

NEW STANDARD ACADEMY

Date : 15-04-25

CLASS : 12TH

Marks: 150

Time: 2hours

PHYSICS

1. A spherical conductor of radius 12 cm has a charge of 1.6×10^{-7} C distributed uniformly on its surface. What is the electric field at a point 18 cm from the centre of the sphere?

- (a) 4.44×10^4 N C⁻¹
 (b) 6.66×10^{18} N C⁻¹
 (c) 6.66×10^{-18} N C⁻¹
 (d) none of these.

2. If q be the charge on body at rest, then the charge on a body, when it is moving with speed u is

- (a) q
 (b) $q/2$
 (c) $2q$
 (d) $\frac{q}{(1-\frac{u^2}{c^2})^{1/2}}$

3. The torque acting on a dipole of moment \vec{p} in an electric field \vec{E} is

- (a) $\vec{p} \cdot \vec{E}$
 (b) $\vec{p} \times \vec{E}$
 (c) $\vec{E} \times \vec{p}$
 (d) zero.

4. Electric dipole moment is

- (a) Scalar
 (b) Vector
 (c) Vector directed from $-q$ to $+q$
 (d) Vector directed from $+q$ to $-q$

5. Electric field due to an electric dipole is

- (a) spherically symmetric
 (b) cylindrically symmetric
 (c) asymmetric
 (d) none of these

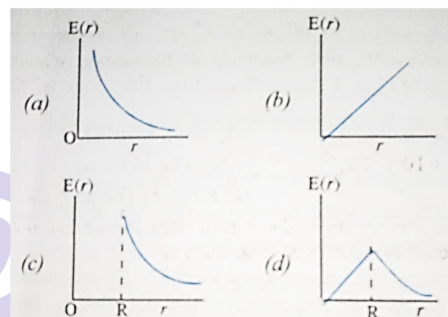
6. Dimensional formula of electric field intensity is

- (a) $[ML T^{-3} A^{-1}]$
 (b) $[ML^2 T A^{-1}]$
 (c) $[ML T^2 A^{-1}]$
 (d) $[MLTA^2]$

7. When electric dipole is in stable equilibrium then the angle between electric dipole moment \vec{p} and electric field strength \vec{E} is

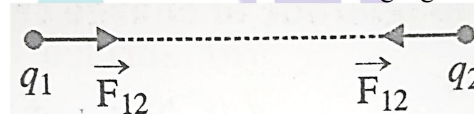
- (a) 0
 (b) π
 (c) $\pi/3$
 (d) $\pi/2$

8. Which of the following graphs represent the variation of electric field intensity $E(r)$ due to a charged spherical shell of radius R with distance from its center?



9. An electric dipole consisting of charges $+q$ and $-q$ separated by a distance L is in stable equilibrium in a uniform electric field \vec{E} . The electrostatic potential energy of the dipole is
 (a) qLE
 (b) zero
 (c) $-LE$
 (d) $-2qEL$

10. According to Coulomb's law, which is the correct relation for the following figure?



- (a) $q_1 q_2 > 0$
 (b) $q_1 q_2 < 0$
 (c) $q_1 q_2 = 0$
 (d) $1 > q_1 / q_2 > 0$

11. Let E_a be the electric field due to a dipole in its axial plane distant l and let E_q be the field in the equatorial plane distant l . The relation between E_a and E_q is

- (a) $E_a = E_q$
 (b) $E_a = 2E_q$
 (c) $E_q = 2E_a$
 (d) $E_a = 3E_q$

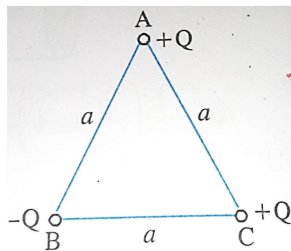
12. The point charges Q and $-2Q$ are placed some distance apart. If electric field at the location of Q is E , then electric field at the location of $-2Q$ will be

