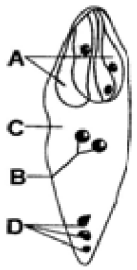
Botany - Section A

1. Our ancestors knew about the inheritance of characters and variations because-
1. They selectively breed plants and animals and selected for organisms that possessed desirable characters.
2. They introduced mutations
3. They performed natural hybridisation
4. All of the above

2. Today _____ are extensively used as a _____ point in the sequencing of whole genome
1. Pedigree charts, conclusive
2. Genetic maps, starting
3. Pedigree charts, starting
4. Genetic maps, conclusive

3.



Identify A, B, C and D structures shown in above diagram of female gametophyte:

	A	B	C	D
1.	Synergid	Polar nuclei	Central cell	Antipodal cells
2.	Antipodal cells	Polar nuclei	Central cell	Synergids
3.	Antipodal cells	Polar nuclei	Megaspore mother cell	Synergids
4.	Filiform apparatus	Polar nuclei	Central cell	Antipodal cell

4. In Connell's elegant field experiments, on the Rocky sea coasts of Scotland which of the following observation was recorded?
1. Barnacle Balanus dominates and exclude the smaller barnacle Chathamalus from that zone
2. Barnacle Chathamalus dominates Barnacle Balanus and exclude them from that zone.
3. Barnacle Balanus dominates and excludes smaller warblers from that zone.
4. Warblers dominate and exclude smaller Balanus from that area.

5. Which one of the following statements is wrong?
1. Glycine is a sulphur containing amino acid.
2. Sucrose is a disaccharide.
3. Cellulose is a polysaccharide.
4. Uracil is a pyrimidine.

6. Which of the following is the best evidence for the 'Lock-and-key model' of enzyme action?
1 all isolated enzymes have been identified as proteins
2. compounds similar in structure to the substrate inhibit the reaction
3. enzymes are found in living organisms and speed up certain reactions
4. enzymes determine the direction of reaction

7. Match each item in Column I with one in Column II and select the correct option from the codes given below:

	COLUMN I [Phyllotaxy]	**COLUMN II [Example]**
A.	Alternate	a. China rose
B.	Opposite	b. Calotropis
C.	Whorled	c. Alstonia

Codes

	A	B	C
1.	a	b	c
2.	a	c	b
3.	b	a	c
4.	c	b	a

8. Match the bacteria in Column I with its shape in Column II and select the correct option from the codes given below:

	COLUMN I	**COLUMN II**
A.	Bacillus	a. Rod
B.	Coccus	b. Spherical
C.	Spirilla	c. Spiral
D.	Vibrio	d. Comma

Codes

	A	B	C	D
1.	a	b	c	d
2.	b	a	c	d
3.	a	d	c	b
4.	b	a	d	c

9. Transgenic plants are the ones
1. Grown in artificial medium after hybridization in the field
2. Produced by a somatic embryo in artificial medium
3. Generated by introducing foreign DNA in to a cell and generating a plant from that cell
4. Produced after protoplast fusion in artificial medium

10. The members of Kingdom Monera and Kingdom Protista in Whittaker's five kingdom classification resemble each other in:
1. Cell type
2. Body organization
3. Nature of cell wall
4. Nuclear membrane

11. Identify the plant growth regulator that is not correctly matched to its chemical nature in the following given options:

	PGR	**Chemical nature**
1.	Ethylene	Gaseous
2.	Adenine derivatives	Kinetin
3.	Indole compounds	Auxins
4.	Terpenes	Abscisic acid

12. Plants have developed many mechanisms to encourage cross-pollination that include:
I. Asynchrony between pollen release and stigma receptivity
II. Placing of pollen and stigma at different positions
III. Self-incompatibility
IV. Dioecy
What would be true regarding these mechanisms?
1. I and II prevent autogamy and geitonogamy
2. III is a genetic mechanism that inhibits pollen germination or pollen tube growth
3. IV is a very common [found in majority]mechanism seen in flowering plants
4. I, II and III invariably lead to xenogamy

13. Which of the following is not an example of dehydration synthesis in the structure of a biomolecule?
1. linking of individual monosaccharides in a polysaccharide
2. nitrogenous base pairing in a double stranded DNA helix
3. synthesis of triglycerides from fatty acids and glycerol
4. formation of the primary structure of a polypeptide

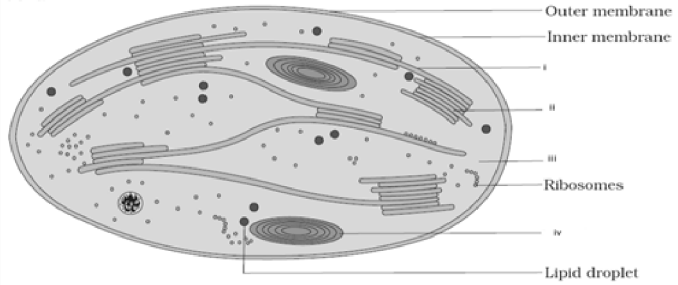
14. Match each item in Column I with one in Column II and select the correct answer from the codes given:

A.	Pollen exine	P.	Cellulose and pectin
B.	Pollen intine	Q.	Sporopollenin
C.	Antipodals	R.	Nutrition to the embryo sac
D.	Synergids	S.	Pollen tube guidance

	A	B	C	D
1.	P	Q	R	S
2.	Q	P	S	R
3.	Q	P	R	S
4.	P	Q	S	R

15. If there were no green house effect:
1. Earth would have been too cold for many organisms to survive
2. The diversity on Earth would have been much higher
3. The primary productivity would have been much higher
4. Earth would not have any atmosphere

16. Identify a,b,c and d labellings in the following diagram.



1. i - stroma lamella; ii- thylakoid; iii-stroma; iv-genetic material
2. i- stroma lamella; ii- grana; iii-stroma; iv-starch granule
3. i- grana; ii- lamella; iii-stroma; iv-starch granule
4. i- stroma lamella; ii- grana; iii-cytoplasm; iv-starch granule

17. RNA can act as
1. Adapter molecule
2. Catalytic molecule as well as Genetic material
3. Structural molecule
4. All of the above

18. A species whose distribution is restricted to a small geographical area because of the presence of a competitively superior species is found to expand its distributional range dramatically when the competing species is experimentally removed. This is called:
1. Competitive Exclusion
2. Competitive Release
3. Competitive Supremacy
4. Competitive Inclusion

19. Which group of organisms are members of red algae?
1 *Trichodesmium, Porphyra, Chondrus*
2 *Gloiopeltis, Dictyota, Sargassurn*
3 *Batrachospermum, Polysiphonia, Porphyridium*
4 *Gelidium, Gracilaria, Chara*

20. Identify the **correct** statement:
1 A haploid plant does not produce gametes
2 Meiosis does not occur in haploid cells
3 All plants form gametes by meiosis
4 Mitosis cannot be the means for gamete formation

21. Which of the following statement about telophase-l is **correct?**
1. Congression stage
2. Disjunction of homologous chromosome stage
3. Centromere dividing stage
4. Nuclear membrane and nucleolus reform stage

22. RQ value will be one when the substrate is
1 Carbohydrate
2 Protein
3 Fat
4 Organic acid

23. Liquid endosperm in coconut results due to :-
1. Karyokinesis followed by cytokinesis
2. Failure of karyokinessis followed by cytokinesis
3. Karyokinesis twice followed by single cytokinesis
4. Karyokinesis is not followed by cytokinesis

24. Bicarpellary ovary with obliquely placed septum is seen in :
1. Brassica
2. Aloe
3. Solanum
4. Sesbania

25. In Hatch and Slack pathway, the primary CO_2 acceptor is -
1. Oxaloacetic acid
2. Phosphoglyceric acid
3. Phosphoenol pyruvate
4. Rubisco

26. The product(s) of the reaction catalyzed by nitrogenase in root nodules of leguminous plants is/are.
1. Nitrate alone
2. Ammonia and oxygen
3. Ammonia and hydrogen
4. Ammonia alone

27. Choose the odd one out w.r.t. lac operon
1. Polycistronic structural genes have common promoter
2. Lactose is transported in cell by permeases
3. The i gene shows its expression constitutively
4. Switching on of operon by lactose is positive control

28. Endosperm is usually completely consumed by the developing embryo in all the following except:
1. Pea
2. Castor
3. Bean
4. Groundnut

29. “An Essay on the Principle of Population” that possibly influenced both Darwin and Wallace was written by:
1. JBS Haldane
2. T R Malthus
3. Eldregde and Gould
4. Georges Cuvier

