BIOLOGY I - SECTION A

1 A waxy thick layer which prevent water loss is
1. Cuticle
2. Guard cell
3. Epidermis
4. Stomata

2 The most important function of the trichomes is:
1. They prevent water loss due to transpiration
2. They prevent herbivory
3. They are sensory structures that decipher the wind velocity and direction
4. They play an important part in pollination of plants

3
Specialised epidermal cells surrounding the guard cells are called?
1. subsidiary cells
2. bulliform cells
3. lenticels
4. complementary cells

4 Mark the incorrect statement with respect to guard cells in stomata
1. In grasses these are dumb-bell shaped
2. They possess chloroplasts
3. Regulate opening and closing of stomata
4. Outer walls are thick and inner walls are thin in dicots

5
Vascular bundles in monocotyledons are considered closed because
1. a bundle sheath surrounds each bundle
2. cambium is absent
3. there are no vessels with perforations
4. xylem is surrounded all around by phloem

6 In radial vascular bundle xylem and phloem are present on _____radii and in an _____manner.
1. different and consecutive
2. same and alternate
3. different and alternate
4. same and consecutive

7 Dicot stem share a common feature with monocot stem that is both have
1. Well developed large pith
2. Conjoint vascular bundles
3. Open vascular bundles
4. Pericycle and endodermis

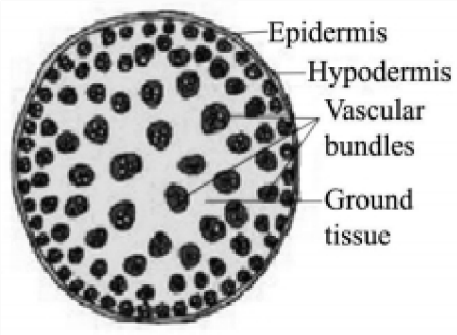
8 Casparian strips are barrel shaped cells in which tangential and radial walls are impermeableto water because of
1. suberin deposition
2. cellulose deposition
3. cutin deposition
4. casparin deposition

9 How many of the following constitute the stele?
Vascular bundles, pericycle, endodermis, pith, cortex, epidermis
1. 4
2. 3
3. 2
4. 5

10 The desert grasses, often curls their leaf to minimise water loss due to presence of
1. Spines
2. Palisade parenchyma
3. Bundle sheath cells
4. Bulliform cells

11 Water containing cavities in the vascular bundle is a characteristics feature of
1. Dicot roots
2. Monocot stems
3. Monocot leaves
4. Dicot stems

12 The diagram given below belongs to -



1. Dicot stem having conjoint and collateral vascular bundles
2. Monocot stem having conjoint and collateral vascular bundles
3. Dicot root with polyarch condition
4. Monocot root with radial vascular bundles

13 In Ground tissue system, parenchymatous cells are usually present in
1.cortex
2.pericycle
3. pith and medullary rays
4. All of the above

14 Which type of cells are not present in Phloem of monocot stem
(1)Companion cell
(2)sieve tubes
(3) Phloem parenchyma
(4) Phloem fibres

BIOLOGY I - SECTION B

15 Select incorrect statement with respect to the anatomy of monocot stem
1. Parenchymatous ground tissue is extended from hypodermis to center
2. Hypodermis is made of thick-walled living mechanical tissue
3. Vascular bundles are conjoint, collateral and closed with endarch xylem
4. Pith is absent

16 Rearrange the following zones as seen in the root in the vertical section and choose the correct option:
I. Root hair zone
II. Zone of meristems
III. Root cap zone
IV. Zone of maturation
V. Zone of elongation
Codes:
1. III, II, V, I, IV
2. I, II, III, IV, V
3. IV, V, I, III, II
4. V, IV, III, II, I

