1. For the stability of the organic compounds, Oparin opined that probably:
1. UV radiation never reached the surface of the primeval Earth
2. the primeval Earth was in a molten state
3. the primeval Earth atmosphere was reducing rather than oxidizing
4. plenty of energy sources were available for chemical reactions to occur

2. Adenine was synthesized by Orgel, using the Miller apparatus, when he used the gas :
1. carbon dioxide
2. hydrogen cyanide
3. hydrogen sulfide
4. nitrogen

3. The first genetic code of life was based on :
1. DNA
2. RNA
3. Proteins
4. Lipids

4. Both Charles Darwin and A.R.Wallace were influenced by the:
1. writings of J.B.S.Haldane on the origin of life
2. findings of Urey and Miller experiments
3. findings on the Galapagos Islands
4. essay on human population by T.R.Malthus

5. Aquatic mammals do not contain gill slits because:
1. they are fishes and not mammals
2. they only float on the water
3. their adaptation to aquatic life is secondary
4. they respire through their moist skins and lungs

6. What is the ultimate source of genetic variability?
1. mutation
2. migration
3. genetic drift
4. nonrandom mating

7. *de Vries* based his "Mutation Theory" on his observation on :
1. *Pisum sativum*
2. *Drosophila melanogaster*
3. *Oenothera lamackiana*
4. *Coenorhabditis elegans*

8. According to the modern view of Darwinism, the unit of natural selection is the :
1. population
2. individual
3. species
4. community

9. If there are two forms of a specific enzyme in a population, and if the relative frequencies of the individuals possessing each form of the enzyme changes, then certainly there is :
1. mutation
2. genetic drift
3. gene migration
4. evolution

10. The cause of the high incidence of the allele of sickle cell anaemia in human population is due to :
1. genetic drift
2. natural selection
3. bottleneck effect
4. founder effect

11. Which of the following is the most important precondition for speciation to occur?
1. reproductive isolation
2. a crash of the population size
3. adaptive radiation
4. random mating

12. Which of the following pairs of organs do not represent analogous organs?
1. Eye of an octopus and eye of a mammal
2. Flippers of penguin and flippers of dolphin
3. Wings of bat and forelimbs of humans
4. Wings of birds and wings of butterfly

13. "Organisms that share common descent show underlying embryological patterns on which they build later their adult patterns". This is :
1. Haeckel's law
2. Baer's law
3. Gauss law
4. Allen's rule

14. The only evolutionary agent that produces adaptive evolutionary changes is :
1. Nonrandom mating
2. Mutation
3. Genetic drift
4. Natural selection

15. A population of an animal is hunted down to only 20 organisms. Later the number is restored to 10,000 organisms, but the variations in this population are highly reduced. This is called :
1. Founder effect
2. Bottleneck effect
3. Edge effect
4. Heterosis

16. The struggle for existence is a consequence of :
1. each organism leaving more organisms than needed to replace itself
2. innate competitive tendencies
3. the inevitable difficulty of coping with climatic conditions
4. territories and dominance hierarchies

17. After pollution destroyed lichens on the trees, the survival of the dark-colored peppered moths increased, because they were :
1. protected from carcinogens
2. protected from lichen poisons
3. more robust
4. protected from predation

18. Many bacteria are now resistant to penicillin, because:
1. penicillin causes gene mutations, some of which are beneficial

2. previously resistant forms survived and reproduced better than non-resistant forms
3. the hospital environment inhibits competition among bacteria
4. penicillin triggers the synthesis of resistant proteins

19. A change in allele frequency within a population, over a succession of generations , is called :
1. microevolution, or adaptive evolution
2. macroevolution, or speciation
3. coevolution
4. phylogenetic evolution

20. If a new allele suddenly becomes very abundant in a population, most likely it is :
1. mutating rapidly
2. flowing with emigrants
3. strongly selected for
4. a product of assortative mating

21. Natural selection is best defined as occurring when the environment causes :
1. differential success in reproduction
2. differential mortality
3. assortative mating
4. a reduced gene pool

22. In allopatric speciation, initial barrier to gene flow is :
1. behavioral
2. postzygotic
3. geographic
4. ecological

23. Which one of the following populations would most quickly lead to two groups with few shared traits?
1. a population with disruptive selection
2. a population with directional selection
3. a population with stabilizing selection
4. a population with no selection

24. Which one of the following would cause the Hardy-Weinberg principle to be inaccurate?
1. The size of the population is very large.

2. Individuals mate with one another at random.
3. Natural selection is present.
4. There is no source of new copies of alleles from outside the population.

25. Why is genetic polymorphism important to evolution?
1. individual variability provides the raw material for natural selection to act on
2. genes cannot mutate unless they are polymorphic
3. only heterozygous individuals are selected in natural populations
4. the Hardy-Weinberg equilibrium is less likely to be disturbed in polymorphic populations

26. The genetic material must show variation. Which of the following is NOT an example of genetic variation?
1. New mutations can occur during meiosis.
2. Different species have different numbers of chromosomes.
3. Different individuals within a species have different phenotypes.
4. Individuals of different species may have similar phenotypes.

27. Why might heat-killed bacteria be useful as a vaccine?
1. It can cause a lethal infection.
2. Heat degradation of proteins changes their shape.
3. Molecules from the cell surface are still intact and can provoke an immune response.
4. DNA molecules can transform other strains of bacteria.

28. Why was the DNase treatment used by Avery, MacLeod, and McCarty an important step?
1. This allowed them to isolate pure DNA samples.
2. This allowed them to isolate pure protein samples.
3. This allowed them to demonstrate that removing the DNA prevents transformation.

4. This allowed them to demonstrate that mixing rough cells with DNA prevents transformation.

29. What key characteristic of T2 bacteriophage allowed Hershey and Chase to use it in their studies of the genetic material?
1. Its genes encode proteins that assemble to produce the viral coat.
2. It injects its genetic material into a bacterial cell.
3. It can undergo either the lytic or lysogenic life cycle.
4. It enters the bacterial cell to cause infection.

30. Which of the following statements about the structure of DNA is incorrect?
1. One complete turn requires 3.4nm and 10 base pairs.
2. The backbones of each strand run in opposite directions relative to each other.
3. Each pair of nucleotides is held together by three hydrogen bonds.
4. The width of the molecule is a constant 2nm.

31. Which of the following structures of a eukaryotic chromosome is not primarily composed of DNA?
1. Telomeres.
2. Origin of replication.
3. Kinetochore.
4. Centromere.

32. Which statement about bacterial DNA replication is correct?
1. DNA replication begins at several places along the chromosome.
2. DNA replication begins at the origin and travels in both directions.
3. DNA replication begins at the origin and travels around the chromosome back to the origin.
4. DNA replication begins at a GC rich region of the chromosome.

33. What is a key difference between DNA pol III and DNA ligase?
1. Only DNA polIII synthesizes phosphoester bonds.
2. Only DNA ligase synthesizes phosphoester bonds.
3. DNA polIII can synthesize DNA from 3'-5'.
4. DNA ligase can use energy from ATP rather than nucleotides.

