Botany - Section A

1. Which of the following reservoir regulates the amount of carbon dioxide in the atmosphere?

1. Ocean

2. Earth’s crust

3. Land

4. Fossil

2. In 2000, maize hybrids that had

1. Twice the amino acids lysine and tryptophan than existing maize hybrids were developed

2. Thrice the amino acids lysine and tryptophan than existing maize hybrids were developed

3. Half the amino acids glutamate and tryptophan than existing maize hybrids were developed

4. Twice the amino acids glutamate and tryptophan than existing maize hybrids were developed

3. Who among the following gave tentative answers to the question that how do the attributes of a stable community are linked to species richness in a community?

1. Paul Ehrlich

2. David Tilman

3. A V. Hamboldt

4. Edward Wilson

4. In an electrostatic precipitator,

1. The velocity of air between the plates must be low enough to allow the dust to fall.

2. The velocity of air between the plates must be very high to purify the air.

3. There is no air between plates so that charge may not get disturbed

4. None of these

5. The natural aging of a lake by nutrient enrichment of its water is called

1. Biomagnification

2. Eutrophication

3. Biopiracy

4. Biosystematics

6. The principle of competitive exclusion was stated by

1. C. Darwin

2. G. F. Gause

3. MacArthur

4. Verhulst and Pearl

7. Which one of the following statements for pyramid of energy is incorrect, whereas the remaining three are correct?

1. It shows energy content of different trophic level organisms

2. It is inverted in shape

3. It is upright in shape

4. Its base is broad

8. Ti-plasmid is used for making transgenic plants. It is obtained from
1. Azotobacter
2. Agrobacterium
3. Rhizobium in leguminous root
4. Yeast

9. For transformation, micro-particles coated with DNA to be bombarded with gene gun are made up of:
1. Silver or Platinum
2. Platinum or Zinc
3. Silicon or Platinum
4. Gold or Tungsten

10. Biolistics (gene-gun) is suitable for:
1. Disarming pathogen vectors
2. Transformation of plant cells
3. Constructing recombinant DNA by joining with vectors
4. DNA finger printing

11. Select the **incorrect** statement w.r.t. SCP

1. Alternate source of proteins for human and animal nutrition

2. Can be grown on waste material

3. Decreases environmental pollution

4. *Methylophilus methylotrophus* can be expected to produce 250 tonnes of protein.

12. Which of the given plant produces cardiac glycosides?

1. Calotropis

2. Acacia

3. Nepenthes

4. Utricularia

13. Mycorrhiza promotes plant growth by
1. Serving as a plant growth regulator
2. Absorbing inorganic ions from the soil
3. Helping the plant in utilizing atmospheric nitrogen
4. Protecting the plant from infection

14. Some organisms that are able to maintain homeostasis by physiological means are called
1. Conformers
2. Regulators
3. Migrators
4. Hibernators

15. Which of the following region has maximum biodiversity?
1. Taiga
2. Tropical forest
3. Temperate rain forest
4. Mangroves

16. Gause's principle of competitive exclusion states that:
1. More abundant species will exclude the less abundant species through competition
2. Competition for the same resources excludes species having different food preferences
3. No two species can occupy the same niche indefinitely for the same limiting resources
4. Larger organisms exclude smaller ones through competition

17. When does the growth rate of a population, following the logistic model, equal zero?
1. When N/K is exactly one
2. When N nears the carrying capacity of the habitat
3. When N/K equals zero
4. When dearth rate is greater than birth rate

18. In which of the following, do both pairs have the correct combination?
1. In situ conservation: National Park
   Ex situ conservation: Botanical Garden
2. In situ conservation: Cryopreservation
   Ex situ conservation: Wildlife Sanctuary
3. In situ conservation: Seed Bank
   Ex situ conservation: National park
4. In situ conservation: Tissue culture
   Ex situ conservation: Sacred groves

19.

Productivity is the rate of production of biomass expressed in terms of

(i)	(kcal m^{-3})yr^{-1}
(ii)	g^{-2} yr^{-1}
(iii)	g^{-1} yr^{-1}
(iv)	(kcal m^{-2})yr^{-1}

1. (ii)

2. (iii)

3. (ii) and (iv)

4. (i) and (iii)

20.

An inverted pyramid of biomass can be found in which the ecosystem?

1. Forest
2. Marine
3. Grassland
4. Tundra

21.

If the carbon atoms fixed by producers already have passed through three species, the trophic level of the last species would be

1. scavenger

2. tertiary producer

3. tertiary consumer

4. secondary consumer

22. The historic convention on biological diversity held in Rio de Janeiro in 1992 is known as

1. CITES Convention

2. The Earth Summit

3. G-16 Summit

4. MAB Programme

23. Match correctly the following and choose the correct option

A. Environment Protection Act	1. 1974
B. Air Prevention and Control of Pollution Act	2. 1987
C. Water Act	3. 1986
D. Amendment of Air Act to include noise	4. 1981

The correct matches are

A B C D

1. 3 4 1 2

2. 1 3 2 4

3. 4 1 2 3

4. 3 4 2 1

24. Why is it necessary to remove sulfur from petroleum products?

1. To reduce the emission of sulfur dioxide in exhaust fumes

2. To increase the efficiency of automobiles engines

3. To use sulfur removal from petroleum for commercial purposes

4. To increase the life span of engine silencers

25. Nuisance growth of aquatic plants and bloom-forming algae in natural water is generally due to high concentrations of

1. carbon

2. sulfur

3. calcium

4. phosphorus

26. When domestic sewage mixes with river water -

1. The increased microbial activity releases micro-nutrients such as iron
2. The increased microbial activity uses up dissolved oxygen
3. The river water is still suitable for drinking as impurities are only about 0.1%
4. Small animals like rats will die after drinking river water

27. The logistic population growth is expressed by the equation :

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

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

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

4. $\frac{dN}{dt} = rN$

28. A male insect mistakes an orchid flower to be female due to its shape and performs the act of copulation and induces pollination. This is an example of
1. Mimicry
2. Pseudocopulation
3. Pseudo pollination
4. None

29. Temperature variation in Pacific ocean in present time is called :
1. Cyclone effect
2. El Nino effect
3. Green house effect
4. Gaudikov's effect

30. Sewage purification is performed by :
1. Microbes
2. Fertilisers
3. Antibiotics
4. Antiseptics

31. The total amount of carbon fixed annually by plants is:

1. 4×10^{23} kg

2. 4×10^{13} kg

3. 4×10^{10} kg

4. 4×10^{11} kg

32. Maximum DDT is present in birds feeding on
1. Fishes
2. Meat
3. Insects
4. Seeds

33. Which of the following is a correct pair : -

1. Cuscuta – parasite

2. Dischidia – insectivorous

3. Opuntia – predator

4. Capsella – hydrophyte

34. Bamboo plant is growing in a far forest then what will be the trophic level of it : -

1. First trophic level (T_1)

2. Second trophic level (T_2)

3. Third trophic level (T_3)

4. Fourth trophic level (T_4)

35. Match List - I with List - II

List - I	List - II
(a) Protoplast fusion	(i) Totipotency
(b) Plant tissue culture	(ii) Pomato
(c) Meristem culture	(iii) Somaclones
(d) Micropropagation	(iv) Virus free plants

Choose the correct answer from the options given below.

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

Botany - Section B

36. Biochemical Oxygen Demand (BOD) is a measure of

1. industrial wastes poured into water bodies

2. extent to which water is polluted with organic compounds

3. amount of carbon monoxide inseparably

4. amount of oxygen needed by green plants during night.

37. In India, we find mangoes with different flavours, colours, fibre content, sugar content and even shelf-life. The large variation is on account of

1. species diversity

2. induced mutations

3. genetic diversity

4. hybridisation.

38. What would be the climax of a hydrarch succession?

1. Grassland

2. Marsh-meadow

3. Forest

4. Reed-swamp

39. The tobacco roots are infected by

1. Nematode Meloidegyne incognitia

2. Diptera beetles

3. Coleoptera fly

4. Lepidopterans

40. Semi-dwarf varieties of rice were derived

1. From IR-7

2. From IR-8

3. From IR-5

4. From IR-9

41. Which of the following is not correct?

1. A wide range of fungal, bacterial, and viral pathogens affect the yield of cultivated crop species, especially in tropical climates.

