The PathShala

MOCK Test-JEE (Class 11th Going to 12th)

Time : 90:00 Min | **Beware Of Negative Marking** | **Max. Marks : 240**

Sample Paper For JEE

Test Syllabus

Physics : Physical world and Measurement, Kinematics, Laws of Motion, Work–Energy–Power

Chemistry : Some Basic Concepts of Chemistry, Atomic Structure, Classification of elements & periodic properties, Chemical Bonding and Molecular Structure.

Mathematics : Sets, Relation and Functions, Linear Inequalities, Trigonometric Functions, Permutation and Combination

INSTRUCTIONS

1. Fill up the particulars of Your name, Registration No, Name of School, Mobile No and Test Date etc.
2. This Question paper consists of three sections. Section A, Section B and Section C.

Section	*Subject*	*Question*	*Marking Schemes of each correct answer.*	
			Correct Answer	*Wrong Answer*
Section A	*Physics*	*Q 01 to Q 20*	*+4*	*-1*
Section B	*Chemistry*	*Q 21 to Q 40*	*+4*	*-1*
Section C	*Mathematics*	*Q 41 to Q 60*	*+4*	*-1*

Candidate ID : | | | | | | | |

Name of the Student : ……..

Name of the School in which you study : ……

……..

Student Mobile No : ……..Test Date ……

Invigilator Signature **Student Signature**

…… **……**

PHYSICS

SECTION–A

1. A particle has an initial velocity $3\hat{i}+4\hat{j}$ and an acceleration of $0.4\hat{i}+0.3\hat{j}$. Its speed after 10 sec is

   (A) 10 units (B) $7\sqrt{2}$ units (C) 7 units (D) 8.5 units

2. 50 coplanar forces each equal to 100 N act on a body. Each force makes angle π/25 with the preceding force. What is the resultant of the forces?

   (A) 5000N (B) 0.5N (C) Zero (D) 4πN

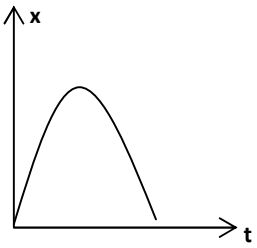
3. If $\vec{a}=3\hat{i}+4\hat{j}$, find a unit vector in the direction of $\vec{a}$

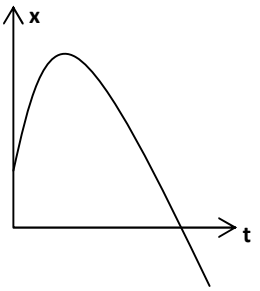
   (A) $\frac{1}{5}\left(3\hat{i}-4\hat{j}\right)$ (B) $\frac{1}{5}\left(3\hat{i}+4\hat{j}\right)$ (C) $\frac{1}{5}\left(3\hat{i}+2\hat{j}\right)$ (D) $\frac{1}{5}\left(3\hat{i}-2\hat{j}\right)$

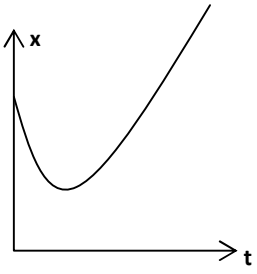
4. The area of a parallelogram formed by the vectors $\vec{A}=\hat{i}+2\hat{j}+3\hat{k}$ and $\vec{B}=3\hat{i}-2\hat{j}+\hat{k}$ as adjacent sides is

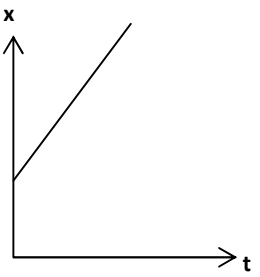
   (A) $8\sqrt{3}$ units (B) 64 units (C) 32 units (D) $\sqrt{3}$ unit

5. The position of a particle moving in a straight line is $x = 1+ 10t–5t^2$. The graphical representation is

   (A) 

   (B) 

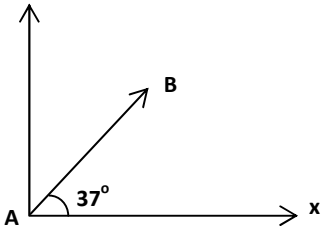
   (C) 

   (D) 

6. A butterfly is flying with $10\hat{i}+12\hat{j}$ and wind is flowing along x with speed u. butterfly starts from A and reaches point B find u in ms^{-1}

   (A) 3 (B) 4

   (C) 5 (D) 6

7. A ball is travelling will uniform translatory motion. This means that

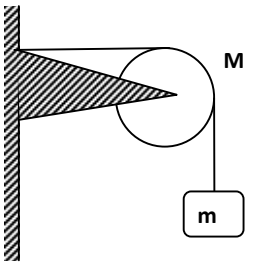
   (A) it is at rest

   (B) The path can be a straight line or circular and the ball travels with uniform speed.

