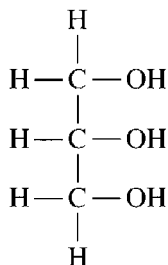


organic**Multiple Choice**

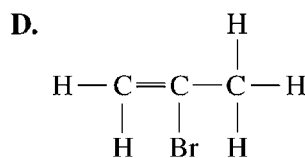
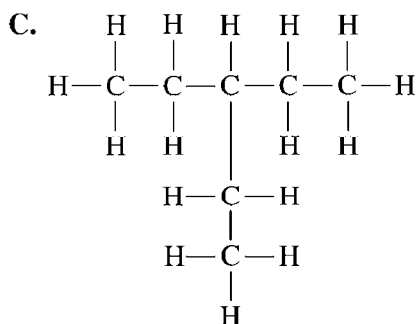
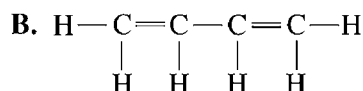
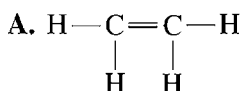
Identify the letter of the choice that best completes the statement or answers the question.

- _____ 1. Carbon shows a very strong tendency to form
a. ionic bonds. c. hydrogen bonds.
b. covalent bonds. d. highly polar bonds.
- _____ 2. How many outermost electrons does a carbon atom have?
a. 3 c. 5
b. 4 d. 6
- _____ 3. How many single covalent bonds can a carbon atom form?
a. 2 c. 4
b. 3 d. 5
- _____ 4. When a carbon atom forms four covalent bonds, the bonds are directed toward the corners of a
a. triangle. c. square.
b. pyramid. d. tetrahedron.
- _____ 5. Carbon atoms readily join with atoms of
a. metals. c. both other elements and carbon.
b. carbon only. d. nonmetals.
- _____ 6. What are two allotropic forms of carbon?
a. carbon-12 and carbon-14 c. solid carbon and liquid carbon
b. alkanes and alkenes d. diamond and graphite
- _____ 7. Which of the following is an allotropic form of carbon?
a. carbon-12 c. solid carbon
b. alkanes d. diamond
- _____ 8. Which statement about the hardness of diamond and graphite is correct?
a. Diamond is very soft, and graphite is very hard.
b. Diamond is very hard, and graphite is very soft.
c. Both diamond and graphite are very hard.
d. Both diamond and graphite are very soft.
- _____ 9. What do all organic compounds contain?
a. hydrogen c. oxygen
b. water d. carbon
- _____ 10. Which of the following is an atom or a group of atoms responsible for the specific properties of an organic compound?
a. isomer c. substituted hydrocarbon
b. hydrocarbon d. functional group
- _____ 11. What is a functional group?
a. a group of organic compounds with similar structural formulas
b. a group of organic compounds that undergo similar chemical reactions
c. a group of atoms that help determine the properties of an organic compound
d. Both (a) and (b)
- _____ 12. What does a functional group determine?
a. the properties of an organic compound c. the molecular mass of a compound
b. how a compound is classified d. Both (a) and (b)

- _____ 13. Why are functional groups important?
- The properties of functional groups help to systematically classify compounds.
 - Reactions of a compound involve the bonds within a functional group.
 - Both (a) and (b)
 - Neither (a) nor (b)
- _____ 14. All organic compounds containing the same functional group
- have the same name.
 - are classified together.
 - undergo different chemical reactions.
 - behave differently.
- _____ 15. Which of the following is the functional group in alcohols?
- COOH
 - OH
 - CO
 - O-
- _____ 16. The name of a compound with the functional group -OH has the suffix
- ol.
 - al.
 - oic acid.
 - one.
- _____ 17. What are alkanes called when atoms of fluorine, chlorine, bromine, or iodine are substituted for hydrogen atoms?
- aldehydes
 - ketones
 - alkyl halides
 - carboxylic acids
- _____ 18. How is the functional group in alkyl halides often written?
- OX
 - XO
 - X
 - O-

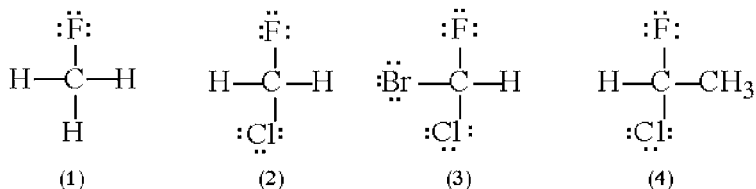


- _____ 19. In the figure above, to what class does the organic compound belong?
- alcohols
 - alkyl halides
 - ethers
 - aldehydes
- _____ 20. Name the compound in the figure above.
- 1,2,3-propanetriol
 - 1,2-ethanediol
 - ethanol
 - 2-butanol



