

Max. Marks: 60

Date: 16.10.2022

JB 1 MR BATCH (SET B) PHYSICS : DCT

Topics: Work Energy Power

- 1. A particle moved from position $\vec{r_1} = 3\hat{i} + 2\hat{j} 6k$ to position $\vec{r_2} = 14\hat{i} + 13\hat{j} + 9k$ under the action of a force $(4\hat{i} + \hat{j} + 3k)$ newtons. Find the work done.
 - (a) 10 J (b) 100 J (c) 0.01 J (d) 1 J
- 2. The work done by the force = $\vec{F} = A(y^2\hat{i} + 2x^2\hat{j})$, where A is a constant and x and y are in meters around the path shown is:



(a) zero (b) Ad (c) Ad^2 (d) Ad^3



3. A body of mass m is slowly pulled up the hill by a force F which at each point was directed along the tangent of the trajectory as shown in figure. All surfaces are smooth. Find the work performed by this force.



(a) mgl (b) -mgl (c) mgh (d) zero

- 4. A block of mass 2 kg is dropped from a height of 40 cm on a spring whose force-constant is 1960 Nm⁻¹. The maximum distance through which the spring is compressed by
 - (a) 5 cm (b) 15 cm (c) 20 cm (d) 10 m
- 5. A slab S of mass m is released from a height h_0 from the top of a spring of force constant k. The maximum compression x of the spring is given by the equation

(a)
$$mgh_0 = \frac{1}{2}kx^2$$

(b) $mg(h_0 - x) = \frac{1}{2}kx^2$
(c) $mgh_0 = \frac{1}{2}k(h_0 + x)^2$
(d) $mg(h_0 + x) = \frac{1}{2}kx^2$



- A pump is required to lift 800 kg of water per minute from a 10 m deep well and eject it with speed of 20 m/s. The required power in watts of the pump will be
 - (a) 6000 (b) 4000 (c) 5000 (d) 8000
- A ball is dropped onto a floor a height of 10 m. If 20% of its initial energy is lost, then the height of bounce is
 (a) 2 m
 (b) 4 m
 (c) 8 m
 (d) 6.4 m
- 8. A system of wedge and block as shown in figure, is released with the spring in its natural length. All surfaces are frictionless. Maximum elongation in the spring will be



(a)	$\frac{2 \text{mg} \sin \theta}{\text{K}}$	(b)	$\frac{\text{mg sin }\theta}{\text{K}}$	(c) $\frac{4 \operatorname{mg} \sin \theta}{K}$	(d)	$\frac{\text{mg}\sin\theta}{2\text{K}}$
-----	--	-----	---	---	-----	---





9. A body of mass m is released from a height h on a smooth inclined plane that is shown in the figure. The following can be true about the velocity of the block knowing that the wedge is fixed



- (a) v is highest when it just touches the spring
- (b) v is highest when it compresses the spring by some amount
- (c) v is highest when the spring comes back to natural position
- (d) v is highest at the maximum compression
- 10. A spring of spring constant 5×10^3 N/m is stretched initially by 5 cm from the unstretched position. The work required to further stretch the spring by another 5 cm is
 - (a) 6.25 N-m (b) 12.50 N-m (c) 18.75 N-m (d) 25.00 N-m
- 11. A car mass 1000 kg accelerates uniformly from rest to a velocity of 54 km/h in 5 s. The average power of the engine during this speed is (neglect friction):
 - (a) 2000 W (b) 45000 W (c) 2250 W (d) 22500 W
- 12. A particle moves on a rough horizontal ground with some initial velocity say v_0 . If (3/4)th of its kinetic energy is lost in friction in time t_0 , then coefficient of friction between the particle and the ground is:
 - (a) $\frac{v_0}{2gt_0}$ (b) $\frac{v_0}{4gt_0}$ (c) $\frac{3v_0}{4gt_0}$ (d) $\frac{v_0}{gt_0}$



- 13. If a number of forces act on a body and the body is in static or dynamic equilibrium, then:
 - (a) work done by any individual force must be zero
 - (b) net work done by all the forces is +ve
 - (c) net work done by all the force is -ve
 - (d) net work done by all the forces is zero
- 14. A body of mass m kg is lifted by a man to a height of one metre in 30 s. Another man lifts the same mass to the same height in 60 s. The work done by them are in the ratio
 - (a) 1:2 (b) 1:1 (c) 2:1 (d) 4:1
- 15. A force $F = (5\hat{i} + 3\hat{j})$ newtons is applied over a particle which displaces it form its origin to the point $r = (2\hat{i} 1\hat{j})$ metres. The work done on the particle is
 - (a) -7 joules (b) +13 joules (c) +7 joules (d) +11 joules



