

Botany - Section A

1.

Meiosis I:

1. is always followed by interphase
2. is not followed by any period of rest
3. is followed by a period of interkinesis
4. is sometimes followed by interphase

2.

Which of the following statements regarding gymnosperms are correct?

I. Ovules are naked - not enclosed by any ovary wall before fertilisation but seeds that develop after fertilisation are covered.

II. In all living Gymnosperms, sporophyte is dominant over the gametophyte.

III. They are heterosporous.

IV. The male and female gametophytes do not have an independent existence.

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

3.

When a shoot tip transforms into a flower,

1. It is always solitary
2. The flower is always short-lived
3. It is never solitary
4. The flower is always long-lived

4.

The endomembrane system of a eukaryotic cell does not include:

1. Endoplasmic reticulum
2. Lysosome
3. Vacuole
4. Peroxisome

5.

The centrioles replicate during:

1. G₁ phase
2. S phase
3. G₂ phase
4. Early prophase

6.

Four statements are given below. How many of them are correct?

- (1) The anther is a tetragonal structure, with four microsporangia at corners, two in each lobe.
- (2) Microsporangia develops further and becomes a pollen sacs.
- (3) A typical microsporangia is surrounded by four layered wall, 3-protective and 1 nutritional.
- (4) The nutritive layer is densely cytoplasmic with more than one nucleus

Options :

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

7.

A genetic cross between homozygous individuals but with different alleles for a single gene of interest is called as:

1. A reciprocal cross
2. Monohybrid cross
3. Dihybrid cross
4. Test cross

8.

Blood group antigens are:

1. Carbohydrates present in plasma
2. Carbohydrates present on the surface of RBCs
3. Plasma proteins
4. Proteins present on the surface of RBCs

9.

During his observation of spermatogenesis in a few insects, Henking found that a nuclear structure was received by 50 % of the sperms. What did he call this structure?

1. X – body
2. Y – body
3. X – chromosome
4. Y – chromosome

10.

Which one is not a cause of biodiversity loss?

1. Alien species invasion.
2. Co-extinction.
3. Endemism.
4. Overexploitation.

11.

In a sewage treatment plant, primary treatment is

1. Physical process which involves sedimentation only
2. Physical process which involves both filtration and sedimentation
3. Biological process which involves formation of primary sludge and effluent
4. Biological process which involves both filtration and sedimentation

12.

Select the correct statement:

1. Cholera, typhoid, tetanus are well-known diseases caused by viruses.
2. Dinoflagellates, euglenoids and slime moulds are placed under kingdom Monera
3. Members of kingdom Protista are primarily aquatic
4. Dinoflagellates are the chief 'producers' in the oceans

13.

Gemmae are the specialized structures produced in liverworts. These are

1. Non-green, multi-cellular, asexual buds which develop in gemma cups.
2. Green, multi-cellular, asexual buds which develop in gemma cups.
3. Non-green, multi-cellular, diploid, sexual spores.
4. Green, unicellular, diploid, sexual spores.

14.

Match the following columns and select the correct option.

Column-I	Column-II
a. Photolysis of water	(i) C ₄ plants
b. Carboxylation of RuBP	(ii) Non-cyclic photophosphorylation
c. Synthesis of ATP only	(iii) Cyclic photophosphorylation
d. Consumption of 5 ATP per CO ₂ fixed	(iv) Calvin cycle

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

15.

Mark the **correct** one (w.r.t anaerobic free-living diazotroph)

1. Azotobacter
2. Clostridium
3. Rhizobium
4. Frankia

16.

Rate of diffusion of substances is affected by all, except

1. Gradient of concentration
2. Temperature but not pressure
3. Density
4. Both temperature and pressure

17.

In facilitated diffusion

1. Special proteins allow movement of molecules from low to high concentration
2. Transport rate reaches maximum when all transporter lipids are used
3. Cell are allowed to select substances for uptake
4. Sensitivity exists towards inhibitors which react with fatty acid side chains

18.

Bougainvillea and Citrus plants are protected from browsing animals as

1. Adventitious buds get modified into thorns
2. Axillary buds get modified into spines
3. Lateral buds get modified into pointed structures
4. Apical buds get modified into thorns

19.

Find the incorrect statement

1. Middle lamella is mainly made up of calcium and magnesium 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

20.

In the life cycle of a plant, the secondary tissues are made by

1. Intercalary meristem and vascular cambium
2. Apical meristem and cork cambium
3. Cork-cambium and vascular cambium
4. Primary meristems and interfascicular cambium

21.

The asexual spores are generally not found in:-

1. Neurospora
2. Claviceps
3. Trichoderma
4. Ustilago

22.

Read the statements carefully and select the correct option:

A. Intrinsic increase in mass of body is defining property of living organisms.

B. Reproduction is synonymous with growth in all the organisms

C. Reproduction is defining feature of all organisms

D. Isolated metabolic reactions in-vitro are living reactions.

Options:

1. A and B

2. B and C

3. A and D

4. B and D

23.

Select the incorrect match

1. Cyclosporin A – Trichoderma polysporum

2. Statins – Streptococcus

3. Amylase – Aspergillus

4. Acetic acid – Acetobacter aceti

24.

In C_4 plants, PEP carboxylase and RuBisCO enzymes are present respectively in

1. Stroma and Grana

2. Thylakoid and Stroma

3. Cytosol and Stroma

4. Stroma and Cytosol

25.

Cellular organelle having single membrane amongst the following is

1. Chloroplast

2. Nucleus

3. Lysosome

4. Mitochondrion

26.

Read the following statements and choose the correct option

A. Parthenocarpy in banana is mainly due to high internal production of auxins

B. Apical dominance can be counteracted by cytokinins

1. Only (A) is correct

2. Only (B) is correct

3. Both (A) & (B) are correct

4. Both (A) & (B) are incorrect

27.

In which of the following conversion steps occurring in the mitochondrial matrix, substrate-level phosphorylation occurs?

1. 1, 3-bisphosphoglyceric acid \rightarrow 3-phosphoglyceric acid

2. Glucose-6-phosphate to fructose-6-phosphate

3. α -ketoglutaric acid \rightarrow Succinyl CoA

4. Succinyl CoA \rightarrow Succinic acid

28.

Fatty acids enter the respiratory pathway after being converted into

1. Pyruvic acid

2. Acetyl CoA

3. Amino acid

4. Phosphoglyceric acid

29.

Consider the following statements (A)-(D) each with one or two blanks :

(A) Bears go into _____(1) _ during winter to _____(2) _ cold weather.

(B) A conical age pyramid with a broad base represents _____(3) human population.

(C) A wasp pollinating a fig flower is an example of _____(4) _ .

(D) An area with high levels of species richness is known as _____(5) _ .

Which of the following options, gives the correct fill ups for the respective blank numbers from(1) to (5) in the statements ?

1. (1) - hibernation, (2) - escape, (3) - expanding, (5) - hot spot
2. (3) - stable, (4) - commensalism, (5) - marsh
3. (1) - aestivation, (2) - escape, (3) - stable, (4) - mutualism
4. (3) - expanding, (4) - commensalism, (5) - biodiversity park

30.

Which of the following exercises control over transcription:

1. Operator
2. Regulator
3. Promoter
4. Recon

31.

Number of base pairs in human chromosomes are:

1. 3×10^9
2. 3×10^7
3. 6×10^8
4. 6×10^7

32.

