NEET 24 BATCH
PHYSICS : DCT (SET B)
### Topic: Circular Motion + Laws of Motion + Friction

1. A body of weight W = mg slides down a rough vertical pole with an acceleration = $\dfrac{g}{4}$, where g is the acceleration due to gravity. What is the frictional force in terms of the weight of the body ?

   (a) $\dfrac{W}{4}$
   (b) $\dfrac{W}{2}$
   (c) $\dfrac{W}{3}$
   (d) $\dfrac{3W}{4}$

2. A rectangular block of mass 6 kg is to be held against a rough vertical wall by applying a force perpendicular to the wall. What is the minimum force to be applied, if the coefficient of friction is 0.42?

   (a) 140 N
   (b) 120 N
   (c) 100 N
   (d) 80 N

3. A body of mass m, kept on a rough horizontal surface, is pulled by a force P as shown in the figure. The coefficient of friction between the body and the surface is μ. What is the limiting force of friction between the body and the surface?
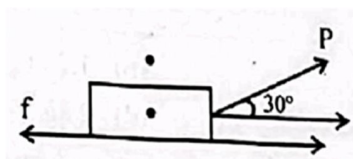
   (a) $\mu\left[mg + \dfrac{P}{2}\right]$
   (b) $\mu\left[mg - \dfrac{P}{2}\right]$
   (c) $\mu\left[mg - \dfrac{P}{2}\right]^{1/2}$
   (d) $\mu\left[mg + \dfrac{P}{\sqrt{3}}\right]$

4. A flywheel of diameter 1 m is rotating at 600 r.p.m. The acceleration of a point on the rim of the flywheel is

   (a) $100\,\pi^2$ m/s²
   (b) $150\,\pi^2$ m/s²
   (c) $200\,\pi^2$ m/s²
   (d) $300\,\pi^2$ m/s²

5. A particle performing a U.C.M. of radius π m makes 'p' revolutions in 't' seconds. What is its tangential velocity?

   (a) $\dfrac{2\pi^2 p}{t}\,m/s$
   (b) $\dfrac{2\pi^2}{pt}\,m/s$
   (c) $\dfrac{\pi^2 p}{t}\,m/s$
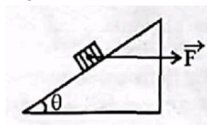   (d) $\dfrac{2\pi p}{t}\,m/s$

Space for Rough Work

6. A particle is moving with a constant speed v in a circle of radius R. What is the magnitude of average acceleration after half revolution ?

   (a) $\dfrac{v^2}{2R}$ (b) $\dfrac{2v^2}{\pi R}$ (c) $\dfrac{v^2}{R}$ (d) $\dfrac{v^2}{\pi R}$

7. A particle is moving along a circular path. Let v, ω, α and a_c be its linear velocity, angular velocity, angular acceleration and centripetal acceleration respectively. Which is the wrong statement from the following ?

   (a) $\vec{\omega} \perp \vec{v}$ (b) $\vec{\omega} \perp \vec{a}_c$ (c) $\vec{\omega} \perp \vec{\alpha}$ (d) $\vec{v} \perp \vec{a}_c$

8. A car is moving on a circular track of diameter 72 m with a speed of 6 m/s. It is accelerated at the rate of $\sqrt{3}$ m/s². If the mass of the car is 1000 kg, the net force acting on the car is:

   (a) 1000 N (b) 2000 N (c) $1000\sqrt{3}$ N (d) $\dfrac{1000}{\sqrt{3}}$ N

9. A particle is performing a U.C.M. along a circle of radius r. The relation between its centripetal acceleration (a) and kinetic energy (E) is given by

   (a) $a = 2Em$ (b) $a = \dfrac{E}{mr}$ (c) $a = \dfrac{2E}{mr}$ (d) $a = \left(\dfrac{2E}{mr}\right)^2$

10. A ball of mass (m), 0.5 kg is attached to the end of a string having length (L), 0.5 m. The ball is rotated on a horizontal circular path about a vertical axis. The maximum tension that the spring can bear is 324 N. The maximum possible value of angular velocity of the ball (in radian/s) is
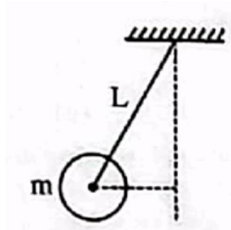
   (a) 9 (b) 18 (c) 27 (d) 36

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11. A force F applied to a body (A) of mass m_1 produces an acceleration of 4 m/s². If the same force F is applied to another body (B) of mass m_2, then an acceleration of 10 m/s² is produced in the body. A and B are then tied together and the same force is applied to the combined body. What is the acceleration of the system ?

    (a) $\dfrac{10}{7} \text{m/s}^2$ (b) $\dfrac{20}{7} \text{m/s}^2$ (c) $\dfrac{5}{3} \text{m/s}^2$ (d) $\dfrac{7}{20} \text{m/s}^2$

12. A block (A) of mass 3 kg in contact with a second block (B) of mass 2 kg, resting on a frictionless horizontal surface. A horizontal force of 20 N is applied to push the block A. What is the force with which the block A pushes the block B?

