PHYSICS

1. Photon is quantum of radiation with energy E = hν where ν is frequency and h is planck constant. The dimension of h are same as that of:

   i. Angular momentum

   ii. Linear momentum

   iii. Linear impulse

   iv. Angular impulse

   (1) i, iii (2) ii, iii

   (3) i, iv (4) i, ii, iv

2. The dimensions of gravitational constant G are:

   (1) MLT^{-1} (2) ML^3T^{-2}

   (3) $M^{-1}L^3T^{-2}$ (4) $M^{-1}LT^{-2}$

3. In $F = A\nu + bt + \frac{cx}{D + At}$, where F = force, ν = speed, t = time, x = position, the dimensions of c will be:

   (1) $[M^2L^{-2}T^\circ]$ (2) $[M^1L^{-1}T^\circ]$

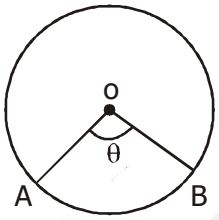
   (3) $[M^2L^0T^{-2}]$ (4) $[M^1L^0T^{-2}]$

4. A physical quantity A is related to four observables a, b, c and d as follows $A = \frac{a^2b^3}{c\sqrt{d}}$. The percentage errors of measurement in a, b, c and d are 1%, 3%, 2% and 2% respectively. What is the percentage error in the quantity A?

   (1) 12% (2) 7%

   (3) 5% (4) 14%

5. A particle is moving an a circular path with a constant speed 'υ'. Its change of velocity as it moves from A to B is:



   (1) $2\upsilon \sin\theta$ (2) $\upsilon \sin\theta/2$

   (3) $\upsilon \cos\theta$ (4) $2\upsilon \sin\theta/2$

6. If momentum of a particle is increased by 100%. Then percentage increase in kinetic energy of the particle is:

   (1) 400% (2) 300%

   (3) 100% (4) 200%

7. A physical quantity A is dependent on four Physical quantities p, q, r & s as given by $A = \frac{\sqrt{pq}}{r^2s^3}$. The error of measurement in p, q, r & s are 1%, 3%, 0.5% and 0.33% respectively, then the maximum percentage error in A is–

   (1) 2% (2) 0%

   (3) 4% (4) 3%

8. If the vectors $\vec{P} = a\hat{i} + a\hat{j} + 3\hat{k}$ and $\vec{Q} = a\hat{i} - 2\hat{j} - \hat{k}$ are perpendicular to each other then the positive value of a is:

   (1) Zero (2) 1

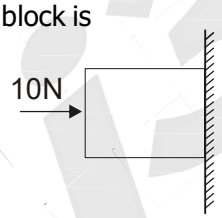
   (3) 2 (4) 4

Rough Work

9. Given that $y = A\sin\left[\left(\frac{2\pi}{\lambda}(ct - x)\right)\right]$, where y and x are measured in metres. Which of the following statments is true?
   (1) The unit of λ is same as that of x and A
   (2) The unit of λ is same as that of x but not of A
   (3) The unit of c is same as that of $\frac{2\pi}{\lambda}$
   (4) The unit of (ct –x) is same as that of $\frac{2\pi}{\lambda}$

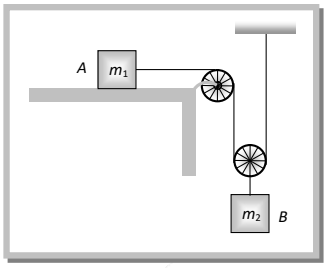
10. The physical quantity having the dimensions $[M^{-1}L^{-3}T^{3}A^{2}]$ is–
   (1) Resistance
   (2) Resistivity
   (3) Electrical conductivity
   (4) Electromotive force

11. A horizontal force of 10 N is necessary to just hold a block stationary against a wall. The coefficient of friction between the block and the wall is 0.2. The weight of the block is