Initiation codon in eukaryotes is

1. UGA
2. CCA
3. AGA
4. AUG

33.

In inducible operon, regulatory gene synthesizes:

1. Promoter
2. Operator
3. Repressor
4. Aporepressor

34.

In Angiosperms, pollen tubes liberate their male gametes into the

1. Central cell
2. Antipodal cells
3. Egg cell
4. Synergids

35.

Mycorrhiza is an example of

1. Symbiotic relationship
2. Ectoparasitism
3. Endoparasitism
4. Decomposers

Botany - Section B

36.

Which of the following complex of mitochondrial ETS possess two copper centers?

1. Cytochrome b c₁ complex.
2. NADH dehydrogenase complex
3. Succinate dehydrogenase complex
4. Cytochrome c oxidase complex

37.

Match the columns and select the correct option

Column-I

Column-II

A. Earth Summit

(i) Johannesburg

B. World summit on sustainable Development.

(ii) Broadly utilitarian

C. Biodiversity plays a major role in many ecosystem services.

(iii) Narrowly utilitarian

D. Direct economic benefits from nature.

(iv) Rio de Janeiro

1. A – (iv), B– (i), C– (ii), D– (iii)

2. A – (i), B– (iv), C– (iii), D– (ii)

3. A – (iv), B– (i), C– (iii), D– (ii)

4. A – (i), B– (iv), C– (ii), D– (iii)

38.

The chromosome in which the 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

39.

Find the wrong match.

1. Wheat → Pusa Shubra

2. Cauliflower → Pusa Snowball K-1

3. Chilli → Pusa Sadabahar

4. Brassica → Pusa Swarnim

40.

In any ecological pyramid, an organism can occupy how many trophic levels?

1. Only one trophic level

2. More than one trophic level simultaneously

3. Can occupy more than one trophic level but not simultaneously

4. Very difficult to say in a precise manner

41.

A normal woman, whose father had colour blindness, married a normal man. What is the chance of occurrence of colour blindness in the progeny?

1. 25%

2. 50%

3. 100%

4. 74%

42.

In a dicot stem, the interfascicular cambium strip arises

1. Between xylem and phloem

2. From medullary rays

3. From pith

4. From pericycle

43.

Choose the incorrect statement regarding early experiments on photosynthesis

1. Priestley experiment revealed the essential role of air in the growth of a green plant

2. Ingenhousz showed that sunlight is essential to the plant processes

3. It is green parts of the plants that can release oxygen

4. Von Sachs provided evidence for production of carbon dioxide when plants grow

44.

Embryogenesis refers to the process of development of an embryo from the zygote. During embryogenesis in humans, zygote undergoes

1. Mitosis

2. Cell differentiation

3. Meiosis

4. Both 1 & 2

45.

The element which cannot be placed along with micronutrients ?

1. Boron
2. Copper
3. Nickel
4. Calcium

49.

Plants with ovaries having only one or a few ovules, are generally pollinated by :

1. Butterflies
2. Birds
3. Wind
4. Bees

46.

The synthesis of spindle proteins occurs during

1. G₁-phase
2. S-phase
3. G₂-phase
4. M-phase

50.

The logistic population growth is expressed by the equation :

1. $\frac{dN}{dt} = rN \left(\frac{N-K}{N} \right)$
2. $\frac{dt}{dN} = Nr \left(\frac{K-N}{K} \right)$
3. $\frac{dN}{dt} = rN \left(\frac{K-N}{K} \right)$
4. $\frac{dN}{dt} = rN$

47.

A balance should exist between production and degradation of ozone. By which factor this balance is being disrupted resulting in degradation of ozone content of atmosphere?

Choose the correct option :-

1. Greenhouse gases
2. Chlorofluorocarbons
3. Nitrous oxide
4. Aromatic Compounds

48.

Industrial waste water is rich in

1. Heavy metals
2. Organic compounds
3. Radioactive waste
4. Both 1 and 2

Zoology - Section A

51.

Identify the incorrectly matched pair

- | | |
|-----------------------------|---------------------|
| 1. <i>Ornithorhynchus</i> : | Oviparous mammal |
| 2. <i>Macropus</i> : | Marsupial mammal |
| 3. <i>Balaenoptera</i> : | Largest land mammal |
| 4. <i>Pteropus</i> : | Flying mammal |

52.

A center that moderates the functions of the respiratory rhythm center is located in:

1. Dorsal medulla oblongata
2. Ventral medulla oblongata
3. Pons Varolii
4. Pre central gyrus of the cerebrum

53.

Vasa recta in cortical nephrons :

1. Arises from afferent arteriole rather than efferent arteriole
2. Does not get involved in counter current exchange with loop of Henle
3. Carries deoxygenated blood rich in urea
4. Is absent or highly reduced

54.

During concentration of urine by the human kidneys, NaCl is returned to the medullary interstitium by the:

1. Descending limb of the loop of Henle
2. Ascending limb of the loop of Henle
3. Descending limb of the vasa recta
4. Ascending limb of the vasa recta

55.

Restriction enzymes are synthesized by:

1. Bacteria only
2. Yeast and bacteria only
3. Eukaryotic cells only
4. All kinds of cells

56.

A person who met with a road accident is likely to develop tetanus, can be immunised by administering

1. Weakened germs
2. Dead germs
3. Preformed antibodies
4. Wide spectrum antibiotics

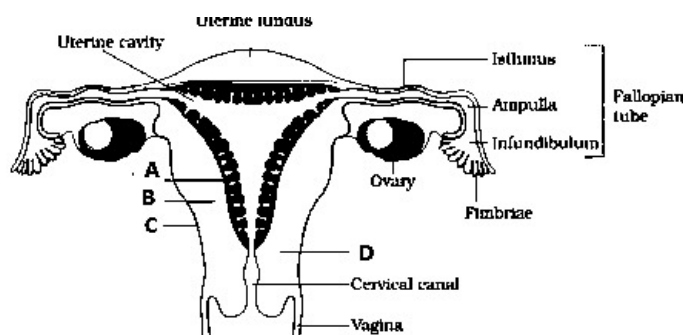
57.

MALT constitutes about _____ percent of the lymphoid tissue in human body

1. 50%
2. 20%
3. 70 %
4. 10%

58.

In the given diagram the part of the female reproductive system that undergoes cyclical changes with changes in the secretion of gonadotropins and gonadal steroids during the menstrual cycle is represented by:



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

59.

Which of the following is not a natural method for birth control ?

1. Periodic abstinence
2. Coitus interruptus
3. Lactational amenorrhoea
4. Vaults

60.

Which organisation in India deals with the safety of introducing GM- organisms for public services ?

1. GEAC
2. CFTRF
3. NII
4. CDRI

61.

All of the following characters are related with Bt- toxin except

1. Kills lepidopteran, dipteran, and coleopteran insects
2. The toxin is coded by a gene named cry
3. Activated in the midgut of insects in acidic medium
4. Causes lysis of cells in the epithelial lining of the midgut

62.

Mark the incorrect match

- (i) All spermatocytes have haploid structure.
 - (ii) All of the spermatogonia changes into primary spermatocyte.
 - (iii) FSH is required for the process of spermiogenesis.
 - (iv) Seminal plasma is essential for maturation and motility of sperms.
1. (i), (ii), (iii), (iv)
 2. (iii) and (iv) only
 3. (i) and (ii) only
 4. Only (iii)

63.