    (a) 4 N   (b) 6 N   (c) 8 N   (d) 10 N

13. A body, under the action of a force $\vec{F} = 6\hat{i} - 8\hat{j} + 10\hat{k}$ acquires an acceleration of 1 m/s². The mass of this body must be

    (a) $2\sqrt{10}$ kg   (b) 10 kg   (c) 20 kg   (d) $10\sqrt{2}$ kg

14. A horizontal force $\vec{F}$ acts on a block of mass m kept on a smooth inclined plane of inclination θ, as shown in the figure. What is the normal reaction N on the block ?

    (a) mg cos θ − F sin θ   (b) mg sin θ − F cos θ

    (c) mg sin θ + F cos θ   (d) mg cos θ + F sin θ

15. When forces F_1, F_2 and F_3 are acting on a particle of mass m such that F_2 and F_3 are mutually perpendicular, then the particle remains stationary. If the force F_1 is now removed, then the acceleration of the particle is

    (a) $\dfrac{F_2}{m}$ (b) $\dfrac{F_2 F_3}{mF_1}$ (c) $\dfrac{F_2 - F_3}{m}$ (d) $\dfrac{F_1}{m}$

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NEET 24 BATCH
CHEMISTRY : DCT (SET B)
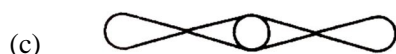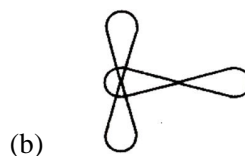### Topic: Chemical Bonding + Periodic Properties + Mole Concept

16. The correct order of the lattice energies of the following ionic compounds is:

    (a) $NaCl > MgBr_2 > CaO > Al_2O_3$ (b) $Al_2O_3 > MgBr_2 > CaO > NaCl$

    (c) $MgBr_2 > Al_2O_3 > CaO > NaCl$ (d) $Al_2O_3 > CaO > MgBr_2 > NaCl$

17. Hypervalent compound is:

    (a) IF_7 (b) NH_3 (c) BeF_2 (d) CH_4

18. In the periodic table the size of atoms across a period:

    (a) decreases from right to left (b) increases from left to right

    (c) increases from right to left (d) does not change

19. Which of the following is not isoelectronic to others?

    (a) NO^- (b) CN^- (c) N_2 (d) O_2^{2+}

20. Strongest bond is formed by the head on overlapping of:

    (a) 2s- and 2p- orbitals (b) 2p- and 2p-orbitals

    (c) 2s- and 2s-obritals (d) all of these

21. Which set represents isoelectronic species?

    (a) Be, Al^{3+}, Cl^- (b) Ca^{2+}, Cs^+, Br (c) Na^+, Ca^{2+}, Mg^{2+} (d) N^{3-}, F^-, Na^+

22. Number of sigma bonds in P_4O_{10} is:

    (a) 6   (b) 7   (c) 17   (d) 16

23. Which has a giant covalent structure?

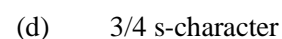   (a) PbO_2 (b) SiO_2 (c) $NaCl$ (d) $AlCl_3$
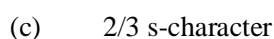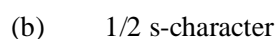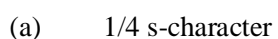

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24. Which p-orbital overlapping would give the strongest bond?

(a)

(b)

(c)

(d)

25. Octet rule is not valid for the molecule:

(a) CO_2 (b) NO   (c) O_2 (d) PCl_3

26. A sp^3-hybrid orbital contains:

(a) 1/4 s-character   (b) 1/2 s-character   (c) 2/3 s-character   (d) 3/4 s-character

27. The pair of elements which on combination are most likely to form an ionic compound is:

(a) Na and Ca   (b) K and O_2 (c) O_2 and Cl_2 (d) Al and I_2
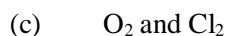
28. Oxidation number of fluorine in F_2O is:

(a) +1   (b) +2   (c) –1   (d) –2

29. $Cl_2 + H_2S \rightarrow 2HCl + S$,

In the above reaction, oxidation state of chlorine changes from:

(a) zero to –1   (b) 1 to zero   (c) zero to 1   (d) remains unchanged
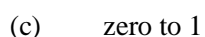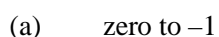
30. According to periodic law of elements, the variation in properties of elements is related to their:

(a) atomic number   (b) atomic mass

(c) nuclear mass   (d) neutron-proton ratio

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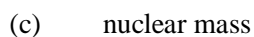
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NEET 24 BATCH
PHYSICS : DCT (SET B) ANSWER KEY
Topic: Circular Motion + Laws of Motion + Friction

1.	(d)	2.	(a)	3.	(b)	4.	(c)	5.	(a)
6.	(b)	7.	(c)	8.	(b)	9.	(c)	10.	(d)
11.	(b)	12.	(c)	13.	(d)	14.	(d)	15.	(d)

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16.	(d)	17.	(a)	18.	(c)	19.	(a)	20.	(b)
21.	(d)	22.	(d)	23.	(b)	24.	(c)	25.	(b)
26.	(a)	27.	(b)	28.	(c)	29.	(a)	30.	(a)