1.

Identify the incorrect statement:

1. The presence of vessels is a characteristic of angiosperms
2. In roots the primary xylem is exarch
3. Gymnosperms lack albuminous cells and sieve cells
4. Bast fibers are generally absent in primary phloem

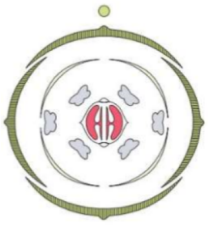
2.

The type of placentation show in the given figure is seen in:

1. *Dianthus*
2. *Argemone*
3. China rose
4. Marigold

3.

The given floral diagram can be of:



1. *Asparagus*
2. *Atropa belladonna*
3. Mustard
4. Indigofera

4.

In the dicot root, the vascular cambium:-
1. is absent
2. is completely secondary in origin
3. does not form a continuous ring
4. originates from the tissue just above the phloem bundles

5.

Match the columns A and B.

A	B
a. Marginal placentation	(i) Marigold
b. Axile placentation	(ii) Dianthus
c. Parietal placentation	(iii) Argemone
d. Free central placentation	(iv) Chinarose
e. Basal placentation	(v) Pea

1.a-v, b-iv, c-iii, d-ii, e-i
2. a-v, b-iii, c-iv, d-i, e-ii
3. a-iV, b-iii, c-V, d-ii, e-i
4. a-i, b-v, c-iv, d-iii, e-ii

6.

The feature lacking in bony fishes would be:

1. Operculum
2. Swim bladder
3. Ammonotelism
4. Placoid scales

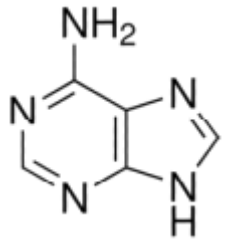
7.

Which of the following stages of Meiosis I of Prophase I is not correctly matched with events occurring during that stage?

	Stage	Event
1.	Zygotene	Pairing between homologous chromosomes
2.	Pachytene	Crossing over between sister chromatids of homologous chromosomes
3.	Diplotene	Tendency of recombined homologues to separate
4.	Diakinesis	Terminalization of chiasmata

8.

Identify the given compound:



1. An amino acid
2. A purine base
3. Polysaccharide containing nitrogen
4. Prostaglandin

9.

Which of the following groups of animals is correctly matched with its one characterstic feature without even a single exception?

1. Mammalia: give birth to young ones.
2. Reptilia: possess 3-chambered heart with one incompletely divided ventricle
3. Chordata: possess a mouth provided with an upper and a lower jaw
4. Chondrichthyes: possess cartilaginous endoskeleton

10.

Select the correct sequence of taxonomic categories of Mango in ascending order

1. Mangifera → Anacardiaceae → Dicotyledonae → Sapindales → Angiospermae.
2. Mangifera → Anacardiaceae → Sapindales → Dicotyledonae → Angiospermae.
3. Angiospermae → Dicotyledonae → Sapindales → Anacardiaceae → Mangifera.
4. Angiospermae → Sapindales → Anacardiaceae → Dicotyledonae → Mangifera.

11.

Select incorrect statement w.r.t the following group of organisms and their characteristics

1. Chrysophyte – Includes diatoms and desmids, Planktonic organism.
2. Dinoflagellate – Mostly marine and photosynthetic, cell wall has stiff cellulosic plate on outer surface.
3. Euglenoids – Majority of them are fresh water, cell wall is absent.
4. Slime mould – Saprophytic motile spores with true walls

12.

Gametophyte of Bryophyte is

1. Green and vascular.
2. Independent, multicellular.
3. Dependent on sporophyte.
4. Foliose in nature.

13.

Blood is different from other connective tissue because
(i) It is mesodermal in origin.
(ii) Blood cells do not form the composition of blood plasma or matrix.
(iii) It contains different kind of cells performing different function.
(iv) It lack fibres.

1. (i), (ii), (iii), (iv)
2. (ii), (iv) only
3. (iv) only
4. (ii) only

14.

Match column-I and column-II, choose the correct combination from the option given

	Column-I		Column-II
(A)	Adhering Junctions	1.	Help to stop substances from leaking across a tissue
(B)	Gap junctions	2.	Perform cementing to keep neighbouring cells together
(C)	Tight junctions	3.	Facilitate the cells to communicate with each other

1. (A)-3, (B)-2, (C)-1

2. (A)-2, (B)-3, (C)-1

3. (A)-2, (B)-1,(C)-3

4. (A)-1, (B)-3, (C)-2

15.

Protonema is a characteristic feature of

1. Fern

2. Marchantia

3. Moss

4. Cycas

16.

Sweet potato is a modified

1. Rhizoid

2. Stem

3. Root

4. Leaf

17.

A land snail, a clam, and an octopus all share
1. a mantle
2. calcareous shell
3. a radula
4. distinct cephalization

18.

Which of the following combinations of phylum and description is incorrect?

1. Echinodermata–branch Bilateria, coelom from archenteron

2. Nematoda–roundworms,pseudocoelomate

3. Cnidaria–radial symmetry, polyp and medusa body forms

4. Porifera - gastrovascular cavity, mouth from blastopore

19.

During what phase in the cell cycle would you find the most DNA per cell?
1. G_1
2. G_2
3. S
4. Prophase II

20.

Choose the correct statements –
I. Mitochondria and Chloroplast transfer energy.
II. Mitochondrion is a power-house of cell as it produces most of the cellular ATP.
III. Mitochondria and chloroplast are found in all eukaryotic cells.
IV. Mitochondria are the sites of anaerobic respiration.
V. The matrix of mitochondria posses a single linear DNA, many RNA molecules, 80S ribosomes.

1. IV and V
2. I, II
3. II, IV and V
4. III and V

21.

Which of the following combinations is false?
1. Apocarpous – Carpels free – Lotus, Rose.
2. Syncarpous – Carpels fused – Mustard, tomato.
3. Placentation – arrangement of ovules within ovary.
4. Arrangement of ovules within ovary – ovulation.

22.

Which of the following statements about classification is not true?
I. Members of a family are less similar than members of an included genus.
II. An order has more members than the number of members in an included genus.
III. Families have more members than phyla.
IV. The number of species in a taxon depends on their relative degree of similarity.
1. Only III
2. Only IV
3. Only IV
4. Only I

23.

Read the following statements carefully
A. Lipid component of the plasma membrane mainly consists of phosphoglycerides.
B. Polar molecules can pass through the lipid bilayer of plasma membrane, therefore they do not require carrier proteins to facilitate their transport.
C. Secondary wall is capable of growth and it is formed on the outer side of the cell
D. Quasi fluid nature of lipid enables lateral movement of proteins within the overall lipid bilayer of plasma membrane
E. Middle lamella glues the different neighbouring cells together

How many statements are incorrect?