   (C) All parts of the ball have the same velocity (magnitude) and direction) and the velocity is constant.

   (D) The centre of the ball moves with constant velocity and the ball spins about its centre uniformly

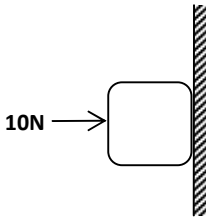
8. A string of negligible mass going over a clamped pulley of mass M supports a block of mass m as shown in figure. The force on the pulley by the clamp is given by



(A) $\sqrt{2}Mg$ (B) $\sqrt{2}mg$

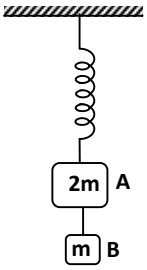
(C) $\sqrt{(M+m)^2+m^2}g$ (D) $\sqrt{(M+m)^2+M^2}g$

9. A horizontal force of 10N necessary to just hold a block stationary against a wall. The coefficient of friction between the block and the wall is 0.2. The weight of the block is



(A) 2N (B) 20N (C) 50N (D) 100N

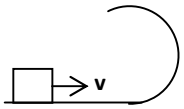
10. Two blocks A and B of masses 2m and m, respectively, are connected by a massless and inextensible string. The whole system is suspended by a massless spring as shown in figure. The magnitude of acceleration of A and B, immediately after the string is cut, are respectively.



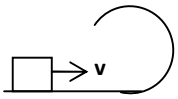
(A) g, g (B) g, g/2 (C) g/2, g (D) g/2 , g/2

11. A small block is shot into each of the four tracks as shown below. Each of the tracks rises to the same height. The speed with which the block enters the track is the same in all cases. At the highest point of the track, the normal reaction is maximum in

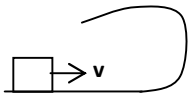
(A)



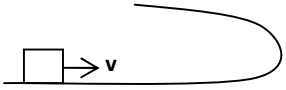
(B)



(C)



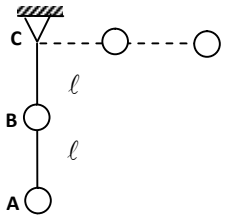
(D)



12. Force acting on a particle is $\left(2\hat{i}+3\hat{j}\right)N$. Work done by this force is zero, when a particle is moved on the line $3y+kx=5$. Here value of k is

(A) 2 (B) 4 (C) 6 (D) 8

13. A weightless rod of length 2ℓ carries two equal masses 'm' one tied at lower end A and the other at the middle of the rod at B. the rod can rotate in vertical plane about a fixed horizontal axis passing through C. The rod is released rest in horizontal position the speed of the mass B at the instant rod becomes vertical is



(A) $\sqrt{\frac{3g\ell}{5}}$ (B) $\sqrt{\frac{4g\ell}{5}}$ (C) $\sqrt{\frac{6g\ell}{5}}$ (D) $\sqrt{\frac{7g\ell}{5}}$

14. A particle is projected upwards. If t_1& t_2 be times at which it was at height h. Then

(A) h= $\frac{1}{2}gt_1t_2$ (B) h= $\frac{3}{2}gt_1t_2$ (C) h= $\frac{1}{4}gt_1t_2$ (D) h= gt_1t_2

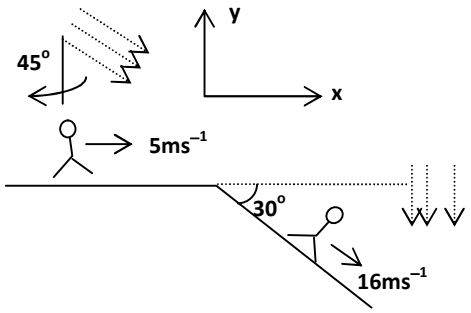
15. A balloon starts ascending at a constant acceleration of $2ms^{-2}$. When it was a height of 100m from the ground, a stone was dropped from it. With what velocity does the stone hit the ground (take g =$10ms^{-2}$)

