SECTION - I

Straight Objective Type

This section contains multiple choice questions. Each question has 4 choices (A), (B), (C), (D), out of which ONLY ONE is correct. Choose the correct option.

1. *If the force acts at right angles to the direction of motion of a body, the work done by the force on the body will be*
(a) W= Fs (b) W= F/s (c) W= s/F (d) Zero

2. *When an object is lifted up, the work done by the gravitational force is considered as*
(a) positive (b) negative (c) +ve (or) -ve (d) zero

3. *A gas in a cylinder is compressed, the work done by the compressing force is considered as*
(a) positive (b) negative (c) +ve (or) -ve (d) zero

4. *1 Newton metre=*
(a) 10^5 *erg (b)* 10^6 *erg (c)* 10^7 *erg (d)* 10^8 *erg*

5. *A man of the mass 60 kg pushes a concrete wall, the work done by the man is*
(a) 60 J (b) 600 J (c) 6 J (d) zero

6. *1 electron volt is equal to*
(a) 1.6×10^{-12} *J* *(b)* 1.6×10^{-12} *erg*
(c) 1.76×10^{-19} *J* *(d)* 36×10^5 *J*

7. *The energy consumed per second is*
(a) Power (b) work (c) energy (d) capacity

8. *The product of force and velocity and the cosine angle between them is*
(a) power (b) work (c) energy (d) capacity

9. *The smallest unit of energy*
(a) joule (b) calorie (c) erg (d) electron volt

10. *The energy possessed by a bended bow is*
(a) potential energy (b) kinetic energy
(c) tension (d) pressure

11. *If two bodies of different masses have the same K.E. then the relation between momentum and mass will be*

(a) $p \propto \sqrt{m^3}$ *(b)* $p \propto 1/\sqrt{m}$ *(c)* $p \propto \sqrt{M}$ *(d)* $p \propto m$

12. *If two bodies have the same momentum but they have different masses then the variation of the kinetic energy with the mass will be*

(a) $E \propto \sqrt{M}$ *(b)* $E \propto 1/\sqrt{m}$ *(c)* $E \propto m$ *(d)* $E \propto \frac{1}{m}$

13. *What happens to K.E. of a body when 3/4th of mass is removed and its velocity is doubled*

(a) becomes 4 times *(b) becomes 1/4 times*

(c) becomes 1/2 times *(d) no change*

14. *A force of 16 N acts on a body of mass 90 kg for 2 min., if the body is initially at rest, the final velocity of it is*

(a) $20.36\ ms^{-1}$ *(b)* $21.36\ ms^{-1}$ *(c)* $22.36\ ms^{-1}$ *(d)* $23.36\ ms^{-1}$

15. *A body of mass 225 kg is acted upon by a force of 15 N for 5 minutes. The body is initially at rest, the displacement covered by it within this time is*

(a) 6.03 km *(b) 4.03 km* *(c) 3 km* *(d) 4.015 km*

16. *A force of 19.6 kgf is acting on a body of mass 9.8 kg initially at rest. If the force acts for 10 seconds, the change in its momentum is*

(a) $196\ kg\ ms^{-1}$ *(b)* $19.6\ kg\ ms^{-1}$

(c) $1.96\ kg\ ms^{-1}$ *(d)* $1960\ kg\ ms^{-1}$

17. *A body starts from rest and accelerates uniformly at* $0.2\ ms^{-2}$ *for 1 minute 40 seconds and collides a rigid wall and interacts for 0.1 seconds, if mass of the body 140 kg, the force exerted by it on the wall is*

(a) 28 N *(b) 280 N* *(c) 2800 N* *(d) 28000 N*

18. *A bullet of mass 30 g loses 80% of its velocity when it comes out from a sand bag within 0.3 seconds. If its initial velocity of penetration is* $25\ ms^{-1}$*, the magnitude of resistive force acting on it is*

(a) 20 N *(b) 2 N* *(c) 0.2 N* *(d) 0.02 N*

19. *A bullet of mass 20 g loses 80% of its initial velocity while penetrating through a wooden plank of width 5 cm, if its initial velocity is 90 kmph, the magnitude of resistive force is*
(a) 4.5 N (b) 120 N (c) 450 N (d) 45 kgf

20. *A truck starts from rest and rolls down a hill with a constant acceleration. It travels a distance of 200 m with in 8 seconds. If the mass of the truck is 5 metric tonnes the force acting on it is*
(a) 31250 N (b) 3125 N (c) 312.5 N (d) 31.25 N

21. *A force of 4 N gives a mass* m_1 *an acceleration of* $6\ ms^{-2}$ *and a mass* m_2 *an acceleration of* $12\ ms^{-2}$. *The acceleration that is produced by the same force if the bodies are tied together is*
(a) $1\ ms^{-2}$ *(b)* $2\ ms^{-2}$ *(c)* $3\ ms^{-2}$ *(d)* $4\ ms^{-2}$

22. *A certain force caging on a body produces an acceleration of* $6\ ms^{-2}$ *and the same force actign on other body produces an acceleration of* $8\ ms^{-2}$. *If the two bodies are connected together and the same force acts, the acceleration produced is*
(a) $5.42\ ms^{-2}$ *(b)* $4.42\ ms^{-2}$ *(c)* $3.42\ ms^{-2}$ *(d)* $2.42\ ms^{-2}$