   (1) 2 N (2) 20 N
   (3) 50 N (4) 100 N

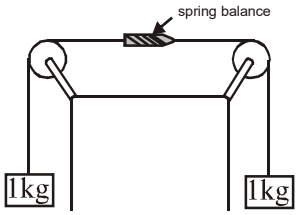
12. The acceleration of block *B* in the figure will be



   (1) $\frac{m_2 g}{(4m_1 + m_2)}$ (2) $\frac{2m_2 g}{(4m_1 + m_2)}$
   (3) $\frac{2m_1 g}{(m_1 + 4m_2)}$ (4) $\frac{2m_1 g}{(m_1 + m_2)}$

13. A man weighing 80 *kg* is standing in a trolley weighing 320 *kg*. The trolley is resting on frictionless horizontal rails. If the man starts walking on the trolley with a speed of 1 *m/s*, then after 4 *sec* his displacement relative to the ground will be
   (1) 5 *m* (2) 4.8 *m*
   (3) 3.2 *m* (4) None of these

14. In the given figure, what is the reading of the spring balance?



   (1) 10N (2) 20N
   (3) 5N (4) Zero

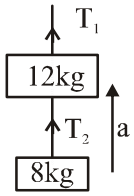
Rough Work

15. A car is moving along a straight road with speed v_0. If the coefficient of friction between tyres and the road is μ. The shortest distance in which the car can be stopped is:

(1) $\frac{v_0^2}{2\mu g}$ (2) $\frac{v_0^2}{\mu g}$

(3) $\left(\frac{v_0}{\mu g}\right)^2$ (4) $\frac{2v_0^2}{\mu g}$

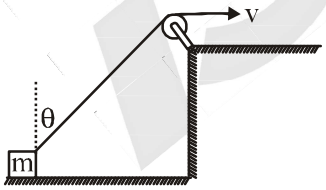
16. A body of mass 8 kg is hanging from another body of mass 12kg. The combination is being pulled by a string with an acceleration of 2.2 ms^{-2}. The tension T_1 and T_2 will be respectively: (use g = 9.8 m/s^{-2})–



(1) 200N, 80N (2) 200N, 90N

(3) 240N, 96N (4) 260N, 96N

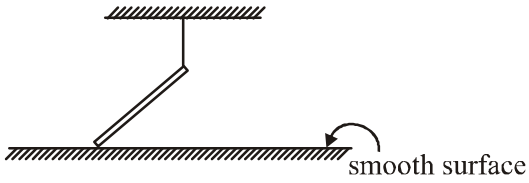
17. A block is dragged on smooth plane with the help of a rope which moves with velocity v. The horizontal velocity of the block is–

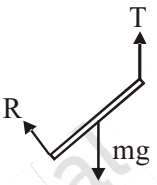


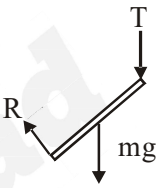
(1) v (2) $\frac{v}{\sin\theta}$

(3) v sin θ (4) $\frac{v}{\cos\theta}$

18. Which figure represents the correct F.B.D. of rod of mass m as shown in figure:



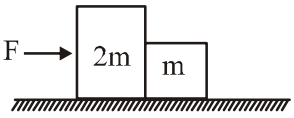
(1) 

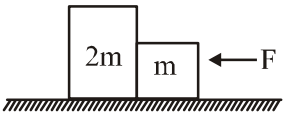
(2) 

(3) 

(4) None of these

19. Two blocks are in contact on a frictionless table. One has mass m and the other 2m. A force F is applied on 2m as shown in the figure. Now the same force F is applied from the right on m. In the two cases respectively, the ratio of force of contact between the two blocks will be–



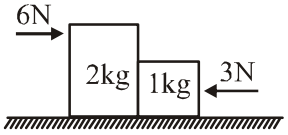


(1) Same (2) 1 : 2

(3) 2 : 1 (4) 1 : 3

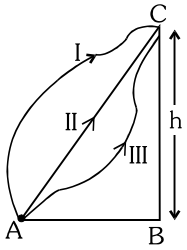
Rough Work

20. Two forces of 6N and 3N are acting on the two blocks of 2kg and 1kg kept on frictionless floor. What is the force exerted on 2kg block by 1kg block–