- ___ 21. In the figure above, name the compound in diagram D.
- | | |
|-------------------|---------------------|
| a. 2-bromopropyne | c. 2-bromopropane |
| b. 2-bromopropene | d. 2,2-bromopropene |
- ___ 22. In the figure above, name the compound in diagram B.
- | | |
|------------------|------------------|
| a. 1,3-butadiene | c. 2,3-butadiene |
| b. 1,4-butadiene | d. 1,3-butene |
- ___ 23. In the figure above, name the compound in diagram A.
- | | |
|-----------|--------------|
| a. ethane | c. ethyne |
| b. ethene | d. ethadiene |
- ___ 24. Name the polymer(s) in the process used to make *vulcanized* rubber by heating rubber and sulfur.
- | | |
|-----------|------------------------------|
| a. sulfur | c. both rubber and sulfur |
| b. rubber | d. neither rubber nor sulfur |
- ___ 25. Which are large molecules made of many small units joined by organic reactions?
- | | |
|---------------|--------------------|
| a. monomers | c. polymers |
| b. copolymers | d. linear polymers |
- ___ 26. Two different monomers joined to each other form
- | | |
|---------------|------------------|
| a. a polymer. | c. a polygon. |
| b. an isomer. | d. an allotrope. |
- ___ 27. Macromolecules found in living things are which of the following?
- | | |
|-----------------------|------------------------|
| a. synthetic polymers | c. Both (a) and (b) |
| b. natural polymers | d. Neither (a) nor (b) |
- ___ 28. What polymer is formed by a chain addition reaction between monomers that have a double bond?
- | | |
|-------------------------|-------------------------|
| a. addition polymer | c. branched polymer |
| b. condensation polymer | d. cross-linked polymer |
- ___ 29. Structural isomers are defined as compounds that
- | |
|---|
| a. have identical molar masses. |
| b. have the same molecular orbitals. |
| c. have identical chemical formulas but different structures. |
| d. have the same Lewis structure, but different molecular orbital energies. |
| e. contain different isotopes of the same elements. |

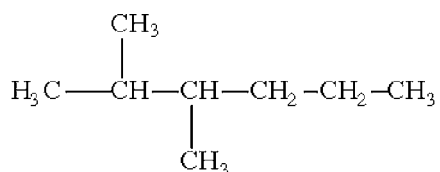
- _____ 30. All of the following statements regarding isomers are correct EXCEPT
- optical isomers have non-superimposable mirror images.
 - there are two types of stereoisomers, geometric and optical isomers.
 - enantiomers are pairs of non-superimposable molecules.
 - enantiomers have different physical properties, such as melting point and color.
 - molecules with non-superimposable mirror images are said to be chiral.
- _____ 31. Which of the following molecules has a chiral center?



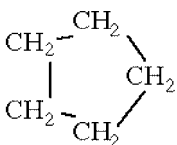
- 1 only
 - 2 and 3
 - 2 and 4
 - 3 and 4
 - 2, 3, and 4
- _____ 32. What is the general formula for an alkane?
- $\text{C}_n\text{H}_{2n+2}$
 - C_nH_{2n}
 - C_nH_{n-2}
 - C_{n+2}H_n
 - CH_{n+2}
- _____ 33. Which of the following molecules is an alkyne?
- C_3H_6
 - C_2H_2
 - C_4H_{10}
 - CH_4
 - C_2H_4
- _____ 34. Which of the following molecules may be a cycloalkane?
- C_2H_4
 - C_3H_4
 - C_4H_{10}
 - C_6H_{10}
 - C_5H_{10}
- _____ 35. What is the molecular formula for ethylene?
- CH_4
 - C_2H_2
 - C_2H_4
 - C_2H_6
 - C_3H_8

- _____ 36. How many structural isomers exist for C_5H_{12} ?
- 1
 - 2
 - 3
 - 4
 - 8
- _____ 37. Which of the following (non-cyclic) hydrocarbons has at least two π bonds?
- C_4H_8
 - $C_{10}H_{20}$
 - C_8H_{18}
 - C_5H_{12}
 - C_3H_4

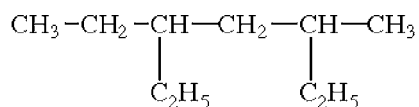
- _____ 38. What is the name of the following compound?