- (a) $-E/2$
 (b) $-(3E)/2$
 (c) $-E$
 (d) $-2E$

13. An electron having charge e and mass m is moving in a uniform electric field E . Its acceleration will be

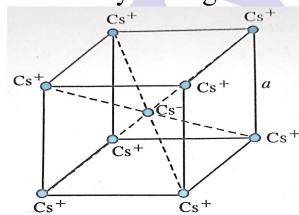
- (a) e^2/m
 (b) eE/m
 (c) eE^2/m
 (d) mE/e

14. Three charges are placed at the vertices of an equilateral triangle of side a as shown in the figure. The force experienced by the charge placed at the vertex A in a direction normal to BC is



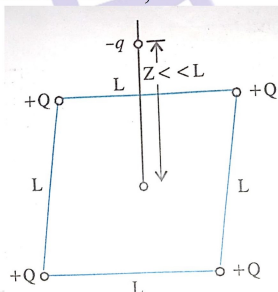
- (a) $\frac{Q^2}{4\pi\epsilon_0 a^2}$ (b) $-Q^2(4\pi\epsilon_0 a^2)$
 (c) Zero (d) $\frac{Q^2}{(2\pi\epsilon_0 a^2)}$

15. In the basic CsCl crystal structure Cs^+ and Cl^- ions are arranged in a bcc configuration as shown in figure. The net electrostatic force exerted by the eight Cs^+ ions on the Cl^- ion is

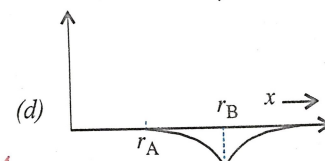
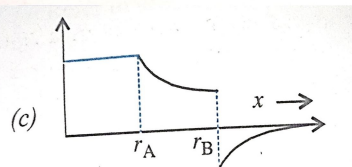
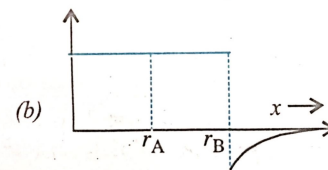
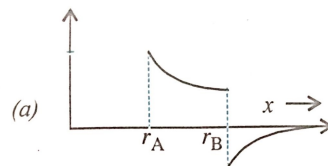


- (a) $\frac{1}{4\pi\epsilon_0} \cdot \frac{4e^2}{3a^2}$ (b) $\frac{1}{4\pi\epsilon_0} \cdot \frac{16e^2}{3a^2}$
 (c) $\frac{1}{4\pi\epsilon_0} \cdot \frac{32e^2}{3a^2}$ (d) Zero

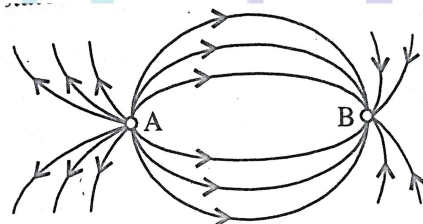
16. Four point +ve charges of same magnitude (Q) are placed at the four corners of a rigid square frame as shown in the figure. The plane of the frame is perpendicular to z -axis. If a -ve point charge is placed at a distance z away from the above frame, the



- (a) -ve charge oscillates along the z -axis
 (b) it moves away from the frame
 (c) it moves slowly towards the frame and stays in the plane of the frame
 (d) it passes through the frame only once.
17. Two concentric conducting thin spherical shells A and B radii r_A and r_B ($r_B > r_A$) are charged to Q_A and $-Q_B$ ($|Q_B| > |Q_A|$) The electric field along a line passing through centre is



18. The spatial distribution of the electric field due to two charges (A, B) is shown in the figure. Which one of the following statements is correct?



