

Max Marks: 60

Date: 02.10.2022

JB 2 MR BATCH PHYSICS : DCT Topic: Work Energy Power

| 1. | A body of mass 5 kg is placed at the origin, and can move only on the x-axis. A force of 10 N is acting on it in a direction making an angle of 60° with the x-axis and displaces it along the x-axis by 4 metres. The work done by the force is | | | | | | | | |
|----|--|--|-------------------------------|---|------------------|-------------------------------|----------------|-------------------------|--|
| | (a) | 2.5 J | (b) | 7.25 J | (c) | 40 J | (d) | 20 J | |
| 2. | A force $F = (5\hat{i} + 3\hat{j})N$ is applied over a particle which displaces it from its origin to the point $r = (2\hat{i} - 1\hat{j})$ meters The work done on the particle is | | | | | | | | |
| | (a) | —7 J | (b) | +13 J | (c) | +7 J | (d) | +11 J | |
| 3. | A horiz surface | contal force of 5 N is The work done by | s require this forc | ed to maintain a veloc ce in one minute is | ity of 2 | m/s for a block of 10 | kg mass | sliding over a rough | |
| 4. | (a)600 J(b)60 J(c)6 J(d)6000 JA box of mass 1 kg is pulled on a horizontal plane of length 1 m by a force of 8 N, then it is raised vertically to a | | | | | | | | |
| | neight (| or 2m, the net work | done is | 0.1 | (-) | 10 1 | (1) | Nama of these | |
| 5. | (a) A 10 kg | 28 J g satellite completes | (D) s one rev | 8 J volution around the e | (c) arth at a | height of 100 km in | (a) 108 min | utes. The work done | |
| | by the g | gravitational force o | of earth v | vill be | | | | | |
| | (a) | $108\times100\times10~J$ | (b) | $\frac{108 \times 10}{100} \mathbf{J}$ | (c) | $\frac{100 \times 10}{108} J$ | (d) | Zero | |
| 6. | A posit | ion dependent force | $\vec{F} = (7 \cdot \vec{F})$ | $-2x+3x^2$)N acts on | ı a small | object of mass 2 kg | to displa | ce it from $x = 0$ to x | |
| | = 5m. T | The work done in jo | ule is | | | | | | |
| | (a) | 70 J | (b) | 270 J | (c) | 35 J | (d) | 135 J | |



7. A particle moves under the effect of a force F = Cx from x = 0 to $x = x_1$. The work done in the process is

(a)
$$Cx_1^2$$
 (b) $\frac{1}{2}Cx_1^2$ (c) Cx_1 (d) Zero

- 8. The vessels A and B of equal volume and weight are immersed in water to a depth h. The vessel A has an opening at the bottom through which water can enter. If the work done in immersing A and B are W_A and W_B respectively, then
 - (a) $W_A = W_B$ (b) $W_A < W_B$ (c) $W_A > W_B$ (d) $W_A > = < W_B$
- Work done in time t on a body of mass m which is accelerated from rest to a speed υ in time t₁ as a function of time t is given by

(a)
$$\frac{1}{2}m\frac{v}{t_1}t^2$$
 (b) $m\frac{v}{t_1}t^2$ (c) $\frac{1}{2}\left(\frac{mv}{t_1}\right)^2t^2$ (d) $\frac{1}{2}m\frac{v^2}{t_1^2}t^2$

10. A 10 kg mass moves along x-axis. Its acceleration as a function of its position is shown in the figure. What is the total work done on the mass by the force as the mass moves from x = 0 to x = 8 cm



11. The relationship between force and position is shown in the figure given (in one dimensional case). The work done by the force in displacing a body from x = 1 cm to x = 5 cm is





12. The graph between the resistive force F acting on a body is shown in the figure. The mass of the body is 25 kg and initial velocity is 2 m/s. When the distance covered by the body is 5 m, its kinetic energy would be



13. If W_1 , W_2 and W_3 represent the work done in moving a particle from A to B along three different paths 1, 2 and 3 respectively (as shown) in the gravitational field of a point mass m, find the correct relation



- (a) $W_1 > W_2 > W_3$ (b) $W_1 = W_2 = W_3$ (c) $W_1 < W_2 < W_3$ (d) $W_2 > W_1 > W_3$
- 14. A particle of mass 0.01 kg travels along a curve with velocity given by $4\hat{i}+16\hat{k}$ ms⁻¹. After some time, its velocity becomes $8\hat{i}+20\hat{j}$ ms⁻¹ due to the action of a conservative force. The work done on particle during this interval of time is
 - (a) 0.32 J (b) 6.9 J (c) 9.6 J (d) 0.96 J
- 15. A particle of mass 'm' and charge 'q' is accelerated through a potential difference of 'V' volt. Its energy is