23. *A body acquires an acceleration of* $0.6\ ms^{-2}$ *due to the application of a force of 36 kgf. If the force is reduced to half of its initial value the acceleration of the body will be*
(a) $1.2\ ms^{-2}$ *(b)* $0.9\ ms^{-2}$ *(c)* $0.6\ ms^{-2}$ *(d)* $0.3\ ms^{-2}$

24. *An object acquires an acceleration of* $1.4\ ms^{-2}$ *due to the application of a force. If the force is raised by 300%, its acceleration will be*
(a) $5.6\ ms^{-2}$ *(b)* $4.2\ ms^{-2}$ *(c)* $2.8\ ms^{-2}$ *(d)* $1.4\ ms^{-2}$

25. *An object acquires on acceleration of* $0.9\ ms^{-2}$ *due to the application of a force. If the force is doubled, its new acceleration will be*
(a) $0.45\ ms^{-2}$ *(b)* $0.9\ ms^{-2}$ *(c)* $1.8\ ms^{-2}$ *(d)* $2.7\ ms^{-2}$

26. *A body of mass 22 kg will have a weight of*
(a) 22 N (b) 22 dyne (c) 22 kg wt (d) 220 kg wt

27. *A force 200 kgf acts on a body of mass 900 kg, its acceleration will be*
(a) $2.22\ ms^{-2}$ *(b)* $3.33\ ms^{-2}$ *(c)* $4.44\ ms^{-2}$ *(d)* $5.55\ ms^{-2}$

28. *A hammer of mass 0.4 kg moves with a uniform acceleration of* $5.0\ ms^{-2}$ *for 1.6 seconds and exerts a force on the nail, if the time of interaction of nail and hammer is 0.01 seconds, the force acting on the nail is*
(a) 8 N (b) 80 N (c) 320 N (d) 8000 N

29. *A constant retarding force of 60 N is applied on a body of mass 15 kg moving initially with a speed of 36 kmph. How long does the body take to stop.*
(a) 2.5 s (b) 3 s (c) 5 s (d) 6 s

30. *A constant accelerating force of 60 N is applied on a body of mass 120 kg moving initially with a speed of 36 kmph. The final velocity of the body after 5 s is*
(a) $10\ ms^{-1}$ *(b)* $12.5\ ms^{-1}$ *(c)* $15\ ms^{-1}$ *(d)* $17.5\ ms^{-1}$

31. *A constant force acting on a body of mass 3 kg changes its sped from* $5\ ms^{-1}$ *to* $25\ ms^{-1}$ *in 100 seconds. The magnitude of the force acting is*
(a) 0.06 kgf (b) 0.06 N (c) 0.6 kgf (d) 6 N

32. *A hammer weighing 1 kg moving with a speed of* $10\ ms^{-1}$ *strikes the head of a nail during it 10 cm into a wall, the time interval of the impact is*
(a) 2 s (b) 0.2 s (c) 0.02 s (d) 0.002 s

33. *A machine gun fires 120 bullets per second each of mass 20 g with a speed of* $800\ ms^{-1}$*. The magnitude of the force, that is to be exerted by the person on the gun to hold it properly is*
(a) 172 kgf (b) 192 kgf (c) 220 kgf (d) 242 kgf

34. *A force of 6 N acts on a body of mass 3 kg produces a displacement of 10 m to it in its own direction, the work done by it is*
(a) 18 J (b) 30 J (c) 60 J (d) 36 J

35. *A body of mass 24 kg is lifted vertically upto a height 4 m, from the ground, the potential energy of the body at that point is*
(a) 960 J (b) 60 J (c) 480 J (d) 240 J

36. *A body of mass 5 kg is moving with an acceleration of* $5\ ms^{-2}$ *gets a displacement of 2 m, the work done by the force is*
(a) 25 J (b) 50 J (c) 75 J (d) 100 J

37. *A body is acted upon by a force of 25 N acquires a uniform acceleration*

of $2.5\ ms^{-2}$ *and covers a distance of 10 m in the direction of the force. If the body starts from rest, the kinetic energy acquired by it is*

(a) 25 J *(b) 250 J* *(c) 75 J* *(d) 100 J*

38. *A body of mass 4 kg has a momentum of* $20\ kg\ ms^{-1}$*, its kinetic energy is*

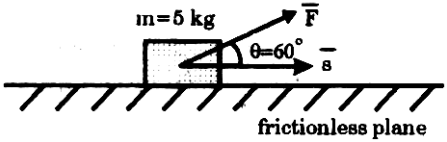
(a) 25 J *(b) 50 J* *(c) 75 J* *(d) 100 J*

39. *An electron is accelerated from rest through a region of potential difference 1 volt, the raise in its kinetic energy is* $\left(e^{-} = 1.6\times10^{-19} c\right)$

(a) $1.6\times10^{-16}\ J$ *(b)* $1.6\times10^{-19}\ J$

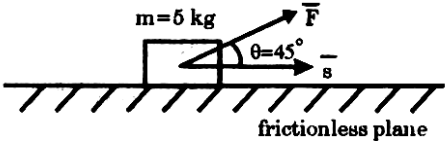
(c) $1.6\times10^{-22}\ J$ *(d)* $1.6\times10^{-25}\ J$