Regular oral contraceptive pills contain

1. Progestogen only.
2. Progestogen - estrogen combination.
3. Estrogen only.
4. Both 1 and 2.

64.

Inspiration occurs when intra-pulmonary pressure is

1. Higher than atmospheric pressure
2. Lower than atmospheric pressure.
3. Equal to atmospheric pressure.
4. Zero compared to atmospheric pressure.

65.

Mucus neck cell is a part of

1. Gastric gland.
2. Intestinal gland.
3. Salivary gland.
4. Both 1 and 2

66.

Contraction of muscle fibre takes place by the sliding of :-

1. Thin filaments over the actin filaments.
2. Thick filaments over the thin filaments.
3. Thin filaments over the thick filaments.
4. Thick filaments over the myosin filaments.

67.

How many vertebrochondral ribs are found in humans?

1. 12 pairs
2. 5 pairs
3. 3 pairs
4. 2 pairs

68.

Which of the following statement is correct with reference to the cockroach eye?

1. Both eyes together consist of about 2000 hexagonal ommatidia
2. Its vision has more sensitivity but less resolution
3. Mosaic vision is not found due to diurnal habit
4. Compound eyes are situated at the vertex region of the head

69.

Which of the following statement is not related to the illustrated animal?



1. It does not have external ear openings
2. It sheds its scales as skin cast
3. Tympanum represents the ear. It is to catch the vibrations from air.
4. It is cobra. Fertilization is internal.

70.

Which of the following event can be related to the repolarisation of nerve fiber?

1. Opening up of K^+ gated channel
2. Opening up of Cl^- gated channel
3. Closure of Na^+ gated channel
4. Both 1 & 3

71.

How much volume of blood each ventricle pumps out approximately during a cardiac cycle ?

1. 70 mL
2. $70 \text{ mL} \times 72$
3. $70 \text{ mL} \times 0.8$
4. $70 \text{ mL} \times 2$

72.

Which of the following conditions is not linked to thyroid hormone?

1. Cretinism
2. Goitre
3. Osteomalacia
4. Exophthalmic goitre

73.

A worm-like animal with proboscis, collar, and trunk has _____ and _____ type of fertilization and development respectively.

Choose the option which fills the blanks correctly

1. External and direct
2. Internal and indirect
3. External and indirect
4. Internal and direct

74.

The cell body of a neuron contains certain granular bodies involved in protein synthesis that are called

1. Perikaryon
2. Nissl's granules
3. Schwann cells
4. Glial cells

75.

Choose the incorrect statement

1. Thyroxine deficiency in adults causes Myxedema
2. PTH and TCT are responsible for maintaining the blood calcium level
3. Deficiency of aldosterone and cortisol causes Addison's disease
4. Cholecystokinin promotes the release of bicarbonate ions from the pancreas and bile juice from the liver

76.

Trypsinogen is activated by ____x____ enzyme in ____y____.

Choose the option that fills the blanks **correctly**

1. x = Enterogastrone ; y = Duodenum
2. x = Enterokinase ; y = Duodenum
3. x = Enterokinase ; y = Pancreas
4. x = Enterogastrone ; y = Pancreas

77.

Match the following and choose the correct option.

Column-I

- a. Adipose tissue
- b. Cuboidal epithelium
- c. Hyaline cartilage
- d. Blood

Column-II

- (i) Fibreless matrix
- (ii) Abundant fat cells
- (iii) Thyroid follicles
- (iv) Tracheal rings

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

78.

If in pBR322 the restriction site of PvuI is disrupted by insertion of foreign DNA, then transformants will be

1. Resistant to ampicillin
2. Sensitive to tetracycline
3. Sensitive to ampicillin
4. Not coding for proteins involved in replication of plasmid

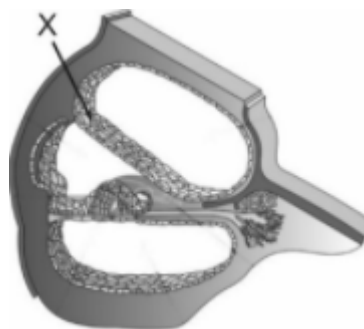
79.

Which of the following statements is not true for the human heart?

1. Adrenal medullary hormones can increase the cardiac output
2. Neural signal through the sympathetic nerves can initiate the heart beat
3. Increase in BMR due to thyroxine can indirectly increase heart rate
4. Strength of ventricular contraction and cardiac output is increased by catecholamines

80.

Identify the structure marked X.



1. Reissner's membrane
2. Tectorial membrane
3. Basilar membrane
4. Organ of corti

81.

Signals from fully developed foetus and placenta ultimately lead to parturition which requires the release of -

1. Oxytocin from maternal pituitary
2. Oxytocin from foetal pituitary
3. Relaxin from placenta
4. Estrogen from placenta

Zoology - Section B

82.

Which one of the following hormones is a modified amino acid?

1. Progesterone
2. Prostaglandin
3. Estrogen
4. Epinephrine

83.

Uricotelism is found in -

1. Fishes and Fresh water protozoans
2. Birds, reptiles and insects
3. Frogs and toads
4. Mammals and birds

84.

Which protein is found in maximum amount:

1. Catalase
2. Zinc carbonic anhydrase
3. Transferase
4. RUBISCO

85.

Role of enzyme in reactions is to

1. Decrease activation energy
2. Increase activation energy
3. Act as inorganic catalyst
4. None of the above

86.

Which of the following does not shift the oxy-haemoglobin dissociation curve to the right?

1. increased pH
2. increased carbon dioxide
3. increased temperature
4. increased 2,3 -DPG

87.

The portion of human stomach into which the oesophagus opens is the:-

1. Cardiac
2. Fundus
3. Corpus
4. Pylorus

88.

What percentage of ventricular filling is achieved by atrial contraction?

1. 30
2. 50
3. 70
4. 90

89.

Acid in stomach, saliva in the mouth, tears from eyes, all prevent microbial growth belong to which of the following barriers?

1. Physical barrier
2. Physiological barrier
3. Cellular barrier
4. Cytokine barrier

90.

Cocaine is obtained from the extract of

1. Cannabis sativa
2. Atropa belladonna
3. Erythroxylum coca
4. Papaver somniferum

91.

Mark the incorrect statement

1. Mule and hinny are examples of interspecific hybridisation
2. Hisardale is an example of crossbreed of sheep developed by crossing Bikaneri ewes with Merino rams
3. A single outcross often helps to overcome inbreeding depression
4. Inbreeding decreases homozygosity

92.

Cerebral aqueduct is found in

1. Fore brain
2. Mid brain
3. Cerebellum
4. Medulla

93.

Part of a plasmid such as pBR322 responsible for controlling the copy number of the linked alien DNA is

1. Ori
2. rop
3. amp^R
4. tet^R

94.

Identify the structure marked 'X'



1. Humerus
2. Radius
3. Scapula
4. Clavicle

95.

What happens during fertilisation in humans after many sperms reach close to the ovum?

1. Only two sperms nearest the ovum penetrate zona pellucida
2. Secretions of acrosome helps one sperm enter cytoplasm of ovum through zona pellucida
3. All sperms except the one nearest to the ovum lose their tails
4. Cells of corona radiata trap all the sperms except one

96.

Nucleotides are building blocks of nucleic acids. Each nucleotide is a composite molecule formed by -

1. Base-sugar-OH
2. Base-sugar-phosphate
3. Sugar-phosphate
4. (Base-sugar-phosphate)_n

97.