1. Three
2. Five
3. Four
4. Two

24.

Crossing over occurs just prior to
1. Pachytene
2. Diplotene
3. Diakinesis
4. Zygotene

25.

Tick mark of the false statement w.r.t. Periplaneta, Americana.
1. Mandible help in incising and grinding.
2. Malpighian tubules are present at the juction of midgut and ileum.
3. Hepatic caeca are present at the juction of crop and gizzard.
4. Mushroom gland is present in 6-7th abdominal segments and funtions as an accessory reproductive gland in males.

26.

Each pole receives half the chromosome number of the parent cell, is true for which stage?
1. Anaphase - II
2. Anaphase - I
3. Telophase-I
4. Telophase-II

27.

Which of the following is not true for three domain system?
1. Divides kingdom monera into two domains.
2. Third domain includes all eukaryotic organisms.
3. It resulted in six kingdom classifications.
4. It is not phylogenetic.

28.

Which of the following fungus lacks dikaryophase?
1. Claviceps
2. Puccinia
3. Aspergillus
4. Trichoderma

29.

Mark the incorrect statement
1. All the cell organelles perform different & specific function.
2. Basal body of cilia & flagella in prokaryotes is formed by cytoskeleton.
3. Endoplasmic reticulum helps in transport.
4. Microbodies are present in both plants and animals.

30.

Find out the correct match from the following table:-

	Column-I	Column-II	Column-III
(i)	Radula	Rasping organ	Pila
(ii)	Hooks and suckers	Taenia	Annelida
(iii)	Tube feet	Asterias; Dentalium	Echinodermata
(iv)	Comb plates	Pleurobrachia; Aurelia	Ctenophora

1. (i) only
2. (i) and (ii)
3. (iii) only
4. (ii) and (iii)

31.

Which of the following epithelium their main function is to provide protection against chemical and mechanical stresses?

1. Simple epithelium.
2. Compound epithelium.
3. Columnar epithelium.
4. Cuboidal Epithelium

32.

A list of different metabolites is given below in this list find out the number of primary & secondary metabolites, respectively & chooses the correct option:
Alkaloids, Abrin, Ricin, Carotenoids, Amino acids, Glucose, Fructose, Fatty acids, Thymine, Uracil, Lectins, Drugs.

1. Five and Six
2. Six and Six
3. Seven and five

4. Four and Eight

33.

Which of the following is an example of branched polymer?
1. Chitin.
2. Cellulose.
3. Amylose.
4. Glycogen

34.

Mark the correct match with the group and its characteristic?
1. Arthropoda → Compound eye and wings.
2. Mammalia → Viviparity.
3. Echinodermata → Calcareous endoskeleton.
4. Annelida → Fresh water and segmented body.

35.

During catalytic cycle of an enzyme action the binding of the __a__ induces the __b__ to alter its shape. Here a and b is _____
1. Substrate, enzyme.
2. Enzyme, substrate.
3. Substrate, Substrate.
4. Enzyme, Enzyme

36.

Long protein chain folded upon itself like a hollow woolen ball and gives us a 3-dimensional view of a protein belongs to
1. Primary structure
2. Secondary structure
3. Tertiary structure
4. Quaternary structure

37.

In the dicot root the vascular cambium originates from :

1. Tissue located below the phloem bundles and a portion of pericycle tissue above protoxylem.

2. Cortical region

3. Parenchyma between endodermis and pericycle

4. Intrafascicular and interfascicular tissue in a ring

38.

Regeneration of damaged growing grass following grazing is largely due to :

1. Lateral meristem

2. Apical meristem

3. Intercalary meristem

4. Secondary meristem

39.

Tracheids are
1. Elongated cells with tapering ends and unperforated end walls
2. Elongated cells with tapering ends and perforated end wall
3. Rounded cells with lignified walls
4. Both (1) and (2)

40.

Which of the following phyla is not correctly matched to its general characters?

1.	Porifera	-	Primitive multicellular animals which have intracellular digestion, internal fertilization and indirect development
2.	Ctenophora	-	Exclusively marine, radially symmetrical, diploblastic have comb plates and colloblast cells
3.	Echinodermata	-	Pentamerous radial symmetry and mostly internal fertilization
4.	Mollusca	-	Basically oviparous and development is indirect through a trochophore or veliger larva

41.

Epidermal hairs on stems known as trichomes

1. May sometimes be secretory in function

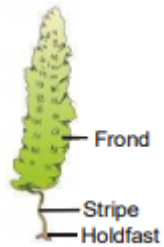
2. Have vascular supply

3. May be soft or stuff but unbrached always

4. Are endogenous in origin like lateral roots

42.

Study the following diagram carefully and select the correct statement given below for this plant



1. It is a source of carrageenan
2. It shows the haplontic life cycle
3. Laminarin has stored food in it
4. (2) and (3) both

43.

Bacterial structure and behaviour are respectively:-

1. Simple, Simple
2. Complex, Simple
3. Simple, Complex
4. Complex, Complex

44.

Ommatidia serve the purpose of photoreception in:-

1. Cockroach
2. Frog
3. Human
4. Star Fish

45.

A feature common in gametophyte of both mosses and maximum ferns is-

1. Independent existence
2. Both are monoecious in nature
3. Presence of vascular tissue
4. Both are filamentous

46.

Read the statement (a - d) :

a. The male and female gametophytes do not have independent existence.

b. The multicellular female gametophyte is also retained within megasporangium.

c. The gametophytic generation is reduced.

d. Sporophylls are aggregate to form cone like structures.

The above statements belong to which group of plant kingdom?

1. Bryophytes
2. Pteridophytes
3. Gymnosperms
4. Angiosperms

47.

Backbone of DNA is formed by :-

1. Sugar - Phosphate - Sugar
2. Nitrogen base - Phosphate - Sugar
3. Phosphate - Nitrogen base - Sugar
4. Base pairs

48.

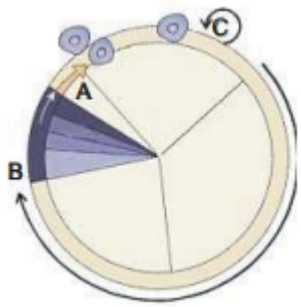
Mark the incorrect statement related to cell wall

(a) Non-living rigid structure
(b) Present in fungi and plants
(c) Provides barriers to undesirable macromolecules
(d) Primary wall is capable of growth
(e) Primary wall gradually diminishes as the cells matures

1. a, b, d
2. d only
3. c, d
4. All statements are correct

49.

Identify the symbols A, B and C in the figure given below



	A	B	C
(1)	G_0	Prophase	Cytokinesis
(2)	Prophase	Metaphase	Telophase
(3)	G_1	S	G_2
(4)	Cytokinesis	Prophase	G_0

1. (1)
2. (2)
3. (3)
4. (4)

50.