40. *A force of 5 N acts on an object of mass 5 kg as shown. If object gets a displacement of 5 m in the horizontal direction the work done by the force is*



(a) 12.5 J *(b) 25 J* *(c) 37.5 J* *(d) 50 J*

41. *A force of* $7\sqrt{2}\,N$ *acts on an object of mass 5 kg as shown. If the body gets a horizontal displacement of 5 m, the work done on it is*



(a) 25 J *(b) 35 J* *(c) 45 J* *(d) 55 J*

42. *The kinetic energy of a body changes from 12 J to 60 J, due to the action of a force of 5 N on an object of mass 4 kg. The work done by the force is*

(a) 24 J *(b) 36 J* *(c) 48 J* *(d) 60 J*

43. *The total energy of a body of mass 12 kg, projected vertically up from the ground is 240 J. The maximum height reached by it is (take* $g = 10\ ms^{-2}$*)*

(a) 0.2 m (b) 2 m (c) 20 m (d) 12 m

44. A body lifts an object of mass 0.3 kg to height of 4 m within 1.2 seconds. The power exerted by him is
(a) 5 watt (b) 10 watt (c) 15 watt (d) 20 watt

45. 1 kwh=
(a) $36\times10^3\ J$ (b) $36\times10^4\ J$ (c) $36\times10^5\ J$ (d) $36\times10^6\ J$

46. A body of mass 44 kg is moving at a velocity of $10\ ms^{-1}$ to bring it to rest in 10 m the work done is
(a) 22 J (b) 220 J (c) 2200 J (d) 22000 J

47. Water of 1000 lt lifted within 10 minutes to a height of 18 m, by a pump. The power of the pump is ($g=10\ ms^{-2}$)
(a) 30 watt (b) 300 watt (c) 3 watt (d) 0.3 watt

48. A 500 kg cloth bag is pulled up a smooth plane 6 m long to platform 4 m above the ground. The work done is
(a) $2\times10^2\ J$ (b) $2\times10^3\ J$ (c) $2\times10^4 J$ (d) $2\times10^5\ J$

49. An aircraft develops a power of 250 k watt. If the velocity is $150\ ms^{-1}$, the force ejected by its engine is
(a) 0.16667 N (b) 1.6667 N (c) 16.667 N (d) 1666.7 N

50. The power of a pump which can pump 100 kg of water to a height of 150 m 20 s is $(g=9.8\ ms^{-2})$
(a) 735 watt (b) 7350 watt (c) 73.5 watt (d) 7.35 watt

51. Water jet of 2 cm^2 area of cross-section strikes of wall normally with a velocity of $20\ ms^{-1}$ and fall freely. The magnitude force exerted on the wall is (density of water $=1000\ kgm^{-3}$)
(a) 40 N (b) 60 N (c) 80 N (d) 100 N

52. A machine gun fires 60 bullets each of mass 10 gm with a velocity of $100\ ms^{-1}$ in one minute. The power of the gun is
(a) 50 W (b) 500 W (c) 5000 w (d) 50000 W

53. A girl weighing 45 kg jumps to a height of $\frac{1}{3}$ m at the rate 10 times per

minute. The power at which she is expending the energy is
(a) 25 W (b) 50 W (c) 75 W (d) 100 W

SECTION - II

Assertion - Reason Questions

This section contains certain number of questions. Each question contains STATEMENT-1 (Assertion) and STATEMENT - 2 (Reason). Each question has 4 choices (a), (b), (c) and (d) out of which ONLY ONE is correct. Choose the correct option.

54. *STATEMENT-1: A body can have kinetic energy without momentum*
because

STATEMENT - 2: A body executing motion only can have momentum and kinetic energy

(a) Statement - 1 is True, Statement - 2 is True; Statement - 2 is a correct explanation for statement - 1

(b) Statement - 1 is True, Statement - 2 is True; Statement - 2 is NOT a correct explanation for Statement - 1

(c) Statement - 1 is True, Statement - 2 is False

(d) Statement - 1 is False, Statement - 2 is True

55. *STATEMENT-1: The area of force-displacement curve gives work.*
because

STATEMENT - 2: The work done $W = FS\cos\theta$

(a) Statement - 1 is True, Statement - 2 is True; Statement - 2 is a correct explanation for statement - 1

(b) Statement - 1 is True, Statement - 2 is True; Statement - 2 is NOT a correct explanation for Statement - 1

(c) Statement - 1 is True, Statement - 2 is False

(d) Statement - 1 is False, Statement - 2 is True

56. *STATEMENT-1: The work done by a force is a scalar quantity.*
because

STATEMENT - 2: The work done is the product of magnitude of force and magnitude of displacement and the cosine angle between them.