- (a) A is +ve and B is -ve and $|A| > |B|$
 (b) A is -ve and B is +ve and $|A| = |B|$
 (c) Both are +ve but $A > B$
 (d) Both are -ve but $A > B$
19. In case of infinite long wire electric field is proportional to
- (a) $1/r$ (b) $1/r^2$
 (c) $1/r^3$ (d) r^0
20. Two point charges $+8q$ and $-2q$ are located at $x = 0$ and $x = L$ respectively. The location of a point on the x -axis at which net electric field due to these two point charges is zero, is
- (a) $8L$ (b) $4L$
 (c) $2L$ (d) $L/4$
21. A charge Q is divided into two parts of q and $(Q - q)$ If the coulomb repulsion between them when they are separated is to be maximum, the ratio of Q/q should be
- (a) 2 (b) $1/2$
 (c) 4 (d) $1/4$
22. A positively charged particle moving along x -axis with a certain velocity enters a uniform electric field along positive y -axis. Then
- (a) vertical velocity changes but horizontal velocity remains constant

- (b) horizontal velocity changes but vertical velocity remains constant
 (c) both vertical and horizontal velocities change
 (d) neither vertical nor horizontal velocity changes.
23. Three charges q , Q and $4q$ are placed in a straight line of length l at points distant 0 , $l/2$ and l respectively from one end. In order to make the net force on q zero, the charge Q must be equal to
 (a) $-q$ (b) $-2q$
 (c) $-q/2$ (d) q
24. An electron of mass m_e initially at rest, moves through a certain distance in a uniform electric field in time t_1 . A proton of mass m_p also initially at rest, takes time t_2 to move through an equal distance in this uniform electric field. Neglecting the effect of gravity, the ratio t_2/t_1 is nearly equal to
 (a) 1 (b) $\sqrt{\frac{m_p}{m_e}}$
 (c) $\sqrt{\frac{m_e}{m_p}}$ (d) 1836.
25. Three identical charges are placed at the vertices of an equilateral triangle. The force experienced by each charge, (if $K = \frac{1}{4\pi\epsilon_0}$) is
 (a) $2K q^2/r^2$ (b) $K q^2/2r^2$
 (c) $\sqrt{3} K q^2/r^2$ (d) $k q^2/\sqrt{2} r^2$
- CHEMISTRY**
26. The molarity of pure water is
 (a) 55.6 (b) 5.56
 (c) 6.55 (d) 65.5
27. Volume of $0.1 \text{ M K}_2\text{Cr}_2\text{O}_7$ required to oxidise 35 mL of 0.5 M FeSO_4 solution is
 (a) 29.2 mL (b) 17.5 mL
 (c) 175 mL (d) 145 mL
28. Molarity of $0.2 \text{ N H}_2\text{SO}_4$ is
 (a) 0.2 (b) 0.4
 (c) 0.6 (d) 0.1
29. Which of the following concentration factors is affected by change in temperature?
 (a) Molarity (b) Molality
 (c) Mole fraction (d) Weight fraction
30. Mole fraction (X) of any solution is equal to
 (a) $\frac{\text{No. of moles of solute}}{\text{Volume of solution in litre}}$
 (b) $\frac{\text{No. of gram-equivalent of solute}}{\text{Volume of solution in litre}}$
 (c) $\frac{\text{No. of moles of solute}}{\text{Mass of solvent in kg}}$
 (d) $\frac{\text{No. of moles of any constituent}}{\text{Total number of moles of all constituents}}$
31. Which is correct about Henry's law?
 (a) There should not be any chemical interaction between the gas and liquid
 (b) The gas in contact with the liquid should behave as an ideal gas
 (c) The production of carbonated beverages is based on Henry's law.
 (d) All of the above
32. The solubility of a gas in liquid at a temperature is directly proportional to its
 (a) Density (b) Melting point
 (c) Boiling point (d) Pressure
33. Vapour pressure of pure A = 100 torr , moles = 2 ; vapour pressure of pure B = 80 torr , moles = 3 . Total vapour pressure of the mixture is
 (a) 440 torr (b) 460 torr
 (c) 180 torr (d) 88 torr
34. The vapour pressure of benzene at a certain temperature is 640 mm of Hg . A non-volatile and non-electrolyte solid weighing 2.175 g is added to 39.08 g of benzene. If the vapour pressure of the solution is 600 mm of Hg , what is the molecular weight of solid substance?
 (a) 49.50 (b) 69.60
 (c) 59.60 (d) 79.82
35. Formation of a solution from two components can be considered as
 (A) pure solvent \rightarrow separated solvent molecules, ΔH_1
 (B) pure solute \rightarrow separated solvent molecules, ΔH_2
 (C) separated solvent and solute molecules \rightarrow solution, ΔH_3 Solution so formed will be ideal if
 (a) $\Delta H_{\text{soln}} = \Delta H_1 - \Delta H_2 - \Delta H_3$
 (b) $\Delta H_{\text{soln}} = \Delta H_3 - \Delta H_1 - \Delta H_2$
 (c) $\Delta H_{\text{soln}} = \Delta H_1 + \Delta H_2 + \Delta H_3$
 (d) $\Delta H_{\text{soln}} = \Delta H_1 + \Delta H_2 - \Delta H_3$
36. A mixture of ethyl alcohol and propyl alcohol has a vapour pressure of 290 mm at 300 K . The vapour pressure of propyl alcohol is 200 mm . If the mole fraction of ethyl alcohol is 0.6 , its vapour pressure (in mm) at the same temperature will be
 (a) 350 (b) 300
 (c) 700 (d) 360
37. Benzene and toluene form nearly ideal solutions. At 25°C , the vapour pressure of benzene is 75 torr and that of toluene is 22 torr . The partial vapour pressure of benzene at 20°C for a solution containing 78 g of benzene and 46 g of toluene in torr is
 (a) 53.5 (b) 37.5
 (c) 25 (d) 50
38. Which of the following is not correct for ideal solution?
 (a) $\Delta V_{\text{mix}} = 0$ (b) $\Delta H_{\text{mix}} = 0$