- 4,5-dihexane
 - 2,3-diethylhexane
 - 4,5-dimethane
 - 2,3-dimethylhexane
 - 4,5-dimethylhexane
- _____ 39. What is the name of the following compound?



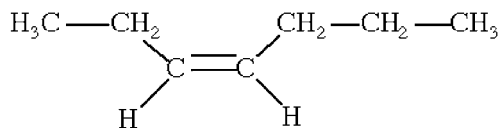
- pentane
 - cyclopentane
 - pentanone
 - pentanol
 - cyclopentene
- _____ 40. What is the name of the following compound?



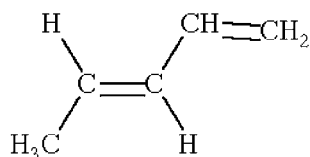
- 3-methyl-5-ethylheptane
- 3,5-diethylhexane
- 2-methyl-4-ethylpentane
- 2,4-diethylhexane
- 5-ethyl-3-methylheptane

- ____ 41. Which of the following hydrocarbons can have *cis* and *trans* isomers?
- butane
 - 2-pentyne
 - 3-hexene
 - 2-ethylbutane
 - propene

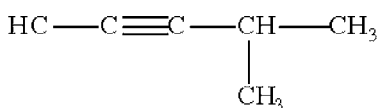
- ____ 42. What is the name of the following compound?



- cis*-4-propyl-3-butene
 - ethyl-propylethene
 - cis*-ethyl-propylethene
 - cis*-3-heptene
 - cis*-5-ethyl-4-pentene
- ____ 43. What is the name of the following compound?



- trans*-acetylene
 - trans*-1,3-pentadiene
 - trans*-2,4-pentadiene
 - trans*-4-methyl-1,3-butadiene
 - trans*-4-methyl-1,3-butene
- ____ 44. What is the name of the following compound?



- 4-methyl-2-pentyne
- 4,4-dimethylbutyne
- 4,4-dimethyl-2-butyne
- 2-methyl-3-pentyne
- 2-methyle-3,4-pentadyne

_____ 45. What is the molecular formula of this hydrocarbon?



- a. C_6H_6
- b. C_5H_{10}
- c. C_5H_9
- d. C_5H_8
- e. C_5H_6

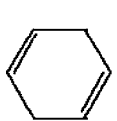
_____ 46. What is the molecular formula for 2,3,4-trimethyl-5-heptene?

- a. C_8H_{18}
- b. C_9H_{20}
- c. $C_{10}H_{20}$
- d. $C_{10}H_{22}$
- e. $C_{11}H_{22}$

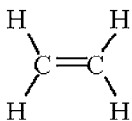
_____ 47. What is the balanced equation for the combustion of 2-methylpropene?

- a. $C_4H_8(g) + 6 O_2(g) \rightarrow 4 CO_2(g) + 4 H_2O(l)$
- b. $2 C_4H_{10}(g) + 13 O_2(g) \rightarrow 8 CO_2(g) + 10 H_2O(l)$
- c. $C_3H_8(g) + 5 O_2(g) \rightarrow 3 CO_2(g) + 4 H_2O(l)$
- d. $2 C_3H_8(g) + 7 O_2(g) \rightarrow 6 CO(g) + 8 H_2O(l)$
- e. $2 C_3H_6(g) + 9 O_2(g) \rightarrow 6 CO_2(g) + 6 H_2O(l)$

_____ 48. Which of the following compounds are aromatic?



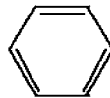
(1)



(2)



(3)



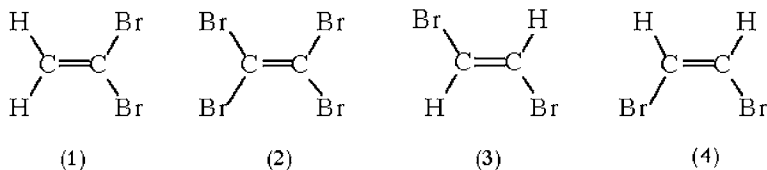
(4)

- a. 3 only
- b. 1 and 4
- c. 2 only
- d. 1, 2, and 4
- e. 4 only

_____ 49. An unsaturated hydrocarbon is

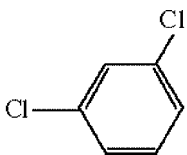
- a. a compound in which carbon atoms have double or triple bonds.
- b. a compound in which all carbon atoms have four single bonds.
- c. a hydrocarbon that contains oxygen.
- d. a cycloalkane with five or more carbons.
- e. a hydrocarbon that is a gas at room temperature.