(A) $49ms^{-1}$ (B)48m/s (C) 50m/s (D) None

16. The co-ordinates of a moving particle at any time t are given by $x= \alpha t^3$& $y= \beta t^3$. The speed of the particle at time t is

(A) $2t^2\sqrt{\alpha^2+\beta^2}$ (B) $\frac{\sqrt{\alpha^2+\beta^2}}{t^2}$ (C) $\frac{t^2}{\sqrt{\alpha^2+\beta^2}}$ (D) $3t^2\sqrt{\alpha^2+\beta^2}$

17. A man moving horizontally find rain hitting him at 45° with vertical, while on incline he finds it vertical. Find the actual velocity of rain



(A) $8\hat{i}-\left(8\sqrt{3}-5\right)\hat{j}$

(B) $8\sqrt{3}\hat{i}-\left(8\sqrt{3}-5\right)\hat{j}$

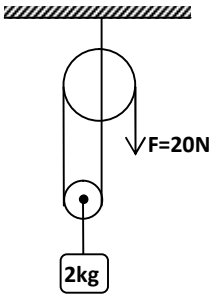
(C) $\sqrt{3}\hat{i}-8\hat{j}$

(D) $\sqrt{8}\ \hat{i}-3\hat{j}$

18. A boat has a speed of 5km/hr in still water, crosses a river of width 3km along the shortest possible path in time t. the river speed is 3km/hr. Find t in minutes

(A) 20 (B) 25 (C) 35 (D) 45

19. The acceleration of the 2kg block if the free end of string is pulled with a force of 20N as shown is



(A) 0 (B)$10m/s^2$

(C) $5m/s^2$ upward (D) $5m/s^2$ downward

20. A false balance has equal arms. An object weigh X when placed in one pan and y when placed in other pan, then weight w of the object is equal to

(A) $\sqrt{xy}$ (B) $\frac{x+y}{2}$ (C) $\frac{x^2+y^2}{2}$ (D) $\frac{2}{\sqrt{x^2+y^2}}$

CHEMISTRY

SECTION–B

21. 3.65 gm equimolar mixture of NaOH and Na_2CO_3 is titrated against 0.1 M HCl using phenolphthalein as an indicator, V_1 mL of acid was required to reach end point. In another experiment 3.65 gm of same mixture is titrated against 0.2 M HCl using methyl orange as an indicator, V_2 mL of acid was required to reach end point. $V_1 + V_2$ is

(A) 875 mL (B) 750 mL (C) 500 mL (D) 1000 mL

22. How many milliliters of a 9 N H_2SO_4 solution will be required to neutralize completely 20 mL of a 3.6 N NaOH solution?

(A) 18.0 mL (B) 8.0 mL (C) 16.0 mL (D) 80.0 mL

23. What is the normality of the H_2SO_4 solution, 18.6 mL of which neutralizes 30.0 mL of a 1.55 N KOH solution?

(A) 5.0 N (B) 1.25 N (C) 2.5 N (D) 3.5 N

24. 50 mL of 5.6% KOH (ω/υ) is added to 50 mL of a 5.6% HCl (ω/υ) solution. The resulting solution will be:
(A) neutral (B) alkaline (C) strongly alkaline (D) acidic

25. Calculate the normality of an NaOH solution, 21.5 mL of which is required to convert 0.240 g of NaH_2PO_4 in a solution to monohydrogen phosphate.
(A) 1.093 N (B) 0.093 N (C) 0.048 N (D) 0.93 N

26. 10 mL of 0.5 N HCl, 30 mL of 0.1 N HNO_3 and 75mL of 0.1 M H_2SO_4 are mixed together. The normality of the resulting solution will be:
(A) 0.2 N (B) 0.1 N (C) 0.4 N (D) 0.5 N

27. The amount of $KMnO_4$ required to prepare 100 mL of a 0.1 N solution in an acidic medium is
(A) 3.16 g (B) 1.58 g (C) 0.316 g (D) 31.6 g