The cells of epithelial tissues are _____ packed with _____ intercellular matrix.

1. Loosely, little
2. Loosely, large
3. Compactly, little
4. Tightly, large

51.

Which of the following cell organelle is absent in prokaryotic cell?

1. Ribosome
2. Lysosome
3. Mitochondria
4. 2 and 3 both

52.

In which of the following Radula is absent ?

1. Sepia
2. Octopus
3. Pila
4. Echinus

53.

Substances having identifiable function & play known role in normal physiological functions of a cell are called as :-

1. Primary metabolites
2. Secondry metabolites
3. Metabolites
4. Biomolecules

54.

Respiration in Balaenoptera takes place by :-

1. Gills
2. Skin
3. Trachea
4. Lungs

55.

The water canal system is found in:-

1. Echinus
2. Sycon
3. Balanoglossus
4. Ascidia

56.

Which phase of mitosis is essentially the reverse of prophase in terms of nuclear changes?

1. S-phase
2. Anaphase
3. Telophase
4. Interphase

57.

In Porifera which type of fertilization takes place?

1. Self & external

2. Self & Internal

3. Cross & external

4. Cross & Internal

58.

In which of the following motile cells are not formed?

1. Zygomycetes and oomycetes

2, Zygomycetes and Phycomycetes

3. Chlorophyceae and Phycomycetes

4. Mucor, Rhizopus, and Spirogyra

59.

Taproots of the following plant are modified to store food.

1. Sweet potato

2. Turnip

3. Rhizophora

4. Potato

60.

Which of the following plays an important role in lateral root growth in dicot root?

1. Endodermis

2. Pericycle

3. Hypodermis

4. Intrafascicular cambium

61.

In some plants, root modified their shape and structure to perform

1. Absorption

2. Conduction of water

3. Conduction of minerals

4. Storage

62.

Select the correct statement(s)

1. Only a few bryophytes are heterosporous

2. Double fertilization is unique to angiosperms

3. Strobili are found in Selaginella & Salvinia

4. Female gametophytes of gymnosperm have an independent free-living existance

63.

Select the incorrect match

1. Palade particle – Ribosome

2. Flagella – Cell movement

3. Centriole – Found in higher plants

4. Lysosome – Acid hydrolase

64.

Which of the following does not belong to the kingdom Protista?

1. Euglena

2. Dinoflagellates

3. Amoeba

4. Spirulina

65.

The animal which is a poikilotherm is

1. Aptenodytes

2. Pteropus

3. Chelone

4. Balaenoptera

66.

Choose the incorrect match

1. Smooth muscle-intercalated disc

2. Fibroblast-secretes fibers

3. Dense irregular connective tissue-skin

4. Lose connective tissue- store fat

67.

Identify the left end of the glycogen chain

1. Reducing end

2. Non-reducing end

3. N-terminal end

4. C-terminal end

68.

A flower is hypogynous and the ovary is said

to be superior in

1. Mustard
2. Plum
3. Peach
4. Guava

69.

In which stage of mitosis, shape of chromosomes is best studied?

1. Prophase
2. Metaphase
3. Anaphase
4. Telophase

70.

Bilateral symmetry is found in the flower of

1. Cassia
2. Mustard
3. Canna
4. Chilli

71.

The study of internal structures of organisms is called

1. Morphology
2. Anatomy
3. Physiology
4. Ecology

72.

Colonial algae is

1. Volvox
2. Ulothrix
3. Spirogyra
4. Kelps

73.

Select the incorrect option w.r.t. animal listed in column A and features exhibited in column B

	Column A (Organism)	Column B (Features)
1.	Psittacula	Homeothermy, Air sacs to supplement respiration
2.	Panthera tigris	Viviparity, Thecodont dentition
3.	Pleurobrachia	Bioluminescence, Eight rows of ciliated comb plates
4.	Pristis	Presence of operculum, Absence of air bladder

74.

Among the options given below, simple epithelium is not found at which location?

1. Air sacs of lungs
2. PCT
3. Inner surface of bronchioles and fallopian tubes
4. Inner lining of ducts of salivary

75.

The term ‘mesosome’ is associated with

1. Yeast
2. Algae
3. Bacteria
4. Diatom

76.

Read the following and **choose** the correct option

A : Chitin is a homopolysaccharide

B : Cellulose consists of β-D glucose

1. A is correct B is wrong
2. A is wrong, B is correct
3. Both A and B are correct
4. Both A and B are wrong

77.

The cell wall is impregnated with silica to form transparent siliceous shell in

1. Dinoflagellates
2. Euglenoids
3. Diatoms

4. Slime moulds

78.

Select the wrong statement about eukaryotic cells.

1. They have well defined nucleus

2. Possess 70S ribosomes

3. May have a cell wall

4. No organelles are single membrane bound

79.

The correctly written binomial epithet of Mango is

1. Mangifera indica Linn

2. Mangifera indica Linn.

3. Mangifera Indica L

4. Mangifera indica L

80.

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

81.

Select the mis-matched option.

1. Selaginella : Heterosporous

2. Volvox : Colonial alga

3. Pinus : Dioecious

4. Chara : Multicellular

82.

Choose the incorrect statement w.r.t cockroach

1. Haemocoel contains haemolymph which contains colourless plasma and haemocytes

2. Nervous system consists of segmentally arranged ganglia, six in thorax and nine in abdomen

3. Mushroom gland is present in 6th – 7th abdominal segment in male cockroach

4. Proventriculus has an outer layer of thick circular muscles and inner thick cuticle forming teeth

83.

Choose the incorrect match w.r.t animal, is phylum and two features

	Animal	Phylum	Features
1.	Clarias	Chordata	Placoid scales, Operculum
2.	Antedon	Echinodermata	Water vascular system, Radial symmetry
3.	Locusta	Arthropoda	Jointed appendages, Open circulatory system
4.	Nereis	Annelida	Dioecious, Parapodia

84.

Match the columns.

Column I	**Column II**
(a) Prion	(p) Nucleic acid + Protein
(b) Bacteriophage	(q) Infectious protein
(c) Plasmid	(r) Bacterial DNA
(d) Virus	(s) Infect bacteria

Select **correct** option

1. a-p, b-q, c-r, d-s

2. a-s, b-r, c-q, d-p

3. a-q, b-s, c-r, d-p

4. a-q, b-s, c-p, d-r

85.

The complex formed by a pair of synapsed homologous chromosomes is

1. Dyad

2. Tetrad

3. Univalent

4. Bivalent

86.

The total number and types of organisms on earth represents the

1. Taxonomy
2. Biodiversity
3. Classification
4. Systematics

87.