34. Which statement could NOT describe both eukaryotic and prokaryotic transcription?
1. Promoter elements in the DNA are required for polymerase binding.
2. Transcription factors control the binding of RNA polymerase.
3. RNA polymerase opens a double stranded DNA to expose the template strand.
4. RNA polymerase catalyzes RNA synthesis from 3' to 5' of the new strand

35. Which of these is an enzymatic function of the ribosome?
1. Polynucleotide kinase.
2. Base pair recognition.
3. Methyl transferase.
4. Peptidyl transferase.

36. Which of the following facts is the most important evidence that the genetic code is a triplet code?
1. Insertions or deletions caused significant defects in protein structure.
2. The effect of single insertions could be remedied by single deletions nearby.
3. Two nearby insertions caused significant defects in protein structure.
4. Three insertions near each other often led to minor defects in protein structure.

37. Which of the following would you expect to find in an inducible system?
1. A repressor protein, which is bound to DNA in absence of any other factor.
2. A repressor protein, which is bound to DNA in the presence of a corepressor.

3. An activator protein, which is bound to DNA in absence of any other factor.
4. An activator protein, which is bound to DNA only in the absence of an inhibitor.

38. The famous double helix model of DNA was proposed by Watson and Crick in ____ and they shared Nobel Prize for Physiology or Medicine in _____ for their effort.
1. 1951, 1971
2. 1943, 1963
3. 1953, 1962
4. 1969, 1972

39. Which of the following was not a character studied by Mendel in garden pea?
1. Flower position
2. Pod shape
3. Flower colour
4. Pod position

40. 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

41. What proportion of progeny in F2 generation in a Mendel monohybrid cross resembled the parent [of P generation] that expressed the recessive trait?
1. ¼
2. ½
3. ¾
4. 2/3

42. In a test cross, the plant expressing the dominant phenotype is crossed with the plant:
1. Which is heterozygous dominant
2. Which is heterozygous recessive
3. Which is homozygous recessive
4. Which is homozygous dominant

43. Which of the following is not true for the Law of Dominance given by Mendel?
1. Characters are controlled by discrete units called factors.
2. Factors occur in pairs.
3. In a dissimilar pair of factors one member of the pair dominates the other.
4. The alleles show blending at the time of fertilization

44. A heterozygous plant produces:
1. Only one kind of gamete
2. Two kinds of gametes each having one allele with equal proportion.
3. Two kinds of gametes each having two alleles with equal proportion.
4. Two kinds of gametes each having one allele with one allele occurring in more gametes than the other.

45. What is the F2 phenotypic ratio in cases of incomplete dominance?
1. 1 : 1
2. 3 : 1
3. 1 : 2 : 1
4. 1 : 1

46. 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

47. What can be the blood groups of progeny whose father and mother are of AB and O blood group respectively?
1. A and B only
2. AB only
3. All except O
4. A, B, AB and O

48. To study whether a gene exhibits multiple allelism or not one must study:
1. An individual
2. A population

3. A species
4. With concentration

49. Occasionally, a single gene product may produce more than one effect. Such a gene is said to be:
1. Pleiotropic
2. Polygenic
3. Psuedoallele
4. Housekeeping

50. 'When two pairs of traits are combined in a hybrid, segregation of one pair of characters is independent of the other pair of characters'. This is the statement of:
1. Law of Dominance
2. Law of segregation
3. Law of Independent Assortment
4. Law of Linkage

51. Mendel's work remained unrecognised till 1900. Which of the following was not a reason for this?
1. His work was widely publicised and it brought bad name to Mendel
2. His concept of factors as stable and discrete units that did not 'blend' was not accepted.
3. His approach of using mathematics to explain biological phenomena was unacceptable.
4. He could not provide any physical proof for the existence of factors or say what they were made of.

52. "Chromosomes, which are seen in all dividing cells and pass from one generation to the next, are the basis for all genetic inheritance".
This statement is credited to:
1. Watson and Crick
2. Hershey and Chase
3. Sutton and Boveri
4. Meselson and Stahl

53. When the two genes in a dihybrid cross are situated on the same chromosome:
1. The proportion of parental gene combinations was much higher than the non-parental type.

2. The proportion of parental gene combinations was much lesser than the non-parental type.
3. The proportion of parental gene combinations was equal to the non-parental type.
4. Only recombinants are formed.

54. The mechanism of sex determination in grasshoppers is:
1. XX – XY; male heterogamety
2. XX – XY; female heterogamety
3. XX – XO; male heterogamety
4. XX – XO; female heterogamety

55. During his observation of spermatogenesis in few insects, Henking found that a nuclear structure was received by 50 % of the sperms. He called this structure as:
1. X – body
2. Y – body
3. X – chromosome
4. Y – chromosome

56. It is unfortunate that in our society women are blamed for producing female children and have been ostracised and ill-treated because:
1. The sex is determined by the type of sperm fertilizing the egg
2. The sex is determined by the type of egg fertilizing the sperm
3. The sex is determined by the hormones produced by the fetus
4. The sex is determined by the God's Will

57. Mendelian disorders are mainly determined by:
1. Alteration or mutation in the single gene.
2. Chromosomal gross structural changes.
3. Recombination between linked genes.
4. Jumping genes

58. The family pedigree of Queen Victoria shows a number of haemophilic descendents as she was:
1. Affected by the disease
2. Carrier for the disease

3. Did not carry the allele for hemopihilia
4. Was not a queen

59. The point mutation leading to sickle cell anaemia occurs:
1. At sixth position in the beta chain of haemoglobin
2. At sixth position in the alpha chain of haemoglobin
3. At sixth position in the beta chain of myoglobin
4. At sixth position in the alpha chain of myoglobin

60. In cases of Phenylketonuria:
1. The affected individual lacks an enzyme that converts the amino acid tyrosine into phenylalanine.
2. The affected individual makes an enzyme that converts the amino acid tyrosine into phenylalanine.
3. The affected individual makes an enzyme that converts the amino acid phenylalanine into tyrosine.
4. The affected individual lacks an enzyme that converts the amino acid phenylalanine into tyrosine.

61. Monosomy means:
1. Lack of one pair of chromosomes
2. Lack of one of any one pair of chromosome
3. Presence of an extra chromosome
4. Presence of an extra set of chromosomes

62. An individual affected with Turner's Syndrome:
I. Is a female
II. Has 45 chromosomes
III. Has rudimentary ovaries
Of the above statements, the correct statements are:
1. Only I and II
2. Only I and III
3. Only II and III
4. I, II and III

63. Which of the following is a pyrimidine base found in DNA?
1. Adenine
2. Guanine
3. Uracil
4. Cytosine

64. In a strand of a nucleic acid. Two nucleotides are linked together by:
1. 3' – 5' phosphodiester bond
2. 5' – 3' phosphodiester bond
3. 2' – 5' phosphodiester bond
4. 3' – 1' phosphodiester bond

65. The backbone of a polynucleotide chain is made of:
1. Sugar and nitrogenous bases
2. Phosphate and nitrogenous bases
3. Sugar and phosphate
4. Sugar, phosphate and nitrogenous bases

66. According to Erwin Chargaff, for a double stranded DNA
1. The ratios between Adenine and Thymine, and , Guanine and Cytosine are constant and equals one.
2. The ratios between Adenine and Thymine, and , Guanine and Cytosine are constant but is not equal to one.
3. The ratios between Adenine and Guanine, and , Thymine and Cytosine are constant and equals one.
4. The ratios between Adenine and Guanine, and , Thymine and Cytosine are constant but is not equal to one.