(a) Statement - 1 is True, Statement - 2 is True; Statement - 2 is a correct explanation for statement - 1

(b) Statement - 1 is True, Statement - 2 is True; Statement - 2 is NOT a correct explanation for Statement - 1

(c) Statement - 1 is True, Statement - 2 is False

(d) Statement - 1 is False, Statement - 2 is True

57. *STATEMENT-1: The work done by a force is zero, if the force acts right angles to the surface of a body.*
because

STATEMENT - 2: The work done by the force becomes zero, if the angle between force and displacement is 90^o

(a) Statement - 1 is True, Statement - 2 is True; Statement - 2 is a correct explanation for statement - 1

(b) Statement - 1 is True, Statement - 2 is True; Statement - 2 is NOT a correct explanation for Statement - 1

(c) Statement - 1 is True, Statement - 2 is False

(d) Statement - 1 is False, Statement - 2 is True

58. *STATEMENT-1: The work is said to be done by a force if the force can produce (some) displacement to the body in any direction on which the force is acting.*
because

STATEMENT - 2: Work done is the product of the displacement and the component of force in the direction of displacement.

(a) Statement - 1 is True, Statement - 2 is True; Statement - 2 is a correct

explanation for statement - 1

(b) Statement - 1 is True, Statement - 2 is True; Statement - 2 is NOT a correct explanation for Statement - 1

(c) Statement - 1 is True, Statement - 2 is False

(d) Statement - 1 is False, Statement - 2 is True

59. *STATEMENT-1: Power can be expressed as the energy consumed per second.*
because

STATEMENT - 2: Power is the rate of doing work.

(a) Statement - 1 is True, Statement - 2 is True; Statement - 2 is a correct explanation for statement - 1

(b) Statement - 1 is True, Statement - 2 is True; Statement - 2 is NOT a correct explanation for Statement - 1

(c) Statement - 1 is True, Statement - 2 is False

(d) Statement - 1 is False, Statement - 2 is True

60. *STATEMENT-1: The work done by the resultant force acting on a body is equal to the change in the kinetic energy of the body.*
because

STATEMENT - 2: The work done on a body always produces a change in its kinetic energy.

(a) Statement - 1 is True, Statement - 2 is True; Statement - 2 is a correct explanation for statement - 1

(b) Statement - 1 is True, Statement - 2 is True; Statement - 2 is NOT a correct explanation for Statement - 1

(c) Statement - 1 is True, Statement - 2 is False

(d) Statement - 1 is False, Statement - 2 is True

61. *STATEMENT-1: When a body is lifted to a certain height against*

gravitational force on it, then there will be a rise in its potential energy.
because

STATEMENT - 2: The potential energy of a body is the energy acquired by it due to its state and position.

(a) Statement - 1 is True, Statement - 2 is True; Statement - 2 is a correct explanation for statement - 1

(b) Statement - 1 is True, Statement - 2 is True; Statement - 2 is NOT a correct explanation for Statement - 1

(c) Statement - 1 is True, Statement - 2 is False

(d) Statement - 1 is False, Statement - 2 is True

SECTION - III

Linked Comprehension Type

This section contains paragraphs. Based upon each paragraph multiple choice questions have to be answered. Each question has 4 choices (a), (b), (c) and (d), out of which ONLY ONE is correct. Choose the correct option.

A pump can hoist 9000 kg of coal per hour from a mine 120 m deep. The efficiency of the pump is 75%

62. *The weight of the coal lifter per hour is*
(a) 9000 N *(b) 9000 kg wt* *(c) 900 kgwt* *(d) 900 kgf*

63. *The work done in lifting 9000 kg of coal is*
(a) 1058.4×10^4 *J* *(b)* 1058.4×10^3 *J*
(c) 1058.4×10^2 *J* *(d)* 1058.4 *J*

64. *The actual power of the pump is*
(a) 39.2 W *(b) 392 W* *(c) 3920 W* *(d)* $392\times10^2 W$

A man of mass 60 kg climbs up a tower of height 50 m in 5

minutes

65. *The weight of the person is*
(a) 60 kg wt *(b) 60 gf* *(c) 60 N* *(d) 60 gwt*

66. *The work done by the person climbing the tower is* $\left(g = 10\ ms^{-2}\right)$
(a) $3\times10^{2}\ J$ *(b)* $3\times10^{3}\ J$ *(c)* $3\times10^{4}\ J$ *(d)* $3\times10^{5}\ J$

67. *The power exerted by him is* $\left(g = 10\ ms^{-2}\right)$
(a) 10 W *(b) 100 W* *(c) 1000 W* *(d) 1 W*

A machine gun fires 360 bullets per minute. The mass of the each bullet is 10 g and moves with a velocity of $400\ ms^{-1}$

68. *The momentum imparted in each bullet is*
(a) $4\ kg\ ms^{-1}$ *(b)* $0.4\ kg\ ms^{-1}$
(c) $0.04\ kg\ ms^{-1}$ *(d)* $40\ kg\ ms^{-1}$

69. *The power of the machine gun is*
(a) 2400 W *(b) 3600 W* *(c) 4800 W* *(d) 6000 W*

70. *The force exerted by the soldier to hold the gun is*
(a) 12 N *(b) 24 N* *(c) 36 N* *(d) 48 N*

A bomb of mass 20 kg is dropped from a helicopter stationary in air at a height of 1 km above the ground

71. *The kinetic energy of the bomb just before reaching the ground is*
(a) $2\times10^{3}\ J$ *(b)* $2\times10^{4}\ J$ *(c)* $2\times10^{5}\ J$ *(d)* $2\times10^{6}\ J$

