



Date: 18.09.2022

Max Marks: 300

ABHIMANYU BATCH

PHYSICS: PART TEST

Topics: Ray Optics and Wave Optics

- Two slits in Young's double slit experiment have widths in the ratio 81 : 1. The ratio of the amplitudes of light waves is
(a) 3 : 1 (b) 3 : 2 (c) 9 : 1 (d) 6 : 1
- The intensity ratio of the maxima and minima in an interference pattern produced by two coherent sources of light is 9 : 1. The intensities of the used light sources are in ratio
(a) 3 : 1 (b) 4 : 1 (c) 9 : 1 (d) 10 : 1
- The two coherent sources with intensity ratio β produce interference. The fringe visibility will be
(a) $\frac{2\sqrt{\beta}}{1 + \beta}$ (b) 2β (c) $\frac{2}{(1 + \beta)}$ (d) $\frac{\sqrt{\beta}}{1 + \beta}$
- In Young's double slit experiment the ratio of intensity of the maxima and minima in the interference experiment is 25 : 9. The ratio of widths of two slits is
(a) 18 : 3 (b) 4 : 1 (c) 8 : 1 (d) 16 : 1
- In Young's double slit experiment, one of the slits is wider than the other, so that the amplitude of the light from one slit is double that from the other slit. If I_m be the maximum intensity, the resultant intensity when they interfere at phase difference ϕ is given by
(a) $\frac{I_m}{3} \left(1 + 2 \cos^2 \frac{\phi}{2} \right)$ (b) $\frac{I_m}{5} \left(1 + 4 \cos^2 \frac{\phi}{2} \right)$ (c) $\frac{I_m}{9} \left(1 + 8 \cos^2 \frac{\phi}{2} \right)$ (d) $\frac{I_m}{9} \left(8 + \cos^2 \frac{\phi}{2} \right)$

Space for Rough Work



6. In Young's double slit experiment the slits are separated by 0.28 mm and the screen is placed 1.4 m away. The distance between the central and fourth bright fringe is measured to be 1.2 cm. The wavelength of light used in the experiment is
 (a) 6×10^{-7} m (b) 3×10^{-7} m (c) 1.5×10^{-7} m (d) 5×10^{-6} m
7. The slits in Young's double slit experiment are illuminated by light of wavelength 6000 Å. If the path difference at the central bright fringe is zero, what is the path difference for light from the slits at the fourth bright fringe?
 (a) 2.4×10^{-6} m (b) 1.2×10^{-6} m (c) 10^{-6} m (d) 0.5×10^{-6} m
8. In a double slight slit experiment, the distance between the slits is d. The screen is at a distance D from the slits. If a bright fringe is formed opposite to one of the slits, its order is
 (a) $\frac{d}{\lambda}$ (b) $\frac{\lambda^2}{dD}$ (c) $\frac{D^2}{2\lambda d}$ (d) $\frac{d^2}{2D\lambda}$
9. In Young's double slit experiment, the 10th maximum of wavelength λ_1 is at a distance y_1 from its central maximum and the 5th maximum of wavelength λ_2 is at a distance y_2 from its central maximum. The ratio y_1/y_2 will be
 (a) $\frac{2\lambda_1}{\lambda_2}$ (b) $\frac{2\lambda_2}{\lambda_1}$ (c) $\frac{\lambda_1}{2\lambda_2}$ (d) $\frac{\lambda_2}{2\lambda_1}$
10. A narrow slit of width 2 mm is illuminated by monochromatic light of wavelength 500 nm. The distance between the first minima on either side on a screen at a distance of 1 m is
 (a) 5 mm (b) 0.5 mm (c) 1 mm (d) 10 mm
11. The two slits are 1 mm apart from each other and illuminated with a light of wavelength 5×10^{-7} m. If the distance of the screen is 1 m from the slits, then the distance between third dark fringe and fifth bright fringe is
 (a) 1.2 mm (b) 0.75 mm (c) 1.25 mm (d) 0.625 mm
12. Young's experiment is performed with light of wavelength 6000 Å wherein 16 fringes occupy a certain region on the screen. If 24 fringes occupy the same region with another light of wavelength λ , then λ is
 (a) 6000 Å (b) 4500 Å (c) 5000 Å (d) 4000 Å