67. Histones are:
1. Positively charged and basic amino acids
2. Negatively charged and basic proteins
3. Positively charged and acidic proteins
4. Not found in bacteria

68. Transcriptionally active chromatin is termed as:
1. Heterochromatin
2. Euchromatin
3. Prechromatin
4. Prochromatin

69. In Griffith experiment, which of the following bacterial strains were capable of causing pneumonia in mice?
1. Live R
2. Bacteria strain with polysaccharide coat
3. Heat Killed S
4. Live R without capsule and Heat Killed S

70. The unequivocal proof that DNA is the genetic material was provided by:
1. Avery, Macleod and McCarty
2. Hershey and Chase
3. Meselson and Stahl
4. Watson and Crick

71. A molecule that can act as a genetic material must fulfill all the following criteria except:
1. It should be able to generate its replica
2. It should chemically and structurally be stable
3. It should provide scope for rapid mutations
4. It should be able to express itself in the form of "Mendelian Characters"

72. Reverse transcriptase is a:
1. DNA dependent RNA polymerase
2. RNA dependent DNA polymerase
3. RNA dependent RNA polymerase
4. DNA dependent DNA polymerase

73. DNA replication is correctly described as:
1. Semi-conservative and Continuous
2. Semi-conservative and Discontinuous
3. Conservative and Continuous
4. Semi-conservative and Semi-discontinuous

74. In a transcription unit, with respect to structural gene, the promoter is located:
1. Upstream and 5'
2. Upstream and 3'
3. Downstream and 5'
4. Downstream and 3'

75. In most prokaryotes the transcription unit is:
1. Mono-cistronic
2. Poly-cistronic
3. Multi-cistronic
4. Uni-cistronic

76. The process of RNA splicing shows the dominance of:
1. DNA world
2. RNA world
3. Protein world
4. Microbial world

77. Whose cell free system finally helped the genetic code to be deciphered?
1. Gamow
2. Severo Ochoa
3. Hargobind Khorana
4. Marshall Nirenberg

78. Which of the following is not a stop codon?
1. UAA
2. UGA
3. UAC
4. UAG

79. Which of the following anticodons will hybridize with the mRNA codon 5' – AUG – 3'?
1. 5' – UAC – 3'
2. 5' – TAC – 3'
3. 3' – UAC – 5'
4. 3' – TAC – 5'

80. *Hisardale* a new breed of sheep developed in Punjab by crossing Bikaneri ewes and Merino rams is an example of
1. Outcrossing
2. Cross-breeding
3. Interspecific hybridisation
4. Outbreeding

81. In poultry, coccidiosis is caused by
1. Virus
2. Fungus
3. Helminth parasite
4. Protozoan

82. Which of the following are edible marine fishes ?
1. Catla, Rohu, Clarias
2. Hilsa, Mackerels, Pomfrets
3. *Heteropneustes, Wallago, Catla*
4. *Labeo, Calbasu, Singhi*

83. Which of the following is not true ?
1. Fish meal is rich source of protein for cattle and poultry
2. Fish meal is produced from the non-edible parts of fishes
3. Silver revolution is increases in fish production
4. Shagreen is the skin of shark

84. Choose incorrect option :
1. More than 70 % of world livestock population is in India and China
2. Milk yielding capacity of buffaloes is three times more as compared to cows
3. Buffalo milk is superior to cow milk with respect to fat and mineral content
4. Continuous inbreeding increases the productivity of milk

85. Major drawback of inbreeding is
1. Increase in homozygosity
2. Decrease in immunity
3. Reduction in fertility
4. Increase in food consumption

86. Project artificial insemination in cattle breeding was initiated at
1. IVRI, izzatnagar, UP
2. NDRI, Karnal
3. NDRI, Kerala
4. CDC, Lucknow

87. Which of the following is not true regarding honey bee ?
1. Drones are produced by arrhenotoky
2. Queen is produced by syngamy
3. Workers are sterile females, produced by thelytoky
4. Worker bees are the smallest members of honey bee colony

88. Rearing pond in culture fishery is used in which of the following process
1. Hatching of egg
2. Nursing of fries
3. Rearing fingerlings
4. Induced breeding

89. Silk obtained from the silk worm cocoon has ___ protein is ___structure
1. Fibroin, Triple helical
2. Fibroin, parallel β-pleated sheet
3. Keratin, αα-helix
4. Fibroin, anti-parallel ββ-pleated sheet
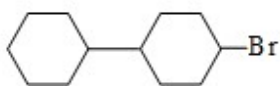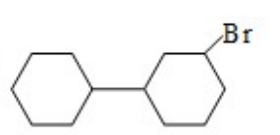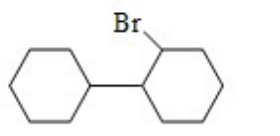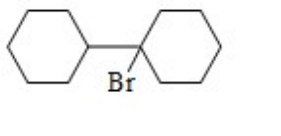
90. A : MOET increases herd size in short time with desirable trait
R : MOET involves production of 6-8 eggs per cycle by inducing follicular maturation and superovulation
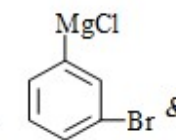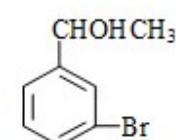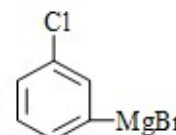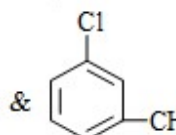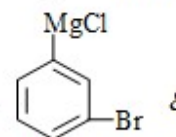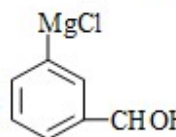
91. Major product for the reaction
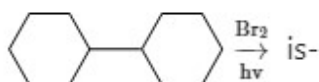
1.

2.

3.

4.
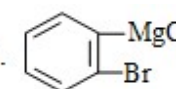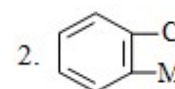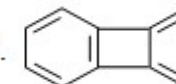
92. What are A & B in the following reaction

1.
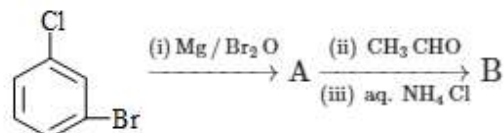
2.

3.

4. None of these

93. What is product of the following reaction ?
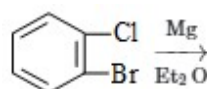
1.   2.

3.   4. None of these

94. Which of the following bromides is the major product of the reaction shown below, assuming that there are no carbocation rearrangement

$$\xrightarrow[\text{(1 equivalent)}]{HBr} C_{13}H_{17}Br$$

1.

2.

3.

4.

96.

$$B \xleftarrow{\text{NaBH}_4} \bigcirc\text{—CH}=\text{CH–CHO} \xrightarrow{\text{H}_2/\text{Pt}} A$$

A and B are-

1. ⬡—CH_2CH_2CHO,
   ⬡—$CH=CH–CH_2OH$

2. ⬡—$CH_2CH_2CH_2OH$,
   ⬡—$CH=CH–CH_2OH$

3. ⬡—$CH=CH–CH_2OH$ in both cases

4. ⬡—$CH_2CH_2CH_2OH$ in both cases
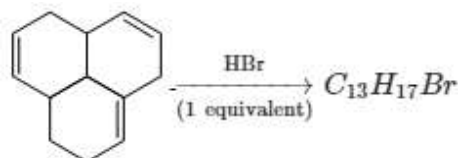
95. Benzyne intermediate is not observed in -

1.   OCH₃, F

2.   Cl, H₃C, CH₃

3.   Cl

4. N_2^+, COO^-

97.