30. Which of the following ‘flows’ through an ecosystem and does not ‘cycle’?
1. Water
2. Nitrogen
3. Energy
4. Carbon

31. If we put a price tag on nature’s life-support services, about 50 % of the total cost will be accounted for by:
1. Recreation and nutrient cycling
2. Soil formation
3. Climate regulation
4. Habitat for wildlife

32. Identify a nucleoside containing a pyrimidine base:
1. Adenine
2. Cytidine
3. Guanosine
4. Thymidylic acid

33. Select the correct pair.
1. Cells of medullary rays that form part of a cambial ring - Interfascicular cambium
2. Loose parenchyma cells rupturing the epidermis and forming a lens-shaped opening in the bark - Spongy parenchyma
3. Large colorless empty cells in the epidermis of grass leaves - Subsidiary cells
4. In dicot leaves, vascular bundles are surrounded tissue by large thick-walled cells - Conjunctive tissue

34. Which of the following RNAs is not required for the synthesis of protein?
1. rRNA
2. siRNA
3. mRNA
4. tRNA

35. For the formation of NADH + H+ during glycolysis, in which form the redox equivalents are removed?
1. Hydrogen atoms
2. Phosphate ions
3. Oxygen atoms
4. Hydroxyl ions

Botany - Section B

36. Which of the following radiatively active gases contributes the least to global warming?
1. CO_2
2. CFC
3. N_2O
4. CH_4

37. Consider the following statements:
I. When certain exotic species are introduced into a geographical area, they become invasive because the invaded land does not have its natural predators.
II. Competition is best defined as a process in which the fitness of one species is significantly lower in the presence of another species.
III. Biological control methods adopted in agricultural pest control are based on the ability of the predator to regulate prey population

Which of the above statements are true?
1. I and II only
2. I and III only
3. II and III only
4. I, II and III

38. A compound which is produced by an organism that inhibits growth of other organism is called:
1. xenobiotics
2. antibiotic
3. antibody
4. interferon

39. Which of the following conditions represents a case of co-dominance genes?
1. A gene expresses itself, suppressing the phenotypic effect of its alleles.
2. Genes that are similar in phenotypic effect when present separately, but when together interact to produce a different trait.
3. Alleles, both of which interact to produce a trait, which may or may not resemble either of the parental types.
4. Alleles, each of which produces an independent effect in a heterozygous condition.

40. Which among the following is not true about pollen grain?
1. Rich in nutrients.
2. Many species cause severe allergies and bronchial afflictions in some people often leading to chronic respiratory disorders– asthma, bronchitis, etc.
3. Pollen consumption has been claimed to increase the performance race horses.
4. *Parthenium* is used against pollen allergy.

41. Which of the following is correct about transport or conduction of substances.
1. Organic food moves upward through xylem
2. Organic food move up through phloem
3. Inorganic food move upward and downward through xylem
4. Organic food move upward and downward through phloem

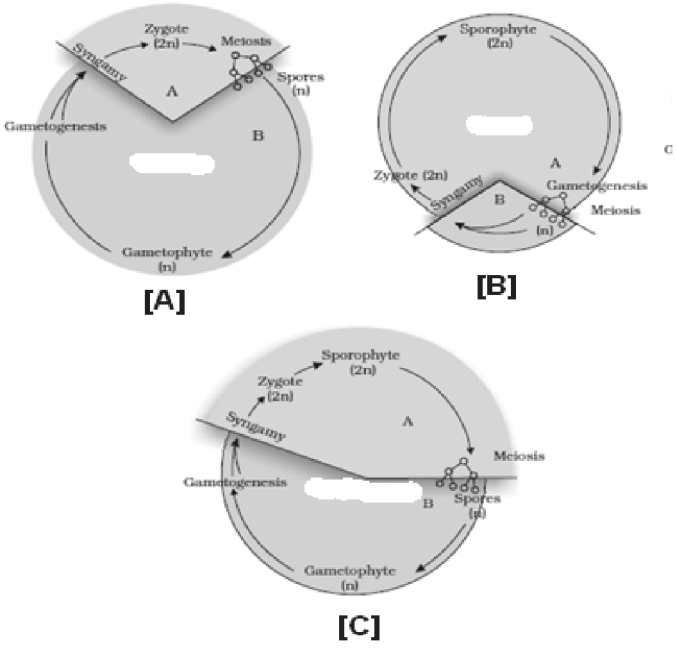
42. Which of the following statements about enzymes is true?

1. Enzymes do not alter the overall change in free energy for a reaction
2. Enzymes are proteins whose three dimensional shape is key to their functions
3. Enzymes speed up reactions by lowering activation energy
4. Enzyme are highly specific for reactions
5. An enzyme like any protein has the secondary and tertiary structure.
6. The energy input needed to start a chemical reaction is called activation energy

(1) All are correct
(2) All except 5
(3) 5 and 6
(4) 2 and 4

43. The diffusion of any substance across a membrane depends on
1 .Solubility in proteins
2 .Solubility in carbohydrates
3 .Solubility in lipids
4. Solubility in glycolipids

44. Which among the following is/are the life cycle pattern of colonial algae Volvox?



1. A
2. B
3. C
4. All of these

45. The bacterium Bacillus thuringiensis is widely used in contemporary biology as a/an
1. indicator of water pollution
2. insecticide
3. agent for production of dairy products
4. source of industrial enzyme

46. Synapsis occurs between
1. a male and a female gamete
2. mRNA and ribosomes
3. spindle fibres and centromere
4. two homologous chromosomes

47. The term 'polyadelphous' is related to
1. calyx
2. gynoecium
3. androecium
4. corolla

48. Choose the wrong statements:
1. Neurospora is used in the study of biochemical genetics
2. Morels and truffles are poisonous mushrooms
3. Yeast is unicellular and useful in fermentation
4. Penicillium is multicellular and produces antibiotics

49. In a dicot root, initiation of lateral roots and vascular cambium during the secondary growth takes place in the cells of:
1. Outer cortex
2. Inner cortex
3. Endodermis
4. Pericycle

50. Select the correct option:

	Direction of RNA synthesis	Direction of reading of the template DNA strand
1.	5' - 3'	3' - 5'
2.	3' - 5'	5' - 3'
3.	5' - 3'	5' - 3'
4.	3' - 5'	3' - 5'

Zoology - Section A

51. Strength to the bones is given by the hard and non-pliable ground substance composed of:
1. Calcium salts and collagen fibres
2. Calcium salts only
3. Calcium and magnesium salts
4. Elastin fibres

52. Arrange the following in the order of their existence during the history of life forms:
a. Stegosaurus, b. Brachiosaurus, c. Triceratops, d. Tyrannosaurus, e. Pteranodon, f. Crocodilian, g. Archaeopteryx.

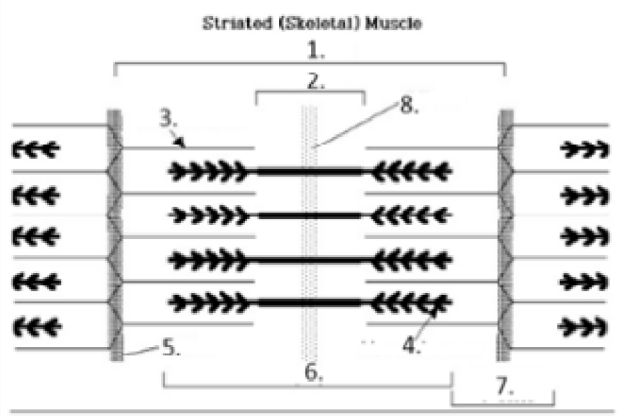
1.	b	a	g	f	e	d	c
2.	e	b	g	a	f	c	d
3.	g	a	f	b	e	d	c
4.	c	a	f	g	d	e	b

53. According to the traditional view which of the following can be kept under the process or form in Biotechnology?
1. Test tube baby
2. DNA vaccine
3. Making of wine
4. Correcting a gene

54. What does continuous culture mean?
1. Where DNA and protein getting expressed continuously
2. Where used medium is drained out and the fresh medium is added from another side
3. Where cells are producing protein for one week continuously
4. Where the production of recombinant DNA is continuing without interference.

55. If for some reason, the vasa efferentia in the human reproductive system get blocked, the gametes will not be transported from
1. epididymis to vas deferens
2. ovary to uterus
3. vagina to uterus
4. testes to epididymis

56. The length of which of the following regions shown in the given diagram of a sarcomere remains unchanged during muscle contraction?