17 Match the Column-I and Column-II with Column-III:

Column-I	Column-II	Column-III
A. Marginal	I. 	a. Sunflower,Marigold
B. Axile	II. 	b. *Dianthus, Primrose*
C. Parietal	III. 	c. Mustard,Argemone
D. Free Central	IV. 	d. Chinarose, Tomato, Lemon
E. Basal	V. 	e. Pea

1. A - V, e; B - II, d; C - I, c; D - III, b; E - IV, a
2. A - I, e; B - II, d; C - III, c; D - IV, b; E - V, a
3. A - V, a; B - II, d; C - I, b; D - III, c; E - IV, e
4. A - V, a; B - III, b; C - II, d; D - I, e; E - IV, c

18 Veins of leaf in addition to acting as channels of transport of water, minerals and food materials also
1. Determine the extent of incision of the lamina
2. Provide rigidity to the leaf blade
3. Hold the leaf blade to light
4. Flutter the leaf in wind thus, helping in cooling of leaf and bringing fresh air

19 Identify the correct features of Mango and Coconut fruits.

(i)	In both, fruit is a drupe
(ii)	Endocarp is edible in both
(iii)	Mesocarp in Coconut is fibrous, and in Mango, it is fleshy
(iv)	In both, the fruit develops from the monocarpellary ovary

Select the correct option from below :
1. (i), (iii) and (iv) only
2. (i), (ii) and (iii) only
3. (i) and (iv) only
4. (i) and (ii) only

20 Pentamerous flower, superior ovary with the swollen axile placenta and epipetalous androecium is characteristics of
1. Liliaceae
2. Solanaceae
3. *Cucurbita*ceae
4. Malvaceae

BIOLOGY II - SECTION A

21 Which of the following sequence is correct in terms of abundance?
1. Neutrophils > Lymphocytes > Monocytes > Eosinophils > Basophils
2. Neutrophils > Lymphocytes < Monocytes > Eosinophils > Basophils
3. Neutrophils < Lymphocytes > Monocytes > Eosinophils > Basophils
4. Neutrophils > Lymphocytes > Monocytes < Eosinophils > Basophils

22 Different blood groups are due to:
1. Specific antigens on the surface of WBCs
2. Specific antibodies on the surface of RBCs
3. Specific antigens on the surface of RBCs
4. Specific type of haemoglobin in RBCs

23 Hemolytic disease of the newborn (HDN) may occur in the feotus of a second pregnancy if:
1. The mother is Rh^+ and the baby is Rh^-
2. The mother is Rh^+ and the baby is Rh^+
3. The mother is Rh^- and the baby is Rh^-
4. The mother is Rh^- and the baby is Rh^+

24 Platelets are formed from–
(1) Megakaryoblast
(2) Megakaryocyte
(3) Macrokaryoblast
(4) Macrophages

25 Thrombokinase performs a specific function in human body
Choose the correct option
1. Thrombin → Prothrombin
2. Fibrinogen → Fibrin
3. Fibrin → Fibrinogen
4. Prothrombin → Thrombin

26 During the initiation of coagulation of blood, the platelets are activated by–
(1) Thrombin
(2) Trauma
(3) Ca^{++}
(4) Thrombokinase

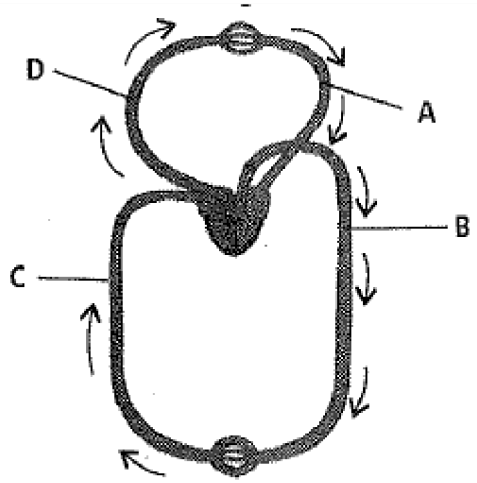
27 The inter-atrial septum in the human heart can be best described as:
1. A thin muscular wall
2. A thick muscular wall
3. A thin fibrous tissue
4. A thick fibrous tissue