72. *The potential energy of the bomb while dropping is*
(a) $2\times10^{6}\ J$ *(b)* $2\times10^{5}\ J$ *(c)* $2\times10^{4}\ J$ *(d)* $2\times10^{3}\ J$

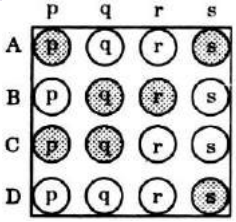
73. *The total energy of the bomb at any point of its path is*
(a) $2\times10^{3}\ J$ *(b)* $2\times10^{5}\ J$ *(c)* $2\times10^{7}\ J$ *(d)* $2\times10^{9}\ J$

SECTION - IV

Matrix - Match Type

This section contains Matrix-Match type questions. Each question contains statements given in two columns which have to be matched. Statements (a, b, c, d) in Column I have to be matched with statements (p, q, r, s) in Column II. The answers to these questions have to be appropriately bubbled as illustrated in the following example.

If the correct matches are a-p, a-s, b-q, b-r, c-p, c-q and d-s, then the correctly bubbled 4 x 4 matrix should be as follows:



74.

Column I	***Column II***
(a) Mechanical energy	*(p) joule*
(b) Potential energy	*(q)* $\frac{(\text{momentum})^2}{2(\text{mass})}$
(c) Kinetic energy	*(r) (mass) (height) g*
(d) Capacity to do work	*(s) Slalar*

75.

Column I	***Column II***
(a) $FV\cos\theta$	*(p) work done*
(b) $FV\cos\theta$	*(q) power*
(c) $\frac{mgh}{t}$	*(r) joule*

(d) change in kinetic energy (s) watt

76.

Column I	**Column II**
(a) Work	(p) joule
(b) Energy	(q) rate of doing work
(c) Power	(r) scalar
(d) Energy consumed per second	(s) erg

77.

Column I	**Column II**
(a) Nm	(p) joule
(b) 10^7 erg	(q) work
(c) Energy	(r) capacity to do work
(d) Change in K.E.	(s) torque (or) moment of force

78.

Column I	**Column II**
(a) 1 kwh	(p) $1.6\times10^{-19}\ J$
(b) 1 eV	(q) kinetic energy
(c) $\frac{P^2}{2m}$	(r) commercial unit of electric energy consumption
(d) joule	(s) $36\times10^5\ J$

SECTION - I
Straight Objective Type

1. *We have* $W = FS\cos\theta$

$(F)(S)\cos 90^0$

$\therefore W = 0$

Hence (d) is the correct answer.

2. *Here, work is done opposite to the direction of gravitational force. So it is negative.*

Hence (b) is the correct answer.

3. *Here the compressing force and the displacement of the piston are directed in the same direction. So the work done is positive.*

Hence (a) is the correct answer.

4. $1Nm = 10^5 \text{ dyne} \times 100\,cm$

$= 10^7 \text{ erg}$

Hence (c) is the correct answer.

5. *Here, there is no displacement to the wall,*

$W = FS\cos\theta$

$= (F)(0)\cos\theta$

$\therefore W = 0$

Hence (d) is the correct answer.

6. $1eV = (1.6\times10^{-19}\,C)(1V)$

$= 1.6\times10^{-19}\,J$

$\therefore 1eV = 1.6\times10^{-12}\,erg$

Hence (b) is the correct answer.

7. $Power = \frac{\text{Energy}}{\text{time}}$

Hence (a) is the correct answer.

8. $P = \frac{W}{t}$

$= \frac{Fs\cos\theta}{t}$

$\because \; p = F\upsilon\cos\theta$

Hence (a) is the correct answer.

9. *Because* $1eV = 1.6\times10^{-19}\,J$

Hence (d) is the correct answer.

10. *It is potential energy which comes out due to the state of bow.*

Hence (a) is the correct answer.

11. $K.E = \frac{p^2}{2m}$

in case of two bodies of same K.E.

$\frac{p_1^2}{2M_1} = \frac{p_2^2}{2M_2} \Rightarrow \frac{p_1}{p_2} = \sqrt{\frac{m_1}{m_2}} \Rightarrow p\alpha\sqrt{m}$

Hence (c) is the correct answer.

12. $K.E. = \frac{p^2}{2M}$

in case of two bodies of same momentum

$E = \frac{p^2}{2M} \Rightarrow E\alpha\frac{1}{\sqrt{m}}$

Hence (d) is the correct answer.

13. $E = \frac{1}{2}\left(\frac{1}{4}m\right)\left(2\upsilon^2\right)$

$= \frac{1}{2} \times \frac{1}{4} m \times 4\upsilon^2$

$E = \frac{1}{4} m\upsilon^2$

Hence (d) is the correct answer.

14. $F = 16\ N\ ;\ m = 90\ kg\ ;\ t = 120\ ;$

$u = 0;\ v = ?$

$v = u + \frac{F}{m}t$

$= 0 + \frac{16N}{90kg} \times 120s$

$= 21.36 ms^{-1}$

Hence (b) is the correct answer.