Which of the following organism lacks cell wall?

1. Eubacteria
2. Mycoplasma
3. Archaebacteria
4. Protista

88.

Identify the member of solanaceae family

1. *Petunia*
2. Lily
3. *Indigofera*
4. *Aloe*

89.

Which of the following is incorrect statement w.r.t cockroach?

1. The nymph grows by moulting about 13 times to reach the adult form
2. The outermost covering of spermatophore is formed by secretions of spermatheca
3. Mushroom glands are accessory reproductive glands in a male
4. Each compound eye consists of nearly 2000 ommatidia

90.

Pulvinus is

1. Flattened petiole in some xerophytic plants
2. Swollen leaf base in some leguminous plants
3. Small leaf like structure near the leaf base
4. Leaf sheath covering the stem

91.

Which is called a bridge element?

1. Li
2. O
3. Mg
4. Pb

92.

Which of the following has the highest electron affinity?

1. F^-
2. O^-
3. O
4. Na

93.

The correct order of second ionisation energies of B, C, N, & O is

1. O > N > C > B
2. O > C > N > B
3. O > B > C > N
4. O > N >B > C

94.

Which has highest bond energy ?

1. CO
2. CO^+
3. N_2
4. N_2^+

95.

Which salt is more hydrolysed ?

(Assume that K_b of all weak base is same)

1. NH_4Cl
2. $CuSO_4$
3. $AlCl_3$
4. All are equally hydrolysed

96.

The element having very high electron affinity but zero ionisation enthalpy is :-

1. He (due to inert gas configuration)

2. Be (due to full filled subshell)

3. H (due to presence of allotropes)

4. None of the above

97.

Concentration of the Ag^+ ions in a saturated solution of $Ag_2C_2O_4$ is 2.2 x 10^{-4} mol^{-1} solubility product of $Ag_2C_2O_4$ is

1. 2.42 x 10^{-8}

2. 2.66 x 10^{-12}

3. 4.5 x 10^{-11}

4. 5.3 x 10^{-12}

98.

The enthalpy and entropy change for the reaction :

$Br_{2\,(l)} + Cl_{2\,(g)} \rightarrow 2BrCl_{(g)}$

are 30 kJ mol^{-1} and 105 JK^{-1} mol^{-1} respectively.

The temperature at which the reaction will be in equilibrium is :

1. 285.7 K

2. 273 K

3. 450 K

4. 300 K

99.

When a gas undergoes adiabatic expansion, it gets cooled due to

1. Loss of energy

2. Fall in entropy

3. Decrease in velocity

4. Energy increase during doing work

100.

A Beckmann thermometer is used to measure

1. High temperature

2. Low temperature

3. Normal temperature

4. All temperature

101.

The enthalpy of neutralization of HCN by NaOH is – 12.13 $kJ\ mol^{-1}$. The enthalpy of ionisation of HCN will be

1. 45.07 kJ

2. 4.310 kJ

3. 451.9 kJ

4. 33.77 kJ

102.

The radius of which ion is closest to that of Li^+ ion?

1. Na^+ 2. Be^{2+}

3. Mg^{2+} 4. Al^{3+}

103.

The incorrect statement is:

1. $AlF_3 > MgO > MgF_2$: **Lattice energy**

2. $Li > Na > Al > Mg$: **Electron affinity**

3. $PF_5 > SF_6 > SiF_4$: **Lewis acidic character**

4. $SiCl_4 > SiBr_4 > SiI_4$: **Decreasing ionic character**

104.

PCl_5 exists but NCl_5 does not because:

1. nitrogen has no vacant d-orbitals

2. NCl_5 is unstable

3. nitrogen atom is much smaller than p

4. nitrogen is highly inert

105.

Which bond angle would result in the maximum dipole moment for the triatomic molecule XY_2

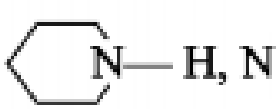
1. 90°

2. 120°

3. 150°

4. 180°

106.



In piperidine

N atom has hybridization:

1. sp

2. sp^2

3. sp^3

4. dsp^2

107.

The BF_3 is a planar molecule where as NF_3 is pyramidal because:

1. *B - F* bond is more polar than *N - F* bond.

2. Boron atom is bigger than nitrogen atom.

3. Nitrogen is more electronegative than boron.

4. BF_3 has no lone pair but NF_3 has a lone pair of electrons.

108.

MY and NY_3, two nearly insoluble salts, have the same K_{sp} values of 6.2 x 10^{-13} at room temperature. Which statement would be true in regard to MY and NY_3 ?

1. The molar solubility of MY in water is less than that of NY_3.

2. The salts MY and NY_3 are more soluble in 0.5 M KY than in pure water

3. The addition of the salt of KY to solution of MY and NY_3 will have no effect on their solubilities

4. The molar solubilities of MY and NY_3 in water are identical.

109.

What is the pH of the resulting solution when equal volumes of 0.1 M NaOH and 0.01 M HCl are mixed?

1. 12.65

2. 2.0

3. 7.0

4. 1.04

110.

Decreasing order of stability of O_2, O_2^-, O_2^+ and O_2^{2-} is

1. $O_2^+ > O_2 > O_2^- > O_2^{2-}$

2. $O_2^{2-} > O_2^- > O_2 > O_2^+$

3. $O_2 > O_2^+ > O_2^{2-} > O_2^-$

4. $O_2^- > O_2^{2-} > O_2^+ > O_2$

111.

Which one of the following pairs of solution is not an acidic buffer?

1. $HClO_4$ *and* $NaClO_4$

2. CH_3COOH *and* CH_3COONa

3. H_2CO_3 *and* Na_2CO_3

4. H_3PO_4 *and* Na_3PO_4

112.

The heat of combustion of carbon to CO_2 is -393.5 KJ/mol. The heat released upon the formation of 35.2 g of CO_2 from carbon and oxygen gas is

1. -315 KJ

2. +315 KJ

3. -630 KJ

4. +630 KJ

113.

If the value of an equilibrium constant for a particular reaction is 1.6 x 10^{12}, then at equilibrium the system will contain

1. all reactants
2. mostly reactants
3. mostly products
4. similar amounts of reactants and products

114.

The K_{SP} of Ag_2CrO_4, AgCl, AgBr and Agl are respectively, 1.1 x 10^{-12}, 1.8 x 10^{-10}, 5.0 x 10^{-13}, 8.3 x 10^{-17}. Which one of the following salts will precipitate last if AgN03 solution is added to the solution containing equal moles ofNaCl, NaBr, Nal and Na_2Cr0_4?

1. Agl
2. AgCl
3. AgBr
4. Ag_2CrO_4

115.

Which of the following is electron-deficient?