____ 50. Which of the following molecules are polar?



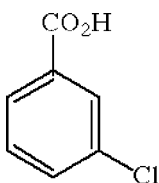
- a. 1 only
b. 2 and 3
c. 1, 2 and 3
d. 1, 3, and 4
e. 1 and 4
- ____ 51. What is the product of the addition of Cl_2 to propene?
a. chloropropene
b. 1,3-dichloropropane
c. dichloropropane
d. 1,2-dichloropropyne
e. 1,3-dichloropropene
- ____ 52. What is the product of the addition of HCl to ethylene?
a. chloroethane
b. chloroethene
c. 1,2-dichloroethane
d. 1,1-dichloroethane
e. ethane
- ____ 53. What is the product of the hydrogenation of *trans*-2-butene?
a. 2-hydroxybutane
b. 2,3-dihydroxybutane
c. *cis*-2-butene
d. butane
e. *trans*-2-butane
- ____ 54. How many isomers are possible for dichlorotoluene? Toluene is a benzene ring with a single methyl substituent.
a. 1
b. 2
c. 4
d. 6
e. 8

____ 55. What is the common name of the following molecule?



- a. *p*-dichlorobenzene
- b. 3-dichlorobenzene
- c. *m*-dichlorobenzene
- d. dichlorobenzene
- e. *o*-dichlorobenzene

____ 56. What is the name of the following benzene derivative?



- a. 3-chlorobenzoic acid
- b. 2-chlorobenzoic acid
- c. 1-nitro-3-chlorobenzene
- d. 1-carboxy-3-chlorobenzene
- e. 3-chlorotoluene

____ 57. All of the statements below concerning hydrocarbons are correct EXCEPT

- a. most are insoluble in water.
- b. most have only covalent bonding.
- c. most are gases at room temperature.
- d. they tend to be oxidized by O_2 to form CO_2 and H_2O .
- e. their solubility in nonpolar solvents are higher than in water.

____ 58. The process of cracking, which occurs in the refining of petroleum, is

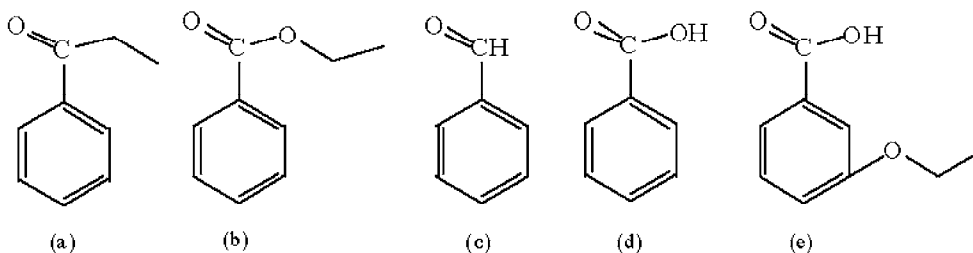
- a. the method by which hydrocarbons are separated.
- b. the method used to make oxygenated fuels.
- c. the method used to eliminate double or triple bonds.
- d. the fragmenting of longer chain hydrocarbons to smaller units.
- e. the method used to make high boiling point hydrocarbons.

____ 59. Which of the following chemical equations depicts an alkylation reaction?

- a. $C_6H_6(l) + CH_3Br(g) \rightarrow C_6H_5CH_3(l) + HBr(g)$
- b. $CH_3CH_2OH(l) + 3 O_2(g) \rightarrow 2 CO_2(g) + 3 H_2O(l)$
- c. $C_2H_2(g) + H_2(g) \rightarrow C_2H_4(g)$
- d. $C_2H_2(g) + 2 H_2(g) \rightarrow C_2H_6(g)$
- e. $C_6H_{12}(l) \rightarrow C_6H_{10}(l) + H_2(g)$