$\xrightarrow{\text{H}^+}$? Product is-

1.

2. H_3C, CH_3

3. CH_3, O, H_3C

4.   O, O
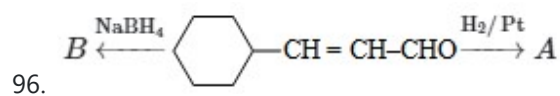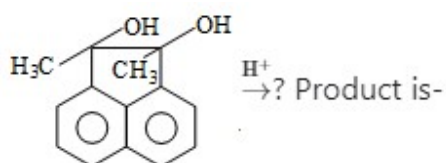
98. If the starting material is 1-methyl-1,2-epoxy cyclopentane, of absolute configuration, decide which one compound correctly represent the product of its reaction with sodium methoxide in methanol.
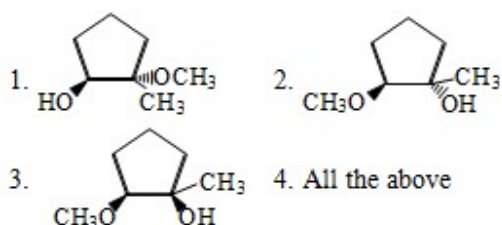
99. The correct order of reactivity towards electrophilic substitution is -
1. Phenol > Benzene > Chlorobenzene > Benzoic acid

2. Benzoic acid > Chlorobenzene > Benzene > Phenol

3. Phenol > Chlorobenzene > Benzene > Benzoic acid

4. Benzoic acid > Phenol > Benzene > Chlorobenzene

100. is converted to by-

1. (i) $CH_3 - MgI$, H_3O+ (ii) H_2SO_4, Δ

   (iii) HBr, R_2O_2

2. (i) $CH_3 - MgI$, H_3O+ (ii) H_2SO_4, Δ

   (iii) HBr

3. (i) $CH_3 - MgI$, H_3O+ (ii) HBr

4. (i) HBr, R_2O_2 (ii) $CH_3 - MgI$, H_3O+

101. Oxalic acid + A→

hence $\xrightarrow{conc.H_2SO_4}$ B, B is-

3. $CH_2 - O - CH_2$
        | |
        OH   OH

4. None of these

102.

Major product is –

103. Product is –

1.

2.

3.

4.

104.

1.

2.

3.

4.
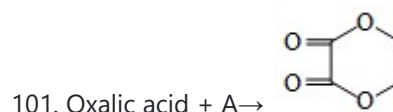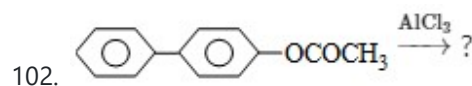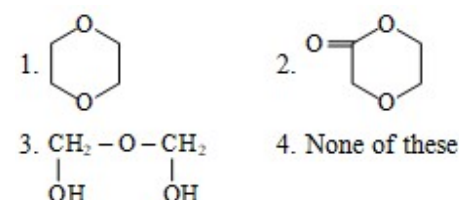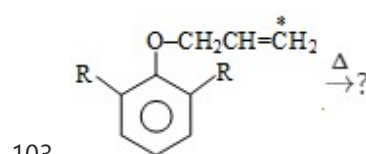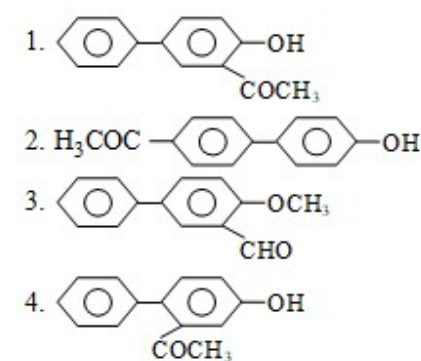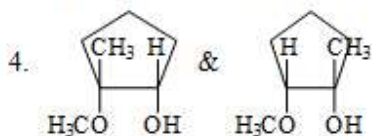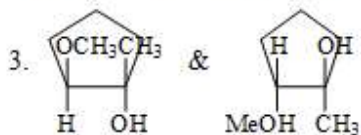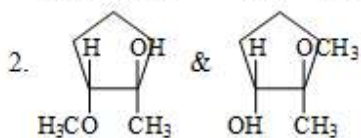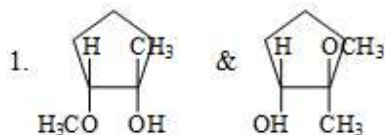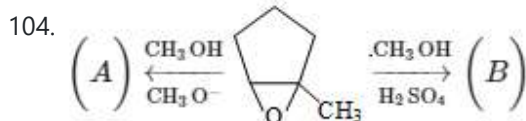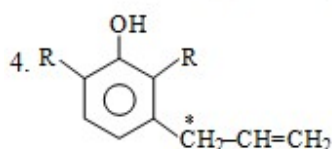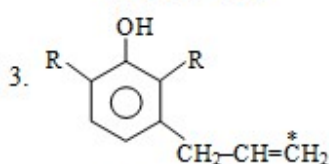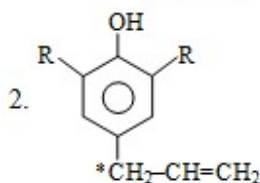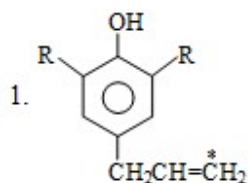
105. Which is/are correct statements?

(1)

nucleophile attacks here when epoxy linkage is cleaved

(2)

nucleophile attacks here
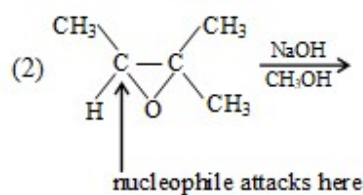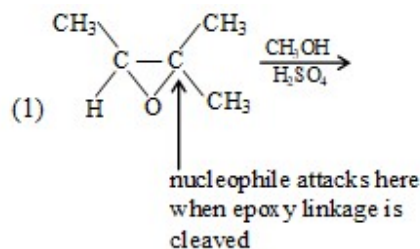
(3) This is only affected in reduction to 2°

alcohol $\xrightarrow[CH_3OH]{NaBH_4}$

(4) $R-\overset{O}{\overset{\|}{C}}-OH + H-O-R \xrightarrow{H^+}$
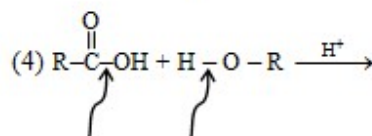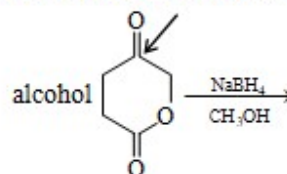
These bonds are affected in esterfication
1. 1 and 4

