1. Out of 800 boys in a school, 224 played cricket, 240 played hockey and 336 played basketball. Of the total, 64 played both basketball and hockey, 80 played cricket and basketball and 40 played cricket and hockey; 24 played all the three games. The number of boys who did not play any game is?
(a) 128
(b) 216
(c) 240
(d) 160
Ans. D

2. Let Z denote the set of all integers and A = {(a, b) : $a^2 + 3b^2 = 28$, a, b ∈ Z} B = {(a, b) : a > b, a, b ∈ Z}. Then the number of elements in $A \cap B$ is :
(a) 2
(b) 3
(c) 4
(d) 5
Ans. D

3. Let A = {2, 4, 6, 8} and define R = {(2, 4), (4, 2), (4, 6), (6, 4)} then R is :
(a) anti symmetric
(b) reflexive
(c) symmetric
(d) transitive
Ans. C

4. If $f(x) = \frac{3x+2}{3x-2}$, then $f(2)$ is equal to :
(a) 1
(b) 3
(c) 4
(d) 2
Ans. D

5. The value of $\left(\frac{1+\sqrt{3}i}{2}\right)^6 + \left(\frac{1-\sqrt{3}i}{2}\right)^6$ is, (where $\omega = \sqrt{-1}$, ω is the cube root of unity) :
(a) 2ω
(b) $2\omega^2$
(c) 2
(d) -2
Ans. C

6. The positive square root of $21 + \sqrt{152}$ is :
(a) $-\sqrt{2} + \sqrt{19}$
(b) $-\sqrt{19} + \sqrt{2}$
(c) $\sqrt{19} + \sqrt{2}$
(d) None of these
Ans. C

7. If $a = \log_3 5$, $b = \log_{17} 25$, which one of the following is correct :
(a) a < b
(b) a = b
(c) a > b
(d) none of these
Ans. C

8. If $z = 3 + 5i$, then $z^3 + \bar{z} + 198 =$:
(a) – 3 – 5i
(b) -3 + 5i

(c) $3 - 5i$
(d) $3 + 5i$
Ans. D

9. If the A.M. and H.M. of two numbers are 9 and 4 respectively, then what is the G.M.?
(a) 13/2
(b) 6
(c) 3
(d) 2
Ans. B

10. If $|\alpha|, |\beta| < 1$ and $S_1 = 1 - \alpha + \alpha^2 - \alpha^3 + \ldots + \infty$
$S_2 = 1 - \beta + \beta^2 - \beta^3 + \ldots \infty$ then
$1 - \alpha\beta + \alpha^2\beta^2 - \alpha^3\beta 3 + \ldots$. to ∞ is equal to :
(a) $S_1 S_2$
(b) $\dfrac{S_1 S_2}{1 + S_1 S_2}$
(c) $\dfrac{S_1 S_2}{1 - S_1 - S_2 + 2S_1 S_2}$
(d) $\dfrac{1}{1 + S_1 S_2}$
Ans. C

11. If $a_1, a_2, a_3 \ldots a_n \in$ G.P. then the value of the determinant
$\Delta = \begin{vmatrix} \log a_n & \log a_{n+1} & \log a_{n+2} \\ \log a_{n+3} & \log a_{n+4} & \log a_{n+5} \\ \log a_{n+6} & \log a_{n+7} & \log a_{n+8} \end{vmatrix}$ equals :
(a) 2
(b) 1
(c) 0
(d) -2
Ans. C

12. The sum of the series $1 + \dfrac{1^2 + 2^2}{2!} + \dfrac{1^2 + 2^2 + 3^2}{3!} + \dfrac{1^2 + 2^2 + 3^2 + 4^2}{4!} + \ldots.$ is :
(a) $3e$
(b) $\dfrac{17}{6}e$
(c) $\dfrac{13}{6}e$
(d) $\dfrac{19}{6}e$
Ans. B

13. Given that tan A and tan B are the roots of $x^2 - ax + b = 0$. The value of $\sin^2 (A + B)$ is :
(a) $\dfrac{a^2}{a^2 + (1 - b)^2}$
(b) $\dfrac{a^2}{a^2 + b^2}$
(c) $\dfrac{a^2}{(a + b)^2}$