Max Marks: 60

Date: 16.10.2022

JB 1 MR BATCH CHEMISTRY : DCT SET - B Topic: Atomic Structure + Mole Concept + Periodic

16.	Planck's constant has the same dimensions as that of									
	(a)	power	(b)	work	(c)	radiant energy	(d)	angular momentum		
17.	Which	of the following ser	ries of tr	ansitions in the spect	rum of h	ydrogen atom falls in	visible	region?		
	(a)	Lyman series	(b)	Balmer series	(c)	Paschen series	(d)	Brackett series		
18.	Atomic	e number and mass	number	of an element M are	25 and	52 respectively. The	number	of electrons, protons		
	and net	utrons in M ⁺² ion ar	e respec	tively						
	(a)	25, 25 and 27	(b)	25, 27 and 25	(c)	27, 25 and 27	(d)	23, 25 and 27		
19.	The rat	io of ionization ene	rgy of H	and Be^{+3} is						
	(a)	1:4	(b)	1:8	(c)	1:16	(d)	16:1		
20.	O_2^{2-} is	the symbol of	. ion.							
	(a)	Oxide	(b)	Super	(c)	Peroxide	(d)	Monoxide		
21.	The nu	mber of orbitals in	the fourt	h principal quantum i	number	will be				
	(a)	4	(b)	8	(c)	12	(d)	16		
22.	Statement I: NaNO ₃ has no definite molecule.									
	Statem	ent II: Its formula n	nass is 8	5.						
	(a) If Statement I is true, Statement II is true, Statement II is the correct explanation of statement I.									
	(b) If Statement I is true, Statement II is true, Statement II is not the correct explanation for Statement I.									
	(c)	(c) Statement I is true but statement II is false.								
	(d)	Statement I is false	e but sta	tement II is true.						
23.	Which	of the following is	a compo	ound						
	(a)	Diamond	(b)	$Salt + H_2O$	(c)	Washing soda	(d)	Ca		



24.	The energy absorbed by each molecule (A ₂) of a substance is 4.4×10^{-19} J and bond energy per molecule is 4.0×10^{-19} J. The kinetic energy per atom will be									
	(a)	2.0	$ imes 10^{-20} \mathrm{J}$	(b)	$2.2 \times 10^{-19} \mathrm{J}$	(c)	$2.0\times 10^{-19}~J$	(d)	$4.0\times 10^{-20}J$	
25.	Physical state of water at 273 K is									
	(a)	Sol	id	(b)	Liquid	(c)	Gas	(d)	Both (a) and (b)	
26.	The outer most orbit of an element X is partially filled with electrons in 's' and 'p' subshells. The element is									
	(a) An inert gas				(b)	A representative element				
	(c) A transition eleme		ent		(d)	An inner transition element				
27.	Which	of th	e following 3d	orbitals	has electron density	along al	l three axes?			
	(a) $3d_{xy}$		у	(b)	$3d_{yz}$	(c)	$3d_{z^2}$	(d)	3d _{zx}	
28.	A men	ber	of Lanthanide							
	(a)	Cae	esium	(b)	Lanthanum	(c)	Neoybium	(d)	Lutetium	
29.	Match	the f	ollowing.							
	Туре-	·I	Type-II							
	Series		Elements							
	A) 3d		1) Sc (21) to Zn (30)							
	B) 4d		2) La (57), Hf (72) to Hg (80)							
	C) 5d		3) Y (39) to Cd (48)							
	D) 6d		4) Ac (89), Rf (104) to Mt (109)							
	(a)	A-l	, B-3, C-2, D-4	- (b)	A-2, B-3, C-l, D-4	(c)	A-3, B-1, C-2, D-4	(d)	A-4, B-2, C-3, D-1	
30.	The number of nucleons in chlorine-37 is									
	(a)	17		(b)	20	(c)	54	(d)	37	
					* * * *	* *				





Max Marks: 60

Date: 16.10.2022

JB 1 MR BATCH PHYSICS : DCT SET - B ANSWER KEY Topics: Work Energy Power

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

Max Marks: 60

Date: 16.10.2022

JB 1 MR BATCH CHEMISTRY : DCT SET - B ANSWER KEY Topic: Atomic Structure + Mole Concept + Periodic

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