Space for Rough Work



13. Two source of light of wavelength 2500 \AA and 3500 \AA are used in Young's double slight experiment simultaneously. Which orders of fringes of two wavelength patterns coincide?
- (a) 3^{rd} order of 1^{st} source and 5^{th} of the 2^{nd} (b) 7^{th} order of 1^{st} and 5^{th} order of 2^{nd}
(c) 5^{th} order of 1^{st} and 3^{rd} order of 2^{nd} (d) 5^{th} order of 1^{st} and 7^{th} order of 2^{nd}
14. Young's double slit experiment uses a monochromatic source of light. The shape of interference fringes formed on the screen is
- (a) parabola (b) straight line (c) circle (d) hyperbola
15. Two beams of red and violet color are made to pass separately through a prism (angle of the prism is 60°). In the position of minimum deviation, the angle of refraction will be
- (a) 30° for both the colors (b) greater for the violet colour
(c) greater for the red color (d) equal but not 30° for both the colors
16. A ray of light passes through an equilateral prism (refractive index 1.5) such that angle of incidence is equal to angle of emergence and the latter is equal to $3/4^{\text{th}}$ of the angle of prism. The angle of deviation is
- (a) 60° (b) 30° (c) 45° (d) 120°
17. A ray is incident at an angle of incidence i on one surface of a prism of small angle A and emerges normally from opposite surface. If the refractive index of the material of prism is μ , the angle of incidence i is nearly equal to
- (a) $\frac{A}{\mu}$ (b) $\frac{A}{2\mu}$ (c) μA (d) $\frac{\mu A}{2}$
18. The angle of minimum deviation for prism of angle $\pi/3$ is $\pi/6$, if the velocity of light in vacuum is $3 \times 10^8 \text{ ms}^{-1}$, then the velocity of light in material of the prism is
- (a) $2.12 \times 10^8 \text{ ms}^{-1}$ (b) $1.12 \times 10^8 \text{ ms}^{-1}$ (c) $4.12 \times 10^8 \text{ ms}^{-1}$ (d) $5.12 \times 10^8 \text{ ms}^{-1}$
19. For a glass prism ($\mu = \sqrt{3}$) the angle of minimum deviation is equal to the angle of the prism. The angle of the prism is
- (a) 45° (b) 30° (c) 90° (d) 60°

Space for Rough Work



20. A ray of light is incident at 60° on one face of a prism of angle 30° and the emergent ray makes 30° with the incident ray. The refractive index of the prism is
- (a) 1.732 (b) 1.414 (c) 1.5 (d) 1.33
21. A small angle prism ($\mu = 1.62$) gives a deviation of 4.8° . The angle of prism is
- (a) 5° (b) 6.36° (c) 3° (d) 7.74°
22. Which of the following colours of white light deviated most when passes through a prism?
- (a) Red light (b) Violet light (c) Yellow light (d) Both (a) and (b)
23. Which light is incident normally on a glass slab. Inside the glass slab
- (a) red light travels faster than other colours (b) violet light travels faster than other colours
- (c) yellow light travels faster than other colours (d) all colours travel with the same speed
24. For a total internal reflection, which of the following is correct?
- (a) Light travel from rarer to denser medium (b) Light travel from denser to rarer medium
- (c) Light travels in air only (d) Light travels in water only
25. Light travels in two media A and B with speeds $1.8 \times 10^8 \text{ ms}^{-1}$ and $2.4 \times 10^8 \text{ ms}^{-1}$ respectively. Then the critical angle between them is
- (a) $\sin^{-1}\left(\frac{2}{3}\right)$ (b) $\tan^{-1}\left(\frac{3}{4}\right)$ (c) $\tan^{-1}\left(\frac{2}{3}\right)$ (d) $\sin^{-1}\left(\frac{3}{4}\right)$

Space for Rough Work

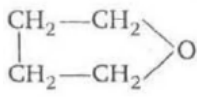
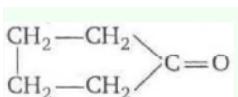
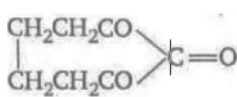
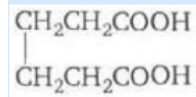
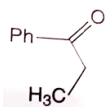
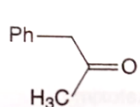
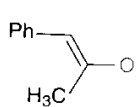
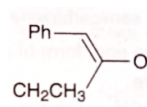