28 Human Heart has SA node which makes it–
(1) myogenic heart
(2) neurogenic heart
(3) Digenic Heart
(4) Rhinogenic Heart

29 The passage of blood from right atrium to body is
(1) right atrium–right ventricle–pulmonary vein–body
(2) right atrium–right ventricle–pulmonary artery–lung
(3) right atrium– left ventricle–pulmonary vein–body
(4)right atrium–left ventricle–pulmonary artery–lung

30 Hepatic portal system connect
1. Liver and heart.
2. Liver and Kidney.
3. Liver and digestive tract.
4. Liver and spleen.

31 The given figure shows schematic plan of blood circulation in humans with labels A to D. Identify the labels along with their functions and select the correct option.



(1) C - Vena Cava - takes blood from body parts to right atrium, P_{CO2} = 45 mm Hg

(2) D - Dorsal aorta - takes blood from heart to body parts, P_{O2} = 95 mm Hg

(3) A - Pulmonary vein - takes impure blood from body parts to heart, P_{O2} = 60 mm Hg

(4) B - Pulmonary artery - takes blood from heart to lungs, P_{O2} = 90 mm Hg.

32 What percentage of ventricular filling is achieved by atrial contraction?
1. 30
2. 50
3. 70
4. 90

33 The pumping pressure of healthy heart is
(1) 120 mmHg
(2) 80 mmHg
(3) 140 mmHg
(4) 90 mmHg

34 Which of the following correctly explains a phase/event in cardiac cycle in a standard electrocardiogram?
1. QRS complex indicates atrial contraction
2. QRS complex indicates ventricular contraction
3. Time between S and T represents atrial systole
4. P-wave indicates the beginning of ventricular contraction

BIOLOGY II - SECTION B

35 Which of the following disorders of circulatory system is not correctly stated?
(1) Hypertension – A sustained blood pressure of 140/90 or above
(2) CAD – The lumen of coronary arteries become narrower due to deposits of calcium, fat, cholesterol and fibrous tissue
(3) Atherosclerosis – Heart muscle is suddenly damaged by inadequate blood supply
(4) Heart failure – Usually called congestive heart failure because congestion of lungs is one of the main symptoms of the disease

36 Choose the correct sequence during expiration
(i) Pressure increases in pulmonary cavity
(ii) Volume of thoracic cavity decreases
(iii) Expulsion of air from high pressure to low pressure
(iv) Decrease in volume of pulmonary cavity

1. i → ii → iii → iv
2. iv → i → iii → ii
3. ii → iv → i → iii
4. iii → iv → i → ii

37 Match the items given in Column I with those in Column II and select the correct option given below.

Column-I	Column-II
a. Inspiratory capacity	(i) IRV + EC
b. Vital capacity	(ii) TV + IRV
c. Residual volume	(iii) TLC –VC
d. Functional residual capacity	(iv) TLC – IC

(1) a(i), b(ii), c(iv), d(iii)
(2) a(iii), b(i), c(ii), d(iv)
(3) a(i), b(iii), c(ii), d(iv)
(4) a(ii), b(i), c(iii), d(iv)

38 Given below are the partial pressures (in mmHg) of oxygen and carbondioxide at different parts involved in diffusion in comparison to those in atmosphere.

Respiratory gas	O_2	CO_2
Atmospheric air	159	A
Alveoli	B	40
Body (deoxygenated)	40	C
Blood (Oxygenated)	D	40
Tissues	40	45

Choose the correct option with respect to the values of partial pressures (in mmHg) marked as A, B, C and D

	A	B	C	D
1.	0.3	104	40	52
2.	32	116	45	45
3.	0.3	104	45	95
4.	32	116	45	95

39 Match the following columns and select the correct option:

Column I		Column II	
(a)	Pneumotaxic Centre	(i)	Alveoli
(b)	O 2 Dissociation curve	(ii)	Pons region of the brain
(c)	Carbonic Anhydrase	(iii)	Haemoglobin
(d)	Primary site of exchange of gases	(iv)	R.B.C.