2. 1 and 2

3. 1, 2 and 3

4. 1, 2, 3 and 4

106. CH_3-CH_2-CHO Product. The product in the above reaction is

1. CH3−CH2COOHCH3-CH2COOH

2. CH3−CH2−CH2COOH

3.
$$CH_3-CH_2-\underset{\underset{OH}{|}}{CH}-CH_2-CHO$$

4.
$$CH_3-CH_2-\underset{\underset{OH}{|}}{CH}-\underset{\overset{|}{CH_3}}{CH}-CHO$$
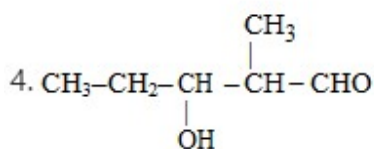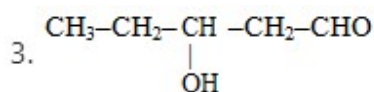
107. In the Cannizzaro reaction given below –

$$2Ph-CHO \xrightarrow{OH^-} Ph-CH2OH + PhC$$
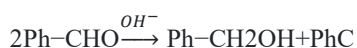
the slowest step is -

1. The attack of OH^- at the carbonyl group

2. The transfer of hydride to the carbonyl group

3. The abstraction of proton from the carboxylic group
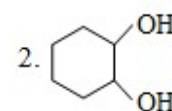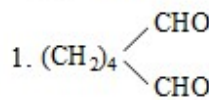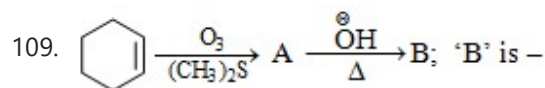
4. The deprotonation of Ph - CH_2OH

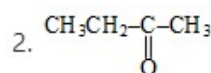**108.** $$2D-\underset{\overset{|}{D}}{C}=O +OH^- \xrightarrow{Cannizzaro} X \text{ and } Y$$
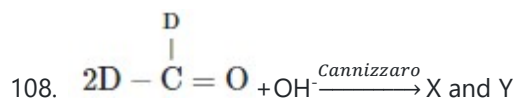
(Y is alcohol, D is deuterium)

X and Y will have structure –

1. $D-\underset{\overset{|}{H}}{\overset{\overset{D}{|}}{C}}-\bar{O}, D-\overset{\overset{O}{||}}{C}-OH$

2. $D-\underset{\overset{|}{D}}{\overset{\overset{D}{|}}{C}}-\bar{O}, D-\overset{\overset{O}{||}}{C}-OH$

3. $H-\underset{\overset{|}{D}}{\overset{\overset{O}{||}}{C}}-\bar{O}, D-\overset{\overset{D}{|}}{C}-OH$

4. None of these

109. $\xrightarrow[(CH_3)_2S]{O_3}$ A $\xrightarrow[\Delta]{\overset{\ominus}{O}H}$ B; 'B' is –

1. $(CH_2)_4 \diagup\diagdown \overset{CHO}{\underset{CHO}{}}$

2. cyclohexane with OH, OH

3. cyclopentane with OH, CHO

4. cyclopentene with CHO
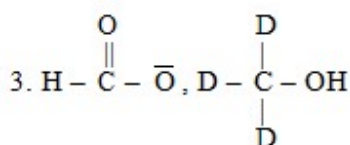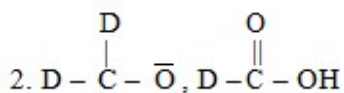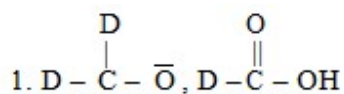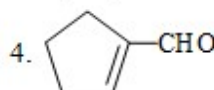
110. Alkaline hydrolysis of $C_4H_8Cl_2$ gives a compound (A) which on heating with NaOH and I_2 produces a yellow precipitate of CHI_3. The compound (A) should be

1. CH3CH2CH2O

2. $CH_3CH_2-\overset{\overset{O}{||}}{C}-CH_3$

3. $CH_3-CH_2-\underset{\overset{|}{OH}}{CH}-\underset{\overset{|}{OH}}{CH_2}$

4. $CH_3-CH_2-\underset{\overset{|}{OH}}{CH}-\underset{\overset{|}{OH}}{CH_2}$

111. $-CH_2-CH_2-CH_2-CH_2-OH$ is converted into by –

1. (i) $KMnO_4$ (ii) H^+, $\Delta\Delta H$

2. (i) $Na_2Cr_2O_7$ (ii) H^+, $\Delta\Delta$

3. (i) Ag_2O (ii) H^+, $\Delta\Delta$

4. All of these

112. , on saponification of the given ester is formed –
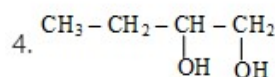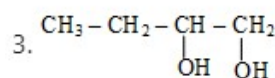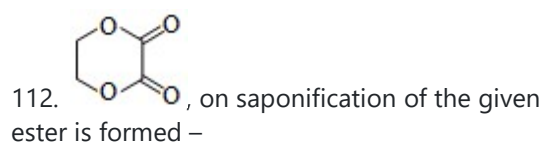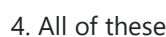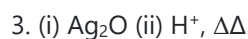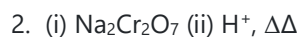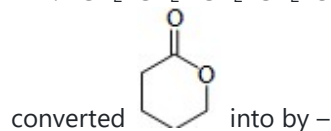
1. $\underset{\displaystyle CH_2 - CH_2}{\overset{\displaystyle OH \quad\; OH}{|\qquad\;\;|}}$ and OHC-CHO

2. OH–CH$_2$–CH$_2$–OH and OHC–COOH

3. $\underset{\displaystyle OH \quad\; OH}{\overset{\displaystyle CH_2 - CH_2}{|\qquad\;\;|}}$ and HOOC–COOH
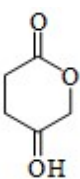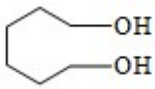
4. HO–CH$_2$–CH$_2$–COOH and HCOOH

113. A sweet smelling ester, with molar mass 116, on hydrolysis produces a carboxylic acid and an alcohol. Alcohol give positive iodoform reaction which of the following formula could correspond to above statements –
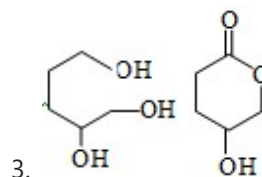
1. CH$_3$–C(=O)–O–CH$_2$–CH$_2$–CH$_2$–CH$_3$

2. CH$_3$CH$_2$–O–COC$_3$H$_7$

3. CH$_3$–O–COC$_4$H$_9$

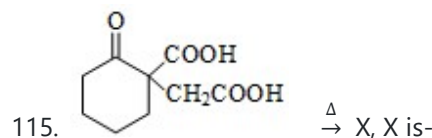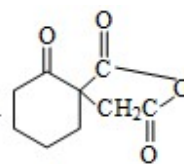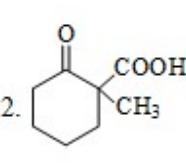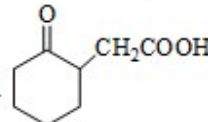4. CH$_3$–CH$_2$–C(=O)–O–CH$_2$–CH$_2$–CH$_3$

114.
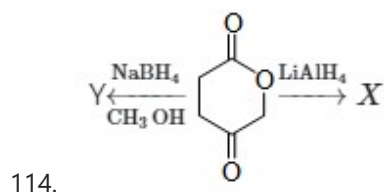
X and Y are -

1. OH in both case

2. in both case

3.