(d) $\frac{b^2}{a^2+(1-b)^2}$

Ans. A

14. The condition that one of the roots of the equation $ax^2 + bx + c = 0$ is three times the other, is :
(a) $b^2 = 8ac$
(b) $3b^2 + 16ac = 0$
(c) $3b^2 = 16ac$
(d) $b^2 + 3ac = 0$
Ans. C

15. Let α, β be the roots of $x^2 + (3 - \lambda)x - \lambda = 0$. The value of λ, for which $\alpha^2 + \beta^2$ minimum is :
(a) 0
(b) 1
(c) 2
(d) 3
Ans. C

16. If ${}^{20}C_{r+1} = {}^{20}C_{r-1}$, then r is equal to :
(a) 10
(b) 11
(c) 19
(d) 12
Ans. A

17. 12 persons are to be arranged to a round table. If two particular persons among them are not be side by side, the total number of arrangements is :
(a) 9 . 10 !
(b) 2 . 10 !
(c) 45 . 8 A
(d) 10 !
Ans. A

18. There are 10 points in space, no 4 of which are in the same plane with the exception of 5, which are all in the same plane. The number of planes each containing 3 of the points is :
(a) 111
(b) 112
(c) 120
(d) 121
Ans. A

19. If r and n are positive integers; $r > 1$, $n > 2$ and coefficient of $(r + 2)^{th}$ term and $(3r)^{th}$ term in the expansion of $(1 + x)^{2n}$ are equal; then n equals to :
(a) 3r
(b) 3r + 1
(c) 2r
(d) 2r + 1
Ans. C

20. $1+\frac{1}{3}+\frac{1\cdot 3}{3\cdot 6}+\frac{1\cdot 3\cdot 5}{3\cdot 6\cdot 9}+...$ is equal to :
(a) $\sqrt{2}$
(b) $\sqrt{3}$
(c) $\sqrt{5}$
(d) $\frac{1}{\sqrt{3}}$
Ans. B

21. The value of $\frac{{}^{21}C_1}{{}^{21}C_0}+2.\frac{{}^{21}C_2}{{}^{21}C_1}+3.\frac{{}^{21}C_3}{{}^{21}C_2}+....+21.\frac{{}^{21}C_{21}}{{}^{21}C_{20}}$ is :

(a) 213
(b) 231
(c) 312
(d) 321
Ans. B

22. $\begin{vmatrix} \log_3 512 & \log_4 3 \\ \log_3 8 & \log_4 9 \end{vmatrix} \times \begin{vmatrix} \log_2 3 & \log_8 3 \\ \log_3 4 & \log_3 4 \end{vmatrix} =:$

(a) 7
(b) 10
(c) 13
(d) 17
Ans. B

23. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ a & b & -1 \end{bmatrix}$, then A^2 is equal to :

(a) null matrix
(b) unit matrix
(c) –A
(d) A.
Ans. B

24. The value of $\begin{bmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 - bc & b^2 - ca & c^2 - ab \end{bmatrix}$ will be :

(a) 0
(b) 1
(c) -1
(d) (a + b + c)
Ans. A

25. If $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}, B = \begin{bmatrix} 0 & -i \\ i & 0 \end{bmatrix}$, then $(A + B)^2$ equals :

(a) $A^2 + B^2$
(b) $A^2 + B^2 + 2AB$
(c) $A^2 + B^2 + AB - BA$
(d) None of these.
Ans. A

26. The value of the determinant $\Delta = \begin{vmatrix} 1^2 & 2^2 & 3^2 & 4^2 \\ 2^2 & 3^2 & 4^2 & 5^2 \\ 3^2 & 4^2 & 5^2 & 6^2 \\ 4^2 & 5^2 & 6^2 & 7^2 \end{vmatrix}$ is equal to :

(a) 1
(b) 0
(c) 2
(d) 3
Ans. B

26. The centroid of a triangle is (2, 7) and two of its vertices are (4, 8) and (-2, 6). The third vertex is :
(a) (0, 0)
(b) (4, 7)
(c) (7, 4)
(d) (7, 7)