1. $(SiH_3)_2$

2. $(BH_3)_2$

3. PH_3

4. $(CH_3)_2$

116.

Which one of the following pairs is iso structural (i.e., having the same shape and hybridization)?

1. $\left[BCl_3 \text{ and } BrCl_3\right]$

2. $\left[NH_3 \text{ and } NO_3^-\right]$

3. $\left[NF_3 \text{ and } BF_3\right]$

4. $\left[BF_4^- \text{ and } NH_4^+\right]$

117.

Standard enthalpy of vaporization $\Delta_{vap}H^0$for water at 100^0C is 40.66 Kj mol^{-1}. The internal energy of vaporization of water at 100^0C (in kJ mol^{-1}) is
(Assume water vapour to behave like an ideal gas).

1. +37.56

1. -43.76

3. +43.76

4. +40.66

118.

Given that bond energy of H—H and Cl-Cl is 430 kJ mol^{-1} and 240 kJ mol^{-1} respectively and ΔH_f for HCl is -90 kJ mol-1. Bond enthalpy of HCl is :

1. 290 $kJ\ mol^{-1}$

2. 380 $kJ\ mol^{-1}$

3. 425 $kJ\ mol^{-1}$

4. 245 $kJ\ mol^{-1}$

119.

In which of the following molecules are all the bonds not equal?

1. ClF_3

2. BF_3

3. AlF_3

4. NF_3

120.

Which of the following is the most basic oxide?

1. Al_2O_3

2. Sb_2O_3

3. Bi_2O_3

4. SeO_2

121.

The angular momentum of an electron in d orbital is equal to

1. $\sqrt{6}$ h

2. $\sqrt{2}$ h

3. $2\sqrt{3}$ h

4. 0 h

122.

For any H like system, the ratio of velocities of I, II & III orbit i.e., $V_1 : V_2 : V_3$ will be

1. 1 : 2 : 3

2. 1 : 1/2 : 1/3

3. 3 : 2 : 1

4. 1 : 1 : 1

123.

Equivalent weight of FeS_2 in the half reaction, $FeS_2 \rightarrow Fe_2O_3 + SO_2$ is :

1. M/10

2. M/11

3. M/6

4. M/1

124.

At 298 K, assuming ideal behaviour, the average kinetic energy of a deuterium molecule is

1. Two times that of a hydrogen molecule

2. Four times that of a hydrogen molecule

3. Half of that of a hydrogen molecule

4. Same as that of a hydrogen molecule

125.

At room temperature, the average speed of Helium is higher than that of Oxygen by a factor of

1. $2\sqrt{2}$

2. $6/\sqrt{2}$

3. 8

4. 6

126.

The number of d-electrons in Fe^{2+} is not equal to that of the

1. p-electrons in Ne
2. s-electrons in Mg
3. d-electrons in Co^{+3}
4. p-electrons in Cl^{-}

127.

The charge on the electron and proton are reduced to $\frac{2}{3}$rd of their original values. Let the present value of Rydberg constant of H-atom be R. What will be the new value of Rydberg constant?

1. $\frac{2R}{3}$ 2. $\frac{4R}{9}$ 3. $\frac{8R}{27}$ 4. $\frac{16R}{81}$

128.

The number of hydrogen bonded water molecules(s) associated with $CuSO_4.5H_2O$ is-

1. 3

2. 1

3. 2

4. 5

129.

ln a closed vessel 50 ml of A_2B_3 completely reacts with 200 ml of C_2 according to the following equation :

$$2A_2B_3(g) + 5C_2(g) \rightarrow 3C_3B_2(g) + CA_4(g)$$

The composition of gaseous mixture in the system will be:

1. 100 ml C_2, 50 $ml\ C_3B_2$, 50 $ml\ CA_4$

2. 25 ml C_2, 75 $ml\ C_3B_2$ 25 $ml\ CA_4$

3. 75 ml C_2, 75 $ml\ C_3B_2$, 25 $ml\ CA_4$

4. 10 ml C_2, 25 $ml\ C_3B_2$, 100 $ml\ CA_4$

130.

In alkaline medium ClO_2 oxidises H_2O_2 to O_2 and it self gets reduces to Cl^{-1}. How many moles of H_2O_2 are oxidised by 1 mol of ClO_2?

1. 1.5

2. 1

3. 2.5

4. 3.5

131.

The oxidation number of phosphorous in ATP (adenosine triphosphate) is

1. 2

2. 3

3. 4

4. 5

132.

Which of the following does not represent redox reactions?

1. $Cr_2O_7^{2-} + 2OH^- \rightarrow CrO_4^{2-} + H_2O$

2. $SO_4^{2-} + 2I^- + 2H^+ \rightarrow I_2^- + H_2S + H_2O$

3. $Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$

4. $PCl_5 \rightarrow PCl_3 + Cl_2$

133.

The strength of 0.01 M Na_2CO_3 solution in terms of molality is nearly ____ when the density of the solution is 1.1 g/mL

1. 9×10^{-3}

2. 1.8×10^{-3}

3. 4.5×10^{-3}

4. 1.1×10^{-3}

134.

The volume of carbon dioxide gas evolved at STP by heating 7.3 g of $Mg(HCO_3)_2$ will be

1. 1000 mL
2. 1120 mL
3. 2230 mL
4. 3240 mL

135.

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

136.

A particle is projected with a speed u at an angle θ to the horizontal. Find the radius of curvature at highest point of its trajectory-

1. $\frac{u^2\cos^2\theta}{2g}$
2. $\frac{\sqrt{3}u^2\cos^2\theta}{2g}$
3. $\frac{u^2\cos^2\theta}{g}$
4. $\frac{\sqrt{3}u^2\cos^2\theta}{g}$

137.

The escape velocity of a particle of mass m varies as

1. m^2 2. m
3. m^0 4. m^{-1}

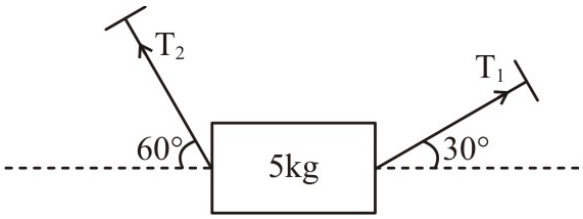
138.

A particle starting from the point (1, 2) moves in a straight line in XY plane. Its coordinates at a later time are (2,3). The path of the particle makes with x-axis an angle of

1. 30°
2. 45°
3. 60°
4. data insufficient

139.