2. Crop losses can often be significant, up to 20-30% or even 100%.

3. Hybrid breeding has led to the development of several high yielding varieties resistant to water stress.

4. The disease-resistant varieties increase our dependence on the use of fungicides and bacteriocides.

42. Which of the following is wrong about Amazonian Rain Forest?

1. It is in South America

2. It has the greatest Biodiversity on Earth

3. It is a tropical Rain Forest

4. It is home to about 2000 species of plants

43. What is/are done by catalytic converters?

1. Unburnt hydrocarbons are converted to CO_2 and H_2O

2. CO is converted to CO_2

3. Nitric oxide is changed to N_2 gas

4. All of these

44.
Niche is

1. All the biological factors in the organism environment
2. The physical space where an organism live
3. The range of temperature that the organism needs to live
4. The functional role played by the organism where it lives

45.
Natality refers to
1. Death rate
2. Birth rate
3. Number of individuals leaving the habitat
4. Number of individuals entering the habitat

46. Pheretima and its close relatives derive nourishment from

1. Sugarcane roots

2. Decaying fallen leaves and soil organic matter

3. Soil insects

4. Small pieces of fresh fallen leaves of maize

47. The introduction of t-DNA into plants involves:
1. Altering the pH of the soil, then heat shocking the plants
2. Exposing the plants to cold for a brief period
3. Allowing the plant roots to stand in water
4. Infection of the plant by Agrobacterium tumefaciens

48. Tailor made plants will supply which of the following alternative resources to industries?

1. Gloden rice

2. Starches

3. Maize

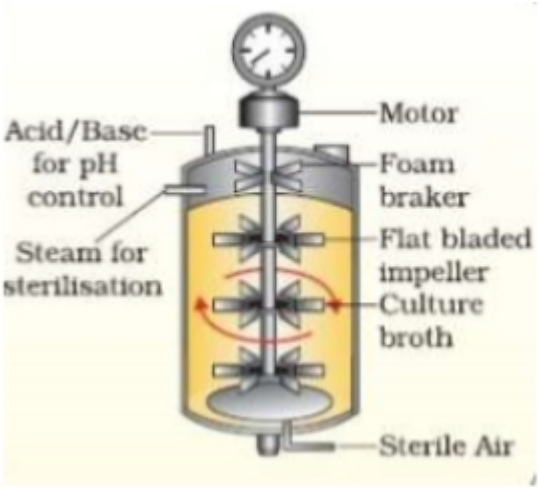
4. Pesticide

49. Organisms that can survive a wide range of temperatures are called
1. Ectotherms
2. Eurytherms
3. Endotherms
4. Stenotherms

50. If CO_2 is absent in the atmosphere of the earth then :
1. Temperature will decrease
2. Temperature will increase
3. Plants will flourish well
4. No effect

Zoology - Section A

51. The bioreactor shown in the diagram is:



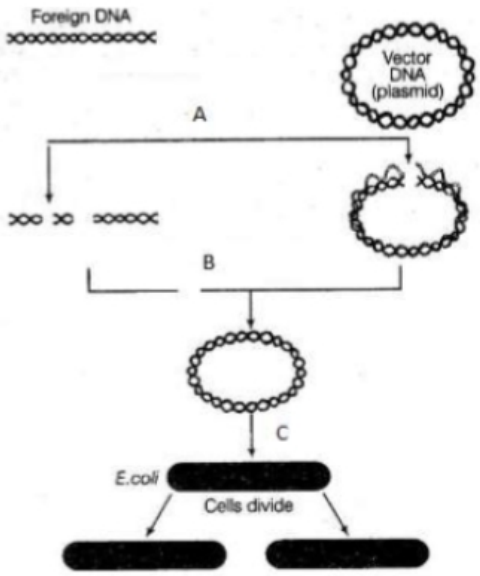
1. Sparged stirred tank type

2. Airlift type

3. Simple stirred tank type

4. Fluidized bed type

52. What is true A,B and C in the given diagrammatic representation of rDNA technology ?



I. At A same restriction enzyme is used to cut both foreign and vector DNA

II. The enzyme used at B is DNA ligase

III. Step C can be called as transformation

1. I and II only

2. I and III only

3. II and III only

4. I,II and III

53. Restriction endonucleases are enzymes which

1. make cuts at specific positions within the DNA molecule

2. recognize a specific nucleotide sequence for binding of DNA ligase

3. restrict the action of the enzyme DNA polymerase

4. remove nucleotides from the ends of the DNA molecule

54. Microbes found to be very useful in genetic engineering are:

1. Escherichia coli and Agrobacterium tumefaciens

2. Vibrio cholerae and a tailed bacteriophage

3. Diplococcus sp. and Pseudomonas sp.

4. Crown gall bacterium and Caenorhabditis elegans

55. Every…….Keoladeo National Park…… in Rajasthan hosts thousands of migratory birds coming from …….

1. Summer, Udaypur, Himachal

2. Winter, Bharatpur, Siberia

3. Summer, Bharatpur, Madhya Pradesh

4. Winter, Jodhpur, Himachal

56. In cloning of cattle, a fertilized egg is taken out of the mother's womb and
1. From this up to eight identical twins can be produced
2. The egg is divided into four pairs of cells that are implanted into the womb of other cows.
3. In the eight cell stage, cells are separated and cultured until small embryos are formed which are implanted into the womb of other cows.
4. In the eight cell stage the individual cells are separated under the electrical field for further development in culture media.

57. Interspecific hybridization is the mating of
1. more closely related individuals within same breed for 4-6 generations
2. animals within same breed without having common ancestors
3. two different related species
4. superior males and females of different breeds

58. The colonies of recombinant bacteria appear white in contrast to blue colonies of non-recombinant bacteria because of:
1. Insertional inactivation of alpha-galactosidase in non-recombinant bacteria
2. Insertional inactivation of beta-galactosidase in recombinant bacteria
3. Inactivation of galactase enzyme in recombinant bacteria
4. Recombinant bacteria containing beta-galactosidase

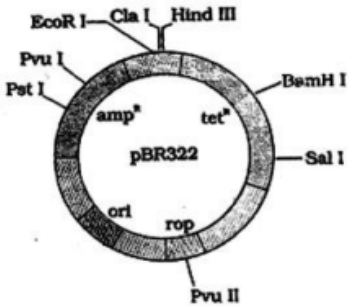
59. The DNA molecule to which the gene of interest is integrated for cloning is called:
1. Vector
2. Template
3. Carrier
4. Transformer

60. The process of separation and purification of expressed protein before marketing is called
1. Upstream processing
2. Downstream processing
3. Bioprocessing
4. Postproduction processing

61. The linking of antibiotic resistance gene with the plasmid vector became possible due to
1. DNA polymerase
2. Exonucleases
3. DNA ligase
4. Endonucleases

62. Which one of the following techniques made it possible to genetically engineer living organisms?
1. Recombinant DNA techniques
2. X-ray diffraction
3. Heavier isotope labeling
4. Hybridization

63. The figure below is the diagrammatic representation of the E.Coli vector pBR 322. Which one of the given options correctly identifies its certain component (s)?



1. ori - original restriction enzyme
2. rop-reduced osmotic pressure
3. Hind III, EcoRI - selectable markers
4. amp^R, tet^R- antibiotic resistance genes

64. Which one of the following represents a palindromic sequence in DNA?
1. 5' - GAATTC - 3'
   3' - CTTAAG - 5'

2. 5' - CCAATG - 3'
   3' - GAATCC - 5'

3. 5' - CATTAG - 3'
   3' - GATAAC - 5'

4. 5' - GATACC - 3'
   3' - CCTAAG - 5'

65. In genetic engineering, the antibiotics are used:
1. As selectable markers
2. To select healthy vectors
3. As sequences from where replication starts
4. to keep the cultures free of infection

66. DNA fragments generated by the restriction endonucleases in a chemical reaction can be separated by:
1. Polymerase chain reaction
2. Electrophoresis
3. Restriction mapping
4. Centrifugation

67. Inbreeding

1. Refers to the mating of distantly related individuals

2. Refers to the mating of more closely related individuals

3. Reduces homozygosity

4. Reduces inbreeding depression

68. Which of the following genes control the cotton bollworm?
1. cry IAc and cry IIAb
2. cry IIAb and cry IIAc
3. cry IAb and cry IAc
4. cry IAb and cry IIAc

69. Select the incorrect statement regarding inbreeding:

1. Inbreeding helps in elimination of deleterious alleles from the population

2. Inbreeding is necessary to evolve a pure-line in any animal

3. Continued inbreeding reduces fertility and leads to inbreeding depression.

4. Inbreeding depression cannot be overcome by Out-crossing.

70. An enzyme catalysing the removal of nucleotides from ends of DNA is :

1. DNA ligase

2. Endonuclease

3. Exonuclease

4. Protease

71. The Green revolution increased the food supply to

1. Triple fold

2. Double fold

3. Four fold

4. One and half fold

72. The ADA deficiency is because of

1. Substitution

2. Inversion

3. Deletion

4. Insertion

73. When did an American company got patent rights on Basmati rice?

1.1997

2.1995

3.1998

4.1994

74. Match the columns:-

Column-I	**Column-II**
(a) Rosie	(i) α - 1 antitrypsin
(b) ELISA	(ii) Protein enriched milk
(c) ROP	(iii) Test to detect antigen or antibody
(d) Emphysema	(iv) Codes for protein involved in plasmid replication

