1.
Embyologically, the body of cockroach is formed of 20 segments. What is the number in each region?
1. Head - 6; Thoracic - 3; Abdominal - 11
2. Head - 1; Thoracic - 3; Abdominal - 10
3. Head - 3; Thoracic - 3; Abdominal - 11
4. Head - 0; Thoracic - 3; Abdominal – 10

2.
Juvenile hormone in cockroach is secreted by :
1. Corpora cardiaca
2. Prothoracic gland
3. Corpora allata
4. Corpora bigemina

3.
Cells in G_0 phase:
1. terminate the cell cycle
2. exit the cell cycle
3. enter the cell cycle
4. suspend the cell cycle

4.
The shorter and longer arms of submetacentric chromosome are referred to as:
1. m-arm and n-arm respectively
2. s-arm and l-arm respectively
3. p-arm and q-arm respectively
4. q-arm and p-arm respectively

5.
The correct sequence of phases in cell cycle is:
1. $G_1 \rightarrow S \rightarrow G_2 \rightarrow M$
2. $M \rightarrow G_1 \rightarrow G_2 \rightarrow S$
3. $G_1 \rightarrow G_2 \rightarrow S \rightarrow M$
4. $S \rightarrow G_1 \rightarrow G_2 \rightarrow M$

6.
The active form of Entamoeba histolytical feeds upon:
1. Mucosa and submucosa of colon only
2. Food in intestine
3. Blood only
4. erythrocytes: mucosa and submucosa of colon

7.
Which of the following endoparasited of humans does show viviparity ?
1. Enterobius vermicularis
2. Trichinella spiralis
3. Ascaris lumbricoides
4. Ancylostoma duodenale

8.
Metagenesis refers to
1. Presence of a segmented body parthenogenetic mode of reproduction
2. Presence of different morphic forms
3. Alternation of generation between asexual and sexual phases of an organism
4. Occurrence of a drastic change in form post - embryonic developement

9.
Which one of the following animals has two separate circulatory pathways?
1. Shark
2. Frog
3. Lizard
4. Whale

10.
Body having meshwork of cells, internal cavities lined with food filtering flagellated cells and indirect developement are the characteristics of phylum :
1. Protozoa
2. Coelenterata
3. Porifera
4. Mollusca

11.
Which one of the following characteristic features always holds true for the corresponding group of animals?
1. Cartilaginous Chondrichthyes endoskeleton
2. Viviparous Mammalia
3. Posses a mouth with Chordata an upper and a lower jaw
4. 3 - chambered heart Reptilia with one incompletely

divided ventricle

12.

Find out the incorrect statement about the Rhodophyceae.
1. Majority are marine with greater concentrations found in the warmer areas.

2. They are also found at great depths of oceans where relatively little light penetrates.

3. Usually reproduce vegetatively by fragmentation.

4. They reproduce asexually by biflagellate zoospores.

13.

Read the following statement and find out the incorrect statement.
1. Algae usually reproduce vegetatively by fragmentation, asexually by formation of different types of spores and sexually by formation of gametes.

2. Algae are classified into three classes, pteridophytes into four classes and angiosperms into two classes.

3. Algae are chlorophyll bearing simple, thalloid, autotrophic and largely aquatic organisms.

4. The plant body of algae is more differentiated than that of bryophytes.

14.

Read the following statements (a-e) and answer question that follows them.
(a) In liverworts, mosses and ferns gametophytes are free-living.
(b) Gymnosperms and some ferns are heterosporous.
(c) Sexual reproduction in Fucus, Volvox and Albugo is oogamous.
(d) The sporophyte in liverworts in more elaborate than that in mosses.
(e) Both, Pinus and Marchantia are dioecious

How many of the above statements are correct?
1. One

2. Two

3. Three

4. Four

15.

Read the following statements.
(a) Gymnosperms are heterosporous.
(b) Bryophytes have well developed vessels and sieve tubes.
(c) Strobilus is found in the main plant body of Equisetum.
(d) Antheridia are absent but archegonia are present in female storobil of gymnosperms.
Choose the correct option.
1. All of these

2. (a), (c) and (d)

3. Only (a)

4. (b) and (c)

16.

Which of the following eukaryote is extensively used in experimental genetics?
1. E. coli
2. Alternaria
3. Ustilago
4. Neurospora

17.

Sexual reproduction in fungus occurs in the following sequential event. Arrange them properly.
(i) Fusion of two nuclei .
(ii) Fusion of protoplasm between two motile or non-motile gametes.
(iii) Meiosis in zygote resulting in haploid spores.
1. (i) $\rightarrow$ (ii) $\rightarrow$ (iii)
2. (ii) $\rightarrow$ (i) $\rightarrow$ (iii)
3. (iii) $\rightarrow$ (ii) $\rightarrow$ (i)
4. (iii) $\rightarrow$ (i) $\rightarrow$ (ii)

18.

Select the correct statement
1. Viroids have double stranded RNA.
2. RNA of viroids has higher molecular weight than that of viruses.
3. Mumps and herpes are viral diseases.
4. The name virus was given by D.J. Ivanowsky.

19.

Which of the following statement are incorrect with respect to lichens ?
(i) Algae protects fungus and fungus is parasite on algae.
(ii) Algae and fungi are in symbiotic association.
(iii) Lichens are pollution indicator.
(iv) Lichen represents the climax of plant succession.
1. (i) and (ii)
2. (i) and (iv)
3. (ii) and (iii)
4. (iii) and (iv)

20.

In lichen, algal component is called______and fungal component is called ______
1. Mycobiont ; phycobiont
2. Phycobiont ; mycobiont
3. Phycobiont ; mycorrhiza
4. Mycorrhiza ; mycobiont

21.

How many statements are correct ?
(i) The seed coat has two layers, the outer testa and the inner tegmen

(ii) The hilum is the small pore on seed coat.

(iii) Both plumule and radical are enclosed in sheath known as coleoptiles in monocot

(iv) Castor seed is endospermic

(v) Generally monocots have non-endospermic seeds except some like orchinds.

(vi) A dicot embryo consists of an embryonal axis and two cotyledons

1. six

2. five

3. four

4. three

22.

In a papilionaceous corolla, the anterior petal is
1. Smallest and called keel

2. Known as scale

3. Largest and is known as wing

4. Largest and is known as standard

23.

The type of placentation shown in the given diagram is seen in:

1. China rose

2. Mustard

3. Marigold

4. Dianthus

24.

Select the correct statement:
1. Centrioles form the basal body of cilia and flagella

2. Secondary constrictions on the chromosomes do not have a constant location

3. Microbodies are present in plant cells only

4. Nucleoli are less in number in cells undergoing protein synthesis

25.

Find the incorrect statement:
1. Middle lamella is mainly made up of calcium pectate

2. Cell wall is formed on the inner side of the cell therefore secondary wall formed first

3. Middle lamella glues the neighbouring cells together

4. Cell wall helps in cell to cell interaction and provides barrier to undesirable macromolecules

26.