Options:	(a)	(b)	(c)	(d)
1.	(i)	(iii)	(ii)	(iv)
2.	(ii)	(iii)	(iv)	(i)
3.	(iii)	(ii)	(iv)	(i)
4.	(iv)	(i)	(iii)	(ii)

40 Aortic arch and carotid artery receptors cannot recognise changes in

1. CO_2 Concentration
2. O_2 Concentration
3. H^+ ions Concentration
4. All of these

CHEMISTRY - SECTION A

41 Which one of the following statements is false?

1.	Temperature is a state function.
2.	Work is a state function.
3.	Change in the state is completely defined when the initial and final states are specified.
4.	Work appears at the boundary of the system.

42 In an adiabatic process, no transfer of heat takes place between the system and its surroundings. The correct option for free expansion of an ideal gas under adiabatic condition from the following is -

1. $q = 0,\ \Delta T \neq 0,\ W = 0$
2. $q \neq 0,\ \Delta T = 0,\ W = 0$
3. $q = 0,\ \Delta T = 0,\ W = 0$
4. $q = 0,\ \Delta T = 0,\ W \neq 0$

43 The correct statement among the following is-

1.	The presence of reacting species in a covered beaker is an example of an open system.
2.	There is an exchange of energy as well as matter between the system and the surroundings in a closed system.
3.	The presence of reactants in a closed vessel made up of copper is an example of a closed system.
4.	The presence of reactants in a thermos flask or any other closed insulated vessel is an example of a closed system.

.

44 Work done is maximum in -

1. Isobaric work
2. Isothermal work
3. Isochoric work
4. Adiabatic work

45 Which of the following pairs correctly represents intensive property?

1. Entropy, Gibb's energy
2. Enthalpy, Heat capacity
3. Electrode potential, Vapour pressure
4. Resistance, Conductance

46 For the reaction :
$C_3H_8(g) + 5O_2(g) \rightarrow 3\,CO_2(g) + 4H_2O(l)$ at constant temperature, ΔH – ΔE is-
1. + RT
2. – 3RT
3. + 3RT
4. – RT

47 The bond energies of $C \equiv C$, C-H, H-H, and C=C are 198, 98, 103 and145 kcal respectively.
The enthalpy change of the reaction $HC \equiv CH + H_2 \rightarrow C_2H_4$ would be-
1. 48 kcal
2. 96 kcal
3. -40 kcal
4. -152 kcal

48 The ΔH for vaporization of a liquid is 20 kJ/mol. Assuming ideal behaviour, the change in internal energy for the vaporization of 1 mol of the liquid at $60^\circ C$ and 1 bar is close to:
1. 13.2 kJ/mol
2. 17.2 kJ/mol
3. 19.5 kJ/mol
4. 20.0 kJ/mol

49 The lattice energy of NaCl is 780 kJ mol^{-1}. The enthalpy of hydration of $Na^+(g)$ and $Cl^-(g)$ ions are -406 kJ mol^{-1} and -364 kJ mol^{-1}. The enthalpy of the solution of NaCl(s) is-
1. 23 kJ mol^{-1}
2. 10 kJ mol^{-1}
3. -10 kJ mol^{-1}
4. -82 kJ mol^{-1}

50 Match the following process with entropy change

Reaction	Entropy change
A. A liquid vaporizes	1. $\Delta S = 0$
B. Reaction is non-spontaneous at all temperatures and ΔH is positive	2. $\Delta S =$ positive
C. Reversible expansion of an ideal gas	3. $\Delta S =$ negative