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ABHIMANYU BATCH
CHEMISTRY: PART TEST

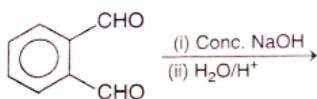
Topic: Aldehydes, Ketones and Carboxylic Acid

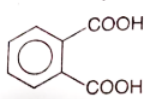
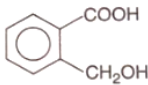
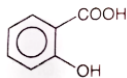
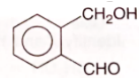
26. Which of the following on heating with aqueous KOH, produces acetaldehyde?
(a) CH_3COCl (b) $\text{CH}_3\text{CH}_2\text{Cl}$ (c) $\text{CH}_2\text{ClCH}_2\text{Cl}$ (d) CH_3CHCl_2
27. Which one of the following product is formed when calcium salt of adipic acid is heated ?
(a)  (b)  (c)  (d) 
28. The reagent used in Gattermann-Koch aldehyde
(a) Pb/BaSO_4 (b) alkaline KMnO_4 (c) acidic KMnO_4 (d) $\text{CO} + \text{HCl}$
29. When ethanol reacts with PCl_5 , then product formed is
(a) vic-chloride (b) gem-chloride (c) 2,2 dichloroethanal (d) syn-dichloroethane
30. In the following reaction, $\text{CH}_3\text{COCl} \xrightarrow[\text{Pd/H}_2]{\text{BaSO}_4} \text{X}$, Identify X out of the following.
(a) Acetaldehyde (b) Propionaldehyde (c) Acetone (d) Acetic anhydride
31. $\text{Ethyne} + \text{H}_2\text{O} \xrightarrow[\text{H}_2\text{SO}_4]{\text{HgSO}_4} \text{Product}$
Product formed in the given reaction is
(a) benzaldehyde (b) acetaldehyde (c) ethanoic acid (d) ethanoyl chloride
32. $\text{Ph}-\text{C}\equiv\text{C}-\text{CH}_3 \xrightarrow{\text{Hg}^{2+}/\text{H}^+} \text{A, A}$
(a)  (b)  (c)  (d) 

Space for Rough Work

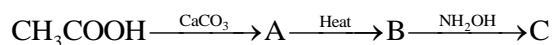


33. The reagent with which both acetaldehyde and acetone react is
 (a) Fehling's solution (b) $I_2/NaOH$
 (c) Tollen's reagent (d) carbonic acid
34. Which of the following reactions convert acetone into hydrocarbon having same number of carbon atoms?
 (a) Wolff-Kishner reaction (b) Hofmann reaction
 (c) Grignard reaction (d) Reduction with $LiAlH_4$
35. In a reaction $RCHO$ is reduced to RCH_3 using amalgamated zinc and concentrated HCl and warming the solution. The reaction is known as
 (a) Meerwein-Pondorf reaction (b) Clemmensen's reduction
 (c) Wolff-Kishner reduction (d) Schiff's reaction
36. An organic compound X is oxidised by using acidified $K_2Cr_2O_7$. The product obtained reacts with phenyl hydrazine but does not give silver mirror test. The possible structure of X is
 (a) CH_3CH_2OH (b) $CH_3 - \overset{\overset{O}{\parallel}}{C} - CH_3$ (c) $(CH_3)_2CHOH$ (d) CH_3CHO
37. A compound X undergoes reduction with $LiAlH_4$ to yield Y. When vapours of Y are passed over freshly reduced copper at $300^\circ C$, X is formed. What is Y?
 (a) CH_3COCH_3 (b) CH_3CHO (c) CH_3CH_2OH (d) CH_3OCH_3
38. Predict the product for the reaction below:



- (a)  (b)  (c)  (d) 

39. The end product C in the following sequence of chemical reaction is



- (a) acetaldehyde oxime (b) formaldehyde oxime
 (c) methyl nitrate (d) acetoxime