(1) 1N (2) 2N
(3) 4N (4) 5N

21. As shown in the diagram a particle is to be carried from point A to C via paths (I), (II) and (III) in gravitational field, then which of the following statements is correct :–



(1) Work done is same for all the paths
(2) Work done is minimum for path (II)
(3) Work done is maximum for path (I)
(4) None of the above;

22. A sphere of mass m moving with a constant velocity collides with another stationary sphere of same mass. The ratio of velocities of two spheres after collision will be, if the co-efficient of restitution is e-

(1) $\frac{1-e}{1+e}$ (2) $\frac{e-1}{e+1}$

(3) $\frac{1+e}{1-e}$ (4) $\frac{e+1}{e-1}$

23. If the momentum of a body is incresed n times, its kinetic energy increases.

(1) n times (2) 2n times
(3) $\sqrt{n}$ times (4) n^2 times

24. A force $\vec{F} = (3x^2+2x-7)$ N acts on a 2 kg body as a result of which the body gets displaced from x=0 to x=5m. The work done by the force will be –

(1) 35 Joule (2) 70 Joule
(3) 115 Joule (4) 270 Joule

25. A body is dropped from a height h. When loss in its potential energy is U then its velocity is v. The mass of the body is –

(1) $\frac{U^2}{2v}$ (2) $\frac{2v}{U}$

(3) $\frac{2v}{U^2}$ (4) $\frac{2U}{v^2}$

26. The relation between time and displacement of a particle moving under the influence of a force F is $t = \sqrt{x} + 3$ where x is in meter and t in second. The displacement of the particle when its velocity is zero will be –

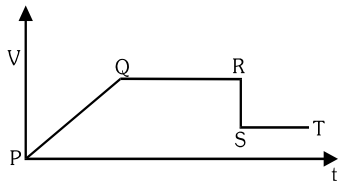
(1) 1m (2) 0 m
(3) 3 m (4) 2m

27. A particle moves in a potential region given by $U = 8x^2 - 4x + 400$ J. Its state of equilibrium will be –

(1) x = 25 m (2) x = 0·25 m
(3) x = 0·025 m (4) x = 2·5 m

Rough Work

28. V–t graph is obtained as shown in the figure. The work done by the force is represented by the path–



(1) PQ (2) QR

(3) RS (4) ST

29. A force $F = Kx^2$ acts on a particle at an angle of 60° with the x–axis. the work done in displacing the particle from x_1 to x_2 will be –

(1) $\frac{kx^2}{2}$ (2) $\frac{k}{2}\left(x_2^2 - x_1^2\right)$

(3) $\frac{k}{6}\left(x_2^3 - x_1^3\right)$ (4) $\frac{k}{3}\left(x_2^3 - x_1^3\right)$

30. A ball after falling from a height of 10m strikes the roof of a lift which is descending down with a velocity of 1 m/s. The recoil velocity of the ball will be (e = 1) –

(1) 8 m/s (2) 11 m/s

(3) 12 m/s (4) 15 m/s

Chemistry

31. In H–atom, electron transits from 6th orbit to 2nd orbit in multi step. Then total spectral lines (without Balmer series) will be :–

(1) 6 (2) 10

(3) 4 (4) 0

32. Which transition emits photon of maximum frequency

(1) 2nd spectral line of Balmer series

(2) 2nd spectral line of Paschen series

(3) 5th spectral line of Humphery series

(4) Ist spectral line of Lymen series

33. Which one of the following species will give a series of spectral lines similar to that of Mg^{2+} :-

(1) Al^{3+} (2) Na

(3) Mg^{+} (4) F

34. An atom has x energy level, then total number of lines in its spectrum are:-

(1) 1 + 2 + 3 .....(x + 1)