- (c) $\Delta S_{\max} = 0$ (d) Obeys Raoult's Law
39. An ideal solution is that which
 (a) Obey Raoult's law
 (b) Shows positive deviation from Raoult's law
 (c) Shows negative deviation from Raoult's law
 (d) Has no connection with Raoult's law
40. Which of the following is true when components forming an ideal solution are mixed?
 (a) $\Delta H_m = \Delta V_m = 0$
 (b) $\Delta H_m < \Delta V_m$
 (c) $\Delta H_m = \Delta V_m = 1$
 (d) $\Delta H_m > \Delta V_m$
41. If for a sucrose solution elevation in boiling point is 0.1°C then what will be boiling point of NaCl solution for the same molal concentration?
 (a) 0.1 (b) 0.2
 (c) 0.16 (d) 0.26
42. The molal elevation constant for water is 0.52. What will be the boiling point of 2 molar sucrose solution at 1 atm pressure? (Assume b.p. of pure water is 100°C)
 (a) 101.04°C (b) 100.52°C
 (c) 100.26°C (d) 99.74°C
43. The elevation in boiling point of a solution of 13.44 g of CuCl_2 in 1 kg of water using the following information will be (molecular weight of $\text{CuCl}_2 = 134.4$ and $k = 0.52 \text{ K m}^{-1}$)
 (a) 0.16 (b) 0.05
 (c) 0.1 (d) 0.2
44. A certain substance 'A' tetramerises in water to the extent of 80%. A solution of 2.5 g of A in 100 g of water lowers the freezing point by 0.3°C . The molar mass of A is
 (a) 31 (b) 62
 (c) 122 (d) 244
45. The freezing point depression constant for water is $1.86 \text{ K kg mol}^{-1}$. If 45 g of ethylene glycol is mixed with 600 g of water, the freezing point of the solution is
 (a) 2.2 K (b) 273 K
 (c) 270.95 K (d) 275.35 K
46. Which of the following shows maximum depression in freezing point?
 (a) K_2SO_4 (b) NaCl
 (c) Urea (d) Glucose
47. What is the freezing point of a solution containing 8.1 g HBr in 100 g water assuming the acid to be 90% ionised? (k_f for wt. = 1.86 K mol^{-1})
 (a) 0.85°C (b) -3.53°C
 (c) 0°C (d) -0.35°C