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

75. What is antisense technology?

1. A cell displaying a foreign antigen used for synthesis of anti bodies

2. Production of somaclonal variants in tissue culture

3. A complimentary RNA used to stop expression of a specific gene

4. RNA polymerase producing DNA

76. Which one of the following are at high risk extinction due to habitat destruction
1. Mammals
2. Birds
3. Amphibians
4. Echinoderms

77. Which of the following sequences of PCR is correct?

1. (a) Extension of primer, (b) Annealing, (c) Denaturation

2. (a) Denaturation, (b) Annealing, (c) Extension of Primer

3. (a) Annealing, (b) Extension of Primer, (c) Denaturation

4. (a) Denaturation, (b) Extension of Primer, (c) Annealing

78. Which of the following is a product of cross-breeding?

1. Mule

2. Jersey

3. Leghorn

4. Hisardale

79. Inbreeding depression is -

1. Reduced motility and immunity due to close inbreeding

2. Decreased productivity due to mating of superior male and inferior female

3. Decrease in body mass of progeny due to continued close inbreeding

4. Reduced fertility and productivity due to continued close inbreeding

80. Large scale death of fishes occur in :
1. Saline lake
2. Oligotrophic lake
3. Eutrophic lake
4. Shallow lake

81. With regard to insulin choose correct options.

(a) C-peptide is not present in mature insulin.

(b) The insulin produced by rDNA technology has C-peptide.

(c) The pro-insulin has C-peptide.

(d) A-peptide and B-peptide of insulin are interconnected by disulphide bridges.

Choose the correct answer from the options given below.

1. (a), (c) and (d) only

2. (a) and (d) Only

3. (b) and (d) only

4. (b) and (c) only

82. _____ gene codes for the proteins required for the replication of plasmid

1. ori

2. rop

3. amp^R

4. tet^R

83. The separated bands of DNA are cut out from the agarose gel and extracted from the gel piece. This step is known as

1. Precipitation

2. Elution

3. Spooling

4. Fragmentation

84. If we ligate foreign DNA at BamHI site of pBR322, then the resultant recombinants will show

(a) Resistance to ampicillin
(b) Sensitivity to tetracycline
(c) Resistance to tetracycline
(d) Sensitivity to ampicillin

1. a and b

2. a and c

3. b and d

4. c and d

85. To make the host cells competent, they are treated with specified concentration of

1. Ca^{+2}

2. Na^{+}

3. K^{+}

4. Cl^{-}

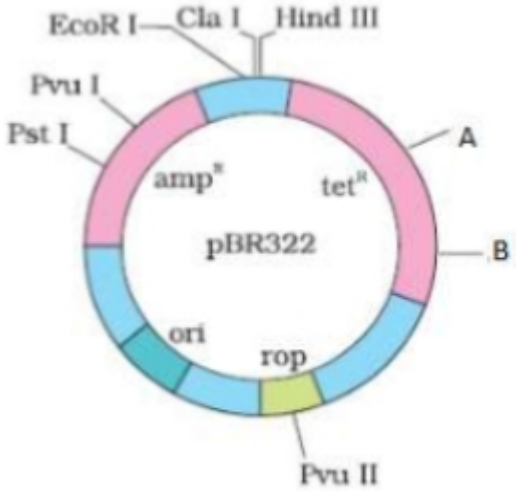
Zoology - Section B

86. The first type II restriction endonuclease discovered that could cut dsDNA at specific site was:

1. EcoRI 2. SmaI

3. Hind II 4. Hind III

87. A and B in the pBR 322, shown in the diagram given below, respectively represent recognition sequences of :



1. BamH I and Sma I

2. Hind II and Sma I

3. BamH I and SaI I

4. SaI I and Hind II

88. Recombinant DNA technology involves several steps in which initial step is of isolation of the DNA. Which enzymes are used in the process for the breakdown of fungal cell, plant cell and bacterial cell respectively?

1. Lysozyme, lipases, trypsin

2. Chitinase, cellulase, lysozyme

3. Chitinase, cellulase, trypsin

4. Trypsin, lipases, cellulase

89. Kangaroo rats:

1. Have a generalized diet

2. Avoid eating fats

3. Do not need to drink water

4. Are insensitive to heat

90. Among animals, which of the following is the most species-rich taxonomic group?

1. Insects

2. Molluscs

3. Crustacean

4. Other animal groups

91. MOET has not been practiced in

a. Cattle b. Sheep

c. Rabbits d. Poultry

1. b,c & d

2. b & d

3. d only

4. c only

92. What is true about Bt toxin?
1. The concerned Bacillus has antitoxins.
2. The inactive protoxin gets converted into active form in the insect gut
3. BT protein exists as active toxin in the Bacillus.
4. The activated toxin enters the ovaries of the pest to sterilise it and thus prevent its multiplication

93. Maximum number of existing transgenic animals is of
1. Fish
2. Mice
3. Cow
4. Pig

94. Which body of the Government of India regulates GM research and safety of introducing GMO for public services?
1. Indian Council of Agricultural Research
2. Genetic Engineering Approval Committee
3. Research Committee on Genetic Manipulation
4. Bio-safety committee

95. Which kind of therapy was given in 1990 to a four-year-old girl with adenosine deaminase (ADA) deficiency?
1. Radiation therapy
2. Gene therapy
3. Chemotherapy
4. Immunotherapy

96. What is the criterion for DNA fragments movement on agarose gel during gel electrophoresis?
1. The larger the fragment size, the farther it moves
2. The smaller the fragment size, the farther it moves
3. Positive charged fragment moves to farther end.
4. Negatively charged fragments do not move

97. There is a restriction endonuclease called EcoRI. What does ‘co’ part in it stand for?
1. Colon
2. Coelom
3. Coenzyme
4. coli

98. Which one is a true statement regarding DNA polymerase used in PCR?
1. It is used to ligate introduced DNA in recipient cell
2. It serves as a selectable marker
3. It is isolated from a virus
4. It remains active at high temperature

99. Snow-blindness in Antarctic regions is due to:

1. Inflammation of cornea due to high doses of UV-B radiation

2. High reflection of light from snow

3. Damage to the retina caused by infra-red rays

4. Freezing of fluids in the eye by low temperature

100. Early detection of disease is not possible by performing

1. RDT

2. Urine analysis

3. PCR

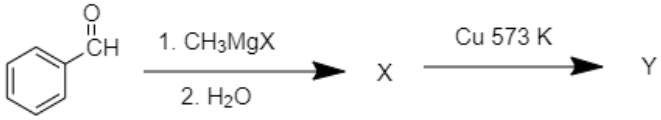
4. ELISA

Chemistry - Section A

101. The reagent used for the separation of acetaldehyde from acetophenone is-

1. $NaHSO_3$
2. $C_6H_5NHNH_2$
3. NH_2OH
4. NaOH and I_2

102.



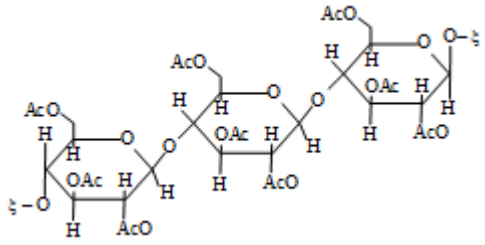
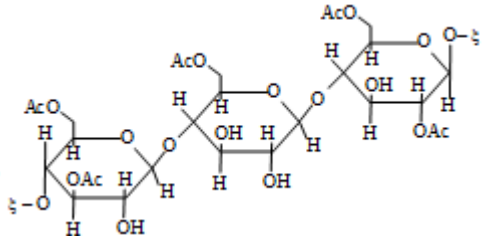
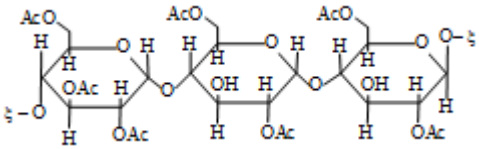
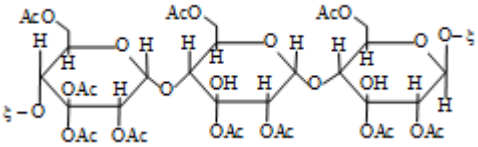
The compound Y in the above sequence of reactions is-

1. 1-Phenylethene
2. 2-Phenyl-2-propanol
3. Acetophenone
4. Benzaldehyde

103. Which of the following is an elastomer ?

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

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

1. 
2. 
3. 
4. 