Ans. B

27. Area of the parallelogram formed by the lines y = mx, y = mx + 1, y = nx and y = nx + 1 equal :

(a) $\frac{|m+n|}{(m-n)^2}$

(b) $\frac{2}{|m+n|}$

(c) $\frac{1}{|m+n|}$

(d) $\frac{1}{|m-n|}$

Ans. D

28. The foot of the perpendicular from point (2, 4) upon x + y = 1 is :

(a) $\left(\frac{1}{2},\frac{3}{2}\right)$

(b) $\left(-\frac{1}{2},\frac{3}{2}\right)$

(c) $\left(\frac{4}{3},\frac{1}{2}\right)$

(d) $\left(\frac{3}{4},-\frac{1}{2}\right)$

Ans. B

29. If the angle 2θ is acute, then the acute angle between the pair of straight lines $x^2 (\cos\theta - \sin\theta) + 2xy \cos\theta + y^2 (\cos\theta + \sin\theta) = 0$ is :

(a) 2θ

(b) θ/2

(c) θ/3

(d) θ

Ans. D

30. The gradient of one of the lines $ax^2 + 2hxy + by^2 = 0$ is twice that of the other, then :

(a) $h^2 = ab$

(b) $h = a + b$

(c) $8h^2 = 9ab$

(d) $9h^2 = 8ab$

Ans. C

31. The joint equation of the straight lines x + y = 1 and x – y = 4 is:

(a) $x^2 - y^2 = -4$

(b) $x^2 - y^2 = -4$

(c) $(x + y - 1)(x - y - 4) = 0$

(d) $(x + y + 1)(x - y + 4) = 0$

Ans. C

32. The equations of the tangents to the circle $5x^2 + 5y^2 = 1$ parallel to the line 3x + 4y = 1 are :

(a) $3x + 4y = \pm 2\sqrt{5}$

(b) $6x + 9y = \pm \sqrt{5}$

(c) $3x + 4y = \pm \sqrt{5}$

(d) none of these.

Ans. C

33. The shortest distance from the point (2, -7) to the circle $x^2 + y^2 - 14x - 10y - 151 = 0$ is :

(a) 2

(b) 3

(c) 5
(d) 7
Ans. A

34. The intercept of the line y = x by the circle $x^2 + y^2 - 2x = 0$ is AB. Equation of circle on AB as diameter is :
(a) $x^2 + y^2 + x + y = 0$
(b) $x^2 + y^2 - x + y = 0$
(c) $x^2 + y^2 - (x + y) = 0$
(d) $x^2 + y^2 + x - y = 0$
Ans. C

35. The focus of the parabola $y = 2x^2 + x$ is :
(a) (0, 0)
(b) $\left(\frac{1}{2}, \frac{1}{4}\right)$
(c) $\left(-\frac{1}{4}, 0\right)$
(d) $\left(-\frac{1}{4}, \frac{1}{8}\right)$
Ans. C

36. The length of the lactus rectum of the parabola $4y^2 + 2x - 20y + 17 = 0$ is :
(a) 3
(b) 6
(c) 1/2
(d) 9
Ans. C

37. The normal to the parabola $y^2 = 8x$ at the point (2, 4) meets the parabola again at the point :
(a) (-18, -12)
(b) (-18, 12)
(c) (18, 12)
(d) (18, -12)
Ans. D

38. The distance between the foci of the ellipse $5x^2 + 9y^2 = 45$ is :
(a) $2\sqrt{2}$
(b) 4
(c) $4\sqrt{2}$
(d) 2
Ans. B

39. If B and B′ are the ends of the minor axes and S and S′ are the foci of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$, then the area of the rhombus SBS′B′ formed will be :
(a) 12 sq. units
(b) 48 sq. units
(c) 24 sq. units
(d) 36 sq. units
Ans. C

40. The directrix of the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ is :
(a) $y = \frac{6}{\sqrt{13}}$
(b) $x = \frac{6}{\sqrt{13}}$

(c) $y = \frac{9}{\sqrt{13}}$

(d) $x = \frac{9}{\sqrt{13}}$

Ans. D

41. The upper 3/4th portion of a vertical pole subtends an angle $\tan^{-1}\frac{3}{5}$ at a point in the horizontal plane through its foot and at a distance 40 m from the foot. A possible height of the vertical pole is :
(a) 80 m
(b) 20 m
(c) 40 m
(d) 60 m
Ans. C

42. If tan A + cot A = 4, then $\tan^4 A + \cot^4 A$ is equal to :
(a) 110
(b) 191
(c) 80
(d) 194
Ans. D

43. In triangle ABC, $a(b^2 + c^2) \cos A + b(c^2 + a^2) \cos B + c(a^2 + b^2) \cos C$ is equal to :
(a) abc
(b) 2abc
(c) 3abc
(d) 4abc
Ans. C