28. 0.185 g of an iron wire containing 99.8% iron is dissolved in an acid to form ferrous ions. The solution requires 33 mL of $K_2Cr_2O_7$ solution for complete reaction. The normality of the $K_2Cr_2O_7$ solution is:
(A) 0.05 (B) 0.02 (C) 0.20 (D) 0.10

29. 8.7 gm of pyrolusite (impure MnO_2) were heated with concentrated HCl. The Cl_2 gas evolved was passed through excess of KI solution. The iodine gas evolved required 80 ml of $\frac{N}{10}$ hypo solution. The percentage of MnO_2 in pyrolusite will be:
[Mn = 55]
(A) 4% (B) 40% (C) 8% (D) 80%

30. Volume of 0.1 M ferrous oxalate solution required to react completely with 60 ml of 0.1 N acidified $KMnO_4$ solution.
(A) 30 mL (B) 20 mL (C) 150 mL (D) 10 mL

31. Uncertainty in position is twice the uncertainty in momentum. Uncertainty in velocity is:
(A) $\sqrt{\frac{h}{\pi}}$ (B) $\frac{1}{2m}\sqrt{\frac{h}{\pi}}$ (C) $\frac{1}{2m}\sqrt{h}$ (D) $\sqrt{\frac{h}{4\pi}}$

32. If wavelength is equal to the distance travelled by the electron in one second, then:
(A) $\lambda = \frac{\hbar}{p}$ (B) $\lambda = \frac{h}{m}$ (C) $\lambda = \sqrt{\frac{h}{p}}$ (D) $\lambda = \sqrt{\frac{h}{m}}$

33. Uncertainty in position of a particle of 25 g in space is 10^{-15}m. Hence, uncertainty in velocity (ms^{-1}) is: (Planck's constant, $h = 6.63 \times 10^{-34}$ Js)
(A) 2.1×10^{-18} (B) 2.1×10^{-34} (C) 0.5×10^{-34} (D) 5.0×10^{-24}

34. The de Broglie wavelength of a tennis ball of mass 60 g moving with a velocity of 10 m/s is approximately:
(Plank's constant, $h = 6.63 \times 10^{-34}$ Js)
(A) 10^{-33} m (B) 10^{-31} m (C) 10^{-16} m (D) 10^{-25} m

35. Number of visible lines when an electron returns from 5^{th} orbit to ground state in H spectrum:
(A) 5 (B) 4 (C) 3 (D) 10

36. Difference in wavelength of two extreme lines of Lyman series in emission spectrum of He^+ would be:

(A) $\frac{1}{12R_H}$ (B) $\frac{12}{R_H}$ (C) $\frac{1}{4R_H}$ (D) $\frac{1}{3R_H}$

37. In the atom, two electrons move around the nucleus in circular orbits of radii R and 4R. The ratio of the time taken by them to complete one revolution is:

(A) 1 : 4 (B) 4 : 1 (C) 1 : 8 (D) 8 : 1

38. The ratio of the energy of a photon of wavelength $3000\,\overset{o}{A}$ to that of a photon of wavelength $6000\,\overset{o}{A}$ is:

(A) $\frac{1}{2}$ (B) 2 (C) 3 (D) $\frac{1}{3}$

39. The kinetic energy of electron present in the ground state of LI^{+2} ion is represented by:

(A) $\frac{3e^2}{8\pi \in_0 r}$ (B) $-\frac{3e^2}{8\pi \in_0 r}$ (C) $\frac{3e^2}{4\pi \in_0 r}$ (D) $-\frac{3e^2}{4\pi \in_0 r}$

40. Which transition in Li^{2+} would have the same wavelength as the $2 \rightarrow 4$ transition in He^+ ion?

(A) $4 \rightarrow 2$ (B) $2 \rightarrow 4$ (C) $3 \rightarrow 6$ (D) $6 \rightarrow 2$

MATHEMATICS

SECTION–C

41. 20 teachers of a school either teach mathematics or physics. 12 of them teach mathematics while 4 teach both the subjects. Then the number of teachers teaching physics only is