(2) 1 + 2 + 3 ..... (x^2)

(3) 1 + 2 + 3 ..... (x - 1)

(4) (x + 1) (x + 2) (x + 4)

35. The ratio of minimum wavelengths of Lyman & Balmer series will be :–

(1) 1.25 (2) 0.25

(3) 5 (4) 10

Rough Work

36. The transition of electron in H–atom that will emit maximum energy is :–

(1) $n_3 \rightarrow n_2$ (2) $n_4 \rightarrow n_3$

(3) $n_5 \rightarrow n_4$ (4) All have same energy

37. Given that in the H– atom the transition energy for n = 1 to n = 2, Rydberg states is 10.2eV. The energy for the same transition in Be^{3+} is :-

(1) 20.4 eV (2) 163.2 eV

(3) 30.6 eV (4) 40.8 eV

38. The wavelength of photon obtained by electron transition between two levels in H– atom and singly ionised He are λ_1 and λ_2 respectively, then :-

(1) $\lambda_2 = \lambda_1$ (2) $\lambda_2 = 2\lambda_1$

(3) $\lambda_2 = \lambda_1/2$ (4) $\lambda_2 = \lambda_1/4$

Assertion & Reason Type Question

Read the assertion and reason carefully to mark the correct option out of the options given below:

(1) If both assertion and reason are true and the reason is the correct explanation of the assertion.

(2) If both assertion and reason are true but reason is not the correct explanation of the assertion.

(3) If assertion is true but reason is false.

(4) If assertion is false but reason is true.

39. ***Assertion*** : Ionic compounds do not exhibit stereo isomerism

Reason : Ionic bonds are non directional

40. ***Assertion*** : LiCl exhibits covalent character.

Reason : Lithium is lightest metal.

41. ***Assertion*** : CO_2 molecule is non–polar while SO_2 is polar.

Reason : Carbon atom is smaller than sulpher.

42. ***Assertion*** : CH_3OH is soluble in water

Reason : CH_3OH is ionic in nature

43. ***Assertion*** : LiI is more soluble in water than LiF.

Reason : LiI has more ionic character.

44. ***Assertion*** : Ionic compounds tend to be non–volalite.

Reason : Inter ionic forces in these compounds are strong.

45. Oxidation number of Os in OsO_4 :

(1) + 2 (2) + 4

(3) + 8 (4) + 10

46. The oxidation state of chromium in potassium dichromate is :

(1) +4 (2) –4

(3) +6 (4) –6

47. Oxidation state of Cl in $CaOCl_2$ is/are

(1) 0 (2) + 1

(3) – 1 (4) + 1, – 1

48. Normality of 0.3 M H_3PO_4 solution is :

(1) 0.3 N (2) 0.4 N

(3) 0.6 N (4) 0.9 N

49. For neutralisation of one mol of NaOH the mass of 70% H_2SO_4 required is :

(1) 48 g (2) 70 g

(3) 49 g (4) 35 g

50. The normality of mixture obtained by mixing 100 mL of 0.2 M H_2SO_4 and 200 mL of 0.2 M HCl is :

(1) 0.0267 (2) 0.2670

(3) 1.0267 (4) 1.1670

51. The normality of solution obtained by mixing 10 mL

Rough Work

of N/5 HCl and 30 mL of N/10 HCl is :

(1) $\frac{N}{15}$ (2) $\frac{N}{5}$

(3) $\frac{N}{7.5}$ (4) $\frac{N}{8}$

52. When 8.3 g copper sulphate reacts with excess of potassium iodide then the amount of iodine liberated is :

(1) 42.3 g (2) 24.3 g

(3) 4.23 g (4) 2.43 g

53. 3.92 g of ferrous ammonium sulphate are dissolved in 100 ml water 20 ml of this solution requires 18 ml of potassium permanganate during titration for complete oxidation. The weight of $KMnO_4$ present in one litre of the solution is