15. $m = 225kg;\ F = 15N; t = 300s;$

$u = 0;$

$s = ut + \frac{1}{2}\frac{F}{m}t^2$

$= 0 + \frac{1}{2} \times \frac{15N}{225kg} \times 300 \times 300s^2$

$= 3000m = 3km$

Hence (c) is the correct answer.

16. $F = 19.6\ kgf = 196\ N$

$m = 9.8\ kg;\ u = 0;\ t = 10\ s$

$\Delta p = ?$

$\Delta p = F \times t$

$= 196N \times 10s$

$1960\,kgms^{-1}$

Hence (d) is the correct answer.

17. $u = 0;\ a = 0.2\,ms^{-2};\ t = 100s;$

$\Delta t = 0.1s;\ m = 140\ kg;\ F = ?$

$v = 0 + \left(0.2ms^{-2}\right)\left(100s\right)$

$= 20\,ms^{-1}$

$F = ma$

$140\,kg\left(\dfrac{20\,ms^{-1} - 0\,ms^{-1}}{0.1s}\right)$

$= 28 \times 10^{3}\,N$

Hence (d) is the correct answer.

18. $m = 30\ g;\ \ u = 25ms^{-1};$

$v = \dfrac{20}{100}u = \dfrac{20}{100} \times 25ms^{-1}$

$= 5\ ms^{-1}$

$t = 0.3s;\ F = m\left(\dfrac{\upsilon - u}{t}\right)$

$F = \left(30m \times 10^{-3}kg\right)\left(\dfrac{5ms^{-1} - 25\,ms^{-1}}{0.3s}\right)$

$\Rightarrow F = -2N$

Resistive force = 2N

Hence (b) is the correct answer.

19. $m = 20g = 0.02kg; s = 0.05m$

$u = 25ms^{-1}; v = 5ms^{-1}$

$a = \dfrac{\upsilon^2 - u^2}{2s}$

$$= \frac{(25-625)m^2s^{-2}}{2\times 0.05m}$$

$$a = -6000\,ms^{-2}$$

$$\therefore\ F = ma$$

$$= (0.02kg)\left(-6\times 10^3 ms^{-2}\right)$$

$$F = -120\,N$$

$\therefore$ *resistive force* $\therefore$

Hence (b) is the correct answer.

20. $u = 0;\ t = 8s;\ s = 200m$

$$\Rightarrow\ s = \frac{1}{2}at^2$$

$$s = \frac{1}{2}\times\frac{F}{m}t^2$$

$$200m = \frac{1}{2}\times\frac{F}{5\times 10^3 kg}\times(8s)^2$$

$$\Rightarrow\ \frac{4\times 10^2\times 5\times 10^3 kgm}{64s^2} = F$$

$$= F = 31250\,N$$

Hence (a) is the correct answer.

21. $F = 4N;\ a_1 = 6ms^{-2};$

$$here\ m_1 = \frac{4n}{6ms^{-2}};\ m_2 = \frac{4n}{12\ ms^{-2}}$$

$$m_1 = \frac{2}{3}kg;\ m_2 = \frac{1}{3}kg$$

$$now\ (m_1 + m_2) = 1kg;\ F = 4N$$

$$\Rightarrow\ \alpha = \frac{F}{(m_1+m_2)} = \frac{4N}{1kg} = 4ms^{-2}$$

Hence (d) is the correct answer.

22. $a_1 = 6 ms^{-2}$

$a_2 = 8 ms^{-2}$

let the force is $'F'$

$m_1 = \frac{F}{6}; m_2 = \frac{F}{8}$

now $a = \frac{F}{m_1 + m_2} = \frac{F}{\frac{F}{6} + \frac{F}{8}}$

$= \frac{F}{\frac{4F + 3F}{24}}$

$\therefore \alpha = \frac{24}{7} = 3.42 ms^{-2}$

Hence (c) is the correct answer.

23. $a_1 = 0.6 ms^{-2}; F = 36\ kgf = 360 N$

$F_1 = 180 N;\ a^1 = ?$

if $'m'$ *mass is constant* $a\ \alpha\ F$

$\Rightarrow \frac{a^1}{a} = \frac{F^1}{F} \Rightarrow a^1 = 0.3\ ms^{-2}$

Hence (d) is the correct answer.

24. $\alpha_1 = 1.4\ ms^{-2}\ ;\ \alpha_2 = ?$

$F_1 = F\ ;\ F_2 = 4F$

$\alpha_2 = \frac{F_2}{F_1} \times a_1 = 4 \times 1.4\ ms^{-2}$

$= 5.6\ ms^{-2}$

Hence (a) is the correct answer.

25. $\alpha_1 = 0.9\ ms^{-2};\ \alpha_2\ ?$

$F_1 = F; F_2 = 2F$

$a_2 = \frac{F_2}{F_1} \times a_1 = 2 \times 0.9 ms^{-2}$

$1.8 ms^{-2}$

Hence (c) is the correct answer.

26. $w = mg$

$= (22\,kg)(9.8 ms^{-2})$

$w = 22\,kgwt$

Hence (c) is the correct answer.

27. $a = \frac{F}{m} = \frac{2000N}{900\,kg} = 2.22 ms^{-2}$

Hence (a) is the correct answer.