Space for Rough Work



40. The product formed when hydroxylamine condenses with a carbonyl compound is called
(a) hydrazide (b) oxime (c) hydrazine (d) hydrazone
41. Benzaldehyde on refluxing with aqueous alc. KCN produce
(a) cyanobenzene (b) cyanohydrin (c) benzoyl cyanide (d) benzoin
42. Which of the following does not undergo Cannizzaro's reaction?
(a) Benzaldehyde (b) 2-methylpropanal
(c) p-methoxybenzaldehyde (d) 2,2-dimethylpropanal
43. Which of the following is an 'acetaldoxime'?
(a) $\text{CH}_3\text{CH}=\text{N}-\text{NH}_2$ (b) $\text{CH}_3\text{CH}=\text{N}-\text{OH}$ (c) $(\text{CH}_3)_2\text{C}=\text{N}-\text{OH}$ (d) $\text{CH}_2=\text{N}-\text{OH}$
44. $\text{CH}_3\text{CHO} \xrightarrow{\text{HCN}} \text{A} \xrightarrow{\text{HOH}} \text{B}$. The product B is
(a) malonic acid (b) glycolic acid (c) lactic acid (d) malic acid
45. Which of the following does not react with NaHSO_3 ?
(a) CH_3COCH_3 (b) CH_3CHO (c) HCHO (d) None of these
46. $\text{OHC}-\text{CHO} \xrightarrow{\text{OH}^-} \text{HOH}_2\text{C}-\text{COOH}$. The reaction given is
(a) aldol condensation (b) knoevenagel reaction
(c) Cannizzaro reaction (d) None of these
47. The reaction of acetaldehyde with Tollen's reagent gives
(a) silver acetate (b) methyl alcohol (c) formaldehyde (d) acetic acid
48. The hydrolysis product of $\text{CH}_3\text{COCH}_3 + \text{CH}_3\text{MgBr}$ is
(a) n-butyl alcohol (b) tertiary butyl alcohol
(c) secondary butyl alcohol (d) iso-propyl alcohol
49. Aldehyde are the first oxidation product of
(a) primary alcohol (b) Secondary alcohol (c) tertiary alcohol (d) dihydric alcohol
50. $\text{C}_3\text{H}_6\text{O}$ did not give a silver mirror with Tollen's reagent, but gave an oxime with hydroxylamine. It can give positive
(a) Iodoform test (b) Fehling's test
(c) Schiff's test (d) carbylamines testenzoic acid

Space for Rough Work

**BJNP***Learning with the Speed of Mumbai and the Tradition of Kota***Date: 18.09.2022**

ABHIMANYU BATCH
MATHEMATICS : PART TEST
Topics: Definite and Indefinite Integration

51. $\int_0^1 (\sec^{-1} x + \operatorname{cosec}^{-1} x) dx = \dots$

- (a) π (b) $\frac{\pi}{3}$ (c) $\sin^{-1} x + \cos^{-1} x$ (d) $-\frac{\pi}{2}$

52. If $\int_0^{\pi/2} \frac{1}{\sqrt{1 + \cos x}} dx = a \log(1 + b)$, then $a^2 + b^2 = \dots$

- (a) 1 (b) 2 (c) 3 (d) 4

53. If $\int_0^{\pi/2} \frac{x}{1 + \cos x} dx = \frac{\pi}{2} + a$, then $a = \dots$

- (a) $\log \frac{1}{2}$ (b) $\log 2$ (c) $\frac{1}{2} \log 2$ (d) $-\frac{1}{2} \log 2$

54. $\int_0^{\pi/2} \frac{\cos x}{1 + \sin^2 x} dx = \dots$

- (a) $\frac{\pi}{2}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) π

Space for Rough Work



55. $\int_0^3 x^2 (3-x)^{1/2} dx = \dots$

- (a) $\frac{144\sqrt{3}}{30}$ (b) $144\sqrt{3}$ (c) $\frac{144\sqrt{3}}{35}$ (d) $\frac{144\sqrt{3}}{70}$

56. If $\int_2^3 \frac{1}{x(x^3-1)} dx = \frac{1}{3} \log p$, then value of $p = \dots$

- (a) $\frac{189}{208}$ (b) $\frac{208}{189}$ (c) $\frac{208}{63}$ (d) $\frac{26}{27}$

57. $\int_0^1 x \tan^{-1} x dx = \dots$

- (a) $\frac{\pi}{4} - \frac{1}{2}$ (b) $\frac{\pi}{4} + \frac{1}{2}$ (c) $\frac{1}{2} - \frac{\pi}{4}$ (d) $\frac{\pi}{2} - \frac{1}{2}$

58. $\int_0^{\pi/2} \frac{\sin x \cos x}{1 + \sin^4 x} dx = \dots$

- (a) $\frac{\pi}{8}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{2}$

59. If $\int_0^1 \tan^{-1} x dx = a$, then the value of $\int_0^1 \tan^{-1} \left(\frac{1+x}{1-x} \right) dx$ is

- (a) $\pi + a$ (b) $\frac{\pi}{4} - a$ (c) $\frac{\pi}{4} + a$ (d) $\pi - a$

60. If $\int_{\pi/4}^{\pi/2} e^x (\log \sin x + \cot x) dx = \frac{1}{2} e^x \log 2$ then value of $a = \dots$

- (a) $\frac{\pi}{2}$ (b) $\frac{\pi}{4}$ (c) $-\frac{\pi}{4}$ (d) $-\frac{\pi}{2}$

Space for Rough Work

**BJNP***Learning with the Speed of Mumbai and the Tradition of Kota*

61. $\int_0^{\pi} \sin^6 x \cos^5 x \, dx = \dots$
- (a) 1 (b) 2 (c) -1 (d) 0
62. $\int_0^{\pi/2} \frac{\sin x + \cos x}{\sqrt{1 + \sin 2x}} \, dx = \dots$
- (a) $\frac{\pi}{4}$ (b) π (c) $\frac{\pi}{2}$ (d) $-\frac{\pi}{2}$
63. The value of $\int_{1/2}^2 \frac{1}{x} \operatorname{cosec}^{101} \left(x - \frac{1}{x} \right) \, dx = \dots$
- (a) 0 (b) $\frac{1}{4}$ (c) 1 (d) 101
64. $\int \frac{5 \cos^3 x + 6 \sin^3 x}{2 \sin^2 x \cos^2 x} \, dx = \dots$
- (a) $\frac{5}{2} \operatorname{cosec} x + 3 \sec x + c$ (b) $\frac{5}{2} \operatorname{cosec} x - 3 \sec x + c$
- (c) $-\frac{5}{2} \operatorname{cosec} x - 3 \sec x + c$ (d) $-\frac{5}{2} \operatorname{cosec} x + 3 \sec x + c$
65. If $\int \frac{\sin 3x}{\sin x} \, dx = Px + \frac{Q \tan x}{1 + R \tan^2 x} + c$, then $P - Q + R = \dots$
- (a) 1 (b) 2 (c) 0 (d) 4
66. If $\int \frac{\cos 4x}{\sin^2 2x} \, dx = A \cot 2x + Bx + c$, then $A - B = \dots$
- (a) $\frac{3}{2}$ (b) $-\frac{3}{2}$ (c) $\frac{5}{2}$ (d) $-\frac{5}{2}$