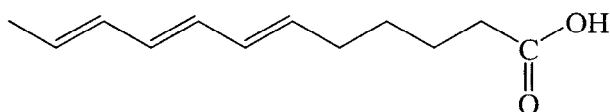
- _____ 60. Which of the following molecules is ethanol?
- C_2H_6
 - CH_3CO_2H
 - CH_3CHO
 - CH_3CH_2OH
 - CH_3OCH_3
- _____ 61. Which functional group does **not** contain an oxygen atom?
- alcohol
 - amine
 - amide
 - ester
 - ether
- _____ 62. The functional group RCO_2R' is characteristic of an _____.
- ether
 - ester
 - amide
 - aldehyde
 - amine
- _____ 63. The functional group $RCOR'$ is characteristic of an _____.
- ester
 - alcohol
 - amine
 - aldehyde
 - amide
- _____ 64. The $C=O$ linkage occurs in molecules with the following functional groups EXCEPT _____.
- esters
 - ketones
 - amines
 - carboxylic acids
 - aldehydes
- _____ 65. All of the following functional groups are members of the class of compounds known as carbonyls EXCEPT
- amides.
 - ethers.
 - aldehydes.
 - carboxylic acids.
 - ketones.
- _____ 66. When a secondary alcohol is oxidized, the product is a(n)
- ketone
 - aldehyde
 - ester
 - amine
 - amide
- _____ 67. Which of the following compounds might be used to oxidize an aldehyde to a carboxylic acid?
- HCl
 - $NaBH_4$
 - NaH
 - K
 - $KMnO_4$

- ___ 68. Which of the following alcohols is likely to be least soluble in water?
- 3-hexanol
 - 2-butanol
 - ethylene glycol
 - 2,3-butanediol
 - methanol
- ___ 69. Compounds from which class usually have offensive odors, such as that of decaying meat or bad breath?
- esters
 - ketones
 - amines
 - alcohols
 - carboxylic acids
- ___ 70. What is the product of the reaction of an aldehyde with potassium dichromate?
- ketone
 - alcohol
 - ester
 - alkane
 - carboxylic acid
- ___ 71. Of the following list of functional groups, which ones act as bases: carboxylic acids, alcohols, amines, ethers, and ketones?
- amines only
 - amines and ketones
 - amines, alcohols, and ketones
 - ketones and alcohols
 - carboxylic acids only
- ___ 72. What is the product of the reduction of propanone with sodium borohydride?
- sodium acetate
 - 2-propanol
 - acetone
 - propene
 - propanoic acid
- ___ 73. A mixture of ethanol and benzoic acid is heated in the presence of acid. What is the primary product of the reaction?



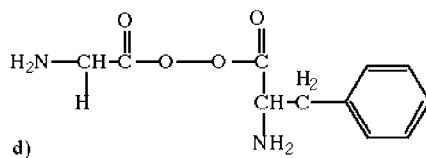
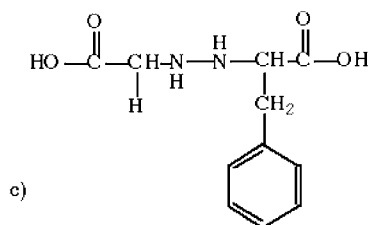
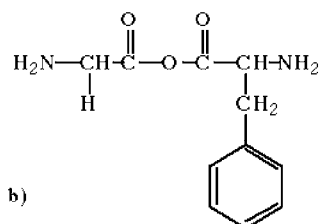
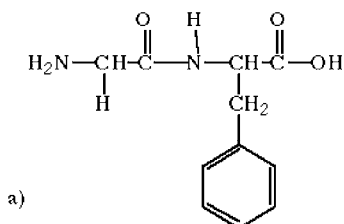
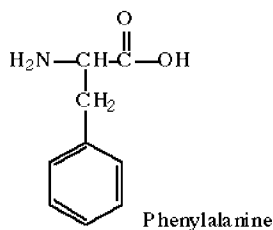
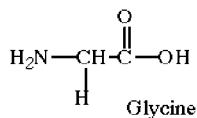
- Figure (a)
- Figure (b)
- Figure (c)
- Figure (d)
- Figure (e)

- _____ 74. What is the name of the product of the reaction that occurs when a mixture of methanol and butanoic acid is heated in the presence of acid?
- methyl butyl ether
 - butyl formate
 - methyl butanate
 - methylbutanol
 - 2-methylbutanone
- _____ 75. The hydrolysis of an ester in the presence of NaOH produces
- an ether and an alcohol.
 - an ether and a carboxylate ion.
 - an alcohol and an aldehyde.
 - an aldehyde and an ether.
 - a carboxylate ion and an alcohol.
- _____ 76. What class of compounds is responsible for many of the distinctive odors of artificial flavors and perfumes?
- esters
 - ethers
 - aldehydes
 - amides
 - amines
- _____ 77. What is the classification of the molecule below?