Transitional vesicles enclosing biochemicals pinched off from ER fuse with:
1. Maturing face of golgibody
2. Forming face of golgi body
3. Primary lysosome for intracellular digestion
4. Plasma membrane to remove them from cell

27.

According to fluid mosaic model of plasma membrane the quasifluid nature of:
1. Protein enables lateral movement of lipids within the overall bilayer

2. Lipid and protein enable the lateral movement of carbohydrates

3. Lipid enables lateral movement of proteins within the overall bilayer

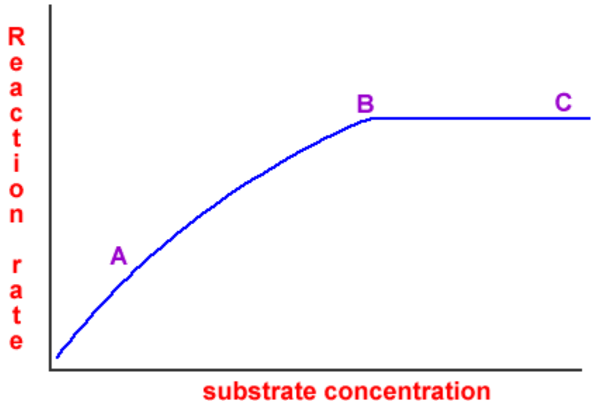
4. Lipid enables the flip-flop movement of proteins

28.

The enzymes present in lysosomes belong to the class_______ and acidic condition inside the lysosome is maintained by_______:
1. Oxidoreductases, pumping protons
2. Hydrolases, secretion of acids
3. Hydrolases, pumping of protons
4. Lyases, removal of hydroxyl ions

29.

- Look at the graph given below. The reaction rate the reaction can be increased beyond point C by:



1. increasing the amount of substrate
2. adding more water
3. increasing the temperature
4. decreasing enzyme concentration

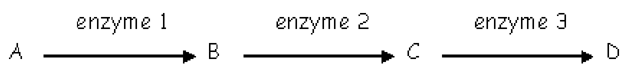
30.

What level of protein organization structure explains the 3-D shape of an enzyme?

1. primary structure
2. tertiary structure
3. secondary structure
4. quaternary structure

31.

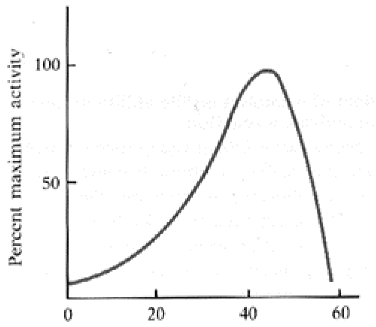
Given below is a schematic metabolic pathway. In an experiment, the concentration of enzyme 1 was increased but the concentration of enzymes 2 and 3 were kept constant What would happen to the rate of production of D?



1. it would go down
2. it would go up
3. it would stay the same
4. it would stop

32.

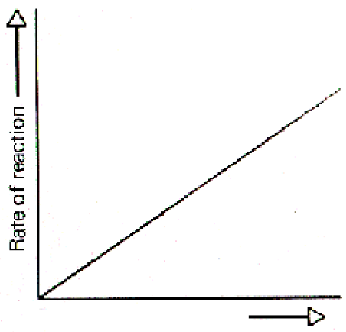
The graph shown below shows the effect of a certain factor on the rate of a reaction catalyzed by an enzyme. The X-axis would show the said factor and that will be:



1. substrate concentration
2. pH
3. enzyme concentration
4. temperature

33.

In the following graph, the X-axis will show:



1. substrate concentration
2. enzyme concentration
3. pH
4. enzyme concentration or substrate concentration

34.

The rate of enzyme action decreases at higher temperature [after a certain value] because the increased heat

1. changes the pH of the system
2. alters the active site of the enzyme
3. neutralizes the acids and bases in the system
4. increases the concentration of the enzyme

35.

The "lock and key hypothesis", given by Emil Fischer, attempts to explain the mechanism of:

1. denaturation of enzyme proteins
2. the formation of peptide binds
3. sharing of electrons
4. enzyme specificity

36.

A taxonomic aid which gives actual account of habitat and distribution of various plants of given area, is

1. Manual

2. Flora

3. Monograph

4. Catalogue

37.

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

1. Mangifera $\rightarrow$ Anacardiaceae $\rightarrow$ Dicotyledonae $\rightarrow$ Sapindales $\rightarrow$ Angiospermae.

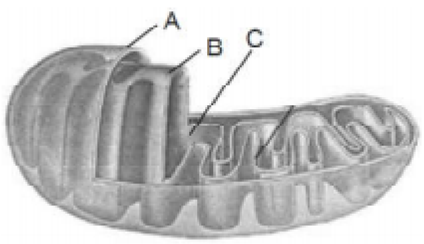
2. Mangifera $\rightarrow$ Anacardiaceae $\rightarrow$ Sapindales $\rightarrow$ Dicotyledonae $\rightarrow$ Angiospermae.

3. Angiospermae $\rightarrow$ Dicotyledonae $\rightarrow$ Sapindales $\rightarrow$ Anacardiaceae $\rightarrow$ Mangifera.

4. Angiospermae $\rightarrow$ Sapindales $\rightarrow$ Anacardiaceae $\rightarrow$ Dicotyledonae $\rightarrow$ Mangifera.

38.

Which is not a feature w.r.t. given diagram of mitochondria (as indicated in diagram)?



1. A $\rightarrow$ Continuous limiting boundary.
2. B $\rightarrow$ Forms number of folding called cisternae.
3. A & B $\rightarrow$ Both having own specific enzyme.
4. C $\rightarrow$ Site of Krebs' cycle.

39.

The chromosome in which centromere is situated close to its end forming one extremely short and one very long arm, is

1. Telocentric

2. Submetacentric

3. Acrocentric

4. Metacentric

40.

Which of the following characteristics is not correct for squamous epithelium?

1. Made up of single thin layer of flattened cells.
2. Cells with irregular boundaries.
3. Free surface contains microvilli.
4. Involved in a function like forming diffusion boundary.

41.

Mark the incorrect statement regarding compound epithelium?

1. Made up of more than one layer of cells.

2. Vital role in secretion and absorption.

3. Provide protection against chemical and mechanical stress.

4. It covers the moist surface of buccal

42.

Which of the following component is not common in bones and cartilage?

1. Fibres

2. Lacunae

3. Intercellular matrix

4. Lamellae

43.

The excess of nutrients which are not used immediately are converted into fats and stored in

1. Areolar tissue

2. Adipose tissue

3. Dense regular connective tissue

4. Dense irregular connective tissue

44.

The animals belonging to all the following groups are exclusively marine except:
1. Ctenophora
2. Porifera
3. Protochordata
4. Echinodermata

45.