1. 1
2. 2
3. 7
4. 6

57. The cell-mediated immunity inside the human body is carried out by
1. B-lymphocytes
2. Thrombocytes
3. Erythorcytes
4. T-lymphocytes

58. Select the correct matching of a hormone, its source and function.

Hormone	Source	Function
1. Norepinephrine	Adrenal medulla	Increases heartbeat, rate of respiration and alertness
2. Glucagon	Beta-cells of Islets of langerhans	Stimulates glycogenolysis
3. Prolactin	Posterior pituitary	Regulates growth of mammary glands and milk formation in females
4. Vasopressin	Posterior pituitary	Increases loss of water through urine

59. Which of the following is not a correct difference between members of Chondrichthyes and Osteichthyes?

Feature	Chondrichthyes	Osteichthyes
1. Operculum	Absent	Present
2. Scales	Placoid	Cycloid/Ctenoid
3. Swim bladder	Absent	Present
4. Mouth	Mostly terminal	Located ventrally

60. Identify the incorrectly matched pair:

1. Leydig cells	Secrete androgens when stimulated by LH
2. Sertoli cells	Help in spermiogenesis and also secrete inhibin
3. Seminal vesicles	Contribute fructose to seminal plasma and store sperms
4. Prostate	Unpaired gland, frequently gets enlarged in older men

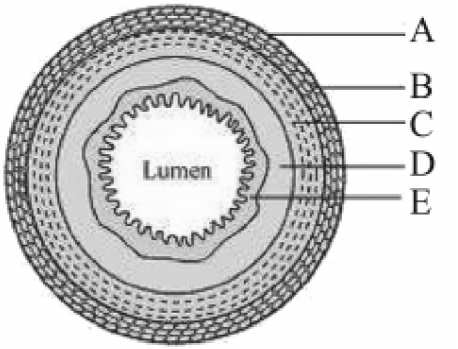
61. The regeneration of the uterine endometrium through proliferation corresponds to:
1. the ovarian follicular phase and is regulated by estrogen
2. the ovarian luteal phase and is regulated by progesterone
3. the ovarian follicular phase and is regulated by progesterone
4. the ovarian luteal phase and is regulated by estrogen

62. Amongst the vertebrates, the Class with maximum number of species is:
1. Pisces
2. Reptilia
3. Aves
4. Mammalia

63. The olfactory bulb in the human brain:
1. is an extension of the limbic system
2. is a part of the olfactory membrane
3. forms an important part of the mesencephalon
4. is located near the Wernicke's area in the temporal cortex

64. Bacteria can protect themselves from getting infected by bacteriophages as they synthesize:
1. Methylase
2. Ligases
3. Plasmids
4. Endonucleases

65. In the given diagram of the transverse section of the gut, the longitudinal muscles are represented by the letter:



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

66. Which of the following will not be equal in normal physiological conditions?
1. Partial pressure of oxygen in deoxygenated blood and partial pressure of oxygen in tissues
2. Partial pressure of carbon dioxide in alveoli and partial pressure of carbon dioxide in oxygenated blood
3. Partial pressure of oxygen in oxygenated blood and partial pressure of oxygen in alveoli
4. Partial pressure of carbon dioxide in tissues and partial pressure of carbon dioxide in deoxygenated blood

67. The pathway of single circulation is

1. Heart- body- gills- Heart
2. Heart- gills- body- Heart
3. Heart- body-gills-body- heart
4. body-heart-gills-Heart

68. On average, what amount of urea is excreted out per day by a healthy human being?
1. 5-10 gm
2. 15-20 gm
3. 25-30 gm
4. 50-60 gm

69. Ribosomes were discovered by
1. Palade
2. De Robertis
3. Porter
4. Golgi

70. Gorilla, Chimpanzee, Monkeys and Humans belong to the same
1. Species
2. Genus
3. Family
4. Order

71. Saheli, developed by CDRI, is a:
1. Social magazine for females
2. Steroidal oral contraceptive pill
3. Non steroidal oral contraceptive pill
4. Injectable contraceptive

72. Match the items given in Column - I with those in Column - II and choose the correct option.

	Column-I		Column-II
(a)	Rennin	(i)	Vitamin B_{12}
(b)	Enterokinase	(ii)	Facilitated transport
(c)	Oxyntic cells	(iii)	Milk proteins
(d)	Fructose	(iv)	Trypsinogen

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

73. According to Alexander von Humboldt :
1. Species richness decreases with increasing area of exploration
2. Species richness increases with the increasing area, but only up to limit
3. There is no relationship between species richness and area explored.
4. Species richness goes on increasing with increasing area of exploration

74. Match the following group of organisms with their respective distinctive characteristics and select the correct option :

	Organisms	**Characteristics**
(a)	Platyhelminthes	Cylindrical body with no segmentation
(b)	Echinoderms	Warm blooded animals with direct development
(c)	Hemichordates	Bilateral symmetry with incomplete digestive system
(d)	Aves	Radial symmetry with indirect development

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

75. In translation, the enzyme amino acyl-tRNA synthetase:
1. synthesizes tRNA
2. attaches amino acids to tRNA
3. hydrolyzes excess tRNA molecules
4. helps tRNA synthesize amino acids

76. Fleming first observed the antibiotic properties of the mould that makes penicillin, but the credit to develop it into a useful treatment goes to:
1. Selman Waksman
2. Florey and Chain
3. Beadle and Tatum
4. Zinder and Lederberg

77. Fecal-oral route is not involved in the transmission of:
1. Polio
2. Amoebic dysentery
3. Ascariasis
4. Filariasis

78. What type of protein structure is the beta-pleated sheet?
1. Primary
2. Secondary
3. Tertiary
4. Quaternary

79. Erythropoietin hormone which stimulates R.B.C. formation is produced by:
1. The cells of bone marrow
2. Juxtaglomerular cells of the kidney
3. Alpha cells of the pancreas
4. The cells of the rostral adenohypophysis

80. What happens to the volume of the pulmonary cavity when there is an increase in the volume of the thoracic chamber?
1. It decreases
2. It increases
3. It remains the same
4. First decreases and then increases

81. Match column-I with column-II

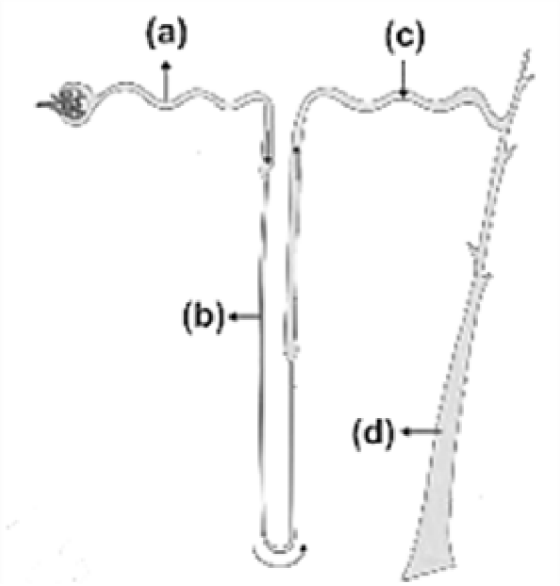
Column-I	Column-II
a. World population in year 1900	(i) Crossed 1.2 billion
b. India's population in year 2000	(ii) 2000 million
c. India's population in May 2011	(iii) About 6 billion
d. World population in year 2000	(iv) Close to 1 billion

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

82. Number of QRS complexes that occur in the ECG in a given time period determine
1. Cardiac output
2. Stroke volume
3. Heart beat rate
4. Strength of heart

83. Choose the incorrect statement
1. Blood groups are based on presence or absence of natural antigens that can induce immune response
2. Natural antibodies are proteins produced in respone to natural antigens
3. Anti-A , Anti-B are present in a person having blood group AB
4. During blood transfusion, blood of donor is carefully matched with blood of recipient

84. Choose the correct option corresponding to labels a,b,c, and d in the given diagram



	(a)	(b)	(c)	(d)
1.	H_2O	H_2O	HCO_3^-	Uric acid
2.	HCO_3^-	H_2O	K^+	Urea
3.	NH_3	NaCl	H_2O	Urea
4.	K^+	NaCl	H_2O	H^+

85. The sensory information for hearing is finally interpreted in
1. Basilar membrane
2. Organ of Corti
3. Auditory cortex of the brain
4. Olfactory part of the brain

Zoology - Section B

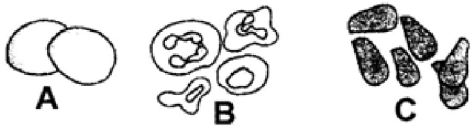
86. Which of the following types of natural selection reduces variation but does not change the mean value?
1. Directional
2. Stabilizing
3. Disruptive
4. All of these

87. A host cell normally does not take up a foreign DNA until it has been made competent to do so. This is because:
1. DNA is a hydrophilic molecule
2. DNA is a very large molecule
3. there are no receptors for DNA on the cell membrane
4. DNA is an inert molecule

88. Thalassemia and sickle-cell anaemia are caused due to a problem in globin molecule synthesis. Select the correct statement.
1. Both are due to a qualitative defect in globin chain synthesis
2. Both are due to a quantitative defect globin chain synthesis
3. Thalassemia is due to less synthesis of globin molecules
4. Sickle-cells anaemia is due to a quantitative problem of globin molecules

89. Antigen binding site in an antibody is found between
1. two light chains
2. two heavy chains
3. one heavy and one light chain
4. either between two light chains or between one heavy and one light chain depending upon the nature of antigen.