(1) 34.76 g (2) 12.38 g

(3) 1.238 g (4) 3.476 g

54. Equivalent weight of chlorine molecule in the equation is :

$3\ Cl_2 + 6\ NaOH \longrightarrow 5\ NaCl + NaClO_3 + 3\ H_2O$

(1) 42.6 (2) 35.5

(3) 59.1 (4) 71

55. The correct order of radii is :

(1) N < Be < B (2) $Mg^{2+} < Li^{+} < N^{3-}$

(3) Na < Li < K (4) $Fe^{+3} < Fe^{2+} < Fe^{4+}$

56. Minimum first ionisation energy is shown by which electronic configuration :

(1) $1s^2, 2s^2, 2p^5$ (2) $1s^2, 2s^2, 2p^6, 3s^2, 3p^2$

(3) $1s^2, 2s^2, 2p^6, 3s^1$ (4) $1s^2, 2s^2, 2p^6$

57. Which of the following statements is wrong ?

(1) Metals are more than non-metals

(2) There are only few metalloids

(3) Hydrogen can be placed with alkali metals as well as with halogen in periodic table

(4) Non metals are more than metals

58. Among the following elements (whose electronic configuration is give below) the one having the highest ionisation energy is :

(1) [Ne] $3s^2\ 3p^3$ (2) [Ne] $3s^2\ 3p^4$

(3) [Ne] $3s^2\ 3p^5$ (4) [Ne] $3s^2$

59. The IP_1, IP_2, IP_3, IP_4 and IP_5 of an element are 7.1, 14.3, 34.5, 46.8, 162.2 eV respectively. The element is likely to be

(1) Na (2) Si

(3) F (4) Ca

60. Which electronic configuration of an element has abnormally high difference between second and third ionization energy ?

(1) $1s^2,2s^2,2p^6,3s^1$ (2) $1s^2,2s^22p^6,3s^23p^1$

(3) $1s^2,2s^22p^6,3s^23p^2$ (4) $1s^2,2s^22p^6,3s^2$

MATHS

61. A man standing on the bank of a river finds that the angle of elevation of a tree standing on the other bank is 60°. When he goes back upto 40 metres then finds that angle to be 30°.The breadth of the river is :

(1) 20 m (2) 30 m

(3) 40 m (4) 60 m

Rough Work

62. AB is a vertical pole with B at the ground level and A at the top. A man finds that the angle of elevation of the point A from a certain point C on the ground is 60°. He moves away from the pole along the line BC to a point D such that CD = 7m. From D the angle of elevation of the point A is 45°. Then the height of the pole is :

(1) $\frac{7\sqrt{3}}{2}(\sqrt{3}+1)$m (2) $\frac{7\sqrt{3}}{2}(\sqrt{3}-1)$m

(3) $\frac{7\sqrt{3}}{2}\frac{1}{\sqrt{3}+1}$m (4) $\frac{7\sqrt{3}}{2}\frac{1}{\sqrt{3}-1}$m

63. For a regular polygon, let r and R be the radii of the inscribed and the circumscribed circles. A false statement among the following is –