In bacteria the cell cycle is divided into:
1. Only 1 phase
2. Two stages
3. Three periods
4. Four classes

46.

The G_0 stage of the cell cycle is irreversible in:

I. Quiescent cells
II. Senescent cells
III. Terminally differentiated cells

1. I and II only
2. I and III only
3. II and III only
4. I, II and III

47.

If a cell in S phase is fused with a cell in G_1:

1. The G_1 nucleus immediately enters the S phase
2. The S nucleus stops DNA replication
3. The G_1 nucleus directly enters G_2 phase
4. Both nuclei enter the M phase immediately

48.

A point in the animal cell cycle at which the cell becomes "committed" to the cell cycle occurs in:

1. G_1
2. S
3. G_2
4. M

49.

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

50.

The stage phase of the cell cycle that is expected to be most variable in duration in different types of cells in an animal will be:

1. G_1
2. S
3. G_2
4. M

51.

After karyogamy followed by meiosis, spores are produced exogenously in

1. Neurospora
2. Saccharomyces
3. Agaricus
4. Alternaria

52.

Choose the option which comprises of oviparous animals

1. Ostrich, eagle, whale
2. Bat, pigeon, crow
3. Parrot, vulture, sparrow
4. Kite, platypus, kangaroo

53.

The phylum which was earlier considered as a subphylum under chordata but now placed as a separate phylum, in non-chordates is

1. Urochordata
2. Hemichordata
3. Cephalochordata
4. Vertebrata

54.

Heterotrophic, eukaryotic, multicellular organisms lacking a cell wall are included in the kingdom.

1. Protista
2. Fungi
3. Plantae
4. Animalia

55.

Which of the following is correct?

1. All slime moulds are haploid.
2. protozoans lack cell wall.
3. Dinoflagellates are non-motile
4. Pellicle is absent in Euglena

56.

Which of the following statement is incorrect regarding bryophytes?

1. They are dependent on water for sexual reproduction.
2. The main plat body is diploid
3. They usually occur in damp, humid and shaded localities.
4. They play an important role in plant succession on bare rocks.

57.

The region of part of root that increases the surface area for water absorption is

1. Root cap

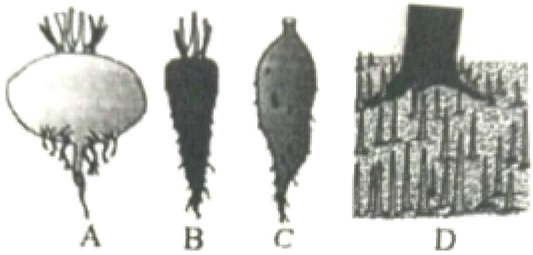
2. Zone of elongation

3. Meristematic zone

4. Root hair

58.

Which of the following incorrect about A, B, C and D?



1. Tap roots of carrot, turnip and adventitious root of sweet potato get swollen and store food.

2. Pneumatophores help of get oxygen for respiration

3. Pneumatophores are found in the plants that grow in sandy soil

4. A, B and C are underground roots but D grows vertically upwards

59.

Study the following statements and choose the correct option.

I. Buds are present in the axil of leaflets of the compound leaf.

II. pulvinus leaf-base is present in some leguminous plants.

III. In Alstonia, the petioles expand, become green and synthesize food.

IV. Opposite phyllotaxy is seen in guava.

1. II and IV are correct but I and III are wrong

2. I and III are correct but II and IV are wrong

3. I and IV are correct but II and III are wrong

4. II, III and IV are correct but I is wrong

60.

The intrafascicular cambium

1. is a simple permanent tissue

2. is a meristematic tissue

3. is a complex permanent tissue

4. is secondary meristem

61.

The conjuctive tissues lie between the

1. Xylem and phloem

2. Pericycle and Endodermis

3. Epidermis and endodermis

4. Epidermis and hypodermis

62.

The feature which is common to both heartwood and sapwood is

1. Both are the regions of secondary xylem

2. Both are involved in the conduction of water.

3. Both comprise dead elements with accumulation of aromatic compounds.

4. Both are located in the central layers of the stem.

63.

An example of protein with quaternary structure is

1. Myoglobin

2. Hemoglobin

3. Keratin

4. All of these

64.

What do A, B and C represent in the given scientific name respectively?

Mangifera	Indica	Linn
C	B	A

1. Generic name, specific name and author's name

2. Specific name, generic name and author's name

3. Author's name, specific name and generic name

4. Generic name, author's name and specific name

65.

Which is the incorrect statement regarding fungi?

1. Wheat rust causing agent is Puccinia.

2. Penicillium is a source of antibiotics.

3. The cell wall of fungi are composed of peptidolycan.

4. Fungi prefer to grow in warm and humid places.

66.

In Rhizophora, roots are modified to form

1. Tuberous roots

2. Pneumatophores

3. Stilt roots

4. Storage roots

67.

Select the correct statement w.r.t mango and coconut

1. They develop from monocarpellary superior ovaries.

2. They develop from monocarpellary inferior ovaries.

3. They have fibrous epicarp.

4. They have fleshy edible mesocarp.

68.

Match Column - I with Column - II and choose the correct option

Column - I	Column - II
a.A vector of disease	(i) Bombyx
b.A gregarious pest	(ii) Limulus
c.A living fossil	(iii) Locusta
d.An economically important	(iv) Culex insect

1. a(iii), b(ii), c(i), d(iv)

2. a(i), b(ii), c(iii), d(iv)

3. a(ii), b(iv), c(iii), d(i)

4. a(iv), b(iii), c(ii), d(i)

69.

Which group of animals belong to the same phylum?

1. Earthworm, Pinworm, Tapeworm

2. Prawn, Scorpion, Locusta

3. Sponge, Sea anemone, Starfish

4. Malarial parasite, Amoeba, Mosquito

70.

Which of the following muscles act involuntarily?

(a) Striated muscles

(b) Smooth muscles

(c) Cardiac muscles

(d) Skeletal muscles

1. (a) & (b)

2. (b) & (c)

3. (c) & (d)

4. (a) & (d)

71.

Enzymes catalyse biochemical reactions by

1. Lowering the activation energy

2. Increasing the activation energy

3. Establishing stable bonds with substrate

4. Increasing temperature

72.

Which one is not the character of skeletal muscle?

1. Voluntary in action

2. Associated with bones

3. Involuntary in actions

4. Striated muscle

73.

Select the correct statement.

1. Cholera, typhoid, tetanus are well-known diseases caused by viruses.

2. Dinoflagellates, euglenids and slime moulds are placed under kingdom Monera

3. Members of kingdom Protista and primarily aquatic

4. Dinoflagellates are the chief 'producers' in the oceans

74.

In gymnosperms, the ovule is naked because

1. Ovary wall is absent

2. Integuments are absent

3. Perianth is absent

4. Nucellus is absent

75.

Which of the following set of animals belong the phylum hemichordate?

1. Balanoglossus, Saccoglossus

2. Salpa, Doliolum

3. Petromyzon, Myxine

4. Dentalium, Chaetopleura

76.