Codes

	A	B	C
1.	2	3	1
2.	1	2	3
3.	1	3	2
4.	3	2	1

51 For $A \rightarrow B$, $\Delta H = 4\ kcal\ mol^{-1}$, $\Delta S = 10\ cal\ mol^{-1}\ K^{-1}$, the reaction is spontaneous when the temperature is:
1. 400 K
2. 300 K
3. 500 K
4. None of the above

52 The equilibrium constant for a reaction is 10. The value of ΔG° will be-
$(R = 8.314\ J\ K^{-1}\ mol^{-1}\ ;\ T = 300\ K)$
1. $-5.74\ kJ\ mol^{-1}$
2. $-5.74\ J\ mol^{-1}$
3. $+4.57\ kJ\ mol^{-1}$
4. $-57.4\ kJ\ mol^{-1}$

53 Equilibrium is represented by -
1. $\Delta H = 0$
2. $\Delta G_{Total}=0$
3. $\Delta S_{Total}=0$
4. $\Delta E=0$

54 When 1 g H_2 gas at S.T.P is expanded to twice its initial volume, then the work done is -
1. 22.4 L atm
2. 5.6 L atm
3. 11.2 L atm
4. 44.8 L atm

CHEMISTRY - SECTION B

55

Assertion (A):	Combustion of all organic compounds is an exothermic reaction.
Reason (R):	The enthalpies of all elements in their standard state are zero.

1.	Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
2.	Both **(A)** and **(R)** are true but **(R)** is not the correct explanation of **(A)**.
3.	**(A)** is true but **(R)** is false.
4.	**(A)** is false but **(R)** is true.

56 In PO_4^{3-} ion, the formal charge on the oxygen atom of the P-O bond is :
1. +1
2. -1
3. -0.75
4. +0.75

57 The decreasing order of ionic character of the N-H, F-H, C-H, and O-H, is :

1.	N-H > F-H > C-H > O-H
2.	F-H > N-H > C-H > O-H
3.	O-H > C-H > F-H > N-H
4.	F-H > O-H > N-H > C-H

58 Which of the following species has a bent T-shape?
1. ICl_4^-
2. PCl_3
3. BrF_3
4. I_3^-

59 The elements in which electrons are progressively filled in 4f-orbitals are called:
1. Actinoids
2. Transition elements
3. Lanthanoids
4. Halogens

60 The general outer electronic configuration of s, p, d , and f-block elements respectively would be :

1.	ns^{1-2}, nd^2np^{1-6}, $(n-1)d^{1-10}np^{0-2}$, $(n-2)f^{1-14}(n-1)d^{0-10}ns^2$
2.	ns^{1-2}, ns^2np^{1-6}, $(n-1)f^{1-10}ns^{0-2}$, $(n-2)g^{1-14}(n-1)d^{0-1}ns^2$
3.	ns^{1-2}, ns^2np^{1-6}, $(n-1)d^{1-10}ns^{0-2,}$ $(n-2)f^{1-14}(n-1)d^{0-1}\ ns^2$
4.	np^{1-2}, nd^2np^{1-6}, $(n-1)d^{1-10}ns^{0-2}$, $(n-2)f^{1-14}(n-1)d^{0-10}ns^2$

PHYSICS - SECTION A

61 The decimal equivalent of $\frac{1}{20}$ up to three significant figures is:
1. 0.0500
2. 0.05000
3. 0.0050
4. 5.0×10^{-2}

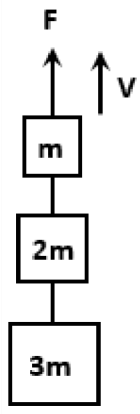
62 Given below are two statements:

Assertion (A):	Position-time graph of a stationary object is a straight line parallel to the time axis.
Reason (R):	For a stationary object, the position does not change with time.