4. Formation of A and B is not possible

115. $\xrightarrow{\Delta}$ X, X is-
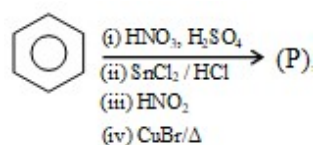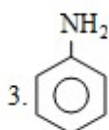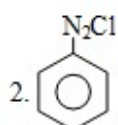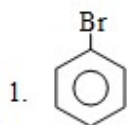
1.   2.

3.   4. None

116. Which of the following reaction does not give 1° amine as final product

1. C2H5−CN + LiAlH4

2. CH3CN $\xrightarrow{LiAlH_4}$

3. CH3−NC $\xrightarrow{H_3O^+}$

4. CH3−NC $\xrightarrow{LiAlH_4}$

117.

 final product P is

1.

$$Br$$ (on benzene ring)

2.

$$N_2Cl$$ (on benzene ring)

3.

$$NH_2$$ (on benzene ring)

4. None of these

4. Both are $CH_3 - CH_2$ with NO attached

118. Which of the following is not correct–

1. Ethyl amine & aniline both have NH_2 group

2. Ethyl amine & aniline both dissolve in HCl

3. Ethyl amine & aniline both react with $CHCl_3$ & KOH to form unpleasent gas

4. Ethyl amine and aniline both react with HNO_2 to give hydroxy compound

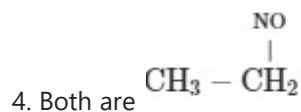119. Dipole moment of which of the following is highest-
1. Ether

2. Alcohol

3. Halo alkane

4. Nitro alkane

120.

$$CH_3 - CH_2 - Cl \xrightarrow{NaNO_2} A;$$

$$CH_3 - \overset{Cl}{\underset{|}{CH_2}} \xrightarrow{AgNO_2} B.$$
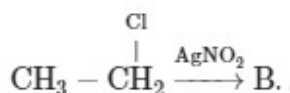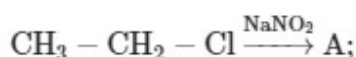
A and B are –

1. $CH_3–CH_2–NO_2$, $CH_3–CH_2–O–N=O$

2. $CH_3–CH_2–O–N=O$, $CH_3–CH_2–NO_2$

3. Both are $CH_3–CH_2–NO_2$

121. The change in optical rotation with time of freshly prepared solution of sugar is known as–
1. Specific rotation
2. Inversion
3. Rotation
4. Mutarotation

122. $X+3NH3 \xrightarrow{H^+/H_2O} Y$ $H2N-CH2-COOH$
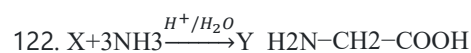
compound X is -

1. Chloroacetic acid

2. Bromoacetic acid

3. Both A & B

4. Acetic acid

123. D-Glucopyranose exist in two forms

1. Anomers

2. Epimers

3. Enantiomers

4. Diastereoisomers

124. Cellulose upon acetylation with excess acetic anhydride/H_2SO_4 (catalytic) gives cellulose triacetate whose structure is –
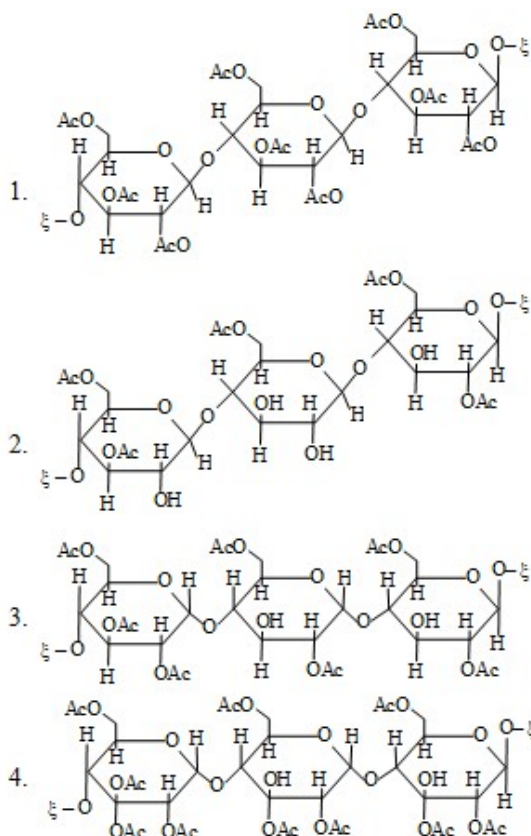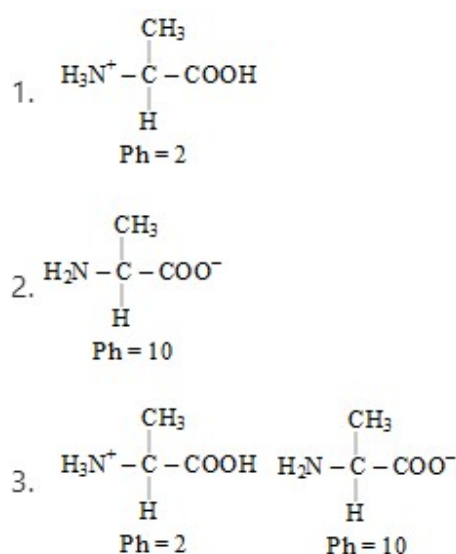

125. Write the structure of alanine at pH = 2 and pH = 10

4. None of above

126. The destruction of the biological nature and activity of proteins by heat or chemical agent is called–
1. dehydration

2. denaturation

3. denitrogenation

4. deammination.

127. Which of the following is an elastomer ?
1. Vulcanized rubber

2. Dacron

3. Polystyrene

4. Malamine

128. Dacron is an example of–
1. Elastomer
2. Fibre
3. Thermoplastic
4. thermosetting polymer

129. Nylon-66 is obtained by condensation polymerization of–
1. Adipic acid and hexamethylene diamine
2. Phenol and formaldehyde
3. Terephthalic acid and ethylene glycol
4. Sebacic acid and hexamethylene diamine.