44. If $\cos(\alpha+\beta) = \frac{4}{5}, \sin(\alpha-\beta) = \frac{5}{13}$ and α, β lie between 0 and $\frac{\pi}{4}$, then tan 2α = :

(a) $\frac{56}{33}$

(b) $\frac{33}{56}$

(c) $\frac{16}{65}$

(d) $\frac{60}{61}$

Ans. A

45. $\sec^2(\tan^{-1} 2) + \text{cosec}^2(\cot^{-1} 3)$ = :
(a) 15
(b) 10
(c) 0
(d) -1
Ans. A

46. In a triangle ABC, let $\angle C = \frac{\pi}{2}$. If r is the in radius and R is the circum radius of the triangle 2(r + R) is equal to :
(a) a + b
(b) b + c
(c) c + a
(d) a + b + c
Ans. A

47. If $\tan^{-1} 3 + \tan^{-1} x = \tan^{-1} 8$, then x = :

(a) 5
(b) 1/5
(c) 5/14
(d) 14/5
Ans. B

48. Given tan ($\pi \cos\theta$) = cot ($\pi \sin\theta$), then the value of $\cos\left(\theta - \frac{\pi}{4}\right)$ will be :

(a) $\frac{1}{2\sqrt{2}}$
(b) $\frac{1}{\sqrt{2}}$
(c) $\frac{1}{3\sqrt{2}}$
(d) $\frac{1}{4\sqrt{2}}$
Ans. A

49. From the top of a h meters high cliff, the angles of depression of the top and bottom of a tower are observed to be 30^o and 60^o respectively. The height of the tower is :

(a) $\frac{h}{3}$
(b) $h\left(1 - \frac{1}{\sqrt{3}}\right)$
(c) $h\sqrt{3}$
(d) $\frac{2h}{\sqrt{3}}$
Ans. B

50. $\sin 6\theta + \sin 4\theta + \sin 2\theta = 0$, then θ = :

(a) $\frac{n\pi}{4}$ or $n\pi \pm \frac{\pi}{3}$
(b) $\frac{n\pi}{4}$ or $n\pi \pm \frac{\pi}{6}$
(c) $\frac{n\pi}{4}$ or $2n\pi \pm \frac{\pi}{6}$
(d) none of these
Ans. A

51. $\cos^{-1}\left(\frac{1}{2}\right) + 2\sin^{-1}\left(\frac{1}{2}\right)$ is equal to :

(a) $\frac{\pi}{4}$
(b) $\frac{\pi}{3}$
(c) $\frac{\pi}{6}$
(d) $\frac{2\pi}{3}$
Ans. D

52. The sum of first 10 terms of the series $\cot^{-1} 3 + \cot^{-1} 7 + \cot^{-1} 13 + \cot^{-1} 21 + \ldots$ is :

(a) $\tan^{-1}\left(\frac{5}{6}\right)$

(b) $\tan^{-1}(100)$

(c) $\tan^{-1}\left(\frac{6}{5}\right)$

(d) $\tan^{-1}\left(\frac{1}{100}\right)$

Ans. A

53. The smallest value of θ satisfying the equation $\sqrt{3}(\cot\theta + \tan\theta) = 4$ is :

(a) $\frac{2\pi}{3}$

(b) $\frac{\pi}{3}$

(c) $\pi/6$

(d) $\frac{3\pi}{2}$

Ans. C

54. A person walking along a straight road towards a hill observes at two points distance √3 kms, the angles of elevation of the hill to be 30^o and 60^o. The height of the hill is :

(a) $\frac{3}{2}$km

(b) $\sqrt{\frac{2}{3}}$km

(c) $\frac{\sqrt{3}+1}{2}$km

(d) $\sqrt{3}$ km

Ans. A

55. Considering only the principal values, if $(\cos^{-1} x) = \left(\cot^{-1}\frac{1}{2}\right)$, then x equals :

(a) $\frac{1}{\sqrt{5}}$

(b) $\frac{2}{\sqrt{5}}$

(c) $\frac{3}{\sqrt{5}}$

(d) $\frac{\sqrt{5}}{3}$

Ans. B

56. The range of the function $f(x) = \frac{x^2 - x + 1}{x^2 + x + 1}$ is :

(a) R

(b) $[3, \infty)$

(c) $\left[\frac{1}{3}, 3\right]$

(d) none of these.