28. $m = 0.4kg; u = 0;$

$\upsilon = u + at$

$= 0 + (5 ms^{-2})(1.6s) = 8 ms^{-1}$

$f = m\left(\frac{0-\upsilon}{\Delta t}\right) = (0.4kg)\left(\frac{0-8 ms^{-1}}{0.01s}\right)$

$= 320\,N$

Hence (c) is the correct answer.

29. $a = -\frac{F}{m} = -\frac{60N}{15kg} = -4 ms^{-2}$

$u = 10 ms^{-1}; v = 0;$

$t = \frac{(0-10) ms^{-1}}{-4 ms^{-2}} = 2.5s$

Hence (a) is the correct answer.

30. $a = \frac{1}{2} ms^{-2} v = 10 + \frac{1}{2} \times 5$

$= 12.5 ms^{-1}$

Hence (b) is the correct answer.

31. $m = 3kg;\ u = 5\ ms^{-1};\ v = 25\ ms^{-1}$

$t = 100\ s;$

$F = ma$

$= (3kg)\left(\frac{25-5}{100s}\right) ms^{-1}$

$= \frac{3}{5} N \qquad = 0.6N$

$= 0.6 \times \frac{10}{10} N = 0.06\, kgf$

Hence (a) is the correct answer.

32. $m = 1\ kg; v = 0;\ u = 10\ ms^{-1}$

$s = 0.1m;$

$a = \frac{\upsilon^2 - a^2}{2s}, \qquad \therefore \alpha = \frac{0-100}{2 \times 0.1} = -500\ ms^{-2}$

$a \times \Delta t = \upsilon - u;$

$-500\ ms^{-2} \times \Delta t = 0 - 10\, ms^{-1}$

$\Delta t = \frac{-10\ ms^{-1}}{-500\ ms^{-2}} = 0.02\, s$

Hence (c) is the correct answer.

33. $F = nm\alpha$

$= \frac{120}{s} (20 \times 10^{-3} kg)(800\, ms^{-1} - 0)$

1920 N = 192 kgf.

Hence (b) is the correct answer.

34. $F = 6N;\ m = 3kg$

$W = \bar{F}.\bar{s} = Fs\cos\theta$

(6N) (10 m) (1)

= 60 J

Hence (c) is the correct answer.

35. $m = 24\ kg;\ h = 4m$

$P.E. = mgh = (24kg)(10ms^{-2})(4m)$

= 960 m

Hence (a) is the correct answer.

36. $m = 5kg;\ a = 5\ ms^{-2};\ s = 2m$

$w = F.s = mas$

$= (5\ kg)(5\ ms^{-2})(2\ m) = 50J$

Hence (b) is the correct answer.

37. $F = 25N;\ a = 2.5\ ms^{-2};\ s = 10\ m;$

$u = 0\ ms^{-1}; K.E. = ?$

K.E. = work done = F. s

= (25 N) (10 m) = 250 J

Hence (b) is the correct answer.

38. $m = 4kg;\ p = 20\ kgms^{-1};$

$$K.E. = \frac{p^2}{2m} = \frac{20 \times 20}{2 \times 4} = 50J$$

Hence (b) is the correct answer.

39. $1\ eV = 1.6 \times 10^{-19}\ J$

$(\because W = \Delta K.E. \Rightarrow \Delta K.E = Vq)$

Hence (b) is the correct answer.

40. $F = 5N\ ;\ m = 5kg;\ s = 5m$

$w = Fs\cos\theta = (5N)(5m)\cos 60^0$

$\therefore w = 12.5J$

Hence (a) is the correct answer.

41. $w = (7\sqrt{2}N)\ (5m)\ \cos 45^0$

$= 7 \times 5J \left(\because \cos 45^0 = \frac{1}{\sqrt{2}} \right)$

$w = 35J$

Hence (b) is the correct answer.

42. $\Delta K.E. = W \Rightarrow W = 60J - 12J = 48J$

Hence (c) is the correct answer.

43. $m = 12kg;\qquad E = 240\,J$

$P.E. = mgh$

$240\,J = (12\,kg)(10\,ms^{-2})h$

$\therefore h = 2m$

Hence (b) is the correct answer.

44. $p = \frac{mgh}{t} = \frac{(0.3kg)(10\,ms^{-2})4m}{1.2\,s}$

$= 10\,watt$

Hence (b) is the correct answer.

45. $1 = kwh = 10^3\,watt \times 3600s$

$= 36 \times 10^5\,J$

Hence (c) is the correct answer.

46. $W = \Delta\ K.E.$

$= \frac{1}{2}m\upsilon^2 - \frac{1}{2}mu^2$

$= 0 - \frac{1}{2} \times 44\ kg \times 100\ m^2 s^{-2} = 2200\ J$

Hence (c) is the correct answer.

47. $m = 1000 kg\ ;\ h = 18 m$

$$p = \frac{10^3 \times 10 \times 18}{10 \times 60 s} = 300\, watt$$

Hence (b) is the correct answer.

48. $W = (500 kg)(10 ms^{-2})(4 m)$

$= 2 \times 10^4\ J$

Hence (c) is the correct answer.