48. A solution of sucrose (Molar mass = 342 g/mol) is prepared by dissolving 68.4 g of it per litre of solution, what is its osmotic pressure ($R = 0.082 \text{ L atm K}^{-1} \text{ mol}^{-1}$) at 273 K ?
 (a) 3.92 atm (b) 4.48 atm
 (c) 5.92 atm (d) 29.4 atm
49. The osmotic pressure of 0.2 molar solution of urea at 27°C ($R = 0.082 \text{ L atm mol}^{-1} \text{ K}^{-1}$) is
 (a) 4.92 atm (c) 1 atm
 (c) 0.2 atm (d) 27 atm
50. At 25°C , the highest osmotic pressure is exhibited by 0.1 M solution of
 (a) Urea (b) Glucose
 (c) KCl (d) CaCl_2

BIOLOGY

51. Milky water of green coconut is
 (a) Liquid nucellus
 (b) Liquid of female gametophyte
 (c) Liquid endosperm
 (d) Liquid chalaza
52. A tetraploid male plant crosses with a hexaploid female plant. Find out the ploidy level of embryo and endosperm
 (a) Pentaploid and octaploid
 (b) Heptaploid and pentaploid
 (c) Diploid and triploid
 (d) Haploid and diploid
53. Diploid nutritive tissue in the seeds of black pepper and beet root is
 (a) Endosperm (b) Perisperm
 (c) Male Gametophytic tissue
 (d) Embryo
54. Match the following column and choose the correct option
- | Column I | Column II |
|---------------------|--|
| 1. Epicotyl | a) Cylindrical portion below the level of Cotyledons |
| 2. Hypocotyl | b) Above the level of cotyledons |
| 3. Radicle | c) Root tip |
| 4. Plumule | d. Stem tip |
| (a) 1-b,2-a,3-c,4-d | (b) 1-a,2-b,3-c,4-d |
| (c) 1-b,2-a,3-d,4-c | (d) 1-a,2-b,3-d,4-c |
55. A seed matures if water if water content is reduced to A. If the general metabolism B the embryo enters a state called C
 Choose correct option for A,B and C.
 (a) A-50-60%, B-fast, C-infertile
 (b) A-10 -15%, B-slows down, C-dormancy
 (c) A-35 -50%, B-slows down, C-development
 (d) A-35 -60%, B-Fast, C-Embryogenesis
56. Which one is the problem of hybrid seed?