Ans. C

57. $\underset{x\to\frac{\pi}{3}}{Lt}\ \frac{\sin\left(\frac{\pi}{3}-x\right)}{2\cos x-1}$ is equal to :

(a) $\frac{1}{2}$

(b) $\frac{1}{\sqrt{3}}$

(c) $\sqrt{3}$

(d) $\frac{2}{\sqrt{3}}$

Ans. B

58. $\underset{n\to\infty}{Lt}\ \frac{1^2+2^2+3^2+...+n^2}{n^3}=:$

(a) 1

(b) $\frac{1}{2}$

(c) $\frac{1}{3}$

(d) 0

Ans. C

59. Suppose *f*(x) is differentiable at x = 1 and $\underset{h\to0}{Lt}\ \frac{1}{h}f(1+h)=5,$ then $f'(1)$ equals :

(a) 0
(b) 2
(c) 4
(d) 5

Ans. D

60. If $f(x)=\sqrt{ax}+\frac{a^2}{\sqrt{ax}},$ then $f'(a)=:$

(a) a
(b) 0
(c) 1
(d) -1

Ans. B

61. The value of $\frac{d}{dx}(|x-1|)+|x-5|)$ at x = 3 is :

(a) -2
(b) 0
(c) 2
(d) 4

Ans. B

62. If 3 sin (x y) + 4 cos (x y) = 5, then $\frac{dy}{dx}=:$

(a) $-\frac{y}{x}$

(b) $\frac{3\sin(x\,y)+4\cos(x\,y)}{3\cos(x\,y)-4\sin(x\,y)}$

(c) $\frac{3\cos(x\,y)+4\sin(x\,y)}{4\cos(x\,y)-3\sin(x\,y)}$

(d) none of these.

Ans. A

63. For what value of x, the function $x^3 + 3x^2 + 3x + 7$ is increasing :
(a) for all x
(b) for $x < 0$
(c) for $x > 0$
(d) for $x = 0$
Ans. A

64. If the perimeter of a rectangle is 100 cm, what will be its sides such that its area is maximum?
(a) 25 cm, 25 cm
(b) 10 cm, 40 cm
(c) 15 cm, 35 cm
(d) 20 cm, 30 cm
Ans. A

65. The angle between tangents to the curves $y = x^2$ and $x = y^2$ at (1,1) is :
(a) 0
(b) $\tan^{-1} 1$
(c) $\tan^{-1}\frac{3}{4}$
(d) $\tan^{-1}\frac{1}{3}$
Ans. C

66. The equation of the normal to the curve $y = \sin x$ at (0, 0) is :
(a) $x = 0$
(b) $y = 0$
(c) $x + y = 0$
(d) $x - y = 0$
Ans. C

67. The point on the curve $y = (x - 3)^2$ where the tangent is parallel to the chord joining (3, 0) and (4, 1) is :
(a) $\left(-\frac{7}{2},\frac{1}{4}\right)$
(b) $\left(\frac{5}{2},\frac{1}{4}\right)$
(c) $\left(-\frac{5}{2},\frac{1}{4}\right)$
(d) $\left(\frac{7}{2},\frac{1}{4}\right)$
Ans. D

68. If $x = e^{y+e^{y+e^{y+\ldots\ldots\infty}}}$; $x>0$ then $\frac{dy}{dx}$ is equal to :
(a) $\frac{x}{1+a}$
(b) $\frac{1}{x}$

(c) $\frac{1-x}{x}$

(d) $\frac{1+x}{x}$

Ans. C

69. The value of $\int \frac{dx}{\sqrt{2x-x^2}}$ is :

(a) $\sin^{-1}(x-1)+c$

(b) $\sin^{-1}(1+x)+c$

(c) $-\sqrt{2x-x^2}+c$

(d) $\sin h^{-1}(1+x)+c$

Ans. A

70. $\int_{-\pi/2}^{\pi/2} \sin^4 x \cos^6 x\, dx =$:

(a) $\frac{3\pi}{128}$

(b) $\frac{3\pi}{256}$

(c) $\frac{3\pi}{572}$

(d) $\frac{3\pi}{64}$

Ans. B

71. The value of $\underset{n\to\infty}{Lt}\left(\frac{\sqrt{1}+\sqrt{2}+\sqrt{3}+....+\sqrt{n}}{n\sqrt{n}}\right)$ is :

(a) 1

(b) $\frac{2}{3}$

(c) $\frac{1}{4}$

(d) 0

Ans. B

72. $\int_0^1 x(1-x)^{99}\, dx$ is equal to :

(a) $\frac{1}{10100}$

(b) $\frac{11}{10100}$

(c) $\frac{1}{10010}$

(d) $\frac{11}{11100}$

Ans. A

73. The value of integral $\int_0^{\ln 5} \frac{e^x\sqrt{e^x-1}}{e^x+3}dx$ is :

(a) $3 + 2\pi$
(b) $4 - \pi$
(c) $2 + \pi$
(d) none of these.
Ans. B

74. $\int e^x (1 - \cot x + \cot^2 x)\, dx = :$
(a) $e^x \cot x + c$
(b) $- e^x \cot x + c$
(c) $e^x \operatorname{cosec} x + c$
(d) $-e^x \operatorname{cosec} x + c$
Ans. B

75. $\int_0^{2a} \frac{f(x)}{f(x) + f(2a - x)} dx =:$
(a) $\pi/2$
(b) 2
(c) $\pi/4$
(d) a
Ans. D

76. The value of $I = \int \frac{\sqrt{x^2 - a^2}}{x} dx$ will be :
(a) $\sqrt{x^2 - a^2} + \sec^{-1} \frac{x}{a}$
(b) $\sqrt{x^2 - a^2} - \sec^{-1} \frac{x}{a}$ (c) $\sqrt{x^2 - a^2} + a \sec^{-1} \frac{x}{a}$
(d) $\sqrt{x^2 - a^2} - a \sec^{-1} \frac{x}{a}$
Ans. D

77. Angle between vectors $\hat{i} - \hat{j} + \hat{k}$ and $\hat{i} + 2\hat{j} + \hat{k}$ is :
(a) $\cos^{-1} \frac{1}{\sqrt{15}}$
(b) $\cos^{-1} \frac{4}{\sqrt{15}}$
(c) $\cos^{-1} \frac{1}{15}$
(d) $\frac{\pi}{2}$
Ans. D

78. The position vectors of the vertices A, B, C of ΔABC are $7\hat{i} + 10\hat{k}, -\hat{i} + 6\hat{j} + 6\hat{k}$ and $-4\hat{i} + 9\hat{j} + 6\hat{k}$ is ΔABC is :
(a) equilateral
(b) isosceles
(c) right angled isosceles
(d) none of these
Ans. D

79. A fair coin is tossed repeatedly. If tail appears on first four tosses, the probability of head appearing on fifth toss equals :
(a) $\frac{1}{2}$

(b) $\frac{1}{32}$

(c) $\frac{31}{32}$

(d) $\frac{1}{5}$

Ans. A

80. A box contains 3 white and 2 red balls. If we draw one ball and without replacing the first ball, the probability of drawing red ball in the second draw is :

(a) $\frac{8}{25}$

(b) $\frac{2}{5}$

(c) $\frac{3}{5}$

(d) $\frac{21}{25}$

Ans. B

81. Three of the six faces of regular hexagon are chosen at random. The probability that the triangle with these three vertices is equilateral equals :

(a) 1/2
(b) 1/5
(c) 1/10
(d) 1/20

Ans. C

82. One card is drawn from a pack of 52 cards.The probability that it is card of a king or spade is :

(a) $\frac{1}{26}$

(b) $\frac{3}{26}$

(c) $\frac{4}{13}$

(d) $\frac{3}{13}$

Ans. C

83. In a class of 100 students there are 70 boys whose average marks in a subject are 75. If the average marks of the complete class are 72, then what are the average marks of the girls?