(A) 12 (B) 8 (C) 16 (D) None of these

42. If $X = \{8^n - 7n - 1 : n \in N\}$ and $Y = \{49(n-1) : n \in N\}$, then

(A) $X \subseteq Y$ (B) $Y \subseteq X$ (C) X = Y (D) None of these

43. The relation "less than" in the set of natural numbers is

(A) Only symmetric (B) Only transitive (C) Only reflexive (D) Equivalence relation

44. In a battle 70% of the combatants lost one eye, 80% an ear, 75% an arm, 85% a leg, x% lost all the four limbs. The minimum value of x is

(A) 10 (B) 12 (C) 15 (D) None of these

45. The number of reflexive relations of a set with four elements is equal to

(A) 2^{16} (B) 2^{12} (C) 2^8 (D) 2^4

46. The value of $e^{\log_{10}\tan 1^\circ + \log_{10}\tan 2^\circ + \log_{10}\tan 3^\circ + \ldots\ldots\ldots + \log_{10}\tan 89^\circ}$ is

(A) 0 (B) e (C) $1/e$ (D) None of these

47. $\sin^2\frac{\pi}{8} + \sin^2\frac{3\pi}{8} + \sin^2\frac{5\pi}{8} + \sin^2\frac{7\pi}{8} =$

(A)1 (B)– 1 (C) 0 (D) 2

48. $\frac{\cot^2 15^\circ - 1}{\cot^2 15^\circ + 1} =$

(A) $\frac{1}{2}$ (B) $\frac{\sqrt{3}}{2}$ (C) $\frac{3\sqrt{3}}{4}$ (D) $\sqrt{3}$

49. If $\cos\theta = \frac{3}{5}$ and $\cos\phi = \frac{4}{5}$, where θ and ϕ are positive acute angles, then $\cos\frac{\theta-\phi}{2} =$

(A) $\frac{7}{\sqrt{2}}$ (B) $\frac{7}{5\sqrt{2}}$ (C) $\frac{7}{\sqrt{5}}$ (D) $\frac{7}{2\sqrt{5}}$

50. $\frac{1}{\tan 3A - \tan A} - \frac{1}{\cot 3A - \cot A} =$

(A) $\tan A$ (B) $\tan 2A$ (C) $\cot A$ (D) $\cot 2A$

51. Total number of four digit odd numbers that can be formed using 0, 1, 2, 3, 5, 7 are

(A) 216 (B) 375 (C) 400 (D) 720

52. In how many ways can 5 boys and 5 girls sit in a circle so that no two boys sit together

(A) $5!\times 5!$ (B) $4!\times 5!$ (C) $\frac{5!\times 5!}{2}$ (D) None of these

53. 20 persons are invited for a party. In how many different ways can they and the host be seated at a circular table, if the two particular persons are to be seated on either side of the host

(A) $20!$ (B) $2.18!$ (C) $18!$ (D) None of these

54. Everybody in a room shakes hand with everybody else. The total number of hand shakes is 66. The total number of persons in the room is

(A) 11 (B) 12 (C)13 (D)14

55. There are 16 points in a plane out of which 6 are collinear, then how many lines can be drawn by joining these points

(A) 106 (B)105 (C) 60 (D) 55

56. Given the function $f(x) = \frac{a^x + a^{-x}}{2}, (a > 2)$. Then $f(x+y) + f(x-y) =$

(A) $2f(x).f(y)$ (B) $f(x).f(y)$ (C) $\frac{f(x)}{f(y)}$ (D) None of these

57. $\frac{1}{x+5} + \frac{1}{x-7} + \frac{1}{x-5} + \frac{1}{x+7} > 0$ is satisfied by

(A) $\left(-7,-\sqrt{37}\right)\cup(-5,0)\cup\left(5,\sqrt{37}\right)\cup(7,\infty)$ (B) $(-5,5)$

(C) $\left(-\sqrt{37},\sqrt{37}\right)$ (D) None

58. $\left(x^2+1\right) \le x$ solution are-

(A) ϕ (B) (-∞, 0) (C) [0, ∞) (D) None of these

59. $(x-1)^2 \le 0$ Solution are-

(A) R (B) {1} (C) ϕ (D) None of these

60. $\frac{1}{x} < \frac{2}{x-2}$ Solution are-

(A) $(-2,0)\cup(2,\infty)$ (B) $(-\infty,-2)\cup(2,\infty)$

(C) $(-2,2)$ (D) None