- (a) Progeny segregate and do not maintain hybrid characters.
 (b) Production of hybrid seeds is costly
 (c) Hybrid seeds have to be produced
 (d) All of these
57. Study the following lists:
 List I list II
 (a) Apomixis (I) Coconut
 (b) Parthenocarpy (II) Banana
 (c) Polyembryony (III) Citrus
 (d) Microscopic seeds (IV) Orchid
 (V) Grasses
- The correct match is
- | | A | B | C | D |
|-----|-------|------|-------|------|
| (a) | (IV) | (I) | (II) | (II) |
| (b) | (I) | (IV) | (III) | (V) |
| (c) | (III) | (IV) | (I) | (II) |
| (d) | (V) | (II) | (III) | (IV) |
58. Select the total number of albuminous seed from the following
 Pea, Groundnut, Wheat, Maize, Barley, Castor, Sunflower
 (a) 4 (b) 5
 (c) 2 (d) 6
59. The phenomenon wherein the ovary develops into a fruit without fertilization is called
 (a) Parthenocarpy
 (b) Apomixis
 (c) Asexual reproduction
 (d) Sexual reproduction
60. Read the following statements and choose the correct option.
 (a) In most plants, by the time the fruit develops from the ovary, other floral parts degenerate and fall off
 (b) In parthenocarpic fruits, thalamus also contribute in the formation of fruits.
 (c) The fruits may be fleshy as in guava, orange, mango, mustard, etc
 (d) All of the above
61. The chemical responsible for fossilization of pollen grains
 (a) Sporopollenin (b) Pollen kit
 (c) Lignin (4) Carotenoids
62. Epiblast in monocot embryo is considered as
 (a) Second embryo
 (b) One-celled suspensor
 (c) Nutritive tissue
 (d) Rudimentary cotyledon
63. Embryo sac is present embedded in nucellus at which end of ovule?
 (a) Micropylar end
 (b) Chalazal end
 (c) In the center
 (d) None of these
64. A single cotyledon in grass family which is situated towards one side of the embryonal axis is called as
 (a) Epicotyl (b) Coleoptile
 (c) Hypocotyl (d) Scutellum
65. Long silky hairs coming out of the cob of maize are
 (a) Meant for fruit dispersal
 (b) Long styles and stigma
 (c) Meant for attracting insects
 (d) Lodicules
66. One of the most resistant biological material known is
 (a) Lignocellulose (b) Sporopollenin
 (c) Lignin (d) Hemicellulose
67. When pollen tube enters by integuments, then the process is called
 (a) Mesogamy (b) Porogamy
 (c) Chalazogamy (d) Pseudogamy
68. Which of the following statement is correct about pollen-pistil interaction?
 (a) It is a static process involving pollen recognition followed by promotion or inhibition of the pollen.
 (b) It is a static process involving pollen recognition followed by promotion of the pollen.
 (c) It is a dynamic process involving pollen recognition followed by inhibition of the pollen.
 (d) It is a dynamic process involving pollen recognition followed by promotion or inhibition of the pollen.
69. Suppose there are 20 chromosomes in zygote of a plant and its female gametophyte develops apospory. Now this plant is crossed with a normal male plant. What will be the number of chromosomes in its zygote and endosperm respectively?
 (a) 30 and 50 (b) 20 and 30
 (c) 30 and 30 (d) 40 and 50
70. Choose the correct statement from the following:
 (a) Chasmogamous flowers never exhibit autogamy
 (b) Cleistogamous flowers always exhibit autogamy
 (c) Cleistogamous flowers exhibit both autogamy and geitonogamy
 (d) Chasmogamous flowers always exhibit geitonogamy
71. The flowers pollinated by flies and beetles
 (a) Secrete abundant nectar to attract these animals.
 (b) Are small and are clustered into an inflorescence to make them conspicuous
 (c) Have colour and/or edible pollen

- (d) Secrete foul odours to attract these animals.
72. A non-albuminous seed is
 (a) Sunflower (b) Barley
 (c) Groundnut (d) Wheat
73. Remains of nucellus in seeds is _____ and is found in _____
 (a) Perisperm, Beet
 (b) Endosperm, Black pepper
 (c) Tegmen, Annona
 (d) Integument, Agave
74. Triple fusion, occurring in embryo sac, results in formation of
 (a) Diploid PEN (b) Triploid PEN
 (c) Diploid zygote (d) Polyploid zygote
75. The coleoptile is
 (a) Single cotyledon of grass family
 (b) Embryonal axis
 (c) Undifferentiated sheath covering radicle and root cap
 (d) Hollow foliar structure