According to fossils which have been discovered till now, origin and evolution of man started from which country?

1. France
2. Java
3. Africa
4. China

98.

Which one of the following sequences was proposed by Darwin and Wallace for organic evolution: -

1. Overproduction, variations, constancy of population size, natural selection
2. Variations, constancy of population size, overproduction, natural selection
3. Overproduction, constancy of population size, variations, natural selection
4. Variations, natural selection, overproduction, constancy of population size

99.

Industrial melanism is an example of : -

1. Drug resistance
2. Darkening of skin due to smoke from industries
3. Protective resemblance with the surroundings
4. Defensive adaptation of skin against ultraviolet radiations

100.

In a random mating population in equilibrium, which of the following brings about a change in gene frequency in a non-directional manner : -

1. Mutations
2. Random drift
3. Selection
4. Migration

Chemistry - Section A

101.

Which of the following is the incorrect match for atom of element?

1. $[\text{Ar}]3d^5 4s^1 \rightarrow 4^{\text{th}}$ period, 6^{th} group
2. $[\text{Kr}]4d^{10} \rightarrow 5^{\text{th}}$ period, 12^{th} group
3. $[\text{Rn}]6d^2 7s^2 \rightarrow 7^{\text{th}}$ period, 3^{th} group
4. $[\text{Xe}]4f^{14} 5d^2 6s^2 \rightarrow 6^{\text{th}}$ period, 4^{th} group

102.

Which factor makes Li metal the strongest reducing agent in an aqueous solution :

1. Sublimation enthalpy
2. Ionisation enthalpy
3. Hydration enthalpy
4. Electron-gain enthalpy

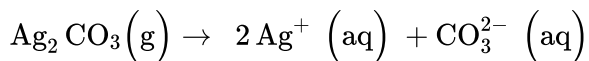
103.

Aluminium becomes passive in nitric acid because it:

1. is a noble metal
2. forms a thin film of oxide
3. has a positive reduction potential
4. None of the above

104.

Given the Gibbs free energy change, $\Delta G^\circ = +63.3 \text{ kJ}$, for the following reaction,

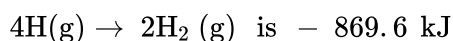


K_{sp} of $\text{Ag}_2\text{CO}_3(\text{s})$ in water at 25°C is ($R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$)

1. 3.2×10^{26}
2. 8.0×10^{-12}
3. 2.9×10^{-3}
4. 7.9×10^{-2}

105.

The given reaction is



The enthalpy change for the reaction is -869.6 kJ . The dissociation energy of the H-H bond is

1. -869.6 kJ
2. $+434.8 \text{ kJ}$
3. $+217.4 \text{ kJ}$
4. -434.8 kJ

106.

The photoelectric emission from a surface starts only when the light incident upon the surface has certain minimum:

1. Intensity
2. Wavelength
3. Frequency
4. Velocity

107.

Which of the following is the most powerful oxidizing agent?

1. F_2
2. Cl_2
3. Br_2
4. I_2

108.

The most harmful air pollutant produced by automobiles is

1. HNO_2
2. NO
3. SO_2
4. CO

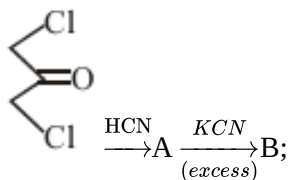
109.

PCl_5 reacts with propanone, to give:

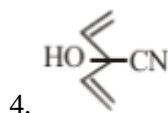
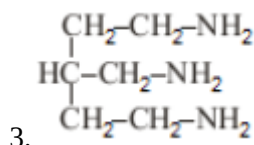
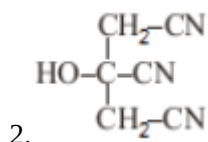
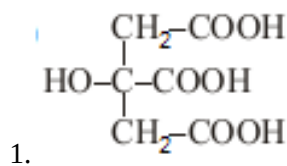
1. gem-dichloride
2. vic-dichloride
3. Propanal
4. Propane chloride

110.

Consider the following sequence of reactions.



The product B is-



111.

Semicarbazide is:

1. NH_2CONH_2
2. $\text{NH}_2\text{-NH}_2$
3. $\text{NH}_2\text{CONHNH}_2$
4. None of the above

112.

Isotope that is used as a tracer in a chemical reaction is-

1. H_1^1
2. H_1^2
3. H_1^3
4. Ortho hydrogen

113.

Sulphuric acid is used

1. In lead storage batteries
2. In making fertilizers
3. As a dehydrating agent
4. All of the above

114.

Which of the following is responsible for turning moist starch iodide paper blue when it is brought in contact with O_3 ?

1. Liberation of iodine
2. Liberation of O_2
3. Formation of alkali
4. All of these

115.

Excess of KCN is treated with CuSO_4 . The final products are-

1. $\text{K}_3[\text{Cu}(\text{CN})_4]$ and $(\text{CN})_2$
2. $\text{K}_2[\text{Cu}(\text{CN})_4]$ and $\text{Cu}_2(\text{CN})_2$
3. $\text{K}_4[\text{Cu}(\text{CN})_6]$ and $(\text{CN})_2$
4. $\text{K}[\text{Cu}(\text{CN})_4]$ and $\text{Cu}_2(\text{CN})_2$

116.

A 100.0 mL dilute solution of Ag^+ is electrolyzed for 15.0 minutes with a current of 1.25 mA and the silver is removed completely. What was the initial $[\text{Ag}^+]$:-

1. $2.32 \times 10^{-1} \text{ M}$
2. $2.32 \times 10^{-4} \text{ M}$
3. $2.32 \times 10^{-5} \text{ M}$
4. $1.17 \times 10^{-4} \text{ M}$

117.

On electrolysis of dilute sulphuric acid using Platinum (Pt) electrode, the product obtained

at the anode will be:

1. Oxygen gas
2. H_2S gas
3. SO_2 gas
4. Hydrogen gas

118.

The half-life of $^{92}\text{U}_{238}$ against α -decay is 4.5×10^9 year. The time taken in a year for the decay of 15/16 part of this isotope is

1. 9.0×10^9
2. 1.8×10^{10}
3. 4.5×10^9
4. 2.7×10^{10}

119.

A 2.24 L cylinder of oxygen at NTP is found to develop a leakage. When the leakage was plugged, the pressure dropped to 570 mm of Hg. The number of moles of gas that escaped will be

1. 0.050
2. 0.025
3. 0.075
4. 0.01

120.

If 0.50 mole of BaCl_2 is mixed with 0.20 mole of Na_3PO_4 , the maximum number of moles of $\text{Ba}_3(\text{PO}_4)_2$ that can be formed is

1. 0.10
2. 0.20
3. 0.30
4. 0.40

121.

An amphoteric compound or ion is-

1. HPO_3^-
2. H_2PO_2^-
3. H_3PO_4
4. H_2PO_4^-

122.

The set, amongst the following, that does not contain isoelectronic species is

1. SO_3^{2-} , CO_3^{2-} , NO_3^-
2. CN^- , N_2 , CO
3. BO_3^{3-} , CO_3^{2-} , NO_3^-
4. PO_4^{3-} , SO_4^{2-} , ClO_4^-

123.

Why do actinoids show more number of oxidation states than lanthanoids?