A body of mass 5 kg is suspended by the strings making angles 60°and 30°with the horizontal



(a) T_1 = 25 N (b) T_2 = 25 N

(c) $T_1 = 25\sqrt{3}$ N (d) $T_2 = 25\sqrt{3}$ N

1. a,b
2. a,d
3. c,d
4. b,c

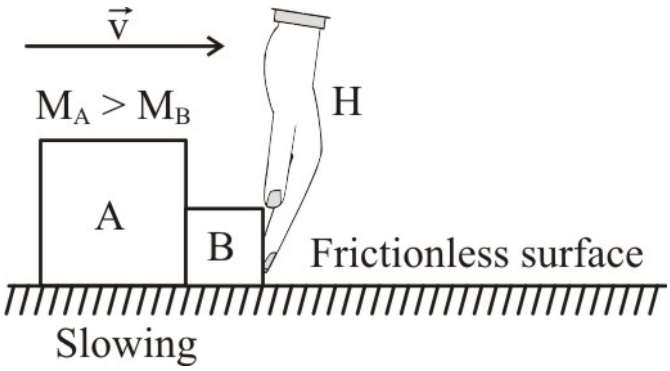
140.

A uniform thick string of length 5 m is resting on a horizontal frictionless surface. It is pulled by a horizontal force of 5 N from one end. The tension in the string at 1m from the end where the force is applied is-

1. Zero
2. 5 N
3. 4 N
4. 1 N

141.

Boxes A and B are sliding to the right across a frictionless table.The hand H is slowing them down. The mass of A is larger than the mass of B. Rank in order, from largest to smallest, the horizontal forces on A, B and H



1. $F_{B\ on\ H} = F_{H\ on\ B} = F_{A\ on\ B} = F_{B\ on\ A}$

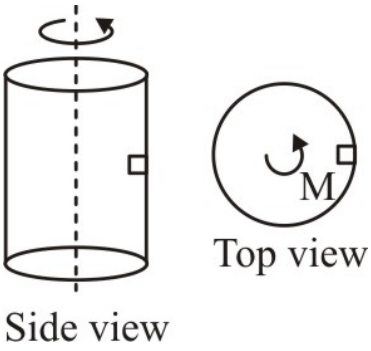
2. $F_{B\ on\ H} = F_{H\ on\ B} > F_{A\ on\ B} = F_{B\ on\ A}$

3. $F_{B\ on\ H} = F_{H\ on\ B} < F_{A\ on\ B} = F_{B\ on\ A}$

4. $F_{B\ on\ H} = F_{H\ on\ B} > F_{A\ on\ B} > F_{B\ on\ A}$

142.

A hollow vertical cylinder of radius R is rotated with angular velocity ω about an axis through its center. What is the minimum coefficient of static friction necessary to keep the mass M suspended on the inside of the cylinder as it rotates?



1. $\mu = \frac{g}{\omega^2 R}$

2. $\mu = \frac{gR}{\omega^2}$

3. $\mu = \frac{\omega^2 R}{g}$

4. $\mu = \frac{\omega^2 g}{R}$

143.

A ball is projected at certain angle with initial velocity u. It covers horizontal range R. With what initial velocity it should be projected keeping the angle of projection same so its horizontal range becomes 2.25 R?

1. 2.5 u

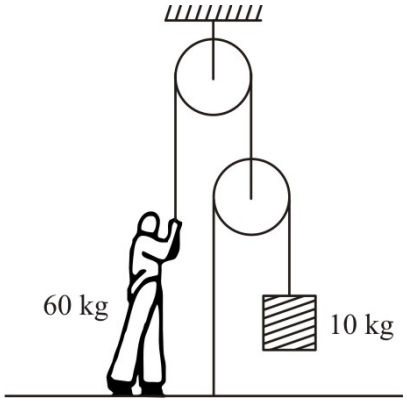
2. 1.5 u

3. 2.25 u

4. 0.25 u

144.

A man of mass 60 kg is standing on ground and holding a string passing over a system of ideal pulleys. A mass of 10 kg hanging over a light pulley such that the system is in equilibrium. The force exerted by the ground on the man is (g = acceleration due to gravity)



1. 20 g

2. 45 g

3. 40 g

4. 60 g

145.

If E is the energy stored per unit volume in a wire having Y Young's modulus of the material, then stress applied is

1. $\sqrt{2EY}$

2. $2\sqrt{EY}$

3. $\frac{1}{2}\sqrt{EY}$

4. $\frac{3}{2}\sqrt{EY}$

146.

When a body moves non-uniformly on a circular path,

1. no work is done by a tangential force.

2. no work is done by centripetal force.

3. work done by the tangential force is always positive.

4. work done by the centripetal force is negative.

147.

A bullet fired towards a wall reduces its half kinetic energy after the penetration of 6 cm. The further penetration of the bullet in the wall is-

1. 2 cm

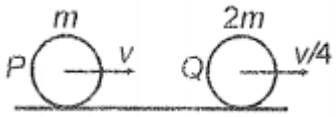
2. 1 cm

3. 6 cm

4. 3 cm

148.

Two balls P and Q of mass m and 2m move with velocity v and $\frac{v}{4}$ respectively as shown in the figure. After the collision, the velocity of P becomes $\frac{v}{2}$. The coefficient of restitution is -



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

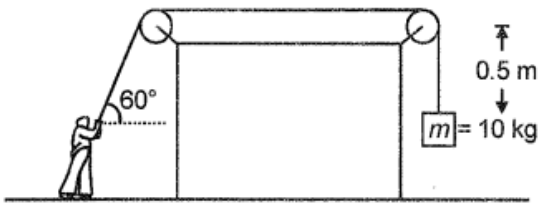
149.

A ball of mass 2 kg is moving with speed 100 m/s along a straight line making an angle of 60° with normal to a wall. If the collision between the ball and the wall is perfectly elastic, then the minimum strength of the wall if the time of contact is 0.01 s, is-

1. 1×10^4 N
2. 2×10^4 N
3. 400 N
4. $\sqrt{3} \times 10^4$ N

150.

In the given figure, a man pulls the mass m with the help of a rope. Work done by the man against the gravity when mass is lifted by 0.5 m is ($g = 10\ m/s^2$)



1. 50 J
2. 100 J
3. 25 J
4. Zero

151.

If $\int \frac{dx}{\sqrt{a^2-x^2}} = a^n \sin^{-1}\frac{x}{a}$ is dimensionally correct, then the value of n is

1. 1
2. zero
3. -1
4. 2

152.

When units of mass, length and time are taken as 10 kg, 60 m and 60 s, the new unit of energy becomes x times the initial SI unit of energy. The value of x is

1. 10
2. 20
3. 60
4. 120

153.

Which of the following relations is dimensionally wrong? [The symbols have their usual meanings.]

1. $s = ut + \frac{1}{6}at^2$
2. $v^2 = u^2 + \frac{2as^2}{\pi}$
3. v=u-2at
4. All of these

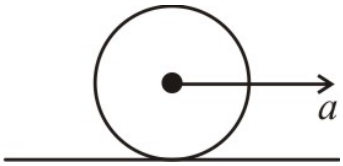
154.