MATH

51. If a function $f: C \rightarrow C$ is defined by $f(x) = 3x^2 - 1$, Where C is the set of complex numbers the the pre-images of -28 are
 (a) 3, -3 (b) 3i, -3i
 (c) 3i only (d) -3i only
52. If function $f: Z \rightarrow Z$ is defined by $f(x) = \begin{cases} \frac{x}{2}, & \text{if } x \text{ is even} \\ 0, & \text{if } x \text{ is odd} \end{cases}$, then f is
 (a) one - one but not onto
 (b) onto but not one - one
 (c) neither one - one nor onto
 (d) a bijection
53. If $A = \{a, b, c\}$ and $B = \{-3, -1, 0, 1, 3\}$ then the number of injections that can be defined from A to B is
 (a) 125 (b) 243
 (c) 60 (d) 120
54. Let set $X = \{1, 2, 3\}$ and a relation R is defined in X as $R = \{(1, 3), (2, 2), (3, 2)\}$ then minimum ordered pairs which should be added in relation R to make it reflexive and symmetric are
 (a) $\{(1, 1), (2, 3), (1, 2)\}$
 (b) $\{(3, 3), (3, 1), (1, 2)\}$
 (c) $\{(1, 1), (3, 3), (3, 1), (2, 3)\}$
 (d) $\{(1, 1), (3, 3), (3, 1), (1, 2)\}$
55. Which of the following statements is not true about equivalence classes $A_i (i = 1, 2, \dots, n)$ formed by an equivalence relation R on a set A?
 (a)

$$\bigcup_{i=1}^n A_i = A$$

- (b) $x \in$ let set X and $x \in A_j \Rightarrow A_i = A_j$
 (c) $A_i \cap A_j \neq \phi, i \neq j$
 (d) All elements of A_i are related to each other for all i

56. The range of the function $f(x) = \frac{1}{3 - \sin 4x}$ is

- (a) $\left[\frac{1}{4}, \frac{1}{2}\right]$ (b) $\left[\frac{1}{2}, 1\right]$
 (c) $\left[\frac{1}{4}, \frac{3}{4}\right]$ (d) $\left[\frac{1}{2}, \frac{3}{4}\right]$

57. The principal value of $\sin^{-1}\left(\sin\left(-\frac{10\pi}{3}\right)\right)$ is

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

58. $\sin^{-1}(\cos x) = \frac{\pi}{2} - x$ is valid for

- (a) $-\pi \leq x \leq 0$ (b) $0 \leq x \leq \pi$
 (c) $\frac{\pi}{2} \leq x \leq \frac{3\pi}{2}$ (d) $\frac{\pi}{4} \leq x \leq \frac{3\pi}{4}$

59. $\sin^{-1}\left(\sin\frac{2\pi}{3}\right) + \cos^{-1}\left(\cos\frac{7\pi}{6}\right) + \tan^{-1}\left(\tan\frac{3\pi}{4}\right)$ is equal

- (a) $\frac{11\pi}{12}$ (b) $\frac{17\pi}{12}$
 (c) $\frac{31\pi}{12}$ (d) $-\frac{3\pi}{4}$

60. Which of the following is true?

- (a) Domain of $\sin^{-1} x$ is $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
 (b) Range of $\cos(\sin^{-1} x + \cos^{-1} x)$ is $\{-1, 1\}$
 (c) Range of $\sin(\sin^{-1} x + \cos^{-1} x)$ is $\{1\}$
 (d) Range of $\cos^{-1} x$ is $(0, \pi)$

61. Let N be the set of natural numbers and a relation R on N be defined by $R = \{(x, y) \in N \times N : x^3 - 3x^2 y - x y^2 + 3y^3 = 0\}$ Then the relation R is

- (a) reflexive but neither symmetric nor transitive
 (b) an equivalence relation
 (c) reflexive and symmetric, but not transitive
 (d) symmetric but neither reflexive nor transitive

62. The probability that a relation R from $\{x, y\}$ to $\{x, y\}$ is both symmetric and transitive, is equal to

- (1) $\frac{5}{16}$ (2) $\frac{9}{16}$
 (3) $\frac{11}{16}$ (4) $\frac{13}{16}$

63. Let R be a relation form the set $\{1, 2, 3, \dots, 60\}$ to itself such that $R = \{(a, b) : b = pq, \text{ where } p, q \geq 3 \text{ are prime numbers}\}$ then the number of elements in R is