In a dicot stem, the interfascicular cambium strip arises

1. Between xylem and phloem
2. From medullary rays
3. From pith
4. From pericylce

77.

"When we conserve and protect the whole ecosystem, its biodiversity at all levels in protected."

1. Biosphere reserves
2. Seed bank
3. National parks
4. Sanctuaries

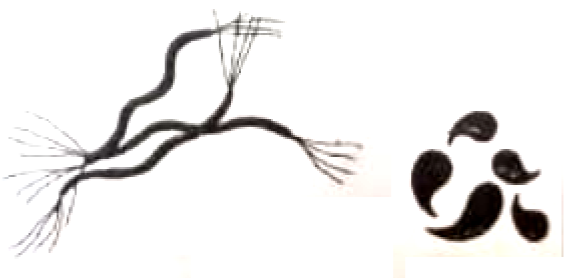
78.

Select the incorrect statement w.r.t. fungi

1. Mycelium is consist of long slender thread like structures called hyphae
2. Aseptate and multinucleate hyphae is called coenocytic hyphae
3. Dolipore septum is characteristic of class ascomycetes.
4. The cell wall is composed of chitin and polysaccharides

79.

Choose the correct option for the given below figures.



1. Peritrichous bacteria
2. They do not contain both RNA and DNA
3. Presence of non-cellulosic cell wall
4. Presence of cyclosis

80.

The endosperm of gymnosperm represents

1. Triploid structure
2. Female gametophytes
3. Male gametophytes
4. Diploid embryonic part

81.

Select an incorrect match

1. Taxus - Anticancerous compound
2. Ephedra - Antiasthmatic drug
3. Cedrus - Cedar wood oil
4. Pinus - Edible seed

82.

Veins of leaf in addition to acting as channels of transport of water, minerals and food materials also

1. Determine extent of incision of 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.

83.

Leaflets are present on rachis and terminal leaflet is absent in

1. Palmate, unifoliate leaf
2. Palmate, bifoliate leaf
3. Imparipinnate type unipinnate leaf
4. Paripinnate type unipinnate leaf

84.

Scapigerous umbel and corymbose raceme is found respectively in

1. Brassica campestris and Allium cepa
2. Allium cepa and Brassica campestris
3. Brassica oleracea and Coriander
4. Coriander and Brassica oleracea

85.

The fruit type and edible part in Ficus carica is

1. Sorosis, fleshy axis and succulent perianth
2. Hypanthodium, fleshy thalamus
3. Syconus, fleshy thalamus
4. Hypanthodium, entire fruit

86.

Epidermal hairs on stems known as trichomes

1. May sometimes be secretor in function
2. Have vascular supply
3. May be soft or stuff but unbrached always
4. Are endogenous in origin like lateral roots

87.

Steler tissue system in shoot is derived from

1. Dermatogen
2. Periblem
3. Plerome
4. Tunica

88.

As a tree grows older, thickness of ______ increases

1. Duramen
2. Alburnium
3. Sap wood
4. Early wood

89.

Bark refers to all the tissues

1. External to vascular cambium
2. External to cork cambium
3. Formed earlier in the season
4. Impregnated with suberin

90.

Chloroplast differs from mitochondria in

1. Having circular DNA and 70S ribosomes
2. Phase of division or duplication during cell cycle
3. Having porins in outer membrane
4. Having enzymes for carbohydrate synthesis in stroma

91.

Correct increasing order of density is:

1. Li<K<Na<Rb<Cs
2. Li<Na<K<Rb<Cs
3. Cs<Rb<K<Na<Li
4. K<Li<Na<Rb<Cs

92.

For the reaction:

$CO(g) + \frac{1}{2}O_2(g) \rightleftharpoons CO_2(g)$, K_p/K_c is:

1. RT
2. $(RT)^{-1}$
3. $(RT)^{-1/2}$
4. $(RT)^{1/2}$

93.

Which is Lewis base?

1. HCl 2. HNO_3
3. HF 4. NH_3

94.

A solution of $FeCl_3$ in water acts as acidic due to:

1. acidic impurities 2. ionization
3. hydrolysis of Fe^{3+} 4. dissociation

95.

200 kg of iron ore (Fe_2O_3) containing 20% impurities, on reduction with CO gives iron. The amount of iron produced will be:-

1. 84 kg
2. 200 kg
3. 56 kg
4. 112 kg

96.

How many moles of $KMnO_4$ are needed a mixture of 1 mole of each $FeSO_4$ & FeC_2O_4 in acidic medium

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

97.

Which bond is expected to be the least polar?

1. O-F

2. P-F

3. Si-N

4. B-F

98.

The bond length of the S—O bond in maximum in which of the following compounds?

1. $SOCI_2$

2. $SOBr_2$

3.SOF_2

4. All have the same length

99.

What volume of $O_2(g)$ measured at 1 atm and 273 K will be formed by action of 100 mL of 0.5 N $KMnO_4$ on hydrogen peroxide in an acid solution? The skeleton equation for the reaction is
$KMnO_4 + H_2SO_4 + H_2O_2$
$\rightarrow K_2SO_4 + MnSO_4 + O_2 + H_2O$

1. 0.12 litre

2. 0.028 litre

3. 0.56 litre

4. 1.12 litre

100.

In photoelectric effect, the kinetic energy of photoelectrons increases linearly with the

1. Wavelength of incident light

2. Frequency of incident light

3. Velocity of incident light

4. Atomic mass of an element

101.

The correct order of atomic radii is:
1. $Yb^{3+} < Pm^{3+} < Ce^{3+} < La^{3+}$
2. $Ce^{3+} < Yb^{3+} < Pm^{3+} < La^{3+}$
3. $Yb^{3+} < Pm^{3+} < La^{3+} < Ce^{3+}$
4. $Pm^{3+} < La^{3+} < Ce^{3+} < Yb^{3+}$

102.

Which of the following statements about nodal planes is/are not true -

1. A plane on which there is zero probability of finding an electron

2. A plane on which there is maximum probability that the electron will be found

3. $\psi^2$is non zero at nodal plane

4. None of these

103.

Lattice energy of $BeCO_3$ (I) , $MgCO_3$ (II) and $CaCO_3$ (III) are in the order -

1. I > II > III

2. I < II < III

3. I < III < II

4. II < I < III

104.

NH_3 and BF_3 combine readily because of the formation of -

1. a covalent bond

2. a hydrogen bond

3. a co-ordinate bond

4. an ionic bond

105.

The pair of species with similar shape is

1. PCl_3, NH_3

2. CF_4, SF_4

3. $PbCl_2$, CO_2

4. PF_5, IF_5

106.

The standard heat of combustion of propane is –2220.1 kJ mol^{-1}. The standard heat of vaporisation of liquid water is 44.0 kJ mol^{-1}. What is Hº of–

C_3H_8 (g) + $5O_2$ (g) $\rightarrow$ $3CO_2$ (g) + $4H_2O$(g)

1. – 2220.1 kJ

2. – 2044.1 kJ

3. – 2396.1 kJ

4. – 2176.1 kJ

107.

The equilibrium constant of the reaction A_2(g) + B_2(g) $\rightleftharpoons$ 2AB (g) at 100ºC is 50. If a one litre flask containing one mole of A_2 is connected to a two litre flask containing two moles of B_2, how many moles of AB will be formed at 373 K ?

1. 1.8
2. 1.9
3. 2.1
4. 3.6

108.

In the preparation of quick lime from lime stone, the reaction is:

$CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$

led to set of K_p values fitting an empirical equation

$\log K_p = 7.282 - \frac{8500}{T}$

If the reaction is carried out in quite an air, what temperature would be predicted from this equation for complete decomposition of the lime stone?

1. T = 1167.26 K
2. T = 1670.55 K
3. T = 1650.80 K
4. None of these

109.

For the equilibrium

$LiCl.3NH_3(s) \rightleftharpoons LiCl.NH_3(s) + 2NH_3$

K_P = 9 atm^2, at 40ºC. A 5 litre contains 0.1 mole of LiCl.NH3. How many moles of NH3 should be added to the flask at this
temperature to drive the backward reaction for completion

1. 0.78
2. 0.80
3. 0.90
4. None of these

110.

A sample of $CaCO_3(s)$ is introduced into a sealed container of volume 0.821 litre and heated to 1000 K until equilibrium is reached. The equilibrium constant for the reaction $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$ is 4×10^{-2} atm at this temperature. Calculate the mass of CaO present at equilibrium.

1. 22.4 mg
2. 25 mg
3. 27.2 mg
4. None of these

111.

What volume (in ml) at STP of SO2 gas is oxidized by 100 ml of 0.1 (M) H2Cr2O7 in acid solution ?

1. 672 ml
2. 224 ml
3. 448 ml
4. 112 ml

112.

25 ml of a 0.1 (M) solution of a stable cation of transition metal z reacts exactly with 25 ml of 0.04 (M) acidified $KMnO_4$ solution. Which of the following is most likely to represent the change in oxidation state of z correctly ?

1. $Z^{+} \rightarrow Z^{2+}$
2. $Z^{2+} \rightarrow Z^{3+}$
3. $Z^{3+} \rightarrow Z^{4+}$
4. $Z^{2+} \rightarrow Z^{4+}$

113.

A gas at a pressure of 5.0 atm is heated from 0º to 546 ºC and simultaneously compressed to one-third of its original volume. Hence final pressure is -

1. 10.0 atm
2. 30.0 atm
3. 45.0 atm
4. 5.0 atm

114.

An open vessel containing air is heated from 300 K to 400 K. The fraction of air originally present which goes out of it is at 400 K -

1. 3/4
2. 1/3
3. 2/3
4. 1/8

115.

$N_2 + 3H_2 \rightarrow 2NH_3$. 1 mol N_2 and 4 mol H_2

are taken in 15 L flask at 27 ºC. After complete conversion of N_2 into NH3, 5 L of H_2O is added. Pressure set up in the flask is -

1. $\frac{3\times0.0821\times300}{15}\ atm$

2. $\frac{2\times0.0821\times300}{10}\ atm$

3. $\frac{1\times0.0821\times300}{15}\ atm$

4. $\frac{3\times0.0821\times300}{10}\ atm$

116.

The ionization energy of sodium is 495 kJ mol^{-1}. How much energy is needed to convert atoms present in 2.3 mg of sodium into sodium ions ?

1. 4.95 J

2. 49.5 J

3. 495 J

4. 0.495 J

117.

What is not true about resonance ?

1. The resonating structures are hypothetical

2. The unpaired electrons in various resonating structures are same

3. Hybrid structure is most energetic

4. Hybrid structure is least energetic

118.

If $S + O_2 \rightarrow SO_2$,

$\Delta H = -298.2$ kJ $mole^{-1}$

$SO_2 + 1/2\ O_2 \rightarrow SO_3$,

$\Delta H = -98.7$kJmole–1

$SO_3 + H_2O \rightarrow H_2SO_4$,

$\Delta H = -130.2$ kJ $mole^{-1}$

$H_2 + 1/2\ O_2 \rightarrow H_2O$,

$\Delta H = -287.3$ kJ $mole^{-1}$

the enthalpy of formation of H_2SO_4 at 298 K will be–

1. – 814.4 kJ $mole^{-1}$

2. + 814.4 kJ $mole^{-1}$

3. – 650.3 kJ $mole^{-1}$

4. – 433.7 kJ $mole^{-1}$

119.

2.1 g of Fe combines with S evolving 3.77 kJ. The heat of formation of FeS in kJ/mole is–

1. – 3.77

2. – 1.79

3. – 100.5

4. none of these

120.

A 1 litre container contains 2 moles of PCl_5 initially. If at equilibrium , K_C is found to be 1, degree of dissociation of PCl_5 is -

1. 4

2. 3

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

4. 50

121.

Equilibrium constant for the following equilibrium is given at 0ºC.

$Na_2HPO_4.12H_2O \rightleftharpoons Na_2HPO_4.7H_2O(s)+5H_2O(g)$

$$K_P = 31.25 \times 10^{-13}$$

the pressure of water vapour is -

1. $\frac{1}{5}$ x 10^{-3} atm

2. 0.5 × 10^{-3} atm

3. 5 × 10^{-2} atm

4. 5 × 10^{-3} atm

122.

During the disproportionation of I_2 to Iodide and Iodate ions, the ratio of Iodate and Iodide ions formed in alkaline medium is -

1. 1 : 5

2. 5 : 1

3. 3 : 1

4. 1 : 3

123.

Which of the following reaction in neither oxidation nor reduction ?

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

2. $Cr \rightarrow CrCl_3$

3. $Na \rightarrow Na^+$

4. $2S_2O_3^{2-} \rightarrow S_4O_6^{2-}$

124.

10 g of a silver coin when dissolved completely in excess of conc. HNO_3 gives 8.5 g of silver nitrate. The percentage purity of the coin is

1. 25%

2. 54%

3. 67%

4. 100%

125.

For a subatomic particle, the uncertainty in position is same as that of uncertainty in its momentum. The least uncertainty in its velocity can be given as

1. $\Delta V = \frac{h}{4\pi m^2}$

2. $\Delta V = \frac{1}{2\pi}\sqrt{\frac{h}{m}}$

3. $\Delta V = \frac{h}{2\pi m}$

4. $\Delta V = \frac{1}{2m}\sqrt{\frac{h}{\pi}}$

126.

The ratio of magnitudes of potential energy to that of kinetic energy of an electron in the 5th shell of hydrogen atom is

1. 1 : 1

2. 1 : 5

3. 5 : 1

4. 2 : 1

127.