90. Identify the following cells in a specialised connective tissue:



	A	B	C
1.	Macrophage	Adipocyte	Platelets
2.	WBC	RBC	Platelets
3.	RBC	WBC	Platelets
4.	Adipocyte	Chondroclast	Platelets

91. The compound or pigment acting as an oxygen store in skeletal muscles is:
1. Myoglobin
2. Haemoglobin
3. Myokinase or ATP
4. Cytochrome

92. Which of the following has 23 chromosomes?

1. Secondary spermatocyte
2. Primary spermatocyte
3. Spermatogonia
4. Sertoli cells

93. Which of the following cranial meninges is in close contact of the brain tissue?
1. Arachnoid
2. Pia mater
3. Dura mater
4. Skull tissue

94. The name of the blood vessel delivering blood directly to the glomerulus is the
1. renal artery
2. interlobar artery
3. arcuate artery
4. afferent arteriole

95. Feeling the tremor of an earthquake a scared resident of seventh floor of a multistoried building starts climbing down the stairs rapidly. Which hormone initiated this action?
1. Thyroxine
2. Adrenaline
3. Glucagon
4. Gastrin

96. Cellular organelles with membranes are
1. Nucleus, ribosome and mitochondria
2. Chromosomes, ribosome and endoplasmic reticulum
3. Endoplasmic reticulum, ribosome and nuclei
4. Lysosomes, Golgi apparatus and mitochondria.

97. The permissible use of the technique amniocentesis is for
1. detecting sex of the unborn foetus
2. artificial insemination
3. transfer of enbryo into the uterus of a surrogate mother
4. detecting any genetic abnormality

98. Which one of the following groups of animals is correctly matched with its one characteristic feature without even a single exception ?
1. Reptilia : possess 3 - chambered heart with one incompletely divided ventricle
2. Chordata : possess a mouth provided with an upper and lower jaw
3.Chondrichthyes : possess cartilanginous endoskeleton
4.Mammalia : give birth to young one.

99. All the following are favorable for the formation of oxyhemoglobin at the lungs except:
1. High PO_2
2. Low PCO_2
3. Low temperature
4. Low pH

100. The best breeding method for animals that are below average in productivity in milk production is:
1. Inbreeding
2. Out-crossing
3. Cross-breeding
4. Interspecific hybridization

Chemistry - Section A

101. In which of the following compounds, hydrogen exists in the atomic state –
1. Metallic hydrides
2. Ionic hydrides
3. Molecular hydrides
4. Water

102. Iron carbonyl, $Fe(CO)_5$ is
1. Tetranuclear
2. Mononuclear
3. Trinuclear
4. Dinuclear

103. Aqua regia reacts with Pt to yield :
1. $Pt(NO_3)_4$
2. H_2PtCl_6
3. $PtCl_4$
4. $PtCl_2$

104. In which one of the following reactions, we will get only one crossed Aldol product,
1. CH_3CHO & CH_3CH_2CHO
2. CH_3CHO & $(CH_3)_2CO$
3. $(CH_3)_2CO$ & $(C_2H_5)_2CO$
4. C_6H_5CHO & CH_3CHO

105. The liquefied gas that is used in dry cleaning along with a suitable detergent is-
1. Water gas
2. Petroleum gas
3. NO_2
4. CO_2

106. Correct statement regarding heating of a liquid is -
1. Surface tension increases
2. Surface tension is lowered
3. Viscosity increases
4. Surface tension is not affected

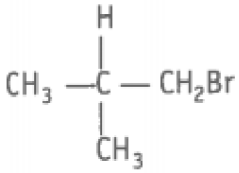
107. Which reagent will you use for the following reaction?
$CH_3CH_2CH_2CH_3 \rightarrow CH_3CH_2CH_2CH_2Cl + CH_3CH_2CHClCH_3$
1. $Cl_2/UV\ light$
2. $NaCl + H_2SO_4$
3. $Cl_2\ gas\ in\ dark$
4. $Cl_2\ gas\ in\ the\ presence\ of\ iron\ in\ dark$

108. Match the vitamins given in Column I with the deficiency disease they cause given in Column II.

Column II (Vitamins)	Column II (Diseases)
A. Vitamin B_{12}	1. Muscular weakness
B. Vitamin E	2. Increased blood clotting time
C. Vitamin K	3. Osteomalacia
D. Vitamin D	4. Pernicious anemia

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

109. Arrange the following alkyl halides in decreasing order of the rate of β-elimination reaction with alcoholic KOH.



A.
B. $CH_3 - CH_2 - Br$
C. $CH_3 - CH_2 - CH_2 - Br$
1. A>B>C
2. C>B>A
3. B>C>A
4. A>C>B

110. Which of the following does not give nucleophilic substitution with alcohol :
1. CH_3COCl
2. Acetic anhydride
3. Ether
4. None of the above

111. A compound having two direct bonds between P and H atom is :
1. H_3PO_2
2. H_3PO_3
3. H_3PO_4
4. $H_4P_2O_7$

112. n-propyl alcohol and isopropyl alcohol can be chemically distinguished by which reagent : -
1. PCl_5
2. Reduction
3. Oxidation with Potassium dichromate
4. Ozonolysis

113. Given that

$E^{\Theta}_{O_2/H_2O} = +1.23\ V; E_{S_2O_8^{2-}/SO_4^{-2}} = 2.05\ V$

$E^{\Theta}_{Br_2/Br^-} = +1.09\ V; E^{\Theta}_{Au^{3+}/Au} = +1.4\ V$

The strongest oxidizing agent is -

1. $S_2O_8^{2-}$
2. O_2
3. Au^{3+}
4. Br_2

114. The increasing order of nucleophilicity of the following nucleophiles is-

(a) $CH_3CO_2^{\ominus}$ (b) H_2O

(c) $CH_3SO_3^{\ominus}$ (d) $\overset{\ominus}{O}H$

1. (b) < (c) < (a) < (d)
2. (b) < (c) < (d) < (a)
3. (a) < (d) < (c) < (b)
4. (d) < (a) < (c) < (b)

115. The correct order of catenation is :

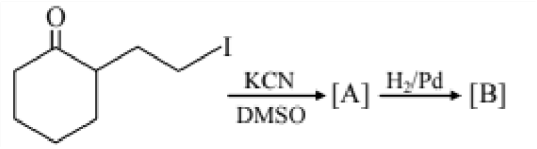
1. C > Sn > Si ≈ Ge
2. Si > Sn > C > Ge
3. C > Si > Ge ≈ Sn
4. Ge > Sn > Si > C

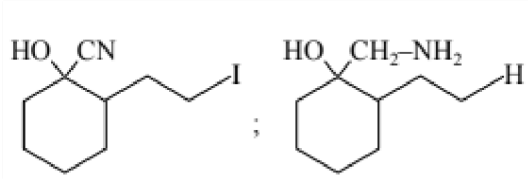
116. At room temperature, a dilute solution of urea is prepared by dissolving 0.60 g of urea in 360 g of water. If the vapour pressure of pure water at this temperature is 35 mm Hg, lowering of vapour pressure will be.