130. The monomer of PMMA is–
1. Methyl methacrylate
2. Ethyl acrylate
3. Acrylonitrile
4. Methyl acrylate

131. Which of the following is correct statement for a substance to act as dye?
1. Presence of chromophore is necessary

2. Presence of auxochrome group as well as chromophore is necessary

3. Every coloured substance

4. All the above

132. Which of these is a hypnotic?
1. Metaldehyde

2. Acetaldehyde

3. Paraldehyde

4. None of these

133. Morphine is
1. Antiseptic

2. Analgesic

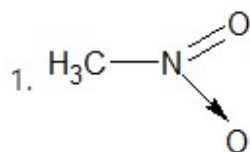3. Antibiotic

4. Anesthetic

134. Sulpha drugs are use for
1. Removing bacteria

2. Precipitating bacteria

3. Stopping the growth of bacteria

4. Decreasing the size of bacteria

135. Which of the following is used as monopropellant ?

1. $H_3C-N \begin{smallmatrix} =O \\ \\ O \end{smallmatrix}$

2. H3C–O–N=O

3. Kerosene

4. Alcohol

136. A 220 - volt input is supplied to a Transformer. The output circuit draws a current of 2.0 ampere at 440 volts. If the efficiency of the transformer is 80%, the current drawn by the primary windings of the transformer is :-
1. 5.0 ampere

2. 3.6 ampere

3. 2.8 ampere

4. 2.5 ampere

137. An ac voltage is applied to a resistance R and an inductor L in series. If R and the inductive reactance are both equal to 3Ω, the phase difference between the applied voltage and the current in the circuit is :-
1. $\pi/6$

2. $\pi/4$

3. $\pi/2$

4. Zero

138. In an ac circuit an alternating voltage e = 200 √2 sin 100 t volts is connected to a capacitor of capacity 1μF. The r.m.s. value of the current in the circuit is :-
1. 10 mA

2. 100 mA

3. 200 mA

4. 20 mA

139. In an electrical circuit R, L, C and an a.c. voltage source are all connected in series. When L is removed from the circuit, the phase difference between the voltage and the current in the circuit is $\pi/3$. If instead, C is removed from the circuit the phase difference is again $\pi/3$. The power factor of the circuit is :
1. 1

2. $\sqrt{3}/2$

3. 1/2

4. $1\sqrt{2}$

140. In an AC circuit, voltage V = $V_0\sin\omega t$ and inductor L is connected across the circuit. Then the instantaneous power will be :-
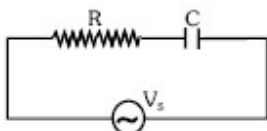
1. $\frac{V_0^2}{2\omega L}\sin\omega t$

2. $\frac{-V_0^2}{2\omega L}\sin\omega t$

3. $\frac{-V_0^2}{2\omega L}\sin 2\omega t$

4. $\frac{V_0^2}{2\omega L}\sin 2\omega t$

141. A 50 Hz a.c. source of 20 volts is connected across R and C as shown in figure below. The voltage across R is 12 volts. The voltage across C is –

1. 8 V
2. 16V
3. 10 V
4. not possible to determine unless values of R and C are given

142. In an ideal parallel LC circuit, the capacitor is charged by connecting it to a dc source which is then disconnected. The current in the circuit :-
1. becomes zero instantaneously.
2. grows monotonically.
3. decays monotonically.
4. oscillates instantaneously.

143. A conducting circular loop is placed in a uniform magnetic field, B = .025 T with its plane perpendicular to the loop. The radius of the loop is made to shrink at a constant rate of 1 mm s^{-1}. The induced e.m.f. when the radius is 2 cm, is :-

1. 2 μV
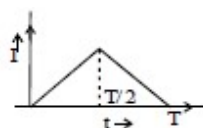
2. 2πμV

3. πμV

4. (π/2)μV

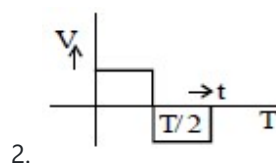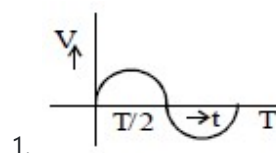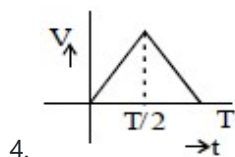144. The current (I) in the inductance is varying with
time according to the plot shown in figure.

Which one of the following is the correct variation of voltage with time in the coil ?

1.

2.

3.

4.
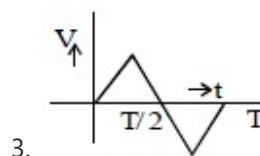
145. A circular disc of radius 0.2 meter is placed in a uniform magnetic field of
induction $1/\pi$ Wbm^2 in such way that its axis makes an angle of 60° with $\vec{B}$. The magnetic flux linked with the disc is :-

1. 0.08 Wb

2. 0.01 Wb

3. 0.02 Wb

4. 0.06 Wb

146. A coil of resistance 400 Ω is placed in a magnetic field. If the magnetic flux ϕ(Wb) linked with the coil varies with time t (sec) as $\phi = 50 t^2 + 4$. The current in the coil at t = 2 sec is :

1. 2A   2. 1A

3. 0.5A   4. 0.1A

147. What is the value of inductance L for which the current is a maximum in a series LCR circuit with C=10 μF and $\omega = 1000s^{-1}$?

1. 10 mH
2. 100mH
3. 1 mH
4. cannot be calculated unless R is known

148. The magnetic flux through a circuit of resistance R changes by an amount $\Delta\phi$ in a time Δt. Then the total quantity of electric charge Q that passes any point in the circuit during the time Δt is represented by :–

1. $Q = \frac{\Delta\phi}{R}$

2. $Q = \frac{\Delta\phi}{\Delta t}$

3. $Q = R. \frac{\Delta\phi}{\Delta t}$

4. $Q = \frac{1}{R}. \frac{\Delta\phi}{\Delta t}$

149. Voltage across each elements of a series LCR circuit are given by V_L= 60V, V_C= 20V, V_R= 30V
Find out source voltage.
1. 50V

2. 100V

3. 150V

4. 200V

150. A metallic ring is dropped down, keeping its plane perpendicular to a constant and horizontal magnetic field. The ring enters the region of magnetic field at t = 0 and completely emerges out at t = T sec. The current in the ring varies as :-

1.

2.

3.

4.
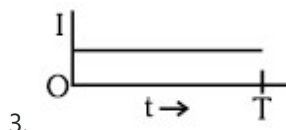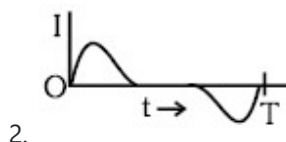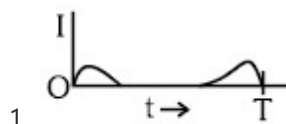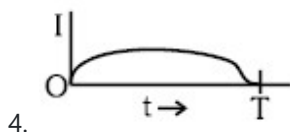
151. Statement-1 :- A small magnet takes longer time in falling in a hollow metallic tube without touching the wall.
Statement-2 :- There is opposition of motion due to production of eddy currents in metallic tube.
1. Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.

2. Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.

3. Statement-1 is true, statement-2 is false.

4. Statement-1 is false, statement-2 is true

152. Statement-1 :- An inductor acts as a perfect conductor for direct current.
Statement-1 :- The power factor of an inductor is zero.
1. Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.

2. Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.