105. Compound A (C_4H_8) is treated with H_2O/H_2SO_4 gives $C_4H_{10}O$, an optically inactive compound. The structure of A is-

1. $CH_3CH_2CH = CH_2$
2. $CH_3CH = CHCH_3$
3. $(CH_3)_2C = CH_2$
4. 

106. Equanil is used as :

1. Analgesic
2. Antibiotic
3. Tranquilizer
4. Antacid

107. Polymer that is addition as well as copolymer is:

1. PHBV
2. PVC
3. Buna-S
4. Neoprene

108. Cetyltrimethyl ammonium bromide is an example of :

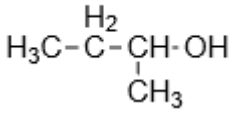
1. Artificial sweetener.
2. Cationic detergent.
3. Soap .
4. Anionic detergent.

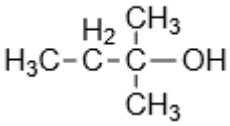
109. The plastic household crockery is prepared by using :

1. Melamine and tetrafluoroethane.
2. Malonic acid and hexamethylene imine.
3. Melamine and vinyl acetate.
4. Melamine and formaldehyde.

110. The order of reactivity of following alcohols with halogen acids is-

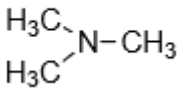
I. $CH_3CH_2—CH_2OH$

II. 

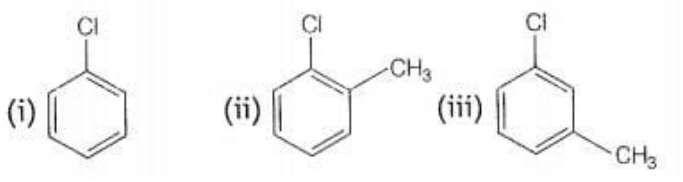
III. 

1. (I) >(II)> (III)
2. (III) >(II) >(I)
3. (II) >(I)> (III)
4. (II) >(I)> (III)

111. Chloromethane on treatment with excess of ammonia yields mainly:

1. N, N-dimethylmethanamine 
2. N-methylmethanamine (CH_3 —NH—CH_3)
3. Methanamine (CH_3NH_2)
4. Mixture containing all these in equal proportion

112. Arrange the compounds in increasing order of rate of reaction towards nucleophilic substitution.



1. (i) < (ii) < (iii)
2. (i) < (iii) < (ii)
3. (iii) < (ii) < (i)
4. (ii) < (iii) < (i)

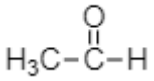
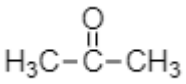
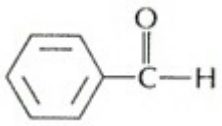
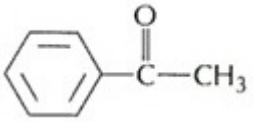
113. CH_3CH_2OH can be converted into CH_3CHO by ...

1. Catalytic hydrogenation
2. Treatment with $LiAlH_4$
3. Treatment with pyridinium chlorochromate
4. Treatment with $KMnO_4$

114. IUPAC name of m-cresol is :

1. 3-Methylphenol
2. 3-Chlorophenol
3. 3-Methoxyphenol
4. Benzene-1,3-diol

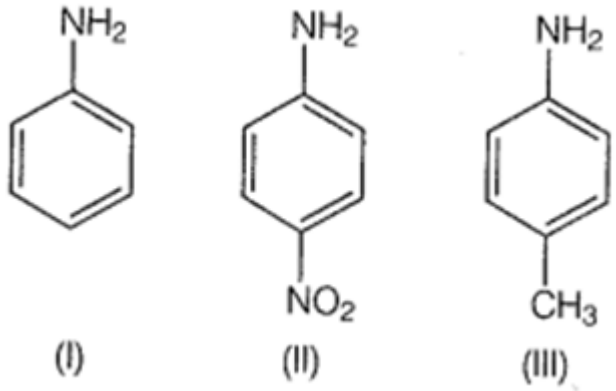
115. Which of the following compounds is most reactive towards nucleophilic addition reaction?

1. 
2. 
3. 
4. 

116. Through which of the following reactions number of carbon atoms can be increased in the chain?
a. Grignard reaction
b. Cannizzaro's reaction
c. Aldol condensation
d. HVZ reaction

Choose the correct option
1. (a, b)
2. (b, c)
3. (c, d)
4. (a, c)

117. The correct increasing order of basic strength for the following compounds is .



1. II<III<I

2. III<I<II

3. III<II<I

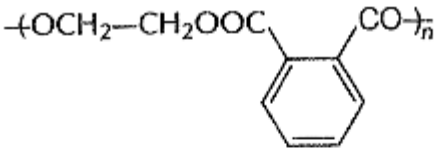
4. II<I<III

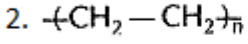
118. Methylamine reacts with HNO_2 to form-

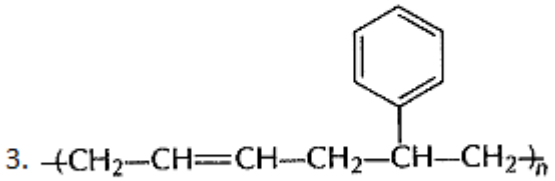
1. CH_3-O-N=O
2. CH_3-O-CH_3
3. CH_3-OH
4. CH_3CHO

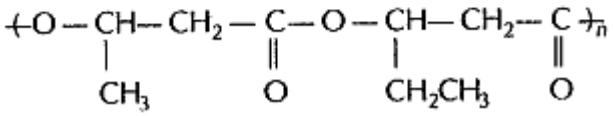
119.

In which of the following polymers ethylene glycol is one of the monomer units

1. 

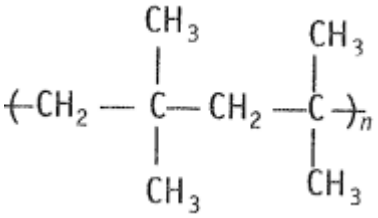
2. 

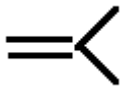
3. 

4. 

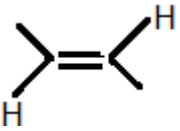
120.

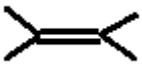
The monomer unit present in the given polymer among the following is-



1. 

2. 

3. 

4. 

121. A narrow-spectrum antibiotic is active against-

1. Gram-positive or gram-negative bacteria

2. Gram-negative bacteria only

3. Single organism or one disease

4. Both gram-positive and gram-negative bacteria

122. Polyethyleneglycols are used in the preparation of which type of
detergents?

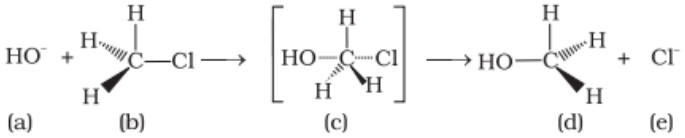
1. Cationic detergents

2. Anionic detergents

3. Nonionic detergents

4. Soaps

123.



Which of the following statements are correct about this reaction?
(i) The given reaction follows S_N2 mechanism.
(ii) (b) and (d) have opposite configuration.
(iii) (b) and (d) have same configuration.
(iv) The given reaction follows S_N1 mechanism

Choose the correct option

1. (i, ii)

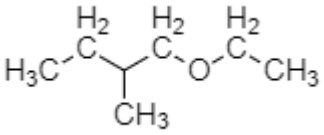
2. (ii, iii)

3. (iii, iv)

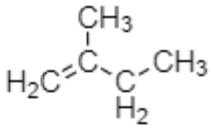
4. (i, iii)

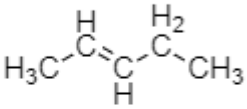
124. The mechanism of action of "Terfenadine" (Seldane) is :
1. Inhibits the secretion of histamine
2. Inhibits the action of histamine receptor
3. Activates the histamine receptor
4. Helps in the secretion of histamine

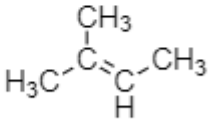
125. The major product [B] In the following reactions is :



$\xrightarrow{HI/Heat} (A)\ Alcohol \xrightarrow[\Delta]{H_2SO_4} (B)$

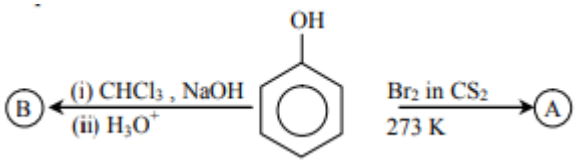
1. 

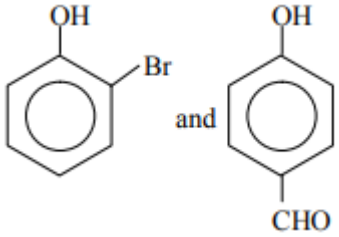
2. 

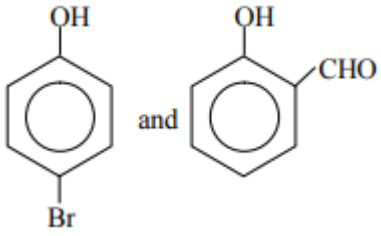
3. 

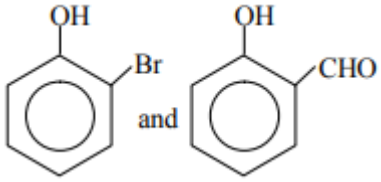
4. $H_2C=CH_2$

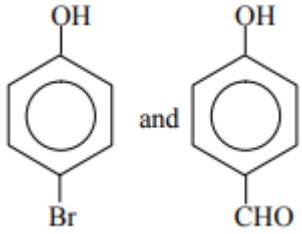
126. Identify the major products A and B respectively in the following reactions of phenol.

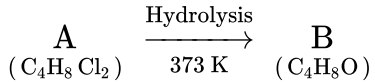


1. 

2. 

3. 

4. 

127. 

B reacts with hydroxylamine but does not give Tollen's test. A and B are respectively-

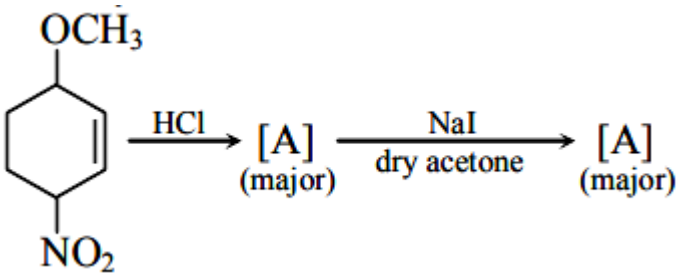
1. 1,1-Dichlorobutane and 2-Butanone

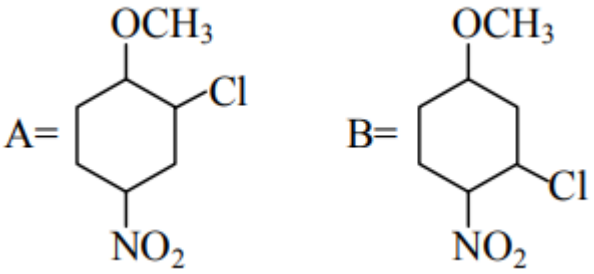
2. 2,2-Dichlorobutane and Butanal

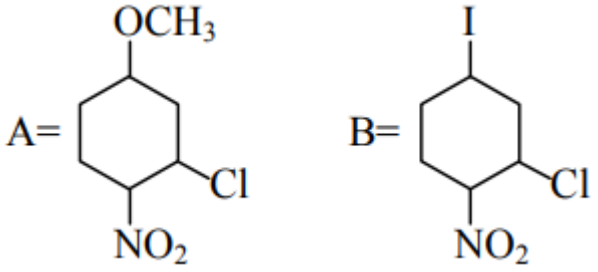
3. 1,1-Dichlorobutane and Butanal

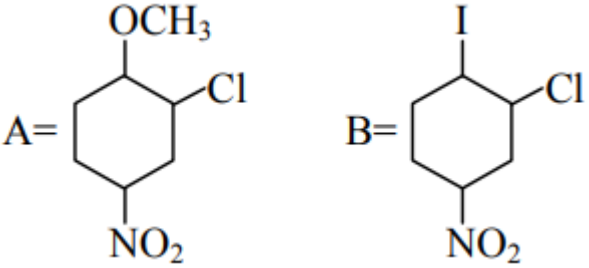
4. 2,2-Dichlorobutane and 2-butanone

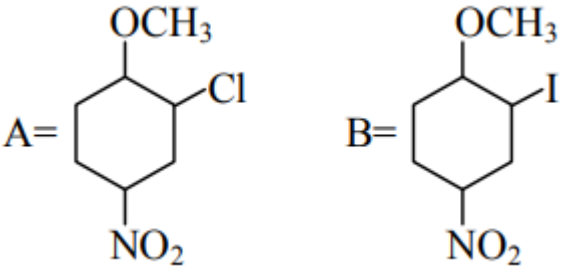
128. Identify A and B in the chemical reaction.



1. 

2. 

3. 

4. 

129. The major product of the following chemical reaction is :

$$CH_3\,CH_2\,CN \xrightarrow[(3)\ Pd/BaSO_4,H_2]{(1)\ H_3O^+,\Delta \\ (2)\ SOCl_2} ?$$

1. $CH_3\,CH_2\,CH_3$
2. $CH_3\,CH_2\,CH_2\,OH$
3. $(CH_3\,CH_2\,CO)_2O$
4. $CH_3\,CH_2\,CHO$

130. The major product obtained when glucose reacts with bromine water among the following is-

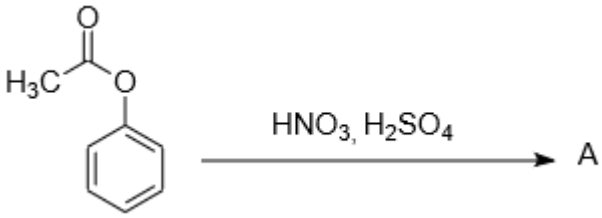
1. Gluconic acid
2. Glyceraldehyde
3. Sorbitol
4. Saccharic acid

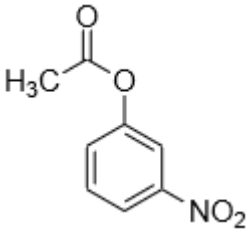
131. Identify Z in the given sequence

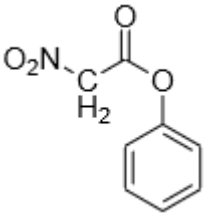
$$CH_3COONH_4 \xrightarrow{\Delta} X \xrightarrow[\Delta]{P_2O_5} Y \xrightarrow{H_2O/H^+} Z$$

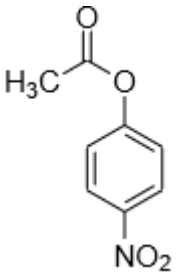
1. $CH_3CH_2CONH_2$
2. CH_3CN
3. CH_3COOH
4. $(CH_3CO)_2O$

132.
The major product A in the following reaction is -



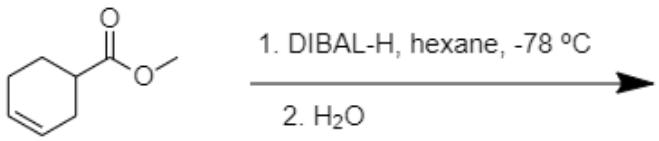
1. 

2. 

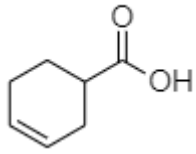
3. 

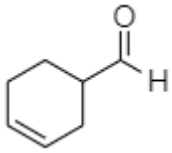
4. None of the above

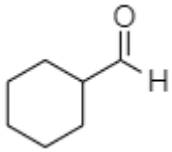
133.

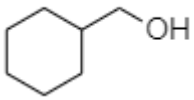


The major product of the reaction is-

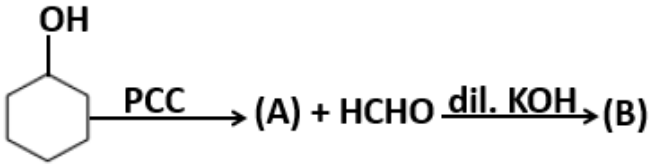
1. 

2. 

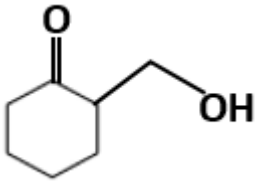
3. 

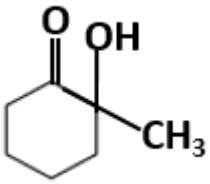
4. 

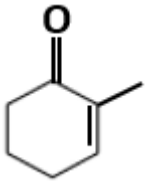
134.

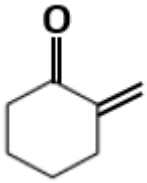


The structure of B is-

1. 

2. 

3. 

4. 

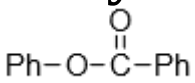
135. In the following sequence of reactions :

$$CH_3CH_2OH \xrightarrow{KMnO_4} (a) \xrightarrow{SOCl_2, NH_3} (b) \xrightarrow{Br_2, NaOH} (C)$$

The end product (c) is-

1. Acetone
2. Ethylamine
3. Acetic acid
4. Methylamine

Chemistry - Section B

136. Compound  can be prepared by the reaction of -

1. Phenol and benzoic acid in the presence of NaOH
2. Phenol and benzoyl chloride in the presence of pyridine
3. Phenol and benzoyl chloride in the presence of $ZnCl_2$
4. Phenol and benzaldehyde in the presence of palladium

137. Compounds A and C in the following reaction are

$$CH_3CHO \xrightarrow[(ii)\ H_20]{(i)\ CH_3MgBr} (A) \xrightarrow{H_2SO_4} (B) \xrightarrow{Hydroboration\ oxidation} (C)$$

1. Identical
2. Positional isomers
3. Functional isomers
4. Optical isomers

138. The reaction $Ar\overset{+}{N}_2\ Cl^- \xrightarrow{Cu,\ HCl} ArCl + N_2 + CuCl$ is named as .....,..

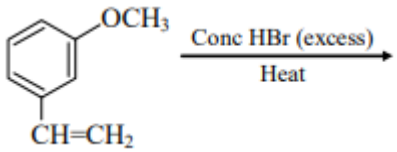
1. Sandmeyer reaction
2. Gattermann reaction
3. Claisen reaction
4. Carbylamine reaction

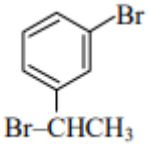
139. Assertion (A) Acylation of amines gives a monosubstituted product whereas alkylation of amines gives a polysubstituted product.

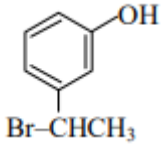
Reason (R) Acyl group sterically hinders the approach of further acyl groups,

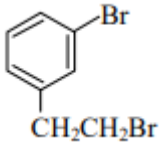
1. Both assertion and reason are true and the reason is the correct explanation of assertion.
2. Both assertion and reason are true and reason is not the correct explanation of assertion.
3. Assertion is true but the reason is false.
4. Assertion is false but reason is true.

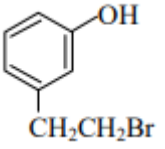
140. The major product of the following reaction is -



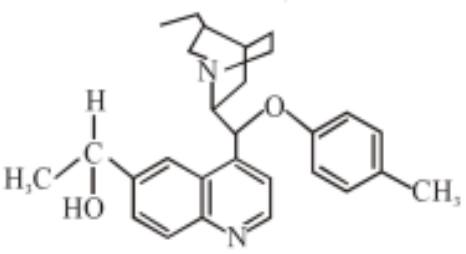
(1) 

(2) 

(3) 

(4) 

141. The number of chiral carbons present in the molecule given below is -



1. 8
2. 7
3. 5
4. 6

142. Match the following drugs with their therapeutic actions :

(i) Ranitidine	(a) Antidepressant
(ii) Nardil (Phenelzine)	(b) Antibioitic
(iii) Chloramphenicol	(c) Antihistamine
(iv) Dimetapp (Brompheniramine)	(d) Antacid
	(e) Analgesic

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

143. Which of the glycosidic linkage between galactose and glucose is present in lactose?

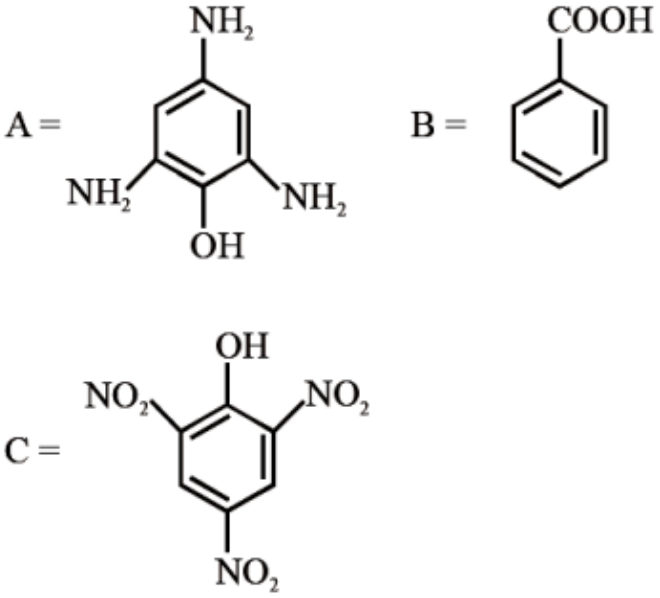
1. C-1 of galactose and C-4 of glucose

2. C-1 of glucose and C-6 of galactose

3. C-1 of glucose and C-4 of galactose

4. C-1 of galactose and C-6 of glucose

144. Compound(s) which will liberate carbon dioxide with sodium bicarbonate solution is/are:



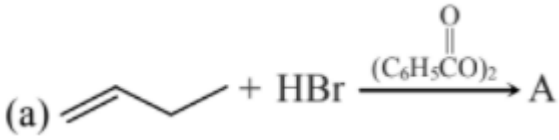
1. B only

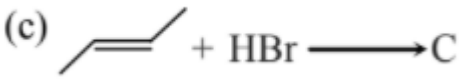
2. C only

3. B and C only

4. A and B only

145. The increasing order of the boiling points of the major products A, B and C of the following reactions will be :





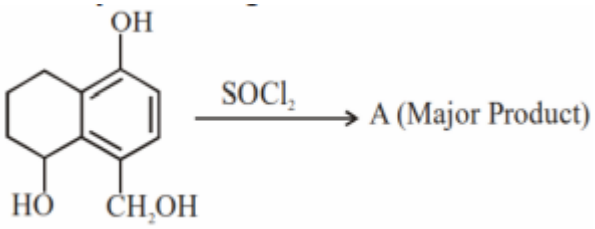
1. C < A < B

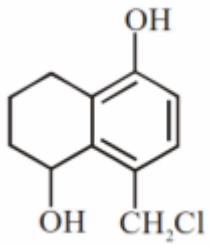
2. B < C < A

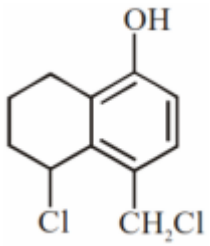
3. A < B < C

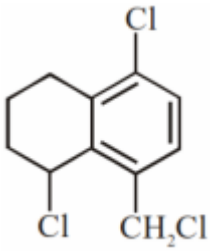
4. A < C < B

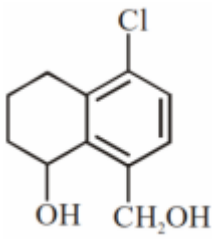
146. Identify A in the given reaction.



1. 

2. 

3. 

4. 

147. The major product obtained on interaction of phenol with sodium hydroxide and carbon dioxide is:

1. Benzoic acid

2. Salicylaldehyde

3. Salicylic acid

4. Phthalic acid

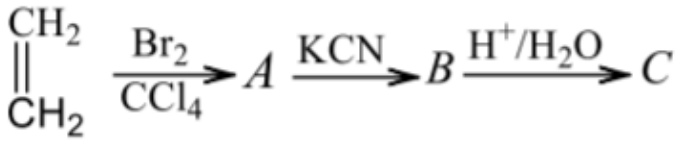
148. In the following sequence of reactions, $CH_3CH_2OH \xrightarrow{P+I_2} A \xrightarrow[ether]{Mg} B \xrightarrow{HCHO} C \xrightarrow{H_2O} D$, then compound 'D' is –

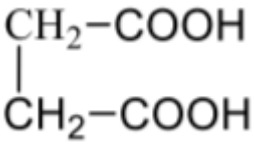
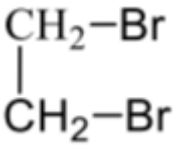
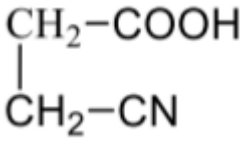
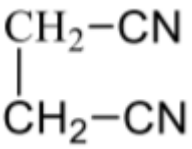
1. Butanal
2. n-Butyl alcohol
3. n-Propyl alcohol
4. Propanal

149. The polyamide among the following is-

1. Bakelite
2. Terylene
3. Nylon-6,6
4. Teflon

150. The final product of the following sequence of reactions is-



1. 
2. 
3. 
4. 

Physics - Section A

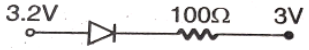
151. An electron with speed v and a photon with speed c have the same de Broglie wavelength. If the kinetic energy and momentum of electron is E_e and P_e and that of photon is E_{ph} and P_{ph} respectively, then the correct option is:

1. $\frac{E_e}{E_{ph}}=\frac{2c}{v}$
2. $\frac{E_e}{E_{ph}}=\frac{v}{2c}$
3. $\frac{P_e}{P_{ph}}=\frac{2c}{v}$
4. $\frac{P_e}{P_{ph}}=\frac{v}{2c}$

152. When p-n junction diode is forward biased, then:

1. the depletion region is reduced and barrier height is increased
2. the depletion region is widened and barrier height is reduced
3. both the depletion region and barrier height are reduced
4. both the depletion region and barrier height are increased

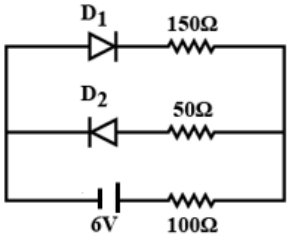
153. The current in the circuit shown in the figure considering the ideal diode is:



1. 20 A
2. $2 \times 10^{-3} A$
3. 200 A
4. $2 \times 10^{-4} A$

154. The current gain (β) of a transistor in common emitter mode is 40. To change the collector current by 160 mA at constant V_{CE}, the necessary change in the base current is:
1. 0.25 μA
2. 4 μA
3. 4 mA
4. 40 mA

155. Two diodes D_1 and D_2 each with a forward resistance of 50 ohms and with infinite backward resistance are connected as shown in the figure. If the battery voltage is 6V, the current through 50 ohm resistance (in amperes) is:



1. zero
2. 0.02
3. 0.03
4. 0.036

156. In an n-p-n transistor circuit, the collector current is 10 mA. If 80% of the electrons emitted from emitter reach the collector, then
1. the emitter current will be 7.5 mA
2. the emitter current will be 12.5 mA
3. the base current will be 3.5 mA
4. the base current will be 2.0 mA

157. The output of a two input NOR gate is in state 1 when
1. either input terminals is at 0 state.
2. either input terminals is at 1 state
3. both input terminals are at 0 state
4. both input terminals are at 1 state

158. In a common-base transistor amplifier
1. both junctions are forward biased
2. both junctions are reverse biased
3. biasing is immaterial
4. emitter and base junction is forward biased and the collector and base junction is reverse biased

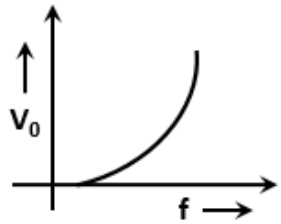
159. An n-type semiconductor is formed by adding impurity materials
1. aluminum, boron, or selenium
2. aluminum, boron, or indium
3. phosphorus, antimony, or arsenic
4. cobalt, aluminum or selenium

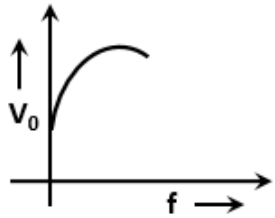
160. In an insulator, the energy gap between the conduction band and the valence band is:
1. infinity
2. wide
3. narrow
4. zero

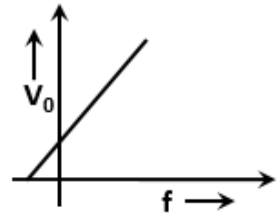
161. When semiconductor is heated, its resistance
1. decreases
2. increases
3. remains the same
4. may increase or decrease depending upon the semiconductor

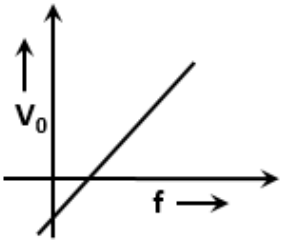
162. Zener diode is not used for-
1. oscillatory circuit
2. amplification
3. modulation
4. all of the above

163. For a photoelectric cell, the graph showing the variation of stopping potential (V_0) with the frequency (f) of incident light is best represented by:

1. 

2. 

3. 

4. 

164. The kinetic energy of the fastest photoelectron emitted using light of wavelength λ is ϵ, while the K.E. of the fastest photoelectron using light of wavelength λ' is 2ϵ. The photocathode is the same in both cases. Then,

1. $\frac{\lambda}{\lambda'}=\frac{1}{2}$
2. $1>\frac{\lambda}{\lambda'}>\frac{1}{2}$
3. $\frac{\lambda}{\lambda'}<\frac{1}{2}$
4. $\frac{\lambda}{\lambda'}>1$

165. Regarding the photoelectric effect, mark the incorrect statement?

1. there is a minimum frequency of light, below which no photoelectric effect takes place
2. by reverse potential, the photoelectric effect can be stopped
3. intensity can alter the energy of photoelectron
4. even at low intensity, with frequency more than threshold, photoelectric emission takes place

166. In a photoelectric cell, when photons of energy 6 eV are incident on the cathode, the most energetic photoelectron has energy of 2 eV. When photons of energy 7 eV are incident on the cathode, no photoelectric current would be observed when the potential of the anode with respect to cathode is:

1. 7 V
2. 3 V
3. -2 V
4. -3 V

167. Suppose an electron is attracted towards the origin by a force k where 'k' is a constant. By applying Bohr's model to this system, the radius of the n^{th} orbital of the electron is found to be 'r_n'. Then which of the following is true?

1. $r_n \propto n^{1/3}$
2. $r_n \propto n^{2/3}$
3. $r_n \propto n$
4. r_n is independent of n

168. The count rate of a radioactive source at t = 4 s was 1600 count/s and t = 8 s, it was 100 count/s. The count rate at t = 6 sec will be

1. 150
2. 200
3. 300
4. 400

169. The angular momentum of electron in an orbit is quantized because it is

1. in accordance with particle nature of electron
2. in accordance with wave nature compatibility of electron
3. in accordance with Hund's rule
4. in accordance with Maxwell's theory

170. A hydrogen atom is in an excited state of principle quantum number n. It emits a photon of wavelength λ when it returns to the first excited state state. The value of n is (R = Rydberg's constant)

1. $\sqrt{4\lambda R\left(\lambda R-1\right)}$
2. $\sqrt{\frac{(\lambda R-4)}{4\lambda R}}$
3. $\sqrt{\frac{4\lambda R}{\lambda R-4}}$
4. $\sqrt{\lambda\left(R-1\right)}$

171. Three-fourths of the active nuclei present in a radioactive sample decay in $\frac{3}{4}s$. The half-life of the sample is
1. 1 s
2. $\frac{1}{2}s$
3. $\frac{3}{4}s$
4. $\frac{3}{8}s$

172. A nucleus with mass number 220 initially at rest emits an α- particle. If the momentum of α- particle and daughter nucleus are p_a and p_d respectively, then-
1. $p_a < p_d$
2. $p_a = p_d$
3. $p_a > p_d$
4. Mass of daughter nucleus is required

173. If E_1, E_2 and E_3 represent respectively the kinetic energies of an electron, an alpha particle and a proton each having same de-Broglie wavelength then:
1. $E_1 > E_3 > E_2$
2. $E_2 > E_3 > E_1$
3. $E_1 > E_2 > E_3$
4. $E_1 = E_2 = E_3$

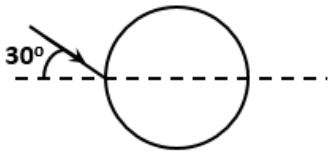
174. The electric current in an X-ray tube (from the target to the filament) operating at 40 kV is 10 mA. Assuming that on average,1% of the total kinetic energy of the electrons hitting the target is converted into X-rays, what is the total power emitted as X-rays?
1. 4 W
2. 3 W
3. 2 W
4. 1 W

175. If h is planck's constant, the momentum of a photon of wavelength 0.01 $\overset{o}{A}$ is:
1. 10^{-2} h
2. h
3. 10^{2} h
4. 10^{12} h

176. The work function for a metal is 4 eV. To emit a photoelectron of zero velocity from the surface of the metal, the wavelength of incident light should be:
1. 2700 $\overset{o}{A}$
2. 1700 $\overset{o}{A}$
3. 2900 $\overset{o}{A}$
4. 3100 $\overset{o}{A}$

177. The first experimental evidence for the existence of matter waves was observed by Davisson and Germer in their experiment on electron beam. In their experiment they observed:
1. Diffraction of electron beam from a single slit
2. Diffraction of electron beam from crystals
3. Interference of electron beam in a double-slit experiment
4. Formation of standing waves between the lattice of crystals

178. A ray of light falls on the surface of the spherical glass (having refractive index n) making angle 30^o with normal. The net angle of deviation between emergent and incident rays is:



1. $30^\circ - 2\sin^{-1}\frac{1}{2n}$
2. zero
3. $60^\circ - 2\sin^{-1}\frac{1}{2n}$
4. $30^\circ - 8\sin^{-1}\frac{1}{n}$

179. By mistake, an eye surgeon puts a concave lens in place of the lens in the eye after a cataract operation. Then
1. The person will not be able to see anything at all
2. The person can see clearly all types of objects in front of the eyes
3. The person will be able to see virtual objects which a normal human eye cannot see
4. The data is insufficient

180. An astronomical telescope has an angular magnification of magnitude 5 for distant objects. The separation between the objective and the eye piece is 36 cm and the final image is formed at infinity. The focal length f_0 of the objective and the focal length f_e of the eye piece are:
1. f_0 = 45 cm and f_e = -9 cm
2. f_0 = 7.2 cm and f_e = 5 cm
3. f_0 = 50 cm and f_e = 10 cm
4. f_0 = 30 cm and f_e = 6 cm

181. For an equilateral prism, it is observed that when a ray strikes grazingly at one face it emerges grazingly at the other. Its refractive index will be:
1. $\frac{\sqrt{3}}{2}$
2. $\frac{2}{\sqrt{3}}$
3. 2
4. data not sufficient

182. Concave and convex lenses are placed touching each other. The ratio of magnitudes of their power is 2:3. The focal length of the system is 30 cm. Then the focal lengths of individual lenses are:
1. -75, 50
2. -15, 10
3. 75, 50
4. 75, -50

183. A converging lens is used to focus light from a small bulb onto a book. The lens has a focal length of 10 cm and is located 40 cm from the book. Determine the distance of the bulb from the lens:
1. 8 cm
2. 20.3 cm
3. 13.3 cm
4. 16 cm

184. The transition from the state n = 3 to n = 2 in a hydrogen atom results in visible radiation. Infrared radiation will be obtained in the transition:
1. $2 \rightarrow 1$
2. $3 \rightarrow 2$
3. $4 \rightarrow 2$
4. $4 \rightarrow 3$

185. In gamma ray emission from a nucleus:
1. only the proton number changes
2. both the neutron number and the proton number change
3. there is no change in the proton number and the neutron number
4. only the neutron number changes

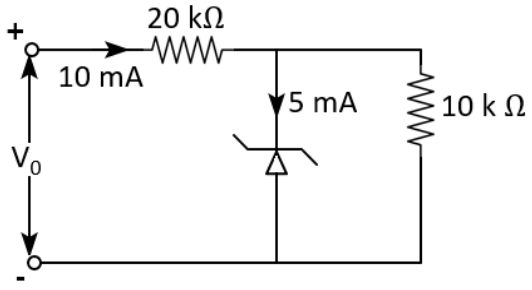
Physics - Section B

186. A photocell employs photoelectric effect to convert:
1. change in the frequency of light into a change in the electric current
2. change in the frequency of light into a change in electric voltage
3. change in the intensity of illumination into a change in photoelectric current
4. change in the intensity of illumination into a change in the work function of the photocathode

187. The energy that should be removed from a photon to increase its de Broglie wavelength from 1 nm to 2 nm is:
1. 310 eV
2. 620 eV
3. 1240 eV
4. 2480 eV

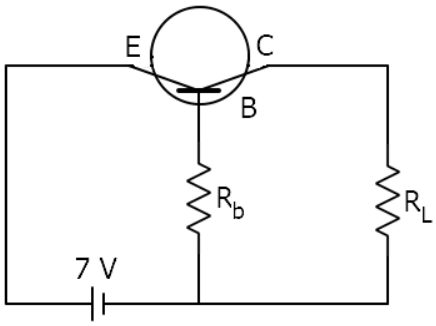
188. A proton accelerated through a potential V has de Broglie wavelength λ. Then, the de Broglie wavelength of an α -particle, when accelerated through the same potential V is:
1. $\frac{\lambda}{2}$
2. $\frac{\lambda}{\sqrt{2}}$
3. $\frac{\lambda}{2\sqrt{2}}$
4. $\frac{\lambda}{8}$

189. For the given Zener circuit find the source voltage.



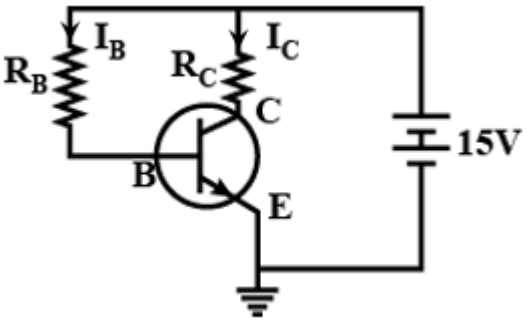
1. 100 V
2. 150 V
3. 200 V
4. 250 V

190. In the given transistor circuit, the base current is 10 μA. What will be the value of R_b for which V_{BE} is 6 V?



1. 100 $k\Omega$
2. 200 $k\Omega$
3. 300 $k\Omega$
4. 400 $k\Omega$

191. In the following common emitter circuit is $\beta=100$, V_{CE} = 7 V, V_{BE} = negligible, R_C = 2 $k\Omega$, then I_B =?



1. 0.01 mA
2. 0.04 mA
3. 0.02 mA
4. 0.03 mA

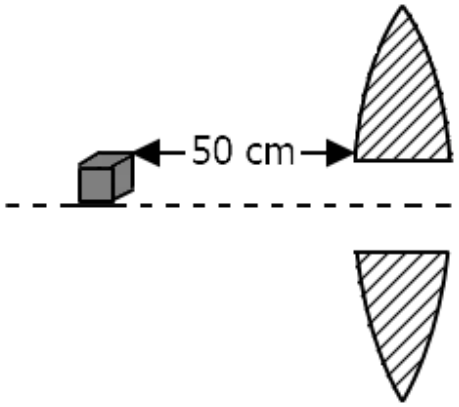
192. An AND gate is followed by a NOT gate in series. With two inputs A and B, the Boolean expression for the output Y will be:

1. $\overline{A+B}$
2. $\overline{A.B}$
3. A.B
4. $\overline{\overline{A}+B}$

193. The focal length of a convex lens is f. An object is placed at a distance x from its second focal point. The ratio of the size of the real image to that of the object is:

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

194. A symmetrical bi-convex lens of focal length 40 cms and refractive index 1.5 is sliced (transversely) into two identical half-lenses that are then separated as shown. Which of the following is incorrect?

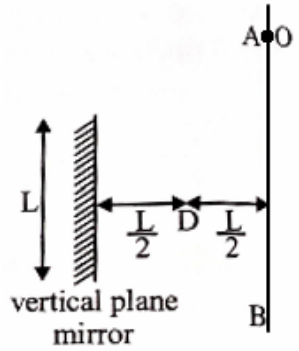


1. Image/images formed are real
2. Image/images formed are magnified
3. Two images are formed
4. Image/images formed are virtual

195. The x-z plane separates two media A and B of refractive indices $\mu_1=1.5$ and $\mu_2=2$. A ray of light travels from A to B, its directions in the two media are given by unit vectors $\vec{u}_1=a\hat{i}+b\hat{j}$ and $\vec{u}_2=c\hat{i}+d\hat{j}$. Then:

1. $\frac{a}{c}=\frac{4}{3}$
2. $\frac{a}{c}=\frac{3}{4}$
3. $\frac{b}{d}=\frac{4}{3}$
4. $\frac{b}{d}=\frac{3}{4}$

196. A point object O can move along vertical line AB as shown in the figure. When image of the object is first visible to D, then it is released under gravity at t = 0 from rest from A. The time for which object is visible to D is:



1. $\sqrt{\frac{6L}{g}}$
2. $\sqrt{\frac{2L}{g}}$
3. $\sqrt{\frac{3L}{g}}$
4. $t \to \infty$

197. In Young's double-slit experiment, the intensity at a point P on the screen is half the maximum intensity in the interference pattern. If the wavelength of light used is λ and d is the distance between the slits, the angular separation between point P and the centre of the screen is:

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

198. As compared to ^{12}C atoms, ^{14}C atom has:
1. two extra protons and two extra electrons
2. two extra protons but no extra electron
3. two extra neutrons but no extra electron
4. two extra neutrons and two extra electrons

199. Energy made available when free nucleons combine to form nucleus is called:
1. Gibbs free energy
2. Ionisation energy
3. Potential energy
4. Binding energy

200. Red light is used in a single slit diffraction experiment with a slit width of 0.6 mm. If the red light is replaced by yellow light, then the observed pattern will reveal:
1. that the central maximum is wider
2. more number of fringes
3. less number of fringes
4. no diffraction pattern

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