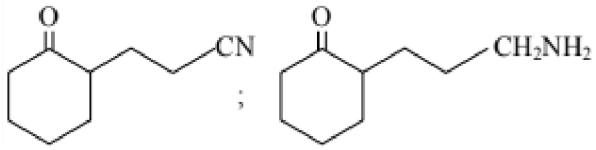
(molar mass of urea = 60 g mol^{-1})

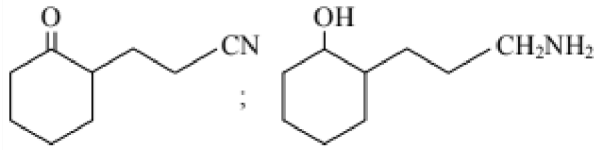
1. 0.031 mmHg
2. 0.017 mmHg
3. 0.028 mmHg
4. 0.027 mmHg

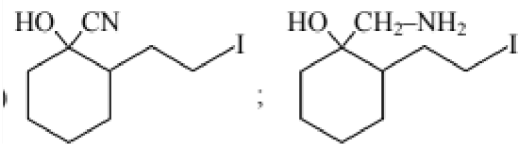
117. The major products A and B for the following reactions are, respectively :



1. 

2. 

3. 

4. 

118. An oxidation-reduction reaction in which 3 electrons are transferred has a ΔG° of 17.37 kJ mol^{-1} at 25°C. The value of E^{o}_{cell}(in V) is A× 10^{-2}. The value of A is-

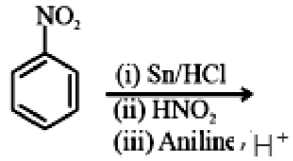
(1 F = 96,500 C mol^{-1})

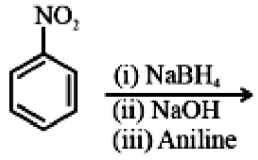
1. -6
2. 4
3. -8
4. 2

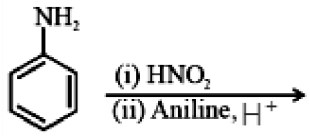
119. An aqueous solution contains an unknown concentration of Ba^{2+}. When 50 mL of a 1 M solution of Na_2SO_4 is added, $BaSO_4$ just begins to precipitate. The final volume is 500 mL. The solubility product of $BaSO_4$ is 1×10^{-10}. What is the original concentration of Ba^{2+} ?

1. 5×10^{-9} M
2. 2×10^{-9} M
3. 1×10^{-9} M
4. 1.0×10^{-10} M

120. Among the following, the reaction/s will not give p-aminoazobenzene is-

A. 

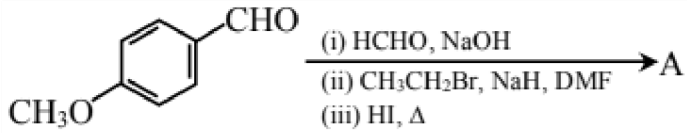
B. 

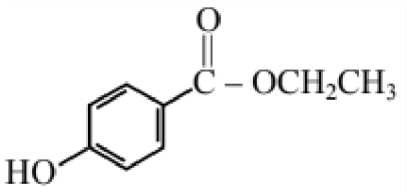
C. 

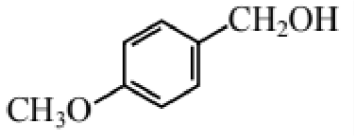
1. A only
2. B only
3. C only
4. A and B

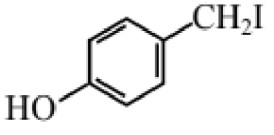
121. The correct order of electron gain enthalpy is
1. S > Se > Te > O
2. Te > Se > S > O
3. O > S > Se > Te
4. S > O > Se > Te

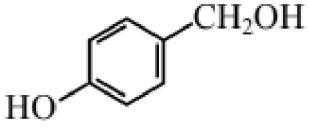
122. Identify A in the following chemical reaction



1. 

2. 

3. 

4. 

123. Given below are the half-cell reactions :

$Mn^{2+} + 2e^- \rightarrow Mn; E^\circ = -1.18\ V$

$2\left(Mn^{3+} + e^- \rightarrow Mn^{2+}\right); E^\circ = +1.51\ V$

The E^o for $3Mn^{2+} \rightarrow Mn + 2Mn^{3+}$ will be :
1. – 2.69 V; the reaction will occur
2. – 0.33 V; the reaction will not occur
3. – 0.33 V; the reaction will occur
4. – 2.69 V; the reaction will not occur

124. For the non – stoichiometry reaction 2A + B → C + D, the following kinetic data were obtained in three separate experiments all at 298 K.

Initial Concentration (A)	Initial Concentration (B)	Initial rate of formation of C (mol L^- S^-)
0.1 M	0.1 M	1.2×10^{-3}
0.1 M	0.2 M	1.2×10^{-3}
0.2 M	0.1 M	2.4×10^{-3}

The rate law for the formation of C is -
1. $\frac{dc}{dt} = k\left[A\right]^2\left[B\right]$
2. $\frac{dc}{dt} = k\left[A\right]\left[B\right]^2$
3. $\frac{dc}{dt} = k\left[A\right]$
4. $\frac{dc}{dt} = k\left[A\right]\left[B\right]$

125. Stability of the species Li_2, Li_2^- and Li_2^+ increases in the order of -
1. $Li_2 < Li_2^- < Li_2^+$
2. $Li_2^- = Li_2^+ = Li_2$
3. $Li_2 < Li_2^+ < Li_2^-$
4. $Li_2^- < Li_2^+ < Li_2$

126. Which of the following is the wrong statement?
1. Ozone is violet-black in solid-state
2. Ozone is paramagnetic gas
3. ONCl and ONO^- are not isoelectronic
4. O_3 molecule is bent

127. Among the following the maximum covalent character is shown by the compound :
1. $FeCl_2$
2. $SnCl_2$
3. $AlCl_3$
4. $MgCl_2$

128. A vessel at 1000 K contains CO_2 with a pressure of 0.5 atm. Some of the CO_2 is converted into CO on the addition of graphite. If the total pressure at equilibrium is 0.8 atm, the value of K is :
1. 1.8 atm
2. 3 atm
3. 0.3 atm
4. 0.18 atm

129. The wavelength (in nanometer) associated with a proton moving at 1.0×10^3 m s^{-1} (Mass of proton = 1.67×10^{-27} kg and h = 6.63×10^{-34} Js) is-:
1. 0.032 nm
2. 0.40 nm
3. 2.5 nm
4. 14.0 nm

130. Standard entropy of X_2, Y_2 and XY_3 are $60, 40$ and $50 JK^{-1} mol^{-1}$, respectively. For the reaction, $\frac{1}{2} X_2 + \frac{3}{2} Y_2 \rightarrow XY_3 \; \Delta H = -30$ kJ, to be at equilibrium, the temperature will be
1. 500 K
2. 750 K
3. 1000 K
4. 1250 K

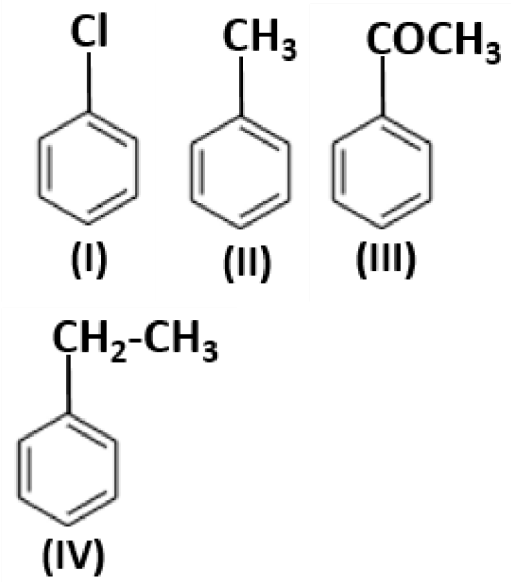
131. How many atoms are present in a mole of acetic acid?
1. $8 \times 6.02 \times 10^{23}$ atom/mol
2. $4 \times 6.02 \times 10^{23}$ atom/mol
3. $6 \times 6.02 \times 10^{23}$ atom/mol
4. None of the above

132. Which of the following compounds shows optical isomerism?
1. $[Co(CN)_6]^{3-}$
2. $[Cr(C_2O_4)_3]^{3-}$
3. $[ZnCl_4]^{2-}$
4. $[Cu(NH_3)_4]^{2+}$

133. Following statements reagarding the periodic trends of chemical reactivity of the alkali metals and the halogens are given. Which of these statements gives the correct picture ?
1. The reactivity decreases in the alkali metals but increases in the halogens with increase in atomic number down the group
2. In both the alkali metals and the halogens the chemical reactivity decreaeses with increase in atomic number down the group
3. Chemical reactivity increases with increase in atomic number down the group in both the alkali metals and halogens
4. In alkali metals the reactivity increases but in the halogens it decreases with increase in atomic number down the group