- alcohol
 - soap
 - aldehyde
 - fatty acid
 - polymer
- _____ 78. What is the monomer of Teflon?
- CH_2CH_2
 - CHFCHF
 - CF_2CH_2
 - CF_2CF_2
 - CHF CF_2
- _____ 79. All of the following statements concerning polymers are correct EXCEPT
- elastomers are materials that spring back to their original shape when stretched.
 - polymers formed from two or more different monomers are called copolymers.
 - thermoplastics can withstand very high temperatures without softening or melting.
 - polystyrene is nonpolar and dissolves well in nonpolar solvents.
 - a condensation reaction involves two different monomers, each with two different functional groups.

80. Amino acids polymerize in condensation reactions that result in the formation of an amide linkage (or peptide bond) between amino acid molecules. What is a possible dipeptide formed in the reaction of glycine with phenylalanine?

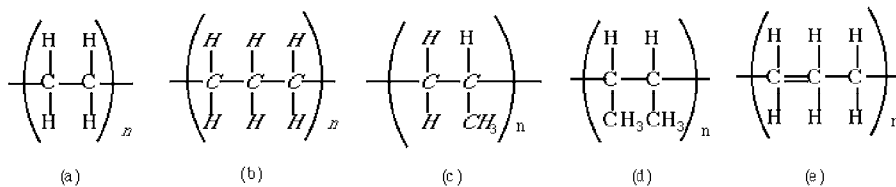


- a. Figure a
 b. Figure b
 c. Figure c
 d. Figure d
 e. none of the above
81. Polyethylene
- is an example of a condensation polymer.
 - reacts with methanol to form Dacron.
 - contains no double bonds.
 - contains equal numbers of *cis* and *trans* bonds.
 - cannot form branched chains.

Name: _____

ID: A

82. Polypropylene is used in bottles, carpet, and films. It is produced by the addition reaction of propylene (propene). What is the structure of the polymer produced in this reaction?



- a. Figure a
- b. Figure b
- c. Figure c
- d. Figure d
- e. Figure e

organic
Answer Section**MULTIPLE CHOICE**

1. ANS: B
2. ANS: B
3. ANS: C
4. ANS: D
5. ANS: C
6. ANS: D
7. ANS: D
8. ANS: B
9. ANS: D
10. ANS: D
11. ANS: C
12. ANS: D
13. ANS: C
14. ANS: B
15. ANS: B
16. ANS: A
17. ANS: C
18. ANS: C
19. ANS: A
20. ANS: A
21. ANS: B
22. ANS: A
23. ANS: B
24. ANS: B
25. ANS: C
26. ANS: A
27. ANS: B
28. ANS: A
29. ANS: C
30. ANS: D
31. ANS: D
32. ANS: A
33. ANS: B
34. ANS: E
35. ANS: C
36. ANS: C
37. ANS: E
38. ANS: D
39. ANS: B
40. ANS: E

- 41. ANS: C
- 42. ANS: D
- 43. ANS: B
- 44. ANS: A
- 45. ANS: D
- 46. ANS: C
- 47. ANS: A
- 48. ANS: E
- 49. ANS: A
- 50. ANS: E
- 51. ANS: B
- 52. ANS: A
- 53. ANS: D
- 54. ANS: D
- 55. ANS: C
- 56. ANS: A
- 57. ANS: C
- 58. ANS: D
- 59. ANS: A
- 60. ANS: D
- 61. ANS: B
- 62. ANS: B
- 63. ANS: E
- 64. ANS: C
- 65. ANS: B
- 66. ANS: A
- 67. ANS: E
- 68. ANS: A
- 69. ANS: C
- 70. ANS: E
- 71. ANS: A
- 72. ANS: B
- 73. ANS: B
- 74. ANS: C
- 75. ANS: E
- 76. ANS: A
- 77. ANS: D
- 78. ANS: D
- 79. ANS: C
- 80. ANS: A
- 81. ANS: C
- 82. ANS: C