- (a) 600 (b) 660
 (c) 540 (d) 720

64. The minimum number of elements that must be added to the relation $R = \{(a, b), (b, c)\}$ on the set $\{a, b, c\}$ so that it becomes symmetric and transitive is

- (a) 3 (b) 7
(c) 4 (d) 5
65. If R is the smallest equivalence relation on the set $\{1,2,3,4\}$ such that $\{(1,2), (1,3)\} \subset R$ then the number of elements in R is
(a) 10 (b) 12
(c) 8 (d) 15
66. Let a relation R on $N \times N$ be defined as $(x_1, y_1) R (x_2, y_2)$ if and only if $x_1 \leq x_2$ or $y_1 \leq y_2$ consider the two statements
(I) R is reflexive but not symmetric.
(II) R is transitive.
Then which one of the following is true ?
(a) Only (II) is correct.
(b) Only (I) is correct
(c) Both (I) and (II) are correct.
(d) Neither (I) nor (II) is correct.
67. Let $A = \{12345\}$. Let R be a relation on A defined by xRy if and only if $4x \leq 5y$. Let m be the number of elements in R and n be the minimum number of elements from $A \times A$ that are required to be added to R to make it a symmetric relation. Then $m+n$ is equal to
(a) 25 (b) 24
(c) 26 (d) 23
68. Let $f: (1,3) \rightarrow R$ be a function defined by $f(x) = \frac{x[x]}{1+x^2}$, where $[x]$ denotes the greatest integer $\leq x$. Then the range of f is
(a) $\left(\frac{2}{5}, \frac{4}{5}\right]$ (b) $\left(\frac{2}{5}, \frac{1}{2}\right) \cup \left(\frac{3}{5}, \frac{4}{5}\right]$
(c) $\left(\frac{2}{5}, \frac{3}{5}\right] \cup \left(\frac{3}{4}, \frac{4}{5}\right]$ (d) $\left(\frac{3}{5}, \frac{4}{5}\right]$
69. A function $f(x)$ is given by $f(x) = \frac{5^x}{5^x + 5}$, then the sum of the series
 $f\left(\frac{1}{20}\right) + f\left(\frac{2}{20}\right) + f\left(\frac{3}{20}\right) + \dots + f\left(\frac{39}{20}\right)$ is equal to:
(a) $\frac{19}{2}$ (b) $\frac{49}{2}$
(c) $\frac{29}{2}$ (d) $\frac{39}{2}$
70. The domain of the function $f(x) = \sin^{-1}[2x^2 - 3] + \log_2(\log_{1/2}(x^2 - 5x + 5))$ Where $[t]$ is the greatest integer function is,
(a) $\left(-\sqrt{\frac{5}{2}}, \frac{5-\sqrt{2}}{2}\right)$ (b) $\left(\frac{5-\sqrt{5}}{2}, \frac{5+\sqrt{5}}{2}\right)$
(c) $\left(1, \frac{5-\sqrt{5}}{2}\right)$ (d) $\left(1, \frac{5+\sqrt{5}}{2}\right)$
71. The domain of the function $f(x) = \sin^{-1}\left(\frac{x^2 - 3x + 2}{x^2 + 2x + 7}\right)$ is
(a) $[1, \infty)$ (b) $(-1, 2]$
(c) $[-1, \infty)$ (d) $(-\infty, 2]$
72. The range of the function $f(x) = \sqrt{3-x} + \sqrt{2+x}$ is
(a) $[2\sqrt{2}, \sqrt{11}]$ (b) $[\sqrt{5}, \sqrt{10}]$
(c) $[\sqrt{5}, \sqrt{13}]$ (d) $[\sqