

Important Instructions:-

1. Immediately fill in the particulars on this page of the Test with Black/Blue Ball Point .
2. The test is of **70** minutes duration.
3. The Test consists of **75** questions.
4. The maximum marks are **240**.
5. There are three parts in the question paper I, II, III consisting of Quick Answer Types ,Logical and Analytical Reasoning and Aptitude respectively
6. **PART I** carries question of **2** marks.
7. **PART II** carries question of **4** marks.
8. **PART III** carries question of **4** marks.
9. Quick Answer Type questions will be applicable for 10 minutes.
10. Candidates will be awarded marks as stated above in instruction No. 6, 7, and 8 for correct response of each question.
11. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.
12. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response
13. For writing particulars/markings responses on Side-1 and Side-2 of the Answer Sheet use only Black Ball Point Pen provided in the examination hall.
14. No candidate is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. except the Admit Card inside the examination room/ hall.
15. Rough work is to be done on the space provided for this purpose in the Test Booklet only. This space is given at the bottom of each page.
16. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall.
17. In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
18. Do not fold or make any stray mark on the Answer Sheet.
19. **25% negative marking for incorrect questions.**

Name of the Candidate (in Capital letters) : _____

Roll Number : in figures _____

: in words _____

Name of Examination Centre (in Capital letters) : _____

Candidate's Signature

2. Invigilator's Signature : _____

1. Invigilator's Signature : _____

Part I

QUICK ANSWER TYPES

1. $\frac{3+\sqrt{6}}{5\sqrt{3}-2\sqrt{12}-\sqrt{30}+\sqrt{50}} = ?$

- (A) 3
- (B) $3\sqrt{2}$
- (C) 6
- (D) None of these

2. $1.5^2 \times \sqrt{0.0225} = ?$

- (A) 0.0375
- (B) 0.3375
- (C) 3.275
- (D) 32.75

3. If $a = \frac{\sqrt{5}+1}{\sqrt{5}-1}$, $b = \frac{\sqrt{5}-1}{\sqrt{5}+1}$ then find the value of $\left[\frac{a^2+ab+b^2}{a^2-ab+b^2} \right]$ is?

- (A) $3/4$
- (B) $4/3$
- (C) $3/5$
- (D) $5/3$

4. If $x \times y = x + y + \sqrt{xy}$, The value of 6×24 is:

- (A) 41
- (B) 42
- (C) 43
- (D) 44

5. Find the value of $\sqrt{\frac{1.21 \times 0.9}{1.1 \times 0.11}}$?

- (A) 0
- (B) 1
- (C) 3
- (D) 5

6. If $x = 2 + 2^{\frac{2}{3}} + 2^{\frac{1}{3}}$ then find the value of $x^3 - 6x^2 + 6x$?

- (A) 1
- (B) 2
- (C) 3
- (D) 4

7. If $\log 27 = 1.431$, then the value of $\log 9$ is?

- (A) 0.754
- (B) 0.854
- (C) 0.954
- (D) 0.654

8. The value of $\left(\frac{1}{\log_3 60} + \frac{1}{\log_4 60} + \frac{1}{\log_5 60} \right)$ is?

- (A) 0
- (B) 1
- (C) 5
- (D) 60

9. If $\log_7(2) = m$, then $\log_{49}(28)$ is equal to?

- (A) $\{1/(1 + 2m)\}$
- (B) $\{1 + 2m\}/2$
- (C) $\{2m/(2m + 1)\}$
- (D) $\{2m + 1\}/2m$

10. If $1.5x = 0.04y$, then the value of $\frac{(y - x)}{(y + x)}$ is:

- (A) $73/77$
- (B) $7.3/77$
- (C) $730/77$
- (D) $7300/77$

11. What decimal of an hour is a second?
 (A) .0028
 (B) .0027
 (C) .0026
 (D) .0025
12. The rational for the recurring decimal 0.125125.....is?
 (A) $\frac{125}{99}$
 (B) $\frac{125}{999}$
 (C) $\frac{125}{9999}$
 (D) $\frac{125}{9}$
13. How many terms are in the G.P. 3,6,12,24,.....,384?
 (A) 8
 (B) 9
 (C) 10
 (D) 11
14. The product of two numbers is 2028 and their H.C.F. is 13. The number of such pairs is:
 (A) 1
 (B) 2
 (C) 3
 (D) 4
15. Product of two co-prime numbers is 117. Their L.C.M should be?
 (A) 1
 (B) 117
 (C) Equal to their H.C.F
 (D) Cannot be calculated
16. The L.C.M of two numbers is 495 and their H.C.F is 5. If the sum of the numbers is 100. then their difference is?
 (A) 10
 (B) 46
 (C) 70
 (D) 90
17. Three numbers are in the ratio 4:5:6 and their average is 25. The largest number is?
 (A) 30
 (B) 40
 (C) 50
 (D) 60
18. Three times the first of three consecutive odd integers is 3 more than twice the third. The third integer is?
 (A) 12
 (B) 137
 (C) 14
 (D) 15
19. If $3\sqrt{5} + \sqrt{125} = 17.88$, then what will be the value of $\sqrt{80} + 6\sqrt{5}$?
 (A) 13.41
 (B) 20.46
 (C) 21.66
 (D) 22.35
20. $\sqrt{\left(\frac{(0.75)^3}{1-0.75} + [0.75 + (0.75)^2 + 1]\right)} = ?$
 (A) 1
 (B) 2
 (C) 3
 (D) 4

21. The average of five consecutive odd numbers is 61. What is the difference between the highest and lowest numbers:
 (A) 4
 (B) 8
 (C) 12
 (D) 16
22. The average of 20 numbers is zero. Of them, at the most, how many may be greater than zero?
 (A) 0
 (b) -1
 (C) 1
 (d) none of these
23. A student was asked to find the arithmetic mean of the numbers 3, 11, 7, 9, 15, 13, 8, 19, 17, 21, 14 and x. He found the mean to be 12. What should be the number in place of x?
 (A) 6
 (B) 7
 (C) 8
 (D) 9
24. Which of the following fractions is greater than $\frac{3}{4}$ and less than $\frac{5}{6}$?
 (A) $\frac{3}{5}$
 (B) $\frac{4}{5}$
 (C) $\frac{7}{5}$
 (D) $\frac{9}{5}$
25. $3 \times 0.3 \times 0.03 \times 0.003 \times 30 = ?$
 (A) 0.0000243
 (B) 0.000243
 (C) 0.00243
 (D) 0.0243
26. When 0.232323.... is converted into a fraction, then the result is?
 (A) $\frac{1}{5}$
 (B) $\frac{2}{9}$
 (C) $\frac{23}{99}$
 (D) $\frac{23}{100}$
27. Evaluate: $\frac{3.39^2 - 2.61^2}{3.39 - 2.69} ?$
 (A) 3
 (B) 4
 (C) 6
 (D) 1
28. $(10.3 \times 10.3) \times 10.3 + 1 / (10.3 \times 10.3 - 10.3 + 1)$ is:
 (A) 11.3
 (B) 12.3
 (C) 13.3
 (D) 14.3
29. $138.009 + 341.981 - 146.305 = 123.6 + ?$
 (A) 120.085
 (B) 199.57
 (C) 295.05
 (D) None of these
30. $(0.2 \times 0.2 + 0.01) (0.1 \times 0.1 + 0.02)^{-1}$ is equal to?
 (A) $\frac{5}{3}$
 (B) $\frac{9}{5}$
 (C) $\frac{41}{4}$
 (D) $\frac{41}{12}$

PART II
APTITUDE

31. Identify the rule and find the missing Number in place of the question mark?

| | | |
|----|----|----|
| 41 | 43 | 4 |
| 47 | 53 | 36 |
| ? | 61 | 4 |

- (A) 57
(B) 59
(C) 63
(D) 67
32. Tea worth of Rs. 135/kg & Rs. 126/kg are mixed with a third variety in the ratio 1:1:2. If the mixture is worth Rs. 153 per kg, the price of the third variety per kg will be___?
- (A) Rs. 169.50
(B) Rs. 170.00
(C) Rs. 175.50
(D) Rs. 180
33. A can do a piece of work in 10 days, B in 15 days. They work together for 5 days, the rest of the work is finished by C in two more days. If they get Rs. 3000 as wages for the whole work, what are the daily wages of A, B and C respectively (in Rs):
- (A) 200, 250, 300
(B) 300, 200, 250
(C) 200, 300, 400
(D) None of these
34. Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?
- (A) 25200
(B) 52000
(C) 120
(D) 24400
35. If $\log 27 = 1.431$, then the value of $\log 9$ is?
- (A) 0.754
(B) 0.854
(C) 0.954
(D) 0.654
36. 12 men can complete a work in 8 days. 16 women can complete the same work in 12 days. 8 men and 8 women started working and worked for 6 days. How many more men are to be added to complete the remaining work in 1 day?
- (A) 8
(B) 12
(C) 16
(D) 24
37. A milkman purchases the milk at Rs. x per litre and sells it at Rs. $2x$ per litre still he mixes 2 litres water with every 6 litres of pure milk. What is the profit percentage?
- (A) 116%
(B) 166.66%
(C) 60%
(D) 100%

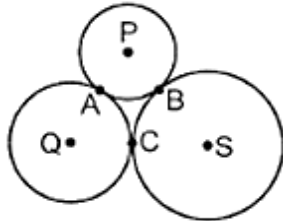
38. A clock is set right at 5 a.m. the clock loses 16 minutes in 24 hours. What will be the true time when the clock indicates 10 p.m. on 4th day?
- (A) 11 pm
(B) 12 pm
(C) 1 pm
(D) 2 pm
39. A man walked diagonally across a square lot. Approximately, what was the percent saved by not walking along the edges?
- (A) 30
(B) 40
(C) 50
(D) 60
40. A can contains a mixture of two liquids A and B in the ratio 7:5. When 9 litres of mixture are drawn off and the can is filled with B, the ratio of A and B becomes 7:9. How many litres of liquid A was contained by the can initially?
- (A) 10
(B) 20
(C) 21
(D) 25
41. A rectangular courtyard 3.78 meters long 5.25 meters wide is to be paved exactly with square tiles, all of the same size. what is the largest size of the tile which could be used for the purpose?
- (A) 14 cms
(B) 21 cms
(C) 42 cms
(D) None of these
42. The least multiple of 7, which leaves a remainder of 4, when divided by 6,9,15 and 18 is:
- (A) 74
(B) 94
(C) 184
(D) 364
43. Two numbers are respectively 20% and 50% more than a third number. The ratio of the two numbers is:
- (A) 2:5
(B) 3:5
(C) 4:5
(D) 5:4
44. In a 100 m race, A beats B by 10 m and C by 13 m. In a race of 180 m, B will beat C by:
- (A) 5.4m
(B) 4.5m
(C) 5m
(D) 6m
45. Salaries of Ravi and Sumit are the ratio 2:3 if the salary of each is increased by Rs. 4000, The new ratio becomes 40:57. what is sumit's salary?
- (A) 38000
(B) 46800
(C) 36700
(D) 50000

PART III
SUBJECT BASED
MATH

46. Simplify $\left[3\sqrt{6\sqrt{a^9}}\right]^4 \left[6\sqrt{3\sqrt{a^9}}\right]^4$; the result is:

- (A) a^{16}
 (B) a^{12}
 (C) a^8
 (D) a^4

47. Circles P, Q & S are mutually tangent externally as shown in the figure at point A, B & C. If the radii of circles P, Q & S are 1, 2 and 3 respectively then the length of chord AB is _____.



- (A) 1
 (B) $\sqrt{3}$
 (C) $\sqrt{2}$
 (D) 2

48. Given that, $\log_3 7 = a$; $\log_7 5 = b$ & $\log_5 4 = c$, then the value of $\log_3 12$ in terms of a, b and c is?

- (A) $ab+c$
 (B) $ac+b$
 (C) $1+abc$
 (D) $abc-1$

49. If x_1, x_2 & x_3 are the three real solutions of the equation:

$$x \log_{10}^2 x + \log_{10} x^3 + 3 = \frac{2}{\frac{1}{\sqrt{x+1}-1} - \frac{1}{\sqrt{x+1}+1}}$$

where $x_1 > x_2 > x_3$. Then

- (A) $x_1 + x_3 = 2x_2$
 (B) $x_1 x_3 = x_2^2$
 (C) $x_2 = \frac{2x_1 x_3}{x_1 + x_3}$
 (D) $x_1^{-1} + x_2^{-1} = x_3^{-1}$

50. If $\log_7 (\log_2 \log_{\pi} x)$ vanishes, then x equals:

- (A) π^2
 (B) 4
 (C) 49
 (D) None

51. Number of values of 'P' for which the equation,

$$(p^2 - 3p + 2)x^2 - (p^2 - 5p + 4)x + p - p^2 = 0$$

possess more than two roots, is:

- (A) 0
 (B) 1
 (C) 2
 (D) None

52. Number of rational terms in the

expansion of $(\sqrt{2} + \sqrt[4]{3})^{100}$ is:

- (A) 25
 (B) 26
 (C) 27
 (D) 28

53. Let $(5 + 2\sqrt{6})^n = p + f$, where $n \in \mathbb{N}$, $p \in \mathbb{N}$ and $0 < f < 1$, then the value of, $f^2 - f + pf - p$ is:
- (A) A natural number
 (B) A negative integer
 (C) A prime number
 (D) Are irrational number

54. The expression $\left[\frac{1 + \sin \frac{\pi}{4} + i \cos \frac{\pi}{8}}{1 + \sin \frac{\pi}{8} - i \cos \frac{\pi}{8}} \right]^8$ is equal to.
- (A) 1
 (B) -1
 (C) i
 (D) None of these

55. There are 10 straight lines in a plane, no 2 of which are parallel, & no 3 pass through the same point. Their point of intersection are joined. The number of fresh lines thus introduced are
- (A) 630
 (B) 45
 (C) 990
 (D) 10

PHYSICS

- 56.



Figure 7-Q2

A car moves at a constant speed on a road as shown in figure (7-Q2). The normal force by the road on the car is N_A and N_B when it is at the points A and B respectively.

- (A) $N_A = N_B$
 (B) $N_A > N_B$
 (C) $N_A < N_B$
 (D) Insufficient information to decide the relation of N_A and N_B .

57. Consider the situation shown in figure (8-E8). Initially the spring is unstretched when the system is released from rest. Assuming no friction in the pulley, find the maximum elongation of the spring?

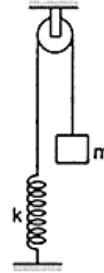
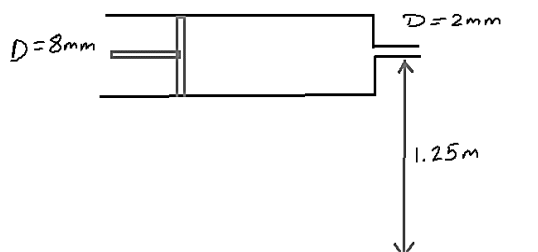


Figure 8-E8

- (A) mg/k
 (B) $2mg/k$
 (C) $mg/2k$
 (D) $3mg/2k$
58. A hollow pipe of length 0.8 m is closed at one end. At its open end a 0.5 m long uniform string is vibrating in its second harmonic and it resonates with the fundamental frequency of the pipe. If the tension in the wire is 50 N and the speed of sound is 320 m/s the mass of the string is
- (A) 5 grams
 (B) 10 grams
 (C) 20 grams
 (D) 40 grams
59. A particle is thrown perpendicular to the surface of earth with a velocity of $0.5V_e$ where V_e is the escape velocity from the surface of earth. What is the maximum height to which the particle rises. (R represents the radius of Earth).
- (A) $R/2$
 (B) $R/4$
 (C) $2R$
 (D) $R/$

60.



Consider a horizontally oriented syringe containing water located at a height of 1.25m above the ground. The diameter of the plunger is 8mm and the diameter of the nozzle is 2mm. The plunger is pushed with a constant speed of 0.25 m/s. Find the horizontal range of water stream on the ground. (Take $g=10 \text{ m/s}^2$).

- (A) 1m
- (C) 0
- (C) 2m
- (D) 0.5 m

61. The molar heat capacity of the process $P=a/T$ (P =pressure, T = temperature, a = positive constant) for a monatomic gas is?

- (A) 3.5R
- (B) 2.5R
- (C) 4.5R
- (D) 1.5R

62. A uniform rod of mass $\sqrt{10}$ kg is hinged from one of its end and is free to rotate in the vertical plane. The rod is held at an angle 30 degrees from the horizontal and is gently released. What is the reaction force by the hinge on the rod when it becomes horizontal. Ignore the friction at the hinge. ($g=10 \text{ m/s}^2$)

- (A) 8 N
- (B) 25 N
- (C) 24 N
- (D) 25.3 N

63. A particle is performing Simple Harmonic Motion with an amplitude A . The magnitude of displacement of the block from the mean position when its velocity is half the maximum velocity is

- (A) $(\sqrt{3}/2)A$
- (B) $A/2$
- (C) $A/4$
- (D) $(\sqrt{3}/4)A$

64. A small object of uniform density rolls up a curved surface with an initial velocity v . it reaches up to A maximum height of $\frac{3v^2}{4g}$ with respect to the initial position. The object is?



- (A) Ring
- (B) Solid sphere
- (C) Hollow sphere
- (D) Disc

65. The quantity $\frac{pV}{kT}$ represents

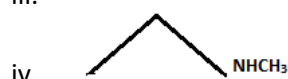
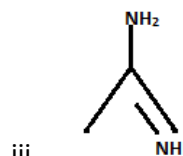
- (A) Mass of the gas
- (B) Kinetic energy of the gas
- (C) Number of moles of the gas
- (D) Number of molecules in the gas.

CHEMISTRY

66. According to molecular orbital theory, which of the following molecule cannot exist?

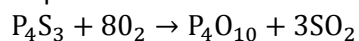
- (A) H_2
- (B) H_2^-
- (C) He_2^+
- (D) He_2^+

67. The increasing order of basicity of the following compounds is?



- (A) (ii) < (i) < (iv) < (iii)
 (B) (ii) < (iv) < (i) < (iii)
 (C) (i) < (ii) < (iii) < (iv)
 (D) (ii) < (iv) < (iii) < (iv)

68. Calculate minimum mass of 80% pure P_4S_3 that is required to produce atleast 1g of each product.



- (A) 1.1458g
 (B) 1.4325g
 (C) 0.77g
 (D) 0.9625g

69. Correct set of four quantum number for valance electron of rubidium is ($z = 37$) is?

- (A) 5,0,0,+1/2
 (B) 5,1,0,+ 1/2
 (C) 5,1,1,+ 1/2
 (D) 6,0,0,+ 1/2

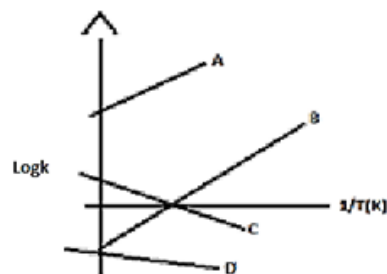
70. An electron, a proton, and alpha particle have kinetic energies 16E, 4E and E respectively. What is the qualitative order of their de-beoglie wavelengths

- (A) $\lambda_e > \lambda_p = \lambda_a$
 (B) $\lambda_p = \lambda_a > \lambda_e$
 (C) $\lambda_p > \lambda_e > \lambda_a$
 (D) $\lambda_a < \lambda_e \gg \lambda_p$

71. The trans-alkenes are formed by the reduction of alkynes with

- (A) Na/liq.NH₃
 (B) Sn-HCl
 (C) H₂-Pd/C,BaSO₄
 (D) NaBH₄

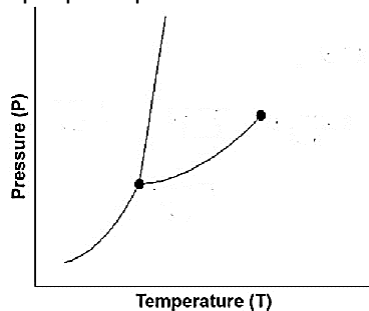
72. Which of the following lines show correctly the temperature dependence of equilibrium constant, K, For an exothermic reaction?



- (A) C and D
 (B) A and D
 (C) A and B
 (D) B and C

73. When heat is supplied to an ideal gas in an isothermal process, the
- (A) work is done on the gas
 - (B) gas will do work
 - (C) kinetic energy of the gas will increase
 - (D) Cannot be predicted

74. According to given phase diagram which phases can exist at pressures lower than the triple point pressure?



- (A) gas only
- (B) solid and gas only
- (C) liquid only
- (D) solid and liquid only

75. For a hypothetical gas containing molecules as point masses & having non zero intermolecular attractions, which of the following is correct?
- (A) The gas shows positive deviations from ideal gas behaviour.
 - (B) Graph of Z vs $\frac{1}{V}$ at a particular temperature will have negative slope.
 - (C) The gas will be difficult to compress as compared to ideal gas
 - (D) 2 moles of the gas at a temperature of 273k can be stored in a 45 litre of container at 1 atm pressures.