1.	Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
2.	Both **(A)** and **(R)** are true but **(R)** is not the correct explanation of **(A)**.
3.	**(A)** is true but **(R)** is false.
4.	Both **(A)** and **(R)** are false.

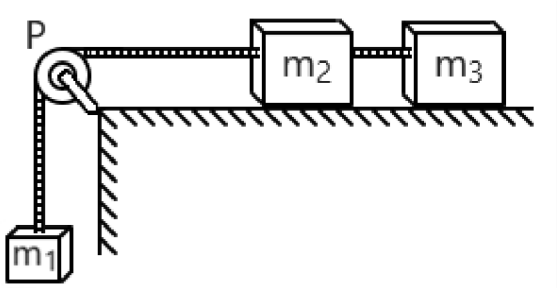
63 A particle moves on the curve $x^2 = 2y$. The angle of its velocity vector with the x-axis at the point $\left(1, \frac{1}{2}\right)$ will be:
1. 30°
2. 60°
3. 45°
4. 75°

64 Three blocks with masses of m, 2m, and 3m are connected by strings as shown in the figure. After an upward force, F, is applied on block m, the masses move upward at a constant speed, v. What is the net force on the block of mass 2m? (g is the acceleration due to gravity).



1. 2mg
2. 3mg
3. 6mg
4. zero

65 A system consists of three masses m_1, m_2, and m_3 connected by a string passing over a pulley P. The mass m_1 hangs freely, and m_2 and m_3 are on a rough horizontal table (the coefficient of friction = μ). The pulley is frictionless and of negligible mass. The downward acceleration of mass m_1 is : (Assume m_1 = m_2 = m_3 = m and g is the acceleration due to gravity.)



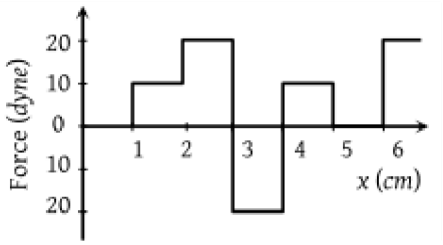
1. $\frac{g(1-g\mu)}{9}$
2. $\frac{2g\mu}{3}$
3. $\frac{g(1-2\mu)}{3}$
4. $\frac{g(1-2\mu)}{2}$

66 A man pushes a wall and fails to displace it. He does:
1. negative work
2. positive but not maximum work
3. no work at all
4. maximum work

67 A particle of mass m_1 is moving with a velocity v_1 and another particle of mass m_2 is moving with a velocity v_2. Both of them have the same momentum, but their kinetic energies are E_1 and E_2 respectively. If $m_1 > m_2$ then:
1. $\frac{E_1}{E_2} = \frac{m_1}{m_2}$
2. $E_1 > E_2$
3. $E_1 = E_2$
4. $E_1 < E_2$

68 The minimum work done in pulling up a block of wood weighing 2 kN for a length of 10 m on a smooth plane inclined at an angle of 15° with the horizontal is (given: $\sin 15^\circ = 0.2588$):
1. 4.36 kJ
2. 5.17 kJ
3. 8.91 kJ
4. 9.82 kJ

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



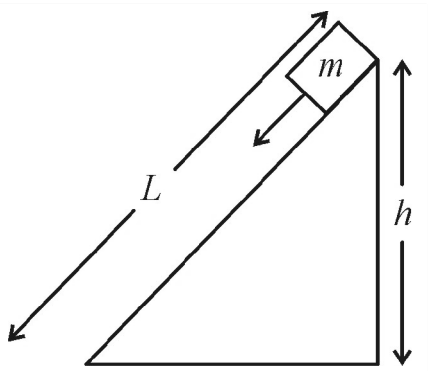
1. 20 ergs
2. 60 ergs
3. 70 ergs
4. 700 ergs

70 A position dependent force $F = 7 - 2x + 3x^2$ N acts on a small body of mass 2 kg and displaces it from $x = 0$ to $x = 5$ m. The work done in joule is:
1. 70
2. 270
3. 35
4. 135

