+9)^{1010}} \leq 0\ is$$
(a)(- ∞, - 9) ∪(-8,0) ∪ (0,1) ∪ (2,3) ∪ [5,6)
(b) (- ∞, - 9) ∪ (-9,0) ∪ (0,1) ∪ (2,3) ∪ (5,6)
(c) (- ∞, - 9) ∪ (-9,0) ∪ (0,1] ∪ (2,3) ∪ [5,6)
(d) (- ∞, 0) ∪ (0,1] ∪ (2,3) ∪ [5,6)]

55. If α, β are the roots of a $x^2 + c = bx$ then the equation $(a + cy)^2 = b^2 y$ in y has the roots
(a) $\alpha\ \beta^{-1} \alpha^{-1}\ \beta$
(b) $\alpha^{-2}\ \beta^{-2}$
(c) $\alpha^{-1}\ \beta^{-1}$
(d) $\alpha^2\ \beta^2$

56. If a, beta are the nonzero roots of $ax^2 + bx + c = 0$ and $\alpha^2\ \beta^2$ are the roots of $a^2x^2 + b^2 x + c^2 = 0$ then a, b, c are in
(a) G.P.
(b) H.P.
(c) A.P.
(d) none of these

57. The number of values of a for which equations $x^3 + ax + 1 = 0$ and $x^4 + ax^2 + 1 = 0$ have a common root is
(1) 0
(2) 1
(3) 2
(4) infinite

58. A value of b for which the equations $x^2 + bx - 1 = 0$, $x^2 + x + b = 0$ have one root in common is
(1) $\sqrt{2}$
(2) $-i\sqrt{3}$
(3) $\sqrt{2}$
(4) $\sqrt{3}$

59. The quadratic equation p(x) = 0 with real coefficients has purely imaginary roots. the equation p(p(x)) = 0 has
(1) only purely imaginary roots
(2) all real roots
(3) two real and two purely imaginary roots
(4) neither real nor purely imaginary roots

60. If $a_1, a_2, a_3 \ldots a_n$ are in H.P and *f(k)*=

$\left(\sum_{r=1}^{n} a_r\right) - a_k$ *then*

$\frac{a_1}{f(1)}, \frac{a_2}{f(2)}, \frac{a_3}{f(3)}$ ……..$\frac{a_n}{f(x)}$ are in

(1)A.P (2)G.P

(3)$H.P$ (4) none of these

61. Let n ∈ N n > 25 Let A, G, H denote the arithmetic mean, geometric mean, and harmonic mean of 25 and n. The least value of n for which A, G, H ∈ {25, 26 ,...,n} is
(1) 49
(2) 81
(3) 169
(4) 225

62. Value of $\left(1+\frac{1}{3}\right)\left(1+\frac{1}{3^2}\right)\left(1+\frac{1}{3^4}\right)\left(1+\frac{1}{3^8}\right)$ ….∞ is equal
(1) 3 (2) $\frac{6}{5}$
(3) $\frac{3}{2}$ (4) none of these

63. If a, b, and c are in A.P., then $a^3 + c^3 - 8b^3$ is equal to
(1) 2abc
(2) 3abc
(3) 4abc
(4)-6abc

64. Consider an A.P. a_1, a_2, a_3 such that $a_3 + a_5 + a_8 = 11$ and $a_4 + a_2 = -2$ then the value of $a_1 + a_6 + a_7$ is
(1)-8
(2) 5
(3) 7
(4) 9

65. If 2 and 6 are the roots of the equation $ax^2 + bx + 1 = 0$, then the quadratic equation, whose roots are 1/(2a + b) and 1/(6a + b) is:
(1) $2x^2 + 11x + 12 = 0$
(2) $4x^2 + 14x + 12 = 0$
(3) $x^2 + 10x + 16 = 0$
(4) $x^2 + 8x + 12 = 0$

66. If the domain of the function $\sin^{-1}\left(\frac{3x-22}{2x-19}\right) + \log_e\left(\frac{3x^2-8x+5}{x^2-3x-10}\right)$ is $(\alpha\beta]$, then $3\alpha + 10\beta$ is equal to:
(1) 94 (2) 100
(3) 95 (4) 98

67. Let α, β *be the roots of the equation* $x^2+2\sqrt{2}x-1=0$. The quadratic equation whose roots are $\alpha^4 + \beta^4$ and $\frac{1}{10}(\alpha^4 + \beta^4)$ *is*:
(1) $x^2-190x+9466 = 0$
(2) $x^2-195x+9466 = 0$
(c) $x^2-195x+9506 = 0$
(3) $x^2-180x+9506 = 0$

68. Let α, β be such $\pi < \alpha - \beta < 3\pi$.If $\sin\alpha + \sin\beta = -\frac{21}{65}$ and $\cos\alpha + \cos\beta = -\frac{27}{65}$, then the value of $\cos\frac{\alpha-\beta}{2}$ is
(1) $-\frac{3}{\sqrt{300}}$ (2) $\frac{3}{\sqrt{300}}$
(3) $\frac{6}{65}$ (4) $-\frac{6}{65}$

69. Let $f_K(x) = \frac{1}{k}(\sin^k x + \cos^k x)$ *Where* $x \epsilon R$ *and* $k \geq 1$then the value of $f_4(x)-f_6(x)$ *equals*
(1) $\frac{1}{6}$ (2) $\frac{1}{3}$
(3) $\frac{1}{4}$ (4) $\frac{1}{12}$

70. If 0< x< and cos x +sin x = $\frac{1}{2}$, then tan x is
(1) $\frac{(1-\sqrt{7})}{4}$ (2) $\frac{(4-\sqrt{7})}{3}$
(3) $-\frac{(4+\sqrt{7})}{3}$ (4) $\frac{(1+\sqrt{7})}{4}$

Section-B

71. In a ΔPQR,if 3 sinP+4 cos Q = 6and 4 sin Q +3 cos P=1 then $(cot\ R)^2$ is equal to

72. Let α and β be the solutions of the quadratic equation $x^2 - 1154x + 1 = 0$ then the value of $\alpha^{\frac{1}{4}} + \beta^{\frac{1}{4}}$ is equal to

73. The quadratic equation. $x^2 + mx + n = 0$ has roots which are twice those of $x^2 + px + m = 0$ and m, n and p ne0 Then the value of n/p is

74. Given a, b, c are in A.P., b, c, d are in G.P., and c, d, e are in H.P. If a = 2 and e = 18 then the sum of all possible value of c is_____

75. The value of the sum $\sum_{i=1}^{20} i\left(\frac{1}{i} + \frac{1}{i+1} + \frac{1}{i+2} + \cdots + \frac{1}{20}\right)$ *is*_____