An element with atomic number 123 will have the symbol

1. Unb

2. Ntq

3. Qph

4. Ubt

128.

Which of the following element of third period is expected to have the positive electron gain enthalpy?

1. Na

2. Al

3. Cl

4. Ar

129.

Which of the following species shows deviation from Octet rule?

1. CO_3^{2-}

2. H_2SO_3

3. PCl_3

4. O_3

130.

Which of the following species has bent T-shape?

1. ICl_4^-

2. PCl_3

3. BrF_3

4. I_3^-

131.

Which of the following species is diamagnetic?

1. O_2

2. O_2^{2-}

3. O_2^+

4. O_2^-

132.

Which of the following pair correctly represents intensive property?

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

133.

When 0.01 mole of HCl is added to a buffer solution, its pH changes from 4.5 to 4.3. The buffer capacity of the buffer solution is

1. 1
2. 0.05
3. 0.2
4. 0.002

134.

The solubility of AgCl in 0.2 M magnesium chloride will be $\left(K_{sp} \text{ of AgCl } = 1.8 \text{ x } 10^{-10}\right)$

1. $1.8 \text{ x } 10^{-10}$
2. $1.8 \text{ x } 10^{-11}$
3. $9 \text{ x } 10^{-10}$
4. $4.5 \text{ x } 10^{-10}$

135.

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

136.

A particle is projected from a point (0,1) on Y-axis (assume+Y direction vertically upwards) aiming towards a point (4,9). It fell on ground along x axis in 1 sec. Taking g = 10 m/s^2 and all coordinate in metres, find the coordinates where it fell .

1. (3,0)
2. (4,0)
3. (2,0)
4. $(2\sqrt{5},0)$

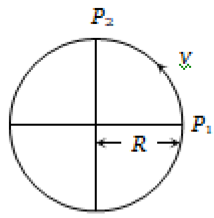
137.

At what angle must the two forces $(x+y)$ and $(x-y)$ act so that the resultant may be $\left(\sqrt{x^2+y^2}\right)$?

1. $\cos^{-1}\left(-\frac{x^2+y^2}{2(x^2-y^2)}\right)$
2. $\cos^{-1}\left(-\frac{2(x^2-y^2)}{x^2+y^2}\right)$
3. $\cos^{-1}\left(-\frac{x^2+y^2}{x^2-y^2}\right)$
4. $\cos^{-1}\left(-\frac{x^2-y^2}{x^2+y^2}\right)$

138.

Figure below shows a body of mass M moving with the uniform speed v on a circular path of radius, R. What is the change in acceleration in going from P_1 to P_2 ?



1. zero
2. $v^2/2R$
3. $2v^2/R$
4. $\frac{v^2}{R} \times \sqrt{2}$

139.

The position of a particle at time t is given by the relation $x(t)=\left(\frac{v_0}{\alpha}\right)\left(1-e^{-\alpha t}\right)$, where v_0 is a constant and α>0. The dimensions of v_0 and α are respectively

1. $M^0L^1T^{-1}$ and T^{-1}
2. $M^0L^1T^0$ and T^{-1}
3. $M^0L^1T^{-1}$ and LT^{-2}
4. $M^0L^1T^{-1}$ and T

140.

The volume V of water passing any point of a uniform tube during t seconds is related to the cross-sectional area A of the tube and velocity u of water by the relation

$V \propto A^{\alpha}u^{\beta}t^{\gamma}$

Which one of the following will be true?

1. $\alpha=\beta=\gamma$
2. $\alpha\neq\beta=\gamma$
3. $\alpha=\beta\neq\gamma$
4. $\alpha\neq\beta\neq\gamma$

141.

Which one of the following relations is dimensionally consistent where h is height to which a liquid of density ρ rises in a capillary tube of radius, r, T is the surface tension of the liquid, θ the angle of contact and g the acceleration due to gravity ?

1. $h=\frac{2T\cos\theta}{r\rho g}$

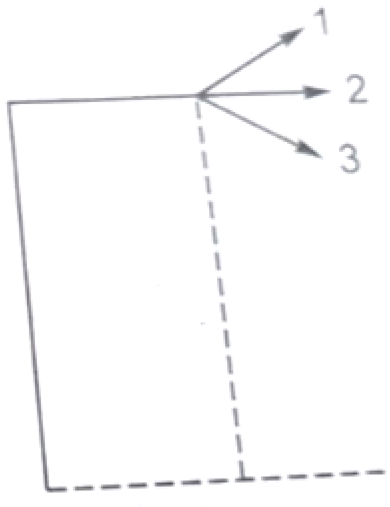
2. $h=\frac{2Tr}{\rho g\cos\theta}$

3. $h=\frac{2\rho g\cos\theta}{Tr}$

4. $h=\frac{2Tr\rho g}{\cos\theta}$

142.

Three balls are dropped from the top of a building with equal speeds at different angles. When the balls strike ground , their speeds are v_1, v_2 and v_3 respectively,then



1. $v_1>v_2>v_3$

2. $v_3>v_2>v_1$

3. $v_1=v_2=v_3$

4. $v_1<v_2<v_3$

143.

A ball is projected at an angle of 45°, so as to cross a wall at "a" distance from the point of projection. It falls at a distance "b" on the other side of the wall. If h is the height of the wall then -

1. $h=a\sqrt{2}$

2. $h=b\sqrt{2}$

3. $h=\frac{\sqrt{2}ab}{a+b}$

4. $h=\frac{ab}{a+b}$

144.

A car A is travelling on a straight level road with a uniform speed of 60 km/h. It is followed by another car B which is moving with a speed of 70 km/h. When the distance between them is 2.5 km, the car B is given a deceleration of 20 km/h^2 . After how much time will B catch up with A ?

1. 1 hr
2. 1/2 hr
3. 1/4 hr
4. 1/8 hr

145.

A point starts moving in a straight line with a certain acceleration. At a time 't' after beginning of motion the acceleration suddenly becomes retardation of the same value. The time in which the point returns to the initial point is

1. $\sqrt{2t}$

2. $\left(2+\sqrt{2}\right)t$

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

4. Cannot be predicted unless acceleration is given

146.

A projectile is fired vertically upwards with an initial velocity u. After an interval of T seconds a second projectile is fired vertically upwards, also with initial velocity u.

1. They meet at time $t=\frac{u}{g}$ and at a height $\frac{u^2}{2g}+\frac{gT^2}{8}$

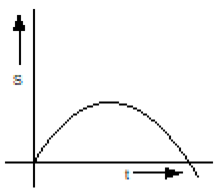
2. They meet at time $t=\frac{u}{g}+\frac{T}{2}$ and at a height $\frac{u^2}{2g}+\frac{gT^2}{8}$

3. They meet at time $t=\frac{u}{g}+\frac{T}{2}$ and at a height $\frac{u^2}{2g}-\frac{gT^2}{8}$

4. They never meet

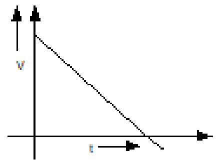
147.