71 A force of 5 N making an angle θ with the horizontal acting on an object displaces it by 0.4 m along the horizontal direction. If the object gains kinetic energy of 1 J then the component of the force is:
1. 1.5 N
2. 2.5 N
3. 3.5 N
4. 4.5 N

72 A body of mass 1 kg is thrown upwards with a velocity of 20 ms^{-1}. It momentarily comes to rest after attaining a height of 18 m. How much energy is lost due to air friction? $(g = 10\ ms^{-2})$
1. 20 J
2. 30 J
3. 40 J
4. 10 J

73 A body of mass 'm' is released from the top of a fixed rough inclined plane as shown in the figure. If the frictional force has magnitude F, then the body will reach the bottom with a velocity: $\left(\mathrm{L}=\sqrt{2}\mathrm{h}\right)$



1. $\sqrt{2gh}$
2. $\sqrt{\frac{2Fh}{m}}$
3. $\sqrt{2gh+\frac{2Fh}{m}}$
4. $\sqrt{2gh-\frac{2\sqrt{2}Fh}{m}}$

74 A uniform chain of length L and mass M is lying on a smooth table and one-third of its length is hanging vertically down over the edge of the table. If g is acceleration due to gravity, the work required to pull the hanging part on the table is:

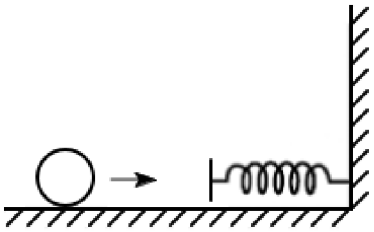
1. MgL
2. $MgL/3$
3. $MgL/9$
4. $MgL/18$

PHYSICS - SECTION B

75 The work done by a person in carrying a box of mass 10 kg to a vertical height of 10 m is 4900 J. The mass of the person is:

1. 40 kg
2. 60 kg
3. 50 kg
4. 55 kg

76 A mass of 0.5 kg moving with a speed of 1.5 m/s on a horizontal smooth surface, collides with a nearly weightless spring with force constant k = 50 N/m. The maximum compression of the spring would be :-



1. 0.12 m
2. 1.5 m
3. 0.5 m
4. 0.15 m

77 The potential energy U of a system is given by $\mathrm{U}=\mathrm{A}-\mathrm{Bx}^2$ (where x is the position of its particle and A, B are constants). The magnitude of the force acting on the particle is:

1. constant
2. proportional to x
3. proportional to x^2
4. proportional to $\left(\frac{1}{\mathrm{x}}\right)$

78 A ball is dropped from a height of 5 m. If it rebounds up to a height of 1.8 m, then the ratio of velocities of the ball after and before rebound will be:

1. $\frac{3}{5}$
2. $\frac{2}{5}$
3. $\frac{1}{5}$
4. $\frac{4}{5}$

79 A particle moves with a velocity of $\left(5\hat{\mathrm{i}}-3\hat{\mathrm{j}}+6\hat{\mathrm{k}}\right)$m/s under the influence of a constant force $\overrightarrow{F}=\left(10\hat{\mathrm{i}}+10\hat{\mathrm{j}}+20\hat{\mathrm{k}}\right)$ N. The instantaneous power applied to the particle is:

1. 200 J/s
2. 40 J/s
3. 140 J/s
4. 170 J/s

80 Two equal masses, m_1 and m_2, moving in the same straight line at velocities +3 m/s and –5 m/s respectively, collide elastically. Their velocities after the collision will be:

1. +4 m/s for both
2. –3 m/s and +5 m/s
3. –4 m/s and +4 m/s
4. –5 m/s and +3 m/s

Fill OMR Sheet*

*If above link doesn't work, please go to test link from where you got the pdf and fill OMR from there. After filling the OMR, you would get answers and explanations for the questions in the test.