(1) There is a regular polygon with $\frac{r}{R}=\frac{1}{\sqrt{2}}$

(2) There is a regular polygon with $\frac{r}{R}=\frac{2}{3}$

(3) There is a regular polygon with $\frac{r}{R}=\frac{\sqrt{3}}{2}$

(4) There is a regular polygon with $\frac{r}{R}=\frac{1}{2}$

64. If $A=\sin^2x+\cos^4x$, then for all real x :

(1) $\frac{3}{4}\le A\le\frac{13}{16}$ (2) $\frac{3}{4}\le A\le 1$

(3) $\frac{13}{16}\le A\le 1$ (4) $1\le A\le 1$

65. In a ΔPQR, if $3\sin P+4\cos Q=6$ and $4\sin Q+3\cos P=1$, then angle R is equal to -

(1) $\frac{3\pi}{4}$ (2) $\frac{5\pi}{6}$

(3) $\frac{\pi}{6}$ (4) $\frac{\pi}{4}$

66. The expression $\frac{\tan A}{1-\cot A}+\frac{\cot A}{1-\tan A}$ can be written as :

(1) sin A cosA + 1 (2) sec A cosec A + 1

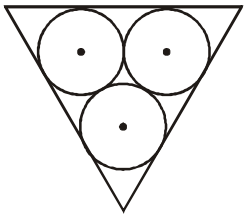
(3) tanA + cotA (4) secA + cosecA

67. Let $f_k(x)=\frac{1}{k}(\sin^k x+\cos^k x)$ where $x\in R$ and $k\ge 1$. Then $f_4(x)-f_6(x)$ equals : -

(1) $\frac{1}{6}$ (2) $\frac{1}{3}$

(3) $\frac{1}{4}$ (4) $\frac{1}{12}$

68. In an equilateral triangle, 3 coins of radii 1 unit each are kept so that they touch each other and also the sides of the triangle. Area of the triangle is



(1) $4+2\sqrt{3}$ (2) $6+4\sqrt{3}$

(3) $12+\frac{7\sqrt{3}}{4}$ (4) $3+\frac{7\sqrt{3}}{4}$

Rough Work

69. Let $\theta \in \left(0, \frac{\pi}{4}\right)$ and $t_1 = (\tan\theta)^{\tan\theta}$, $t_2 = (\tan\theta)^{\cot\theta}$, $t_3 = (\cot\theta)^{\tan\theta}$ and $t_4 = (\cot\theta)^{\cot\theta}$, then

(1) $t_1 > t_2 > t_3 > t_4$ (2) $t_2 < t_1 < t_3 < t_4$

(3) $t_3 > t_1 > t_2 > t_4$ (4) $t_2 > t_3 > t_1 > t_4$

70. $\cos(\alpha - \beta) = 1$ and $\cos(\alpha + \beta) = \frac{1}{e}$, where $\alpha, \beta \in [-\pi, \pi]$. Pairs α, β which satisfy both the equations is/ are

(1) 0 (2) 1

(3) 2 (4) 4

71. The positive integer value of n > 3 satisfying the equation

$$\frac{1}{\sin\left(\frac{\pi}{n}\right)} = \frac{1}{\sin\left(\frac{2\pi}{n}\right)} + \frac{1}{\sin\left(\frac{3\pi}{n}\right)} \text{ is -}$$

(1) 7 (2) –7

(3) 4 (4) –4

72. The number of solutions of the equation

$\cos^2\left(x + \frac{\pi}{6}\right) + \cos^2 x - 2\cos\left(x + \frac{\pi}{6}\right)\cos\frac{\pi}{6} = \sin^2\frac{\pi}{6}$

in the interval $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ is.

(1) 0 (2) 1

(3) 2 (4) 3

73. In the interval $\left[0, \frac{\pi}{2}\right]$, the equation $\cos^2 x - \cos x - x = 0$ has

(1) no solution (2) exactly one solution

(3) exactly two solutions (4) more than two solutions

74. If $|z^2 - 1| = |z|^2 + 1$, then z -

(1) lies on real axis] (2) lies on hyparabola

(3) lies on circle (4) lies on imaginary axis

75. If α and β are the roots of the equation $x^2 - x + 1 = 0$, then $\alpha^{2009} + \beta^{2009} =$

(1) –1 (2) 1

(3) 2 (4) –2

76. The number of complex numbers z such that $|z - 1| = |z+1| = |z - i|$ equals –

(1) 1 (2) 2

(3) ∞ (4) 0

77. If z is a complex number of unit modulus and argument θ, then $\arg\left(\frac{1+z}{1+\bar{z}}\right)$ equals :

(1) $-\theta$ (2) $\frac{\pi}{2} - \theta$

(3) θ (4) $\pi - \theta$

78. A complex number z is said to be unimodular if $|z|=1$. Suppose z_1 and z_2 to are complex number such that $\frac{z_1 - 2z_2}{2 - z_1 z_2}$ is unimodular and z_2 is not. Then the point z_1 lies on :