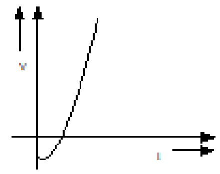
The graph of displacement v/s time is

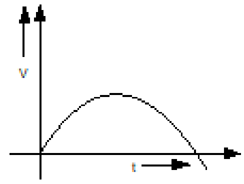


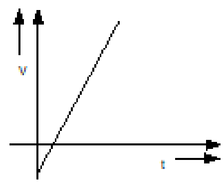
Its corresponding velocity-time graph will be

1.



2. 

3. 

4. 

148.

A particle moves along a parabolic path $y = 9x^2$ in such a way that the x component of velocity remain constant and has a value $\frac{1}{3}\ \mathrm{ms}^{-1}$. The acceleration of the particle is

1. $\frac{1}{3}\ \hat{\mathrm{j}}\ \mathrm{ms}^{-1}$

2. $3\ \hat{\mathrm{j}}\ \mathrm{ms}^{-2}$

3. $\frac{2}{3}\ \hat{\mathrm{j}}\ \mathrm{ms}^{-2}$

4. $2\ \hat{\mathrm{j}}\ \mathrm{ms}^{-2}$

149.

N bullets, each of mass m, are fired with a velocity v at the rate of n bullets/sec upon a wall. The bullets are stopped by the wall. The reaction offered by the wall to the bullets is

1. $\frac{\mathrm{Nmv}}{\mathrm{n}}$

2. nNmv

3. $\mathrm{n}\frac{\mathrm{Nv}}{\mathrm{m}}$

4. nmv

150.

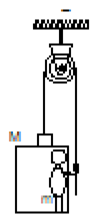
A block can slide on a smooth inclined plane of inclination θ kept on the floor of a lift. When the lift is descending with retardation *a,* the acceleration of the block relative to the incline is:

1. $(g + a) \sin \theta$ 2. $(g – a)$

3. $g \sin \theta$ 4. $(g – a) \sin \theta$

151.

A man of mass m stands on a crate of mass M. He pulls on a light rope passing over a smooth light pulley. The other end of the rope is attached to the crate. For the system to be is equilibrium, the force exerted by the man on the rope is-



1. mg

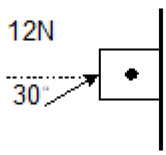
2. Mg

3. $\frac{1}{2}(\mathrm{M}+\mathrm{m})\mathrm{g}$

4. (m+M)g

152.

A force of 12 N is applied on a block of mass 3kg as shown in the figure. The coefficient of friction between the wall and block is 0.6. The magnitude of the force exerted by the wall on the block is

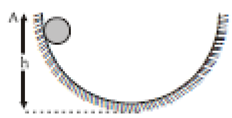


1. 15N 2. 25N

3. 20N 4. 30N

153.

A small solid sphere of mass m is released from a point A at a height h above the bottom of a rough track as shown in the figure. If the sphere rolls down the track without slipping, its rotational kinetic energy when it comes to the bottom of track is



1. mgh

2. $\frac{10}{7}$mgh

3. $\frac{5}{7}$mgh

4. $\frac{2}{7}$mgh

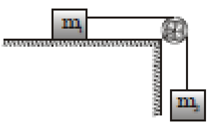
154.

A mass m_1 moves with a large velocity. It strikes another mass m_2 at rest in a head-on elastic collision. It comes back along its path with lesser speed after collision. Then :

1. $m_1 > m_2$
2. $m_1 < m_2$
3. $m_1 = m_2$
4. There is no relation between m_1 and m_2.

155.

In the figure shown X and Y components of acceleration of center of mass are [All surfaces are smooth]



1. $(a_{cm})_x = \frac{m_1 m_2}{m_1+m_2} g$

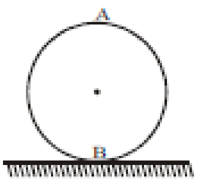
2. $(a_{cm})_x = \frac{m_1 m_2\ g}{(m_1+m_2)^2}$

3. $(a_{CM})_y = \left(\frac{m_2}{m_1+m_2}\right)^2 g$

4. Both 2 and 3 are correct

156.

A wheel of radius R rolls without slipping on the ground with a uniform velocity v. The relative acceleration of the topmost point of the wheel with respect to the bottommost point is



1. $\frac{v^2}{R}$

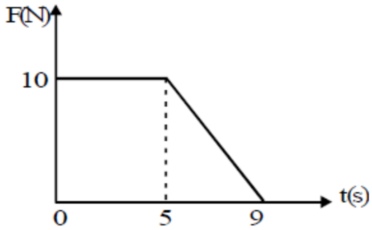
2. $\frac{2v^2}{R}$

3. $\frac{v^2}{2R}$

4. $\frac{4v^2}{R}$

157.

A body of mass 4 kg is acted on by a force which varies as shown in the graph below. The momentum acquired is



1. 280 N–s

2. 140 N–s

3. 70 N–s

4. 210 N–s

158.

A 5 kg stationary bomb is exploded in three parts having mass in the ratio 1 : 1 : 3 respectively. If parts having same mass move in perpendicular directions with velocity 30 m/s, then the speed of the bigger part will be -

1. $10\sqrt{2}$ m/s

2. $\frac{10}{\sqrt{2}}$ m/s

3. $13\sqrt{2}$ m/s

4. $\frac{15}{\sqrt{2}}$ m/s

159.

A boat of length 10 m and mass 450 kg is floating without motion in still water. A man of mass 50 kg standing at one end of it walks to the other end of it and stops. The magnitude of the displacement of the boat in meters relative to ground is -
1. zero

2. 1m

3. 2m

4. 5m

160.

A bullet of mass 0.01 kg, travelling at a speed of 500 m/s, strikes a block of mass 2 kg, which is suspended by a string of length 5 m, and emerges out. The block rises by a

vertical distance of 0.1 m. The speed of the bullet after it emerges from the block is approximately equal to -
1. 55 m/s

2. 110 m/s

3. 220 m/s

4. 440 m/s

161.

Two particles of equal mass go round a circle of radius R under the action of their mutual gravitational attraction. The speed of each particle is

1. $v = \frac{1}{2R}\sqrt{\frac{1}{Gm}}$

2. $v = \sqrt{\frac{Gm}{2R}}$

3. $v = \frac{1}{2}\sqrt{\frac{Gm}{R}}$

4. $v = \sqrt{\frac{4Gm}{R}}$

162.

Mass M is divided into two parts xM and (1-x)M . For a given separation, the value of x for which the gravitational attraction between the two pieces becomes maximum is

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

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

3. 1

4. 2

163.

The escape velocity of a particle of mass m varies as

1. m^2 2. m

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

164.

When a certain weight is suspended from a long uniform wire, its length increases by one cm. If the same weight is suspended from another wire of the same material and length but having a diameter half of the first one, the increase in length will be
1. 0.5 cm

2. 2 cm

3. 4 cm

4. 8 cm

165.