1. 4f- orbitals are more diffused than 5f-orbitals
2. Lesser energy difference between 5f and 6d orbitals than between 4f and 5d orbitals
3. More energy difference between 5f and 6d orbitals than between 4f and 5d orbitals
4. More reactive nature of the actinoids than the lanthanoids.

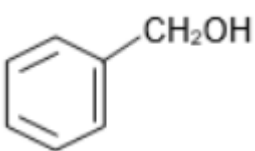
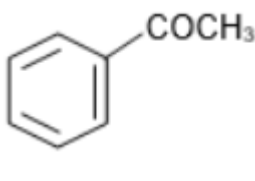
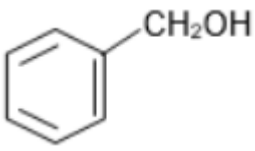
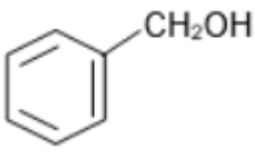
124.

2-Bromopentane reacts with alcoholic KOH to give

1. cis-2-Pentene
2. trans-2-Pentene
3. 1-Pentene
4. None of the above

125.

The reaction that does not give benzoic acid as the major product is-

1.  $\xrightarrow{\text{K}_2\text{Cr}_2\text{O}_7}$
2.  $\xrightarrow[\text{(ii) H}_3\text{O}^+]{\text{(i) NaOCl}}$
3.  $\xrightarrow{\text{PCC}}$
4.  $\xrightarrow{\text{KMnO}_4/\text{H}^+}$

126.

Feeling of weakness and discomfort in breathing at high altitudes is based on-

1. Boyle's law
2. Charles's law
3. Henry's law
4. Raoult's law

127.

Which of the following species is not expected to be a ligand?

1. NO
2. NH_4^+
3. $\text{NH}_2\text{CH}_2\text{CH}_2\text{NH}_2$
4. CO

128.

Nitric acid is added to sodium extract before adding silver nitrate for testing halogens because

1. Nitric acid reduces sulphide
2. Nitric acid decomposes NaCN and Na_2S
3. Nitric acid oxidises the organic compound
4. Nitric acid acts as a dehydrating agent

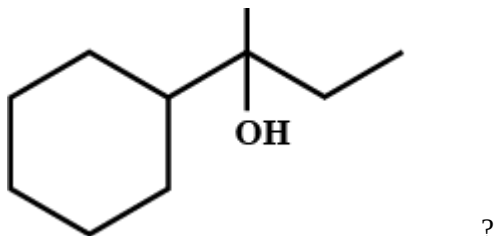
129.

Which of the following acids is a vitamin?

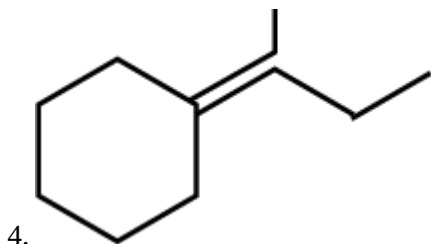
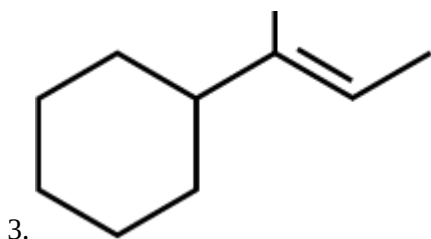
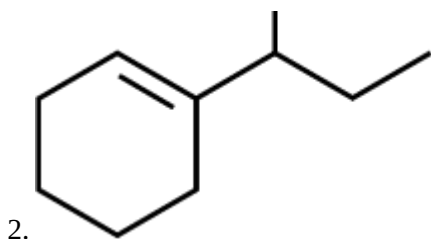
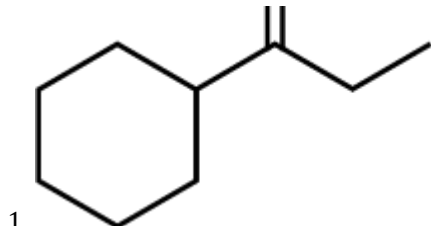
1. Aspartic acid
2. Ascorbic acid
3. Adipic acid
4. Saccharic acid

130.

Which of the following is not the product of dehydration of



?



131.

Compound 'A' on chlorination gives compound 'B'. 'B' reacts with alc. KOH to give gas 'C' which decolorizes Baeyer reagent. Ozonolysis of compound 'C' gives only HCHO compound. Compound 'A' is

1. C_2H_6
2. C_2H_4
3. C_4H_{10}
4. C_2H_5Cl

132.

We know that the relationship between K_c and K_p is

$$K_p = K_c(RT)^{\Delta n}$$

Value of Δn for the following reaction will be



1. 1
2. 0.5
3. 1.5
4. 2

133.

Chlorine atom is a -

1. Carbocation
2. Nucleophile
3. Electrophile
4. Carbanion

134.

The incorrect statement among the following is -

1. pK_b of aniline is more than methylamine.
2. Ethylamine is soluble in water whereas aniline is not.
3. Aniline undergo Friedel-Crafts reaction
4. Gabriel phthalimide synthesis is preferred for synthesizing primary amines.

135.

The bond angles of NH_3 , NH_4^+ and NH_2^- are in the order :

1. $\text{NH}_2^- > \text{NH}_3 > \text{NH}_4^+$
2. $\text{NH}_4^+ > \text{NH}_3 > \text{NH}_2^-$
3. $\text{NH}_3 > \text{NH}_2^- > \text{NH}_4^+$
4. $\text{NH}_3 > \text{NH}_4^+ > \text{NH}_2^-$

139.

For which element of the first transition series the oxidation potential value

$(\text{M} \rightarrow \text{M}^{2+} + 2\text{e}^-)$ is lowest

1. Mn
2. Fe
3. Ni
4. Cu

Chemistry - Section B

136.

The charge on As_2S_3 sol is due to the adsorption of:

1. H^+
2. OH^-
3. O_2^-
4. S^{2-}

137.

The plot of $\log k$ vs $1/T$ helps to calculate

1. Energy of activation
2. Rate constant of reaction
3. Order of reaction
4. Energy of activation as well as the frequency factor

138.

In a cubic unit cell, atom A is present at each corner, atom B at each face centre and atom C at the body centre. The simplest formula of the solid is

1. AB_2C
2. A_2BC
3. AB_3C
4. ABC_3

140.

Cetyltrimethyl ammonium bromide is an example of

1. Artificial sweetener
2. Cationic detergent
3. Soap
4. Anionic detergent

141.

Benzoic acid gives benzene on being heated with X and phenol gives benzene on being heated with Y. Therefore, X and Y are respectively

1. Sodalime and copper
2. Zn dust and NaOH
3. Cu and sodalime
4. Sodlime and zinc dust

142.

Among the given oxoacids, the acid having highest K_a is

- 1 HClO_3
- 2 HBrO_3
- 3 HIO_3
- 4 All have equal K_a

143.

17.4% (w/v) K_2SO_4 solution at $27^\circ C$ is isotonic to 5.85% (w/V) NaCl solution at $27^\circ C$. If

NaCl is 100% ionised, what is the % ionisation of K_2SO_4 in aqueous solution?

[At wt. of K= 39, Na =23] :-

1. 25%
2. 75%
3. 50%
4. None of these

144.

Which of the following is an elastomer?

1. Dacron
2. Melamine
3. Vulcanized rubber
4. Polystyrene

145.