(1) Straight line parallel to x axis

(2) Straight line parallel to y axis

(3) Circle of radius 2

(4) Circle of radius $\sqrt{2}$

Rough Work

79. If z_1, z_2 and z_3 are complex numbers such that $|z_1| = |z_2| = |z_3| = \left|\frac{1}{z_1} + \frac{1}{z_2} + \frac{1}{z_3}\right| = 1$, then $|z_1 + z_2 + z_3|$ is –

(1) equal to 1 (2) less than 1

(3) greater than 3 (4) equal to 3

80. The complex numbers z_1, z_2 and z_3 satisfying $\frac{z_1 - z_3}{z_2 - z_3} = \frac{1 - i\sqrt{3}}{2}$ are the vertices of a triangle which is –

(1) of area zero (2) right-angled isosceles

(3) equilateral (4) obtuse-angled isosceles

81. For all complex numbers z_1, z_2 satisfying $|z_1| = 12$ and $|z_2 - 3 - 4i| = 5$, the minimum value of $|z_1 - z_2|$ is –

(1) 0 (2) 2

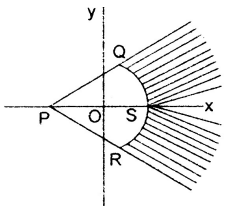
(3) 7 (4) 17

82. If $|z| = 1$ and $w = \frac{z-1}{z+1}$ (where) $z \neq -1$), then Re(w) is

(1) 0 (2) $\frac{1}{|z+1|^2}$

(3) $\frac{1}{|z+1|} \cdot \frac{1}{|z+1|^2}$ (4) $\frac{\sqrt{2}}{|Z+1|^2}$

83. The shaded region, where $P = (-1,0)$, $Q = (-1+\sqrt{2}, \sqrt{2})$, $R = (-1+\sqrt{2}, -\sqrt{2})$, $S = (1,0)$ is represented by –



(1) $|z+1| > 2, |\arg(z+1)| < \frac{\pi}{4}$

(2) $|z+1| < 2, |\arg(z+1)| < \frac{\pi}{2}$

(3) $|z+1| > 2, |\arg(z+1)| > \frac{\pi}{4}$

(4) $|z-1| < 2, |\arg(z+1)| > \frac{\pi}{2}$

84. If $w = \alpha + i\beta$, where $\beta \neq 0$ and $z \neq 1$, satisfies the condition that $\left(\frac{w - \overline{w}z}{1-z}\right)$ is purely real, then the set of values of z is–

(1) $|z| = 1, z \neq 2$

(2) $|z| = 1, z \neq 1$

(3) $z = \overline{z}$

(4) none of these

85. A lady gives a dinner party for six guests. The number of ways in which they may be selected from among ten friends, if two of the friends will not attend the party together is –

(1) 112 (2) 140

(3) 164 (4) none of these

86. If the letters of the word SACHIN arranged in all possible ways and these words are written out as in dictionary, then the word SACHIN appears at serial number -

(1) 603 (2) 602

(3) 601 (4) 600

Rough Work

87. In a shop there are five types of ice- creams available. A child buy six ice-creams.

Statement-1 : The number of different ways the child can buy the six ice-creams is $^{10}C_5$.

Statement-2 : The number of different ways the child can buy the six ice-creams is equal to the number of different ways of arranging 6 A's and 4B's in a row.