134. The enthalpy changes for the following processes are listed below :
Cl_2 (g) → 2Cl(g), 242.3 kJ mol^{-1}
I_2 (g) → 2I (g), 151.0 kJ mol^{-1}
ICI (g) → I(g) + Cl(g), 211.3 kJ mol^{-1}
I_2 (s) → I_2 (g), 62.76 kJ mol^{-1}
Given that the standard states for iodine and chlorine are I_2 (s) and Cl_2 (g), the standard enthalpy of formation of ICI (g) is :
1. -14.6 kJ mol^{-1}
2. -20.8 kJ mol^{-1}
3. +16.8 kJ mol^{-1}
4. +244.8 kJ mol^{-1}

135. The increasing order of the reactivity of the following compounds towards electrophilic aromatic substitution reaction is :



1. III < I < II < IV
2. III < II < I < IV
3. I < III < IV< II
4. III < I < IV < II

Chemistry - Section B

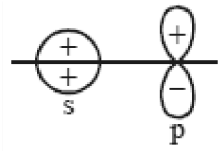
136. In the formation or sulphur trioxide by the contact process,

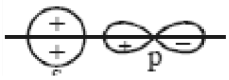
$2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$

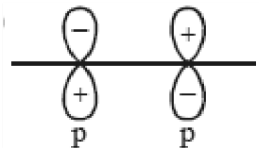
The rate of reaction is expressed as $\frac{d[O_2]}{dt} = 2.5x10^{-4}$ mol $L^{-1}sec^{-1}$. The rate disappearance of SO_2 will be

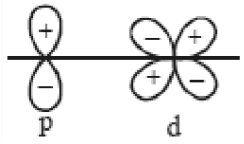
1. $5.0x10^{-4}$ mol $L^{-1}sec^{-1}$
2. $2.5x10^{-4}$ mol $L^{-1}sec^{-1}$
3. $3.75x10^{-4}$ mol $L^{-1}sec^{-1}$
4. $50.0x10^{-4}$ mol $L^{-1}sec^{-1}$

137. Which of the following leads to bonding?

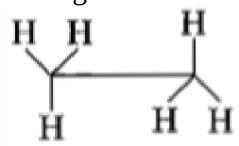
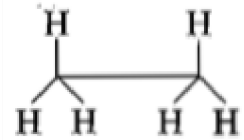
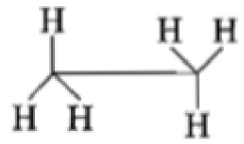
1. 

2. 

3. 

4. 

138. The non-staggered form(s) of ethane among the following is-

1. 
2. 
3. 
4. None of these

139. The correct statement among the following is: -

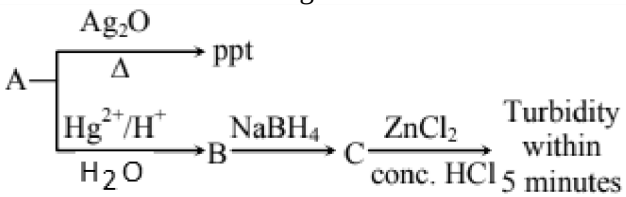
1. Silicon exhibits 8 coordination numbers in its compound.
2. Bond energy of F_2 is less than Cl_2
3. Mn(III) oxidation state is more stable than Mn (II) in an aqueous state.
4. Elements of 15^{th} gp show only + 3, and + 5 oxidation states.

140. With respect to an ore, the Ellingham diagram helps to predict the feasibility of its -

1. Electrolysis
2. Thermal reduction
3. Zone refining
4. Vapour phase refining

141. The pair that has similar atomic radii is :
1. Mo, and W
2. Mn, and Re
3. Ti, and Hf
4. Sc, and Ni

142. Consider the following reactions :



'A' is :
1. $CH_3 - C \equiv CH$
2. $CH_2 = CH_2$
3. $CH_3 - C \equiv C - CH_3$
4. $CH \equiv CH$

143. The coagulating power having ions Na^+, Al^{3+} and Ba^{2+} for arsenic sulphide sol increases in the order -
1. $Ba^{2+} < Na^+ < Al^{3+}$
2. $Al^{3+} < Na^+ < Ba^{2+}$
3. $Al^{3+} < Ba^{2+} < Na^+$
4. $Na^+ < Ba^{2+} < Al^{3+}$

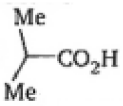
144. Experimentally it was found that a metal oxide has formula $M_{0.98}O$. Metal M, is present as M^{2+} and M^{3+} in its oxide. Fraction of the metal which exists as M^{3+} would be -
1. 6.05%
2. 5.08%
3. 7.01%
4. 4.08%

145. The degree of dissociation (α) of a weak electrolyte, A_xB_y is related to van't Hoff factor (i) by the expression :
1. $\alpha = \frac{i-1}{(x+y-1)}$
2. $\alpha = \frac{i-1}{x+y+1}$
3. $\alpha = \frac{x+y-1}{i-1}$
4. $\alpha = \frac{x+y+1}{i-1}$

146. Which of the following statements about low-density polythene is FALSE?

1. Its synthesis requires high pressure.
2. It is a poor conductor of electricity.
3. Its synthesis requires dioxygen or a peroxide initiator as a catalyst.
4. It is used in the manufacture of buckets, dustbins, etc.

147. Which of the following is an anionic detergent?
1. Sodium stearate
2. Sodium lauryl sulphate
3. Cetyltrimethyl ammonium bromide
4. Glyceryl oleate

148. The correct order of increasing acid strength of the compounds :
I. CH_3CO_2H
II. $MeOCH_2CO_2H$
III. CF_3CO_2H
IV. 

1. II < IV < I < III
2. IV < I <III <II
3. IV < I < II < III
4. I < IV < III < II

149. Consider the reaction equilibrium : $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g); \quad \Delta H^\circ = -198$ kJ
On the basis of Le-Chatelier's principle, the condition favorable for the forward reaction is :
1. lowering of temperature as well as pressure
2. increasing temperature as well as pressure
3. lowering the temperature and increasing the pressure
4. Any value of temperature and pressure

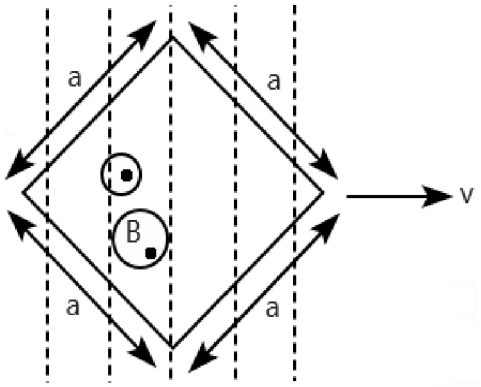
150. Both Co^{3+} and Pt^{4+} have a coordination number of six. Which of the following pairs of complexes will show approximately the same electrical conductance in dilute aqueous solutions?
1. $CoCl_3.6NH_3$ and $PtCl_4.5NH_3$
2. $CoCl_3.4NH_3$ and $PtCl_4.4NH_3$
3. $CoCl_3.3NH_3$ and $PtCl_4.5NH_3$
4. $CoCl_3.6NH_3$ and $PtCl_4.3NH_3$

Physics - Section A

151. Albert Einstein was awarded the Nobel Prize for his work on:
1. special theory of relativity
2. mass-energy equivalence
3. general theory of relativity
4. photoelectric effect

152. The percentage error in the measurement of the diameter of a sphere is 2.5%. What is the percentage error in the measurement of its surface area?
1. 2.5%
2. 5%
3. 1.25%
4. 10%

153. A square conducting frame of uniform thickness and homogeneous material is pulled from a magnetic field at a constant velocity as shown in the figure. When it is being pulled then:



1. magnitude of current remains constant but its direction reverse
2. magnitude of current changes but direction remains constant
3. magnitude of current as well as its direction changes
4. no current is induced in loop

154. Displacement of an object is proportional to the cube of time taken. Then,

1. the speed of the object is constant.
2. the motion is uniform.
3. the motion is uniformly accelerated.
4. its acceleration is variable.

155. If the focal length of the objective lens is increased then:
1. the magnifying power of the microscope will increase but that of the telescope will decrease.
2. the magnifying power of the microscope and telescope will increase.
3. the magnifying power of the microscope and telescope both will decrease.
4. the magnifying power of the microscope will decrease but that of the telescope will increase.

156. Limit of resolution of compound microscope is proportional to: (symbols have their usual meaning)
1. $d \propto \frac{\lambda}{\mu \sin\theta}$
2. $d \propto \frac{\mu \sin\theta}{\lambda}$
3. $d \propto \frac{\lambda\mu}{\sin\theta}$
4. $d \propto \frac{\sin\theta}{\lambda\mu}$

157. In YDSE an electron beam is used to obtain an interference pattern. If the speed of the electron increases then:
1. the distance between consecutive fringes decreases.
2. the distance between consecutive fringes increases.
3. the distance between consecutive fringes remains the same.
4. more information is required.