A force F is needed to break a copper wire having radius R. The force needed to break a copper wire of same length and radius 2R will be
1. F/2

2. 2F

3. 4F

4. F/4

166.

A 1000 kg lift is tied with metallic wires of maximum safe stress of 1.4×10^8 N m^{-2}. If the maximum acceleration of the lift is 1.2 m s^{-2}, then the minimum diameter of the wire is
1. 1 m

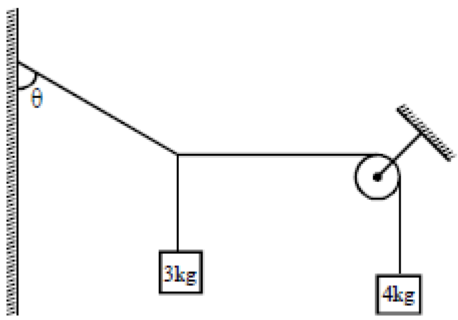
2. 0.1 m

3. 0.01 m

4. 0.001 m

167.

In shown system, each of the block is at rest.
The value of θ is



1. $\tan^{-1}(1)$

2. $\tan^{-1}\left(\frac{3}{4}\right)$

3. $\tan^{-1}\left(\frac{4}{3}\right)$

4. $\tan^{-1}\left(\frac{3}{5}\right)$

168.

Forces acting on a particle have magnitudes of 14, 7, and 7 N and act in the direction of vectors $6\hat{i} + 2\hat{j} + 3\hat{k}$, $3\hat{i} - 2\hat{j} + 6\hat{k}$, $2\hat{i} - 3\hat{j} - 6\hat{k}$ respectively. The forces remain constant while the particle is displaced from point A: (2, –1, –3) to B: (5, –1, 1). Find the work done. The coordinates are specified in meters.

1. 75 J

2. 55 J

3. 85 J

4. 65 J

169.

A block of mass 1 kg lying on the floor is subjected to a horizontal force given by $F=2\sin\omega t$ newtons. The coefficient of friction between the block and the floor is 0.25. The acceleration of the block will be

1. positive and uniform
2. positive and non–uniform
3. zero
4. depending on the value of ω

170.

A body of mass m dropped from a height h reaches the ground with a speed of $1.4\sqrt{gh}$. The work done by air drag is-

1. –0.2 mgh

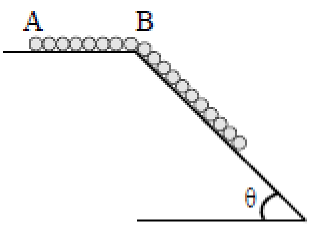
2. –0.02 mgh

3. –0.04 mgh

4. mgh

171.

A chain of length L and mass m is placed upon a smooth surface. The length of BA is (L–b). Calculate the velocity of the chain when its end reaches B.



1. $\sqrt{\frac{2g\sin\theta}{L}(L^2-b^2)}$

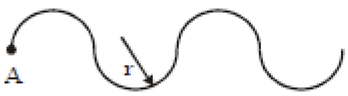
2. $\sqrt{\frac{g\sin\theta}{2L}(L^2-b^2)}$

3. $\sqrt{\frac{g\sin\theta}{L}(L^2-b^2)}$

4. None of these

172.

A uniform rod of mass 2M is bent into four adjacent semicircles each of radius r, all lying in the same plane. The moment of inertia of the bent rod about an axis through one end A and perpendicular to plane of rod is :-



1. 22 Mr^2

2. 88 Mr^2

3. 44 Mr^2

4. 66 Mr^2

173.

A ball is thrown from a point on ground at some angle of projection. At the same time a bird starts from a point directly above this point of projection at a height h horizontally with speed u. Given that in its flight ball just touches the bird at one point. Find the distance on ground where ball strikes

1. $2u\sqrt{\frac{h}{g}}$

2. $u\sqrt{\frac{2h}{g}}$

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

4. $u\sqrt{\frac{h}{g}}$

174.

A horizontal heavy uniform bar of weight W is supported at its ends by two men. At the instant, one of the men lets go off his end of the rod, the other feels the force on his hand changed to

1. W

2. $\frac{W}{2}$

3. $\frac{3W}{4}$

4. $\frac{W}{4}$

175.

Two discs of moment of inertia I_1 and I_2 and angular speeds ω_1 and ω_2 are rotating along collinear axes passing through their centre of mass and perpendicular to their plane. If the two are made to rotate together along the same axis, the rotational KE of system will be

1. $\frac{I_1\omega_1+I_2\omega_2}{2(I_1+I_2)}$

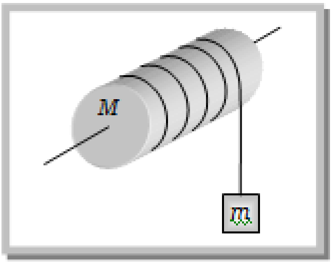
2. $\frac{(I_1+I_2)(\omega_1+\omega_2)^2}{2}$

3. $\frac{(I_1\omega_1+I_2\omega_2)^2}{2(I_1+I_2)}$

4. None of these

176.

In the following figure, a body of mass m is tied at one end of a light string and this string is wrapped around the solid cylinder of mass M and radius R. At the moment t = 0 the system starts moving. If the friction is negligible, angular velocity at time t would be -



1. $\frac{\text{mgRt}}{(\text{M}+\text{m})}$

2. $\frac{2\,\text{Mgt}}{(\text{M}+2\text{m})}$

3. $\frac{2\,\text{mgt}}{\text{R}(\text{M}-2\text{m})}$

4. $\frac{2\,\text{mgt}}{\text{R}(\text{M}+2\text{m})}$

177.

A solid cylinder of mass M is released from rest on an inclined rough plane making an angle θ from horizontal. The cylinder rolls without slipping. Friction force required for rolling is-

1. $\frac{2}{3}Mg\ \sin\theta$

2. $\frac{\text{Mg}\ \sin\theta}{3}$

3. $\frac{\text{Mg}\ \sin\theta}{2}$

4. Mg $\sin\theta$

178.

A rigid body has moment of inertia 12 kgm^2 about a fixed axis and the body is rotating about it, such that angular displacement $\theta = \left(2\text{t} - \frac{\text{t}^2}{3}\right)$ rad at time t second. Kinetic energy of body at t = 3 second

1. Zero

2. 15 J

3. 20 J

4. 30 J

179.

A body of mass m is raised from the surface of earth to a height equal to radius (R) of earth. If acceleration due to gravity on the surface of earth is g. Then gain of its potential energy is

1. mgR

2. $\frac{-\text{mgR}}{2}$

3. $-$mgR

4. $\frac{\text{mgR}}{2}$

180.

A planet whose density is double of earth and radius is half of earth, will produce gravitational field on its surface (g = acceleration due to gravity at surface of earth)

1. g

2. 2g

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

4. 3g

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