(1) Statement-1 is false, statement-2 is true

(2) Statement-1 is true, statement -2 is true, statement-2 is a correct explanation for statement-1

(3) Statement-1 is true, statement-2 is true; Statement-2 is not a correct explanation for statement-1

(4) Statement-1 is true, statement-2 is false

88. From 6 different novels and 3 different dictionary, 4 novels and 1 dictionary are to be selected and arranged in a row on a shelf so that the dictionary is always in the middle. Then number of such arrangements is -

(1) At least 750 but less than 1000

(2) At least 1000

(3) Less than 500

(4) At least 500 but less than 750

89. **Statement-1 :**

The number of ways of distributing 10 identical balls in 4 distinct boxes such that no box is empty is $^9C_3$,

Statement-2 :

The number of ways of choosing any 3 places from 9 different places is $^9C_3$.

(1) Statement-1 is false, Statement-2 is true

(2) Statement-1 is true, Statement-2 is true; Statement-2 is a correct explanation for Statement-1

(3) Statement-1 is true, Statement-2 is true; Statement-2 is not a correct explanation for Statement-1

(4) Statement-1 is true, Statement-2 is false

90. Let X = {1, 2, 3, 4, 5}. The number of different ordered pairs (Y, Z) that can be formed such that $Y \subseteq X$, $Z \subseteq X$ and $Y \cap Z$ is empty, is :

(1) 5^3 (2) 5^2 (3) 3^5 (4) 2^5

91. The number of ways of selecting 15 teams from 15 men and 15 women, such that each team consists of a man and a woman, is :

(1) 1960 (2) 1240

(3) 1120 (4) 1880

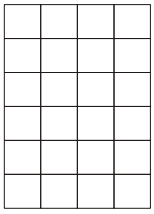
92. Let $A=\{x_1, x_2, \ldots, x_7\}$ and $B=\{y_1, y_2, y_3\}$ be two sets containing seven and three distinct elements respectively. Then the total number of functions f : $A \to B$ that are onto, if there exist exactly three elements x in A such that $f(x)=y_2$, is equal to :

(1) 12. $^7C_2$ (2) 14. $^7C_2$

(3) 14.$^7C_3$ (4) 16. $^7C_3$

Rough Work

93. A ractangle with side 2m – 1 and 2n – 1 is divided into squares of unit length by drawing parallel lines as shown in the diagram, then the number of ractangles possible with odd side lengths is :



(1) $(m + n - 1)^2$

(2) 4^{m+n-1}

(3) $m^2 n^2$

(4) m(m+1) n(n + 1)

94. If r, s, t are prime numbers and p, q are the positive integers such that the LCM of p, q is $r^2 t^4 s^2$, then the number of ordered pair (p, q) is :

(1) 252 (2) 254 (3) 225 (4) 224

95. The number of relations from a set with 4 elements to one with 3 elements is:

(1) 2^7 (2) 2^{12}

(3) 2^{24} (4) 7^2

96. The values of x satisfying the equation $\left(5 + 2\sqrt{6}\right)^{x^2-3} + \left(5 - 2\sqrt{6}\right)^{x^2-3} = 10$, is/are

(1) $\pm\sqrt{3}$ (2) ± 2

(3) ± 3 (4) ± 5]

97. If $x = 2 + \sqrt{3}$ then $x^4 - 8x^3 + 18x^2 - 8x + 2 =$

(1) 0 (2) 1

(3) 2 (4) 3

98. The number of positive integral solutions of , $\frac{x^2 (3x-4)^3 (x-2)^4}{(x-5)^5 . (2x-7)^6} \le 0$ is :

(1) 1 (2) 2

(3) 3 (4) 4

99. If $x^2 + x + |x| + 1 \le 0$, then x lies in (यदि $x^2 + x + |x| + 1 \le 0$, तब $x \in$) :

(1) $(0, \infty)$ (2) $(-\infty, 0)$

(3) R (4) ϕ

100. If x is real and $k = \frac{x^2 - x + 1}{x^2 + x + 1}$ then :

(1) $\frac{1}{3} \le k \le 3$ (2) $k \ge 5$

(3) $k \le 0$ (4) none

Rough Work