Gravitational potential at the center of a solid sphere is V. Now radius of this sphere is made double its present value without changing its mass. Then the potential on the surface of this new sphere will be

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

155.

A ring is rolling without slipping on a horizontal plane with velocity v and acceleration a. The acceleration of point of contact is



1. Horizontally towards right
2. Vertically upward
3. Vertically downward
4. Zero

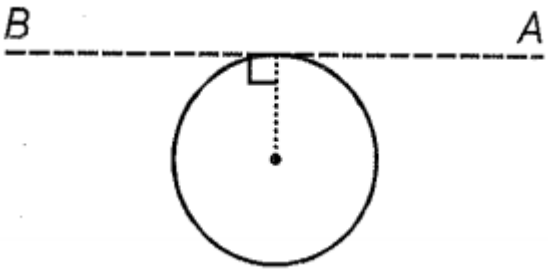
156.

Two solid spheres of masses M_1 and M_2 and radii R_1 and R_2 respectively are released from the top of a rough inclined plane of height h. The spheres are rolling without slipping. If $M_1 : M_2 = 4$ and $R_1 : R_2 = 2$ then ratio of the velocities of two spheres at the bottom of the plane is

1. 1 : 1
2. 2 : 1
3. 1 : 2
4. 1 : 4

157.

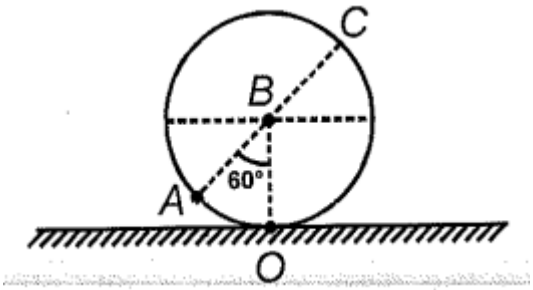
A thin wire of uniform mass density is bent into a circular loop of radius r. The radius of gyration of the loop about axis AB tangentially on the plane as shown in figure is



1. $\sqrt{\frac{3}{2}}r$
2. $\sqrt{\frac{2}{3}}r$
3. r
4. $\frac{r}{\sqrt{2}}$

158.

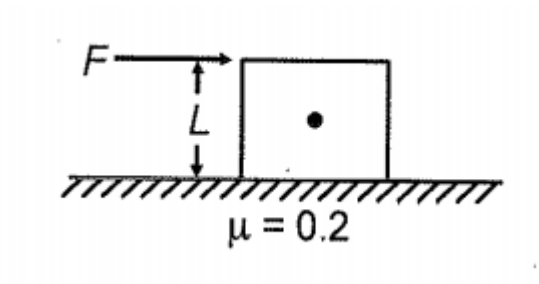
A solid cylinder is rolling without slipping on a horizontal surface. If V_A, V_B, and V_C are instantaneous velocities of points A, B, and C on the cylinder, then which of the following is correct?



1. $V_A = V_B < V_C$
2. $V_A > V_B = V_C$
3. $V_A = V_C > V_B$
4. $V_C > V_A = V_B$

159.

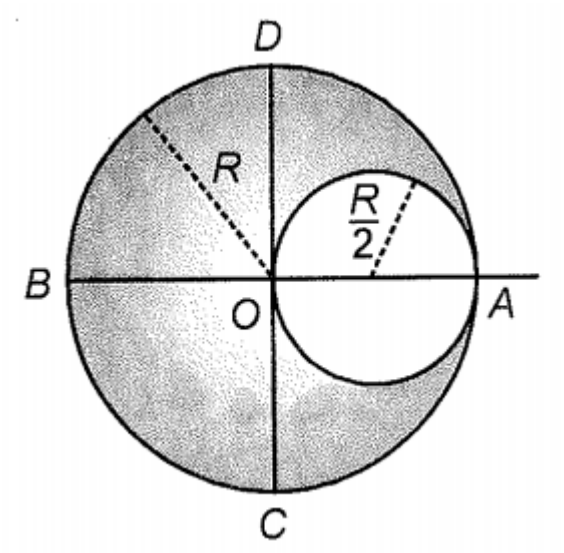
A uniform cubical block of side L rests on a rough horizontal surface with coefficient of friction μ. A horizontal force F is applied on a block as shown. If there is sufficient friction between the block and the ground, then the torque due to normal reaction about its centre of mass is



1. *Zero*
2. *FL*
3. $\frac{FL}{2}$
4. $\frac{3FL}{2}$

160.

From a disc of radius R, a disc of radius $\frac{R}{2}$ is taken out as shown in figure. Position of the centre of mass of remaining disc is on



1. OA
2. OB
3. OC
4. OD

161.

A ring, a spherical shell, a disc and a solid sphere are released from the top of an inclined plane such that they roll without slipping. If t_1, t_2, t_3 and t_4 are their respective times to reach the ground level, then-

1. $t_1 > t_2 > t_3 > t_4$
2. $t_1 = t_2 = t_3 = t_4$
3. $t_1 = t_2 > t_3 > t_4$
4. $t_1 < t_2 < t_3 < t_4$

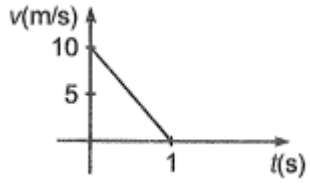
162.

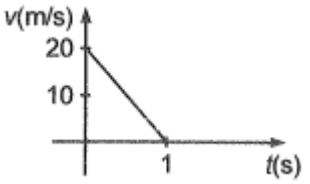
A body starting from rest moves with uniform acceleration on a horizontal surface. The body covers 3 consecutive equal distances from beginning in time t_1, t_2 and t_3 seconds. The ratio of $t_1 : t_2 : t_3$ is

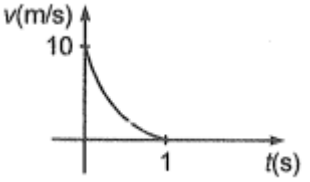
1. 1:2:3
2. $1 : \sqrt{2} : \sqrt{3}$
3. $1 : \left(\sqrt{2} - 1\right) : \left(\sqrt{3} - \sqrt{2}\right)$
4. $\sqrt{3} : \sqrt{2} : 1$

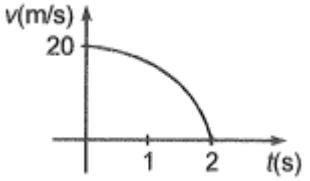
163.

The position (x) of a particle on a straight line motion is given by $x = 2 + 10t - 5t^2$ $\left(\text{m}\right)$. Its velocity (v) is best represented by

1. 

2. 

3. 