The highest boiling point is expected for

1. Iso-octane
2. n-Octane
3. 2,2,3,3-Tetramethyl butane
4. n-Butane

146.

What will be the value of pH of $0.01 \text{ mol dm}^{-3} \text{ CH}_3\text{COOH}$ ($K_a = 1.74 \times 10^{-5}$)?

1. 3.4
2. 3.6
3. 3.9
4. 3.0

147.

The fragrance of flowers is due to the presence of some steam volatile organic compounds called essential oils. These are generally insoluble in water at room temperature but are miscible with water vapor in the vapor phase. A suitable method for the extraction of these oils from the flowers is

1. Distillation
2. Crystallisation
3. Distillation under pressure
4. Steam distillation

148.

The correct order of C-O bond length among CO , CO_3^{2-} , CO_2 is :

1. $CO_2 < CO_3^{2-} < CO$
2. $CO < CO_3^{2-} < CO_2$
3. $CO_3^{2-} < CO_2 < CO$
4. $CO < CO_2 < CO_3^{2-}$

149.

The better reducing agent for ZnO among the following is -

1. C
2. CO
3. CO_2
4. CO_3^{2-}

150.

Which one of the following is an outer orbital complex and exhibits paramagnetic behavior?

1. $[Ni(NH_3)_6]^{2+}$
2. $[Zn(NH_3)_6]^{2+}$
3. $[Cr(NH_3)_6]^{3+}$
4. $[Co(NH_3)_6]^{3+}$

Physics - Section A

151.

An unpolarised light incident on polariser has amplitude A and the angle between analyzer and polariser is 60° . Light transmitted by analyzer has an amplitude:

1. $A\sqrt{2}$
2. $A/2\sqrt{2}$
3. $\sqrt{3}A/2$
4. $A/2$

152.

150 g of ice at 0°C is mixed with 100 g of water at temperature 80°C . The latent heat of ice is 80 cal/g and the specific heat of water is $1\text{ cal/g}^\circ\text{C}$. Assuming no heat loss to the environment, the amount of ice which does not melt is

1. 100 g
2. 0 g
3. 150 g
4. 50 g

153.

An object is placed 20 cm in front of a concave mirror of a radius of curvature of 10 cm. The position of the image from the pole of the mirror is:

1. 7.67 cm
2. 6.67 cm
3. 8.67 cm
4. 9.67 cm

154.

Which of the following pairs of nuclei are isotones?

1. $^{74}_{34}\text{Se}$, $^{71}_{31}\text{Ca}$
2. $^{92}_{42}\text{Mo}$, $^{92}_{40}\text{Zr}$
3. $^{81}_{38}\text{Sr}$, $^{86}_{38}\text{Sr}$
4. $^{40}_{20}\text{Ca}$, $^{32}_{16}\text{S}$

155.

The primary and secondary coils of a transformer have 50 and 1500 turns respectively. If the magnetic flux ϕ linked with the primary coils is given by $\phi = \phi_0 + 4t$, where ϕ is in webers, t is time in second and ϕ_0 is a constant, the output voltage across the secondary coil is

1. 120 V
2. 220 V
3. 30 V
4. 90 V

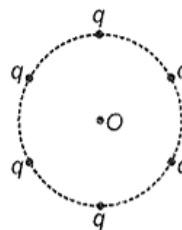
156.

The pitch of a screw gauge is 1mm and there are 100 divisions on the circular scale. While measuring the diameter of a wire, the linear scale reads 1 mm and 47^{th} division on the circular scale coincides with the reference line. The length of the wire is 5.6 cm. Find the curved surface area (in cm^2) of the wire in appropriate number of significant figures.

1. 2.4 cm^2
2. 2.56 cm^2
3. 2.6 cm^2
4. 2.8 cm^2

157.

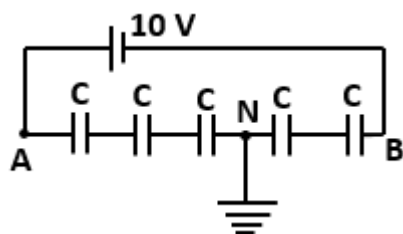
Six-point charges are kept on the circle of radius R as shown below. The electric potential at the center of the circle is:



1. zero
2. $\frac{1}{4\pi\epsilon_0} \left(\frac{q}{R} \right)$
3. $\frac{1}{4\pi\epsilon_0} \left(\frac{3q}{R} \right)$
4. $\frac{1}{4\pi\epsilon_0} \left(\frac{6q}{R} \right)$

158.

Five identical capacitors are shown below along with a battery. The potential at point A is



1. 10 V
2. 8 V
3. 6 V
4. 4 V

159.

The power factor of a series LCR circuit in resonance condition is:

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

160.

The magnetization of a piece of iron or steel:

1. depends on the strength of the magnetizing field.
2. depends on external conditions such as temperature.
3. cannot be done beyond the saturation point.
4. All of these

161.

A point P lies on the axis of a flat coil carrying a current. The magnetic moment of the coil is M. The distance of P from the coil is d, which is large compared to the radius of the coil. The magnetic field at P has magnitude

1. $\frac{\mu_0}{4\pi} \frac{M}{d^3}$
2. $\frac{\mu_0}{2\pi} \frac{M}{d^3}$
3. $\frac{\mu_0}{2\pi} \frac{M}{d^2}$
4. $\frac{\mu_0}{4\pi} \frac{M}{d^2}$

162.

Magnetic dipole moment is a

1. Scalar quantity
2. Vector quantity
3. Constant for all magnets
4. Temperature independent quantity

163.

A body is projected obliquely from the horizontal ground. The magnitude of power delivered by gravity during its motion from the ground to the topmost point is:

1. Constant
2. Increases continuously
3. Decreases continuously
4. May increase or decrease depending on the angle of projection

164.

Stationary waves are formed on a stretched string. If the wavelength is λ , then the distance between two points having maximum displacement can be

1. $3\lambda/2$
2. 4λ
3. $5\lambda/2$
- 4 All of these

165.

Given the equation for a wave on the string, $y = 0.5 \sin(5x - 3t)$ where y and x are in meters and t in second. The ratio of maximum speed of particle to speed of wave is-

1. 1:1
2. 5:2
3. 3:2
4. 4:5

166.

When the electron of a hydrogen-like atom jumps from a higher energy level to a lower energy level, then

1. Angular momentum of the electron remains constant
2. The kinetic energy of the electron increases
3. The wavelength of the de-Broglie wave associated with the motion of the electron increases
4. Potential energy increases

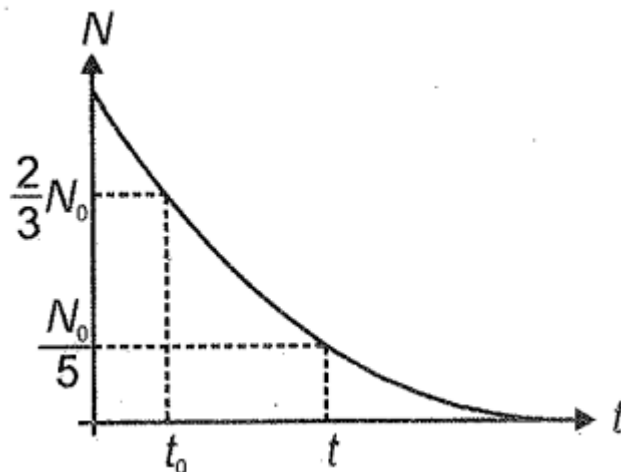
167.