49. $p = 250 kw$

$p = FV$

$250 \times 10^3\ watt = F\ (150\ ms^{-1})$

$\therefore\ F = 1666.7\ N$

Hence (d) is the correct answer.

50. $$P = \frac{(100 kg)(9.8 ms^{-2})(150 m)}{20 s}$$

$= 7350\ watt$

Hence (b) is the correct answer.

51. $A = 2 cm^2 = 2 \times 10^{-4} m^2$

$u = 20 ms^{-1};\ v = 0;$

$F = ma$

$=$ *(Volume) (density)a*

$$= (A \times l)(p)\left(\frac{\upsilon - u}{t}\right)$$

$$= A \times \frac{l}{t} \times r_w \times (v - u)$$

$$= -2 \times 10^{-4} m^2 \times 20 ms^{-1} \times 10^3 kgm^{-3} \times 20 ms^{-1}$$

$$= -80\, N$$

here force exerted on the wall = 80 N

Hence (c) is the correct answer.

52. $p = \frac{w}{t} = \frac{\Delta K.E.}{t}$

$$= \frac{\frac{1}{2} \times 10 \times 10^{-3} kg \times 10^4 m^2 s^{-2} \times 60}{60 s}$$

= 50 watt

Hence (a) is the correct answer.

53. *m = 45 kg*

$$h = \frac{1}{3} m$$

$$p = \frac{mgh}{60} \times 10$$

$$= \frac{(45 kg)(10 ms^{-1})\left(\frac{1}{3} m\right)10}{60 s}$$

$$= \frac{1500 J}{60 s} = 25 watt$$

Hence (a) is the correct answer.

SECTION - II

Assertion - Reason Questions

54. *Because statement -1 is wrong. But the statement – 2 is true.*
Hence (d) is the correct answer.

55. *Because both statements are correct and statement – 2 explains statement -1.*
Hence (a) is the correct answer.

56. *Because statement – 2 explains the statement -1*
Hence (a) is the correct answer.

57. *Because statement – 1 is wrong.* $W = Fs\cos\theta$ *if* $\theta = 90^0 \Rightarrow W = Fs\cos 90^0 = 0$
Hence (d) is the correct answer.

58. *Because if direction of displacement is perpendicular to direction of force, then no work is said to be done.*
Hence (d) is the correct answer.

59. *Because* $p = \frac{w}{t}(or)$

$$p = \frac{\text{energy consumed}}{\text{time}}$$

Hence (a) is the correct answer.

60. *Because statement – 2 is wrong.*
Hence (c) is the correct answer.

61. *Because P.E. = mgh*
Hence (a) is the correct answer.

SECTION - III

Linked Comprehension Type

62. $W = mg$

$= (9000\ kg)(9.8\ ms^{-2})$

$(\because 1\ kgwt = 9.8N)$

$= 9000\ kgwt$

Hence (b) is the correct answer.

63. $W = mgh$

$= (9000\ kg)(9.8\ ms^{-2})$

$(120\ m)$

$W = 1058.4 \times 10^4\ J$

Hence (a) is the correct answer.

64. $\frac{3}{4}p = \frac{1058.4 \times 10^4\ J}{3600\ s}$

$\therefore p = 3920\ watt$

Hence (c) is the correct answer.

65. $60\ kgwt$

Hence (a) is the correct answer.

66. $w = (60\ kg)(10\ ms^{-2})(50\ m)$

$= 3 \times 10^4\ J$

Hence (c) is the correct answer.

67. $p = \frac{W}{t} = \frac{3 \times 10^4\ J}{300\ s} = 100\ watt$

Hence (b) is the correct answer.

68. $p = mv = \left(10 \times 10^{-3}\right)\left(400\ ms^{-1}\right)$

$= 4\ kgms^{-1}$

Hence (a) is the correct answer.

69. $power = \dfrac{\Delta\ K.E.}{t}$

$= \dfrac{6 \times \frac{1}{2} \times 10 \times 10^{-3} \times 400 \times 400}{1s}$

$= 4800\ watt$

Hence (c) is the correct answer.

70. $F = \dfrac{\Delta p}{\Delta t} = \dfrac{6 \times 4\ kgms^{-1}}{1s} = 24N$

Hence (b) is the correct answer.

71. $K.E. = P.E. = mgh$

$= \left(20\ kg\right)\left(10\ ms^{-2}\right)\left(10^{3}\ m\right)$

$= 2 \times 10^{5}\ J$

Hence (c) is the correct answer.

72. $P.E. = 2 \times 10^{5}\ J$

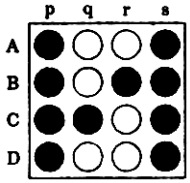
Hence (b) is the correct answer.

73. $T.E. = 2 \times 10^{5}\ J$

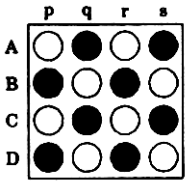
Hence (b) is the correct answer.

SECTION - IV
Matrix - Match Type

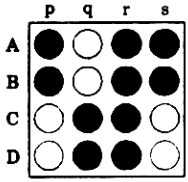
74.



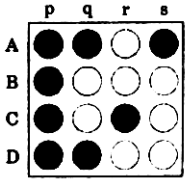
75.



76.



77.



78.