4. 

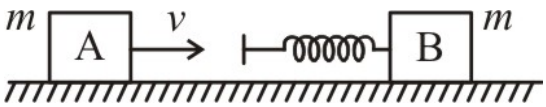
164.

A body is projected with velocity $\vec{v} = \left(\alpha\hat{i} + \beta\hat{j}\right)$ m/s. The time of flight of body is [considering x as horizontal and y as vertical axis and g is acceleration due to gravity]

1. $\frac{2\beta}{g}$
2. $\frac{2\alpha}{g}$
3. $\frac{2\alpha\beta}{g}$
4. $\frac{2\alpha}{g\beta}$

165.

Block A moves on smooth surface and collides with the block B at rest. The maximum energy stored in the spring will be



1. $\frac{1}{}$

8 mv^2

2. $\frac{1}{4}mv^2$

3. $\frac{1}{3}mv^2$

4. $\frac{1}{2}mv^2$

166.

A solid sphere is rolling up on an incline. If it is thrown in upward direction with some initial angular velocity and its motion is pure rolling, then its angular momentum about the initial point of contact during its upward motion

1. Remains constant

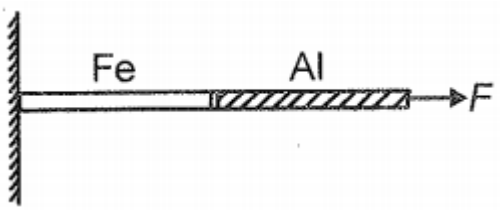
2. Increases

3. Decreases

4. Increases or decreases depending on the value of friction

167.

Aluminum and iron rods of the same length and diameter are combined together as shown in the figure. Force F is applied at one of the ends. The combined length is increased by 2 cm. The rods will have



1. Same stress and strain

2. Different stress and strain

3. Same stress and different strain

4. Same strain and different stress

168.

The bulk modulus of water is 2 x 10^9 N/m^2. The pressure change required to increase the density of water by 0.1% is-

1. 2 x 10^5 N/m^2

2. 2 x 10^6 N/m^2

3. 2 x 10^7 N/m^2

4. 2 x 10^8 N/m^2

169.

In uniform circular motion, speed of the particle is 2 m/s and radius of the circle is 2 m, then the value of centripetal and tangential acceleration are respectively

1. 2 m/s^2, 2 m/s^2

2. 2 m/s^2, 1 m/s^2

3. 0, 2 m/s^2

4. 2 m/s^2, 0

170.

Two cars A and B are moving with constant velocities 10 m/s east and 40 m/s west respectively. The acceleration of A with respect to B is

1. 20 m/s^2 west

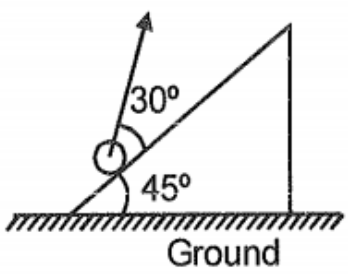
2. 50 m/s^2 west

3. 50 m/s^2 east

4. Zero

171.

A particle is projected on an incline of inclination 45° as shown in the given figure. Acceleration of the particle at its highest point is :



1. g

2. $\frac{g}{2}$

3. $\frac{g}{\sqrt{2}}$

4. $\frac{\sqrt{3}g}{2}$

172.

A spring is having spring constant K. It is cut into two parts A and B whose lengths are in the ratio of m:1. The spring constant of part A is

1. $\frac{K}{m}$

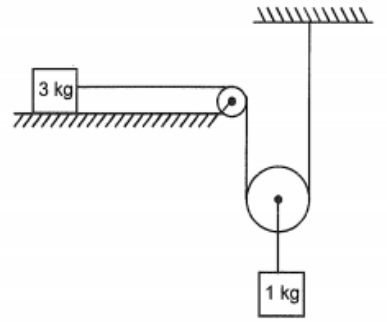
2. $\frac{K}{m+1}$

3. K

4. $\frac{K(m+1)}{m}$

173.

In the figure shown the horizontal surface is smooth and the strings are inextensible and massless pulleys are light. If the acceleration of block 1 kg is a, then acceleration of 3 kg is



1. Zero

2. 2a

3. $\frac{a}{2}$

4. $\frac{a}{4}$

174.

An elevator whose floor to ceiling height is 12 m moves upward with an acceleration of $2.2\,m/s^2$. After 1.5 seconds of start, a bolt falls from its ceiling. The time taken by the bolt to reach the floor is

1. 1 s

2. 2 s

3. $\sqrt{2}$ s

4. $\sqrt{3}$ s

175.

A body is moving towards north with initial velocity of $13\,ms^{-1}$. It is subjected to a retardation of $2\,ms^{-2}$ towards south. The distance travelled by it in 7^{th} second is

1. Zero

2. 0.75 m

3. 0.25 m

4. 0.5 m

176.

A man hangs from a rope attached to a hot-air balloon. The mass of the man is greater than the mass of the balloon and its contents. The system is stationary in air. If the man now climbs up to the balloon using the rope, the centre of mass of the 'man plus balloon' system will-

1. remain stationary

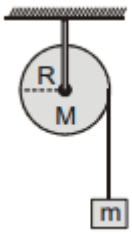
2. moves up

3. moves down

4. first moves up and then return to its initial position

177.

A mass m such that m=M is supported by a massless string wound round a uniform cylinder of mass M and radius R. On releasing the mass from rest, it will fall with acceleration :-



1. g

2. $\frac{1}{2}g$

3. $\frac{1}{3}g$

4. $\frac{2}{3}g$

178.

The potential energy of a satellite having mass m and rotating at a height of 6.4×10^6 m from the earth surface is:-

1. $-0.5\,mgR_e$

2. $-mgR_e$

3. $-2\,mgR_e$

4. $4mgR_e$

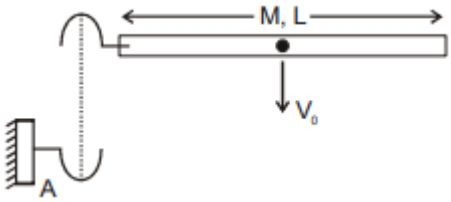
179.

$F = 2x^2 - 3x - 2$. Choose correct option

1. x = -1/2 is position of stable equilibrium
2. x = 2 is position of stable equilibrium
3. x = -1/2 is position of unstable equilibrium
4. x = 2 is position of neutral equilibrium

180.

A rod is falling down with constant velocity V_0 as shown. It comes in contact with hinge A and rotates about A. Angular velocity of the rod just after the moment when it comes in contact with hinge A is-



1. $2V_0/3L$
2. $3V_0/2L$
3. V_0/L
4. $2V_0/5L$

Fill OMR Sheet