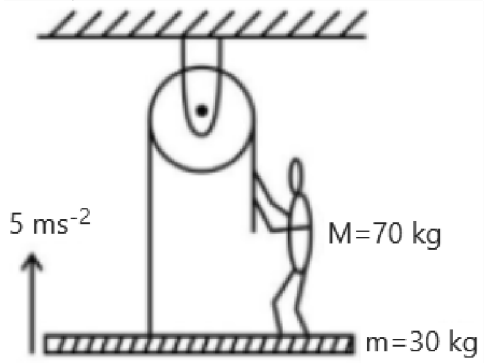
158. To make the electromagnets, the material used should have:
1. low hysteresis loss
2. high hysteresis loss
3. high permeability
4. both (1) and (3)

159. A hollow metallic sphere of radius 5 cm is charged such that the potential on its surface is 40 V. The potential at a distance of 3 cm from the center of the sphere is:
1. 20 V
2. 30 V
3. 40 V
4. 75 V

160. The amount of charge Q passed in time t through a cross-section of a wire is Q = ($7t^2$ + 4t + 1) C. The value of current at time t=6 seconds is:
1. 38 A
2. 27 A
3. 104 A
4. 88 A

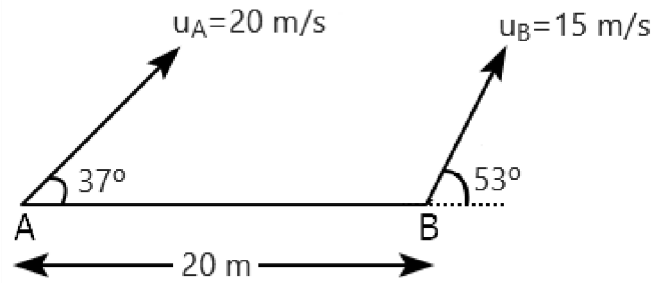
161. A long straight wire of radius a carries a steady current I. The current is uniformly distributed across its cross-section. The ratio of the magnetic field at a distance $3a$ and $5a$ form the axis of the wire will be:
1. $\frac{3}{5}$
2. $\frac{5}{3}$
3. $\frac{9}{25}$
4. $\frac{25}{9}$

162. In the shown arrangement, the man with mass 70 kg is accelerating up with an acceleration of 5 m/s^2 . The mass of trolley used is 30 kg and string is inextensible and light weight. The pull exerted by man on the string is:
(g = 9.8 m/s^2)



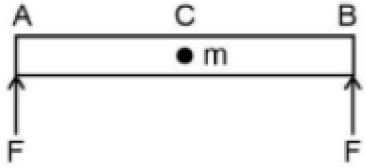
1. 620 N
2. 740 N
3. 1000 N
4. 980 N

163. Two particles A and B are projected as shown in the diagram. The correct statement is:



1. Their relative velocity is along horizontal direction
2. Their relative velocity is along vertical direction
3. Their relative velocity is zero
4. Their relative velocity vector is making $\theta = tan^{-1}(\frac{1}{2})$ angle with the line joining

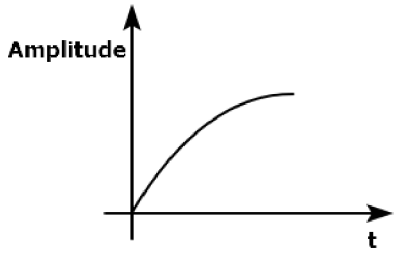
164. A rod is supported by two forces F each as shown in the figure. The rod is in equilibrium, then

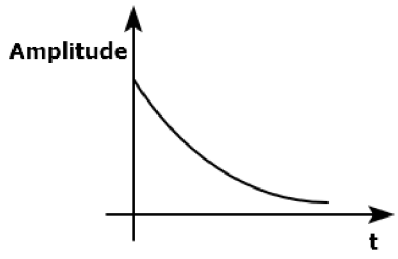


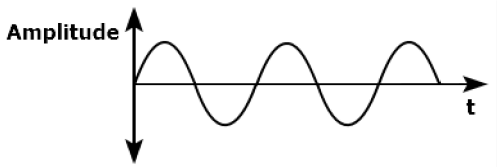
1. The net torque about A is zero
2. The net torque about B is zero
3. The net torque about C is zero
4. All of these

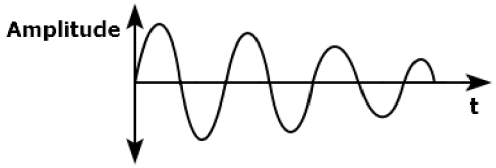
165. Consider the following statements-
(a) A body is in translational equilibrium if net force on it is zero.
(b) A body is in rotational equilibrium if net torque about any point is zero.
Choose the correct statements:
1. (a) only
2. (b) only
3. both (a) and (b)
4. neither (a) nor (b)

166. Which of the following graph best represent the damped simple harmonic motion?

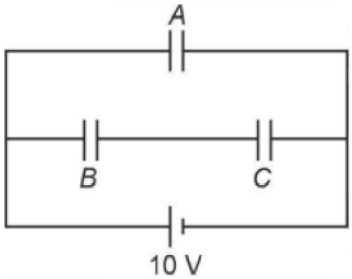
1.


2.


3.


4.


167. Three capacitors A, B and C each of capacitance 1 μF are connected as shown. The charge on capacitor C is:



1. 5 μC
2. 10 μC
3. $\frac{10}{3}\mu C$
4. $\frac{5}{3}\mu C$

168. A charged particle of mass m and charge q is released from rest in an electric field of constant magnitude E. The kinetic energy of the particle after time t is

1. $\frac{2E^2t^2}{mq}$

2. $\frac{E^2q^2t^2}{2m}$

3. $\frac{Eq^2m}{2t^2}$

4. $\frac{Eqm}{2t}$

169. A concave mirror of focal length f in air is used in a medium of refractive index 2. What will be the focal length of the mirror in the medium?
1. 4f
2. 2f
3. f/2
4. none of these

170. For which gate the given truth table is?

A	**B**	**Y**
0	0	1
1	0	1
0	1	1
1	1	0

1. NAND
2. AND
3. OR
4. NOR

171. Which of the following statements is not correct when a junction diode is in forward bias?
1. The width of depletion region decreases
2. Free electrons on n-side will move towards the junction
3. Holes of p-side move towards the junction
4. Electron on n-side and holes on p-side will move away from junction

172. In the reaction represented by,
$_ZX^A \rightarrow {}_{Z-2}Y^{A-4} \rightarrow {}_{Z-2}Y^{A-4} \rightarrow {}_{Z-1}K^{A-4}$
The decays in the sequence are:
1. α, β, γ
2. β, α, γ
3. γ, α, β
4. α, γ, β

173. The cylindrical tube of a spray pump has a cross-section of 8 cm^2, one end of which has 40 fine holes each of area 10^{-8} m^2. If the liquid flows inside the tube with a speed of 0.15 m min^{-1}, the speed with which the liquid is ejected through the holes is:
1. 50 ms^{-1}
2. 5 ms^{-1}
3. 0.05 ms^{-1}
4. 0.5 ms^{-1}

174. One of the most efficient engines ever developed operates between 2100 K and 700 K. Its actual efficiency is 40%. What percentage of the maximum possible efficiency is the actual efficiency?
1. 40%
2. 60%
3. 66.67 %
4. 33.37%

175. A car travelling on a level road cannot have an acceleration greater in magnitude than (μ is coefficient of friction):
1. μg
2. $\mu^2 g$
3. g
4. g/μ

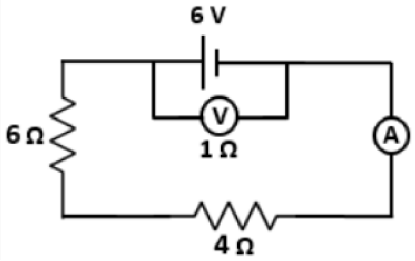
176. In a transformer, the output current and voltage are respectively 4 A and 20 V. If the ratio of the number of turns in the primary to secondary is 2:1, what is the input current and voltage?
1. 2 A and 40 V
2. 1 A and 20 V
3. 4 A and 10 V
4. 8 A and 40 V