In an atom, if the transition from $n = 4$ to $n = 3$ gives ultraviolet radiation, then to obtain infrared radiation transition should be:

1. $5 \rightarrow 4$
2. $3 \rightarrow 2$
3. $2 \rightarrow 1$
4. $3 \rightarrow 1$

168.

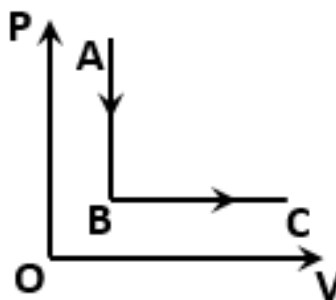
The graph shows the variation of the number of radioactive atoms left undecayed with time. The time t corresponding to $\frac{N_0}{5}$ is:



1. $t = \frac{t_0 \ln(5)}{\ln(2/3)}$
2. $t = \frac{t_0 \ln(5)}{\ln(3/2)}$
3. $t = t_0 \ln(5)$
4. $t = t_0 \ln(5) \times \ln\left(\frac{3}{2}\right)$

169.

The figure shows a process for a gas in which pressure (P) and volume (V) of gas change. If C_1 and C_2 are the molar heat capacities of gas during process AB and BC respectively, then



1. $C_1 = C_2$
2. $C_1 > C_2$
3. $C_1 < C_2$
4. $C_1 \leq C_2$

170.

A heat engine is working between 200 K and 400 K. Efficiency of the heat engine maybe:

1. 20%
2. 40%
3. 50%
4. All of these

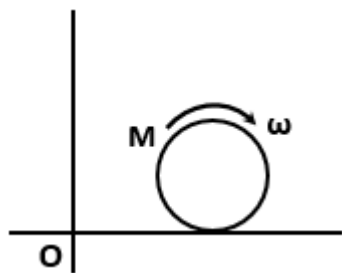
171.

The mean free path of N_2 gas molecules in a rigid container is λ . If the temperature of the gas is doubled, then the new mean free path of N_2 gas is

1. $\frac{\lambda}{2}$
2. 3λ
3. $\frac{\lambda}{4}$
4. λ

172.

A ring of mass M and radius R is rolling with angular speed ω on a horizontal plane as shown in the figure. The magnitude of angular momentum of the ring about origin O is:



1. $MR^2\omega$
2. $2MR^2\omega$
3. $\frac{2}{5}MR^2\omega$
4. $\frac{5}{2}MR^2\omega$

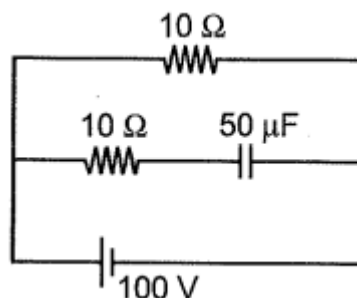
173.

Moment of inertia I of a non-uniform ring of mass M and radius R about an axis through the centre and normal to its plane is:

1. $I > MR^2$
2. $I < MR^2$
3. $I = MR^2$
4. $I \leq MR^2$

174.

What is the energy stored in the capacitor in the circuit shown below?



1. 0.25 J
2. 2.5 J
3. 25 mJ
4. Zero

175.

A bulb rated at 100 W, 220 V is used at 198 V. The power consumed in the bulb will be:

1. 81 W
2. 198 W
3. 90 W
4. 110 W

176.

If a body is dropped from an artificial satellite revolving around the earth at an altitude of 120 km, the body will:

1. fall down to earth gradually.
2. go far away in space.
3. continue to move with same speed along the original orbit of the satellite.
4. continue to move tangentially in a straight line to the satellite orbit with the same speed.

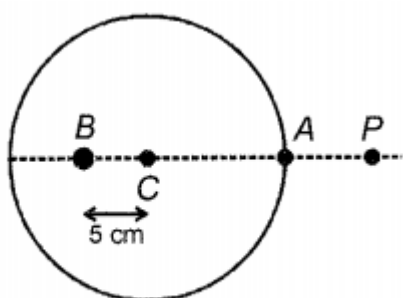
177.

The coefficient of friction between a solid cylinder and a rough inclined plane is just sufficient for the pure rolling of the cylinder. Which of the following bodies can move with pure rolling on the inclined plane?

1. Hollow cylinder
2. Solid sphere
3. Hollow sphere
4. Ring

178.

In a glass ($\mu = 1.5$) sphere of radius 10 cm, there is an air bubble B at distance 5 cm from C. The distance of bubble from the surface of sphere (i.e. point A) as observed from point P in air will be



- 1 4.5 cm
- 2 20.0cm
- 3 9.37 cm
- 4 6.67 cm

179.

How many minimum number of NOR gates are required to obtain an AND gate?

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

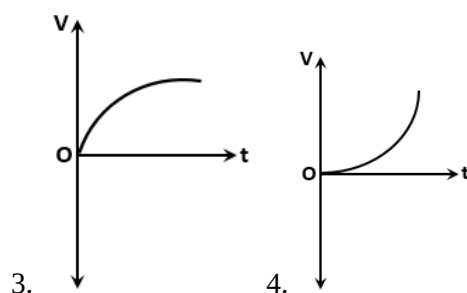
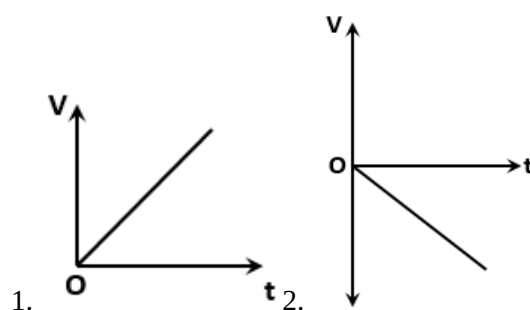
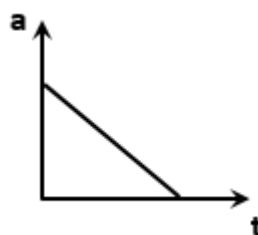
180.

Which of the following-junction is used unbiased?

1. Photo diode
2. LED
3. Zener diode
4. Solar cell

181.

For the given acceleration (a) versus time (t) graph of a body, the body is initially at rest. The velocity (v) versus time (t) graph will be:



182.

An astronomical telescope has angular magnification of 20 in its normal adjustment. Focal length of eyepiece is 4 cm. Distance between objective and eyepiece is

- 1 80 cm
- 2 84 cm
- 3 76 cm
- 4 90 cm

183.

When a transistor is used in common emitter mode as an amplifier

1. Base-emitter junction is forward biased
2. Base-emitter junction is reverse biased
3. Base-collector junction is forward biased
4. Input is connected in series with voltage applied across base-collector junction

184.

Eight droplets of water each of radius 0.5 mm combine to form a bigger drop. The energy released in this process is: (surface tension = 7.2×10^{-2} N/m)

1. 9×10^{-7} J
2. 3×10^{-7} J
3. 1×10^{-7} J
4. 10×10^{-7} J

185.

When a large liquid drop breaks into several smaller liquid drops, then the temperature of smaller drops is relatively:

1. Same
2. More
3. Less
4. Maybe less or more

Physics - Section B

186.