Space for Rough Work



67. If $\int \cos x \cdot \cos 3x \cdot \sin 5x \, dx = \frac{1}{4} \left[-\frac{1}{p} \cos 9x - \frac{1}{q} \cos x - \frac{1}{r} \cos 7x - \frac{1}{s} \cos 3x \right] + c$, then $p + q - r - s = \dots$
- (a) 3 (b) 2 (c) 1 (d) 0
68. If $\int \frac{1}{\sqrt{2x+1} - \sqrt{2x-1}} \, dx = \frac{1}{6} [(2x+1)^p + (2x-1)^q] + c$, then
- (a) $p = q$ (b) $p \neq q$ (c) $p + q = 1$ (d) $p + q = 0$
69. $\int \left(\frac{1 - \tan x}{1 + \tan x} \right)^2 \, dx = \dots$
- (a) $-\tan\left(\frac{\pi}{4} - x\right) + x + c$ (b) $\tan\left(\frac{\pi}{4} - x\right) - x + c$
- (c) $\tan\left(\frac{\pi}{4} - x\right) + x + c$ (d) $-\tan\left(\frac{\pi}{4} - x\right) - x + c$
70. If $\int \frac{3x+2}{x-1} \, dx = Ax + B \log |x-1| + c$, then $\frac{1}{3}A - \frac{1}{5}B = \dots$
- (a) $\frac{2}{15}$ (b) $\frac{8}{15}$ (c) 0 (d) 1
71. $\int \frac{(3 \sin x - 5) \cos x}{2 \sin x + 1} \, dx = \dots$
- (a) $\frac{3}{2} \sin x - \frac{13}{4} \log |2 \sin x + 1| + c$ (b) $\frac{3}{2} \sin x + \frac{13}{4} \log |2 \sin x + 1| + c$
- (c) $\frac{3}{2} \cos x - \frac{13}{4} \log |2 \sin x + 1| + c$ (d) $\frac{3}{2} \sin x - \frac{13}{4} \log |3 \sin x + 5| + c$
72. If $\int \left(\frac{6e^x + 5}{2e^x - 1} \right) f'(x) \, dx = 3e^x + \log |2e^x - 1| + c$, then $f(x) = \dots$
- (a) $2e^x$ (b) e^x (c) $2e^x - 1$ (d) $6e^x + 5$

Space for Rough Work



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73. If $\int \frac{e^{4x} + 1}{e^{4x} - 1} dx = p \log|e^{qx} - e^{rx}| + c$, then $p(q + r) = \dots$

- (a) $\frac{1}{2}$ (b) 0 (c) 2 (d) $-\frac{1}{2}$

74. If $\int \tan^{-1} x \cdot (x^2 + 1)^{-1} dx = A(\tan^{-1} x)^B + c$, then $A + B = \dots$

- (a) 0 (b) -1 (c) 1 (d) $\frac{5}{2}$

75. If $\int \sqrt{(1 + \sin x)^3} f(x) dx = \frac{2}{5} (1 + \sin x)^{5/2} + c$, then $f(x) = \dots$

- (a) $\sin x$ (b) $\operatorname{cosec} x$ (c) $\cos x$ (d) 1

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ABHIMANYU BATCH
PHYSICS: PART TEST - ANSWER KEY
Topics: Ray Optics and Wave Optics

| | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1. | (c) | 2. | (b) | 3. | (a) | 4. | (d) | 5. | (c) |
| 6. | (a) | 7. | (a) | 8. | (d) | 9. | (a) | 10. | (b) |
| 11. | (c) | 12. | (d) | 13. | (b) | 14. | (d) | 15. | (a) |
| 16. | (b) | 17. | (c) | 18. | (a) | 19. | (d) | 20. | (a) |
| 21. | (d) | 22. | (b) | 23. | (a) | 24. | (b) | 25. | (d) |

ABHIMANYU BATCH
CHEMISTRY: PART TEST ANSWER KEY
Topic: Aldehydes, Ketones and Carboxylic Acid

| | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 26. | (d) | 27. | (b) | 28. | (d) | 29. | (b) | 30. | (a) |
| 31. | (b) | 32. | (a) | 33. | (b) | 34. | (a) | 35. | (b) |
| 36. | (c) | 37. | (c) | 38. | (b) | 39. | (d) | 40. | (b) |
| 41. | (d) | 42. | (d) | 43. | (b) | 44. | (c) | 45. | (d) |
| 46. | (c) | 47. | (d) | 48. | (b) | 49. | (a) | 50. | (a) |

ABHIMANYU BATCH
MATHEMATICS : PART TEST
Topics: Definite and Indefinite Integration
ANSWER KEY

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 51. | (a) | 52. | (c) | 53. | (b) | 54. | (d) | 55. | (c) |
| 56. | (a) | 57. | (b) | 58. | (d) | 59. | (a) | 60. | (d) |
| 61. | (c) | 62. | (d) | 63. | (b) | 64. | (d) | 65. | (c) |
| 66. | (b) | 67. | (c) | 68. | (c) | 69. | (a) | 70. | (c) |
| 71. | (c) | 72. | (c) | 73. | (a) | 74. | (b) | 75. | (d) |