(a)
$$qV$$
 (b) mqV (c) $\left(\frac{q}{m}\right)V$ (d) $\frac{q}{mV}$



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JB 2 MR BATCH MATHEMATICS : DCT Topic: Permutation

| 16. In how many ways can a cricket eleven choose a captain and a vice-captain from as | | | | | | | nongst themselves? | | |
|---|---|---------------------------------|---------------------------------------|------------------------|------------|---------------------------|--------------------|-------------------------|--|
| | (a) | 19 | (b) | 21 | (c) | 90 | (d) | 110 | |
| 17. | Three p done in | prizes are to be distr | be distributed in a class of 10 stude | | nts. If a | students can get onl | y one pr | ize, then this can be | |
| | (a) | 30 ways | (b) | 720 ways | (c) | 13 ways | (d) | None of these | |
| 18. | How m | any 2-digit number | can be f | formed from the digits | 51, 3, 5, | 7, 9 if repetition is no | ot allowe | ed? | |
| | (a) | 9 | (b) | 20 | (c) | 25 | (d) | 16 | |
| 19. | How m | any 3-digit numbers | s can be | formed from the digit | ts 3, 4, 6 | , 0, 7, 8 if repetition i | s not all | owed? | |
| | (a) | 29 | (b) | 100 | (c) | 180 | (d) | None of these | |
| 20. | How m allowed | any 4-digit number 1? | greater | than 7000 can be for | rmed fro | m the digits 1, 2, 3, | 5, 7, 8, 9 | 9, if repetition is not | |
| | (a) | 160 | (b) | 260 | (c) | 360 | (d) | None of these | |
| 21. | How many 5-digit number, divisible by 5, can be formed from the digits 3,1, 7, 0, 9, 5, if repetition is allowed? | | | | | | | , if repetition is not | |
| | (a) | 960 | (b) | 560 | (c) | 216 | (d) | 384 | |
| 22. | If ${}^{n}P_{7} =$ | 210 ($^{n}P_{5}$), then : n = | = | | | | | | |
| | (a) | 21 | (b) | 20 | (c) | 10 | (d) | None of these | |



Learning with the Speed of Mumbai and the Tradition of Kota

| 23. | If ${}^{2n}P_3 =$ | If ${}^{2n}P_3 = 2({}^{n}P_4)$, then : n = | | | | | | | | |
|-----|-----------------------|---|------------|-------------------------|------------|----------------------|---------|---------------------|--|--|
| | (a) | 8 | (b) | 6 | (c) | 12 | (d) | 4 | | |
| 24. | $If {}^{2n}\!P_{n+}$ | $_{1}:^{2n-2}P_{n}=56:3, th$ | en : n = | | | | | | | |
| | (a) | 4 | (b) | 67 | (c) | 10 | (d) | 3 | | |
| 25. | If ${}^{10}P_{r} =$ | $= {}^{9}P_{5} + 5 ({}^{9}P_{4})$ | | | | | | | | |
| | (a) | 2 | (b) | 5 | (c) | 3 | (d) | 4 | | |
| 26. | If ${}^{15}P_r$: | ${}^{16}P_r = 3:4$, then : r | = | | | | | | | |
| | (a) | 2 | (b) | 3 | (c) | 4 | (d) | 7 | | |
| 27. | (n + 1) | . ${}^{n}P_{r} =$ | | | | | | | | |
| | (a) | ${}^{n}\mathbf{P}_{r+1}$ | (b) | $^{n+1}P_{r}$ | (c) | $^{n+1}P_{r+1} \\$ | (d) | $^{n+1}P_{r\!-\!1}$ | | |
| 28. | Numbe other is | er of arrangements of | of letters | s of the word STRA | NGE in | which the vowels are | e never | separated from each | | |
| | (a) | 1440 | (b) | 3600 | (c) | 5040 | (d) | None of these | | |
| 29. | Numbe | er of distinct (disting | guishable | e) permutations of lett | ters of th | e word MISSISSIPP | [is | | | |
| | (a) | $\frac{(11)!}{(4+4+2)!}$ | (b) | $\frac{(11)!}{2(4!)^2}$ | (c) | (11)! | (d) | None of these | | |
| 30. | If $^{n+3}P_6$ | $: {}^{n+2}P_4 = 14:1$, then | n : n = | | | | | | | |
| | (a) | 2 | (b) | 4 | (c) | 8 | (d) | 6 | | |





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JB 2 MR BATCH PHYSICS : DCT ANSWER KEY

Topic: Work Energy Power

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

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JB 2 MR BATCH MATHEMATICS : DCT ANSWER KEY Topic: Permutation

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