3. Statement-1 is true, statement-2 is false.

4. Statement-1 is false, statement-2 is true.

153. A generator develops an e.m.f. of 130 V and has a terminal potential difference of 125 V, when the armature current is 25 A. The resistance of the armature is

1. 0.5 Ω

2. 0.2 Ω

3. 1.5 Ω

4. 2.4 Ω

154. A coil is wound of a frame of rectangular cross-section. If the linear dimensions of the frame are doubled and the number of turns per unit length of the coil remains the same, then the self inductance increases by a factor of

1. 6

2. 12

3. 8

4. 16

155. The ratio of amplitude of magnetic field to the amplitude of electric field for an electromagnetic wave propagating in vacuum is equal to:
1. The ratio of magnetic permeability to the electric susceptibility of vacuum
2. Unity
3. The speed of light in vacuum
4. Reciprocal of speed of light in vacuum

156. The electric field of an electromagnetic wave in free space is given by :
$\vec{E}=10 \cos(10^7 t + kx)\hat{j}$ V/m, where t and x are in seconds and metres respectively. It can be inferred that :-
(a) The wavelength λ is 188.4 m
(b) The wave number k is 0.33 rad/m
(c) The wave amplitude is 10 V/m
(d) The wave is propagating along +x direction
Which one of the following pairs of statements is correct :-

1. (a) and (b)

2. (b) and (c)

3. (a) and (c)

4. (c) and (d)

157. The velocity of electromagnetic wave is parallel to

1. $\vec{B} \times \vec{E}$

2. $\vec{E} \times \vec{B}$

3. $\vec{E}$

4. $\vec{B}$

158. In an electric circuit, there is a capacitor of reactance 100 Ω connected across the source of 220V. The displacement current will be:
1. 2.2A

2. 0.22A

3. 4.2A

4. 2.4A

159. An electromagnetic radiation has an energy 14.4 Kev. To which region of electromagnetic spectrum does it belong?
1. Infra red region

2. Visible region

3. X-ray region

4. γ-ray region

160. The magnetic field between the plates of a capacitor is given by

$$B = \frac{\mu_0\, Ir}{2\pi R^2}$$

1. $r \geq R$

2. $r \leq R$

3. $r < R$

4. $r = R$

161. A plane mirror approaches a stationary person with acceleration 10 ms^{-2}. The acceleration of his image as seen by the person, will be
1. 10 m/s^2

2. 20 m/s^2

3. 5 m/s^2

4. can't determined

162. A light ray is incident at an angle 30^0 on a transparent surface separating two media. If the angle of refraction is 60^0 then critical angle is
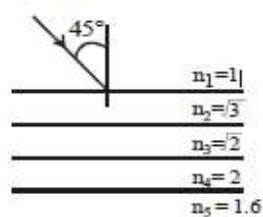
1. $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$

2. $\sin^{-1}\left(\sqrt{3}\right)$

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

4. $45°$

163. In the figure shown the angle made by the light ray with the normal in the medium of refractive index √2 is:

1. 30°

2. 60°

3. 90°

4. None of these

164. A boy is 1.8m tall and can see his image in a plane mirror fixed on a wall. His eyes are 1.6m from the floor level. The minimum length of the mirror to see his full image is–
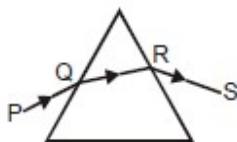1. 0.9 m

2. 0.85 m

3. 0.8 m

4. Can't be determined

165. A ray of light is incident on an equilateral glass prism placed on a horizontal table. For minimum deviation which of the following is true ?
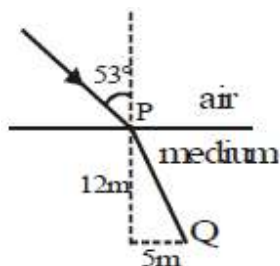

1. PQ is horizontal
2. QR is horizontal
3. RS is horizontal
4 .Either PQ or RS is horizontal

166. A light ray passes from air into another medium at point P. How long does it take the light ray to travel from P to Q?

1. 9×10^{-10} s

2. 9×10^{-7} s

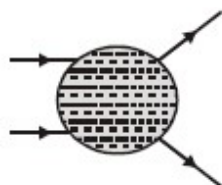3. 9×10^{-8} s

4. 9×10^{-6} s

167. A water drop in air refractes the light ray as
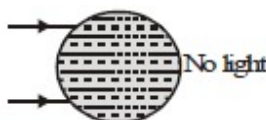

1.

2.

3.

4.

168. In a Young's double-slit experiment, the slit separation is doubled. This result in

1. an increase in fringe intensity

2. a decrease in fringe intensity

3. a halving of the fringe spacing

4. a doubling of the fringe spacing

169. A glass prism of refracting angle 60° gives a minimum deviation of 30°. What is the refractive index of the glass –

1. 1.5

2. √1.5

3. √2

4. can not be determined

170. A prism of refractive index √2 has a refracting angle of 30°. One of the refracting surfaces of the prism is polished. A beam of monochromatic
light will retrace its path if its angle of incidence on the refracting surface is
1. 0°

2. 30°

3. 45°

4. 60°

171. **Assertion:** For best contrast between maxima and minima in the interference pattern of Young's double slit experiment, the intensity of light emerging out of the two slits should be equal.

Reason: The intensity of interference pattern is proportional to square of amplitude.

172. A given ray of light suffers minimum deviation in an equilateral prism P. Additional prisms Q and R of identical shape and of the same
material as P are now added as shown in the figure. The ray will now suffer
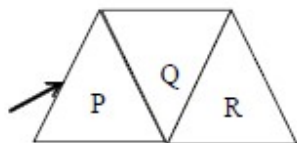
1. greater deviation
2. no deviation
3. same deviation as before
4. total internal reflection

173. A ray of light undergoes deviation of 30° when incident on an equilateral prism of refractive index √2 . The angle made by the ray inside the prism
with the base of the prism is
1. 1

2. 2

3. 3

4. 0

174. In Young's double slit experiment the light emitted from source has l = 6.5×10^{-7} m and the distance between the two slits is 1 mm. Distance between the screen and slit is 1 metre. Distance between third dark and fifth birth fringe will be
1. 3.2 mm

2. 1.63 mm

3. 0.585 mm

4. 2.31 mm

175. Light is incident normally on a diffraction grating through which first order diffraction is seen at 32°. The second order diffraction will be seen at
1. 84°

2. 48°

3. 64°

4. None of these

176. White light is used to illuminate the two slits in Young's double slit experiment, separation between the slits is b and the screen is at a distance d(>>b) from the slits. At a point on the screen, directly in front of the slits, certain wavelengths are missing. Some of these missing wavelengths are

1. $\dfrac{b^2}{2d}$

2. $\dfrac{2b^2}{d}$

3. $\dfrac{2b^2}{3d}$

4. $\dfrac{b^2}{3d}$

177. Angular width of central maximum in the Fraunhoffer's diffraction pattern is measured. Slit is illuminated by the light of another wavelength 6000 Å, angular width decreases by 30%. Wavelength of light used is

1. 3500 Å

2. 4200 Å

3. 4700 Å

4. 6000 Å

178. In a two slit experiment with monochromatic light, fringes are obtained on a screen placed at some distance from the slits. If screen is moved by 5 × 10^{-2} m towards the slits, then change in fringe width is 3 × 10^{-5} m. If the distance between slits is 10^{-3} m then wavelength of the light used will be

1. 4000 Å

2. 6000 Å

3. 5890 Å

4. 8000 Å

179. Interference fringes from sodium light (1 = 5890 Å) in a double slit experiment have an angular width 0.20º. To increase the fringe width by 10%, wavelength of light used should be

1. 5892 Å

2. 4000 Å

3. 8000 Å

4. 6479 Å

180. In a Young's double slit experiment two narrow slit 0.8 mm apart are illuminated by the same source of yellow light (l = 5893 Å). If distance between slits and screen is 2m then separation between adjacent bright lines will be

1. 14.73 mm

2. 14.73 cm

3. 1.473 mm

4. 147.3 mm