(a) 73
(b) 65
(c) 68
(d) 74

Ans. B

84. The empirical relation between mean, median and mode is :

(a) Mean – Median = 3 (Mode – Median)
(b) Mean – Mode = 3 (Median – Mode)
(c) Mode – Mean = 3 (Median – Mode)
(d) Mean – Mode = 3 (Mean – Median)

And. D

85. The S.D. of 15 items is 6 and if each item is decreased by 1, then standard deviation will be :

(a) 5
(b) 7

(c) $\frac{91}{15}$

(d) 6

Ans. D

86. A body of weight 4 kg is kept on a plane inclined at an angle of 30^o to the horizontal. It is in limiting equilibrium. The coefficient of friction is, then equal to :

(a) $\frac{1}{\sqrt{3}}$

(b) $\sqrt{3}$

(c) $\frac{1}{4\sqrt{3}}$

(d) $\frac{\sqrt{3}}{4}$

Ans. A

87. The sum of magnitudes of two forces is 18 N and the magnitude of their resultant whose direction is at right angles to the smaller force is 12 N. The magnitude of the two forces are :

(a) 13 N, 5 N

(b) 12 N, 6 N

(c) 14 N, 4 N

(d) 11 N, 7 N

Ans. A

88. Two like parallel forces P and Q act on a rigid body at A and B respectively. If P and Q be interchanged in position, then the point of application of the resultant will be displaced through a distance (along A B) :

(a) (P – Q) A B

(b) (P + Q) A B

(c) $\frac{P+Q}{P-Q}$ A B

(d) $\frac{P-Q}{P+Q}$ A B

Ans. D

89. A train of length 200 m traveling at 30 m/sec overtakes another train of length 300 m traveling at 20 m/sec. The time taken by the first train to pass the second is :

(a) 30 sec

(b) 50 sec

(c) 10 sec

(d) 40 sec

Ans. B

90. A cricket ball is hit at an angle of 45^o to the horizontal with kinetic energy K. At the top of its flight, its kinetic energy is (neglecting the resistance) :

(a) 0

(b) $\frac{K}{4}$

(c) $\frac{K}{2}$

(d) $\frac{K}{\sqrt{2}}$

Ans. C

91. A billiards ball collides directly with another ball of same mass at rest. If coefficient of restitution is e, then the ratio in their velocities will be :

(a) 2 – e; 2 + e

(b) $1 - e : 1 + e$
(c) $1 - e^2 : 1 + e^2$
(d) $\frac{e}{1-e} : \frac{e}{1+e}$
Ans. B

92. If the range of any projectile is the distance equal to the height from which a particle attains the velocity equal to the velocity of projection, then the angle of projection will be :
(a) 60^o
(b) 75^o
(c) 36^o
(d) 30^o
Ans. B

93. If x and y are +ve integers such that (3x + 7y) is a multiple of 11, then which of the following will also be divisible by 11?
(a) 4x + 6y
(b) x + y + 4
(c) 9x + 4y
(d) 4x – 9y
Ans. D

94. In a family, the father took 1/4 of the cake and he had 3 times as much as others had. The total number of family members is :
(a) 3
(b) 1
(c) 10
(d) None of these
Ans. C

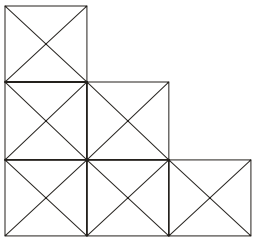
95. Vivek purchased 120 tables at a price of Rs. 110 per table. He sold 30 tables at a profit of Rs. 12 per table and 75 table at a profit of Rs. 14 per table. The remaining tables were sold at a loss of Rs. 7 per table. What is the average profit per table?
(a) Rs. 12.875
(b) Rs. 10.04
(c) Rs. 10.875
(d) Rs. 12.80
Ans. C

96. A train running at the rate of 40 km per hour passes a man riding parallel to the railway line in the same direction at 25 km per hour in 48 seconds. Find the length of the train in metres :
(a) 200 m
(b) 50 m
(c) 10 m
(d) 150 m
Ans. A

97. b a _ b a _ _ b b a a a _ b b b _ _ a a
(a) b a a b a b
(b) b a b b a a
(c) b b b a a a
(d) b a b b a a
Ans. D

98. SHOUT : WHISPER : : RUN : ?
(a) Stay
(b) Stand
(c) Walk
(d) Hop
Ans. C

99. Problem figure
In the following fig.



How many squares are there?
(a) 7
(b) 10
(c) 13
(d) 14
Ans. D

100. In a certain code CHEMISTRY is written as NFIDITUSZ. How is BEANSTOCK written in that code?
(a) CFBOSLDPU
(b) CFBOSUPDL
(c) OBFCSUPDL
(d) OBFCSLDPU
Ans. C