177. The ground state energy of H-atom is -13.6 eV. The energy needed to ionise H-atom from its second excited state is:
1. 1.51 eV
2. 3.4 eV
3. 13.6 eV
4. 12.1 eV

178. A flask containing air at 27^oC at atmospheric pressure is corked up. A pressure of 2.5 atm would force the cork out. The temperature at which this happens is:
1. 67.5^oC
2. 750 K
3. 577^oC
4. 670 K

179. A vibrating tuning fork generates a wave given by $y = 0.1 \sin \pi (0.1x - 2t)$, where x and y are in metre and t in second. The distance travelled by the wave while the fork completes 30 vibrations is:
1. 600 m
2. 20 m
3. 30 m
4. 200 m

180. In the adjoining circuit, the readings of the ammeter and voltmeter are:



1. 6 A, 60 V
2. 0.6 A, 6 V
3. 6 A, 6 V
4. $\frac{6}{11} A$, $\frac{6}{11}$ V

181. A missile is launched from the earth with a velocity 5 km/s towards a target. The sum of its kinetic energy and potential energy is:
1. positive
2. negative
3. zero
4. either positive or negative depending upon the direction of launching

182. The excess pressure inside one soap bubble is three times that inside a second soap bubble, then the ratio of their surface areas is:
1. 1: 9
2. 1: 3
3. 3: 1
4. 1: 27

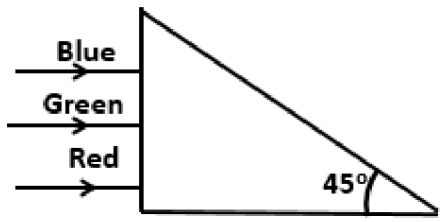
183. A light spring of length l and rigidity k is placed vertically on a table. A small mass of m falls on it. What will be the height from the surface of the table at which the ball will have the maximum velocity?
1. $\frac{mg}{k}$
2. $l - \frac{mg}{k}$
3. $\frac{mg}{2k}$
4. $l - \frac{2mg}{k}$

184. A metal wire of length L, area of cross-section A and Young's modulus Y behaves as a spring of spring constant k, given by:
1. $k = \frac{YA}{L}$
2. $k = \frac{2YA}{L}$
3. $k = \frac{YA}{2L}$
4. $k = \frac{YL}{A}$

185. The general equation of a wave in a string is:
$y = 0.1\ sin\ \pi(0.10x + 8t + 1.3)$
The equation of the wave that would produce a stationary wave with the given wave is
1. $y = 0.1\ cos\ \pi(0.10x - 8t + 1.3)$
2. $y = 0.1\ sin\ \pi(0.10x - 8t + 1.3)$
3. $y = 0.1\ sin\ \pi(8x - 0.10t + 1.3)$
4. $y = 0.1\ cos\ \pi(8x - 0.10t + 1.3)$

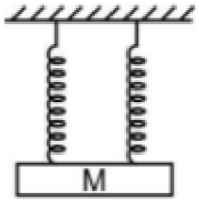
Physics - Section B

186. A beam of light consisting of red, green and blue colours is incident on a right-angled prism. The refractive index of the material of the prism for the above red, green and blue wavelengths are 1.39, 1.44 and 1.47 respectively. Which of the following color(s) will suffer total internal reflection?



1. Green and Red
2. Blue and Green
3. Only Red
4. Only Blue

187. A massless spring of spring constant 100 N/m is cut into two halves. The two halves are connected in parallel to a block of mass M as shown in the figure. If system vibrates at a frequency of (10/π) Hz, the value of M is:



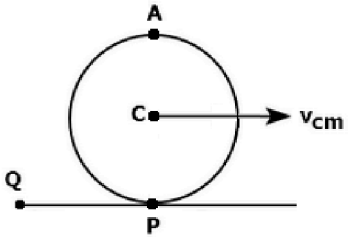
1. 4 kg
2. 3 kg
3. 2 kg
4. 1 kg

188. A uniform rope of length 12 m and mass 6 kg hangs vertically from a rigid support. A block of mass 2 kg is attched at the free end of the rope. A transverse pulse of wavelength 6 cm is produced at the lower end of the rope. The wavelength of the pulse when it reaches the top of the rope is:
1. 6 cm
2. 9 cm
3. 12 cm
4. 24 cm

189. A tube of length 2 m is filled completely with an incompressible liquid of mass 1 kg and closed at both ends. The tube is rotated in the horizontal plane about one of its ends with angular speed of 3 rad/s. The force exerted by the liquid at the other end is:
1. 6 N
2. 12 N
3. 9 N
4. 18 N

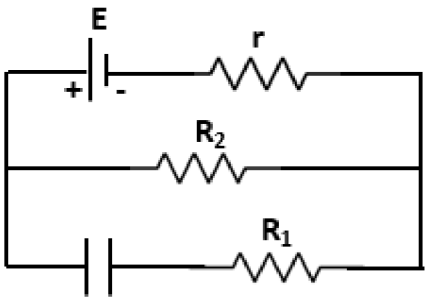
190. A proton enters a uniform electric field with its velocity perpendicular to the direction of the electric lines of force then: (Neglect gravity)
1. the path of the proton will be a straight line
2. the path of the proton will be a circle
3. the path of proton will be a parabola
4. the path of proton will be a hyperbola

191. A solid sphere is in pure rolling with constant speed of centre of mass (v_{cm}) as shown in the figure. Then the net torque on sphere about:



1. point P is non-zero
2. point C is non-zero
3. point A is non-zero
4. point Q is zero

192. The numerical value of the charge on either plate of the capacitor C shown in the figure is:



1. CE
2. $\frac{CER_1}{(R_2+r)}$
3. $\frac{CER_2}{(R_2+r)}$
4. $\frac{CER_1}{(R_1+r)}$

193. The string of a pendulum is of length l. It is made horizontal and then left. A nail is located at a distance d below the point of suspension. For the ball to completely swing around in a circle centred on the nail, the value of d in terms of length l is:
1. 0.5 l
2. 0.6 l
3. 0.4 l
4. 0.25 l

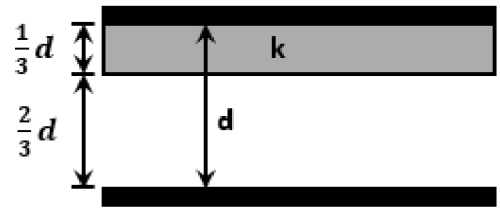
194. What is the rms value of an alternating current which when passed through a resistor produces heat, which is thrice that produced by a current of 2 ampere in the same resistor?
1. 6 ampere
2. 2 ampere
3. 3.46 ampere
4. 0.65 ampere

195. Pressure on a circular plate is obtained by measuring the force and the radius of the plate. If the error in measuring force and radius is 1% and 0.5% respectively, then the error in pressure is:
1. 1%
2. 2%
3. 6%
4. 8%

196. A body of mass m = 10 kg is attached to a wire of length 0.3 m. Its breaking stress is 4.8×10^7 N/m^2. The area of the cross-section of the wire is 10^{-6} m^2. What is the maximum angular velocity with which it can be rotated in the horizontal circle?
1. 4 rad/s
2. 8 rad/s
3. 1 rad/s
4. 2 rad/s

197. n particles of equal masses m gram are placed on the same line at distances l, 2l, 3l, ...nl cm from a fixed point. The distance of the center of mass of the particles from the fixed point (in centimeters) is:
1. $\frac{(2n+1)l}{3}$
2. $\frac{l}{n+1}$
3. $\frac{(n+1)l}{2}$
4. $\frac{2l}{n(n^2+1)}$

198. A parallel-plate capacitor has a capacitance C_0 in the absence of a dielectric. A slab of dielectric material of dielectric constant k=2 and thickness 1/3 d is inserted between the plates (as shown in the figure).



What is the new capacitance when the dielectric is present?
1. $\frac{6\varepsilon_0 A}{5d}$
2. $\frac{5\varepsilon_0 A}{6d}$
3. $\frac{4\varepsilon_0 A}{3d}$
4. $\frac{3\varepsilon_0 A}{4d}$

199. The activity of a radioactive sample decreases to (1/3)rd of its original value in 3 days. Then, in 6 days its activity will become:
1. $\frac{1}{27}th$ of the original value
2. $\frac{1}{9}th$ of the original value
3. $\frac{1}{18}th$ of the original value
4. $\frac{1}{3}rd$ of the original value

200. If the width of one slit is reduced in Young's experiment, which of the following will happen?
1. dark fringes become less dark
2. bright fringes become more bright
3. both of the above
4. the fringe system will disappear and uniform illumination will set in

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