The de-Broglie wavelength of a neutron is λ when its kinetic energy is E. If its kinetic energy is made four times, then the de Broglie wavelength becomes:

1. 4λ
2. 2λ
3. $\frac{\lambda}{4}$
4. $\frac{\lambda}{2}$

187.

A particle moving on a curved path possesses a velocity of 3 m/s towards the north at an instant. After 10 s, it is moving with speed 4 m/s towards west. The average acceleration of the particle is-

1. 0.25 m/s^2 , 37° south to east
2. 0.25 m/s^2 , 37° west to north
3. 0.5 m/s^2 , 37° east to north
4. 0.5 m/s^2 , 37° south to west

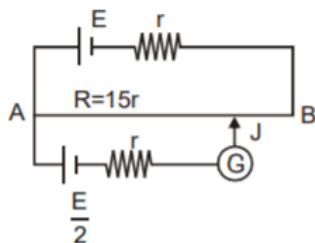
188.

A block of mass 10 kg is kept on a rotating horizontal turntable with an angular velocity of 2 rad/s. If the distance of the block from the center of the table is 0.5 m, the net force on the block is:

1. 40 N
2. 20 N
3. 10 N
4. Zero

189.

The potentiometer wire AB is 600 cm long. At what distance from A should the jockey touch the wire to get zero deflection in the galvanometer?



1. 160 cm
2. 320 cm
3. 400 cm
4. 200 cm

190.

A particle moves along the positive branch of the curve $y = \frac{x^2}{2}$ where $x = \frac{t^2}{2}$, x , and y are measured in metres and in second. At $t = 2$ s, the velocity of the particle is:

1. $(2\hat{i} - 4\hat{j})$ m/s
2. $(4\hat{i} + 2\hat{j})$ m/s
3. $(2\hat{i} + 4\hat{j})$ m/s
4. $(4\hat{i} - 2\hat{j})$ m/s

191.

A block of mass m moving with speed v compresses a spring through distance x before its speed is halved. What is the value of the spring constant?

1. $\frac{3mv^2}{4x^2}$
2. $\frac{mv^2}{4x^2}$
3. $\frac{mv^2}{2x^2}$
4. $\frac{2mv^2}{x^2}$

192.

The magnetic field amplitude of an electromagnetic wave is 2×10^{-7} T. Its electric field amplitude if the wave is traveling in free space is:

1. 6 Vm^{-1}
2. 60 Vm^{-1}
3. $\frac{10}{6} \text{ Vm}^{-1}$
4. None of these

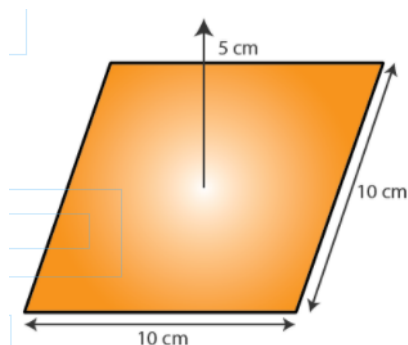
193.

A truck starts from rest and accelerates uniformly at 2.0 m s^{-2} . At $t = 10$ s, a stone is dropped by a person standing on the top of the truck (6 m high from the ground). What is the acceleration of the stone at $t = 11$ s? (Neglect air resistance.)

1. 10 ms^{-2} (upward)
2. 15 ms^{-2} (downward)
3. 10 ms^{-2} (downward)
4. 15 ms^{-2} (upward)

194.

A point charge $+10\ \mu\text{C}$ is at a distance 5 cm directly above the centre of a square of side 10 cm, as shown in the figure. What is the magnitude of the electric flux through the square?



1. $3.18 \times 10^5\ \text{N m}^2\ \text{C}^{-1}$
2. $2.10 \times 10^5\ \text{N m}^2\ \text{C}^{-1}$
3. $1.03 \times 10^5\ \text{N m}^2\ \text{C}^{-1}$
4. $1.88 \times 10^5\ \text{N m}^2\ \text{C}^{-1}$

195.

A block is resting on a piston which executes simple harmonic motion in the vertical direction with a period of 2.0 s. The maximum velocity of the piston at an amplitude just sufficient for the block to get separated from the piston is:

1. $1.57\ \text{ms}^{-1}$
2. $3.2\ \text{ms}^{-1}$
3. $2.0\ \text{ms}^{-1}$
4. $6.42\ \text{ms}^{-1}$

196.

A particle is executing SHM with time period T. If the time period of its total mechanical energy is T' , then $\frac{T'}{T}$ is:

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

197.

On withdrawing the external applied force on bodies within the elastic limit, the body:

1. regains its previous state very quickly.
2. regains its previous state after some time.
3. regain its previous state after a very long time.
4. does not regain its previous state.

198.

A wheel with 20 metallic spokes, each 1 m long, is rotated with a speed of 120 rpm in a plane perpendicular to a magnetic field of 0.4 G. The induced emf between the axle and rim of the wheel will be, ($1\ \text{G} = 10^{-4}\ \text{T}$)

1. $2.51 \times 10^{-4}\ \text{V}$
2. $2.51 \times 10^{-5}\ \text{V}$
3. $4.0 \times 10^{-5}\ \text{V}$
4. 2.51 V

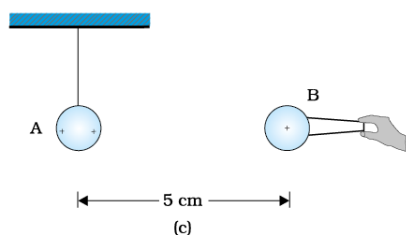
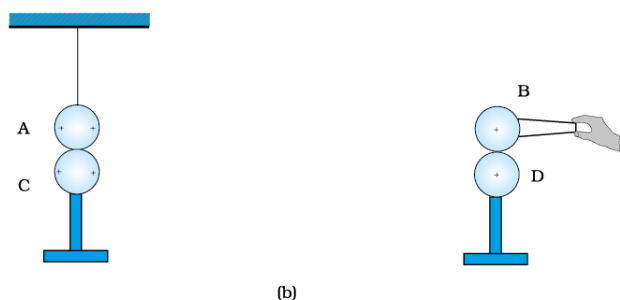
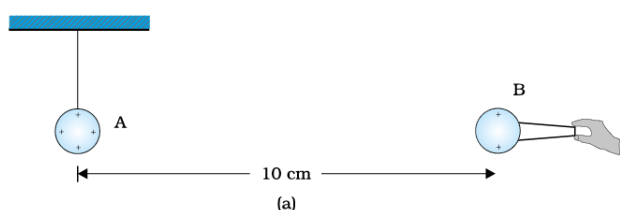
199.

For a coil having $L = 2\ \text{mH}$, current flow through it is $I = t^2 e^{-t}$, then the time at which emf becomes zero :-

1. 2 s
2. 1 s
3. 4 s
4. 3 s

200.

A charged metallic sphere A is suspended by a nylon thread. Another identical charged metallic sphere B held by an insulating handle is brought close to A such that the distance between their centres is 10 cm, as shown in Fig.(a). The resulting repulsion of A is noted. Then spheres A and B are touched by identical uncharged spheres C and D respectively, as shown in Fig.(b). C and D are then removed and B is brought closer to A to a distance of 5.0 cm between their centres, as shown in Fig. (c). What is the expected repulsion on A on the basis of Coulomb's law?



1. Electrostatic force on A due to B remains unaltered.
2. Electrostatic force on A due to B becomes double.
3. Electrostatic force on A due to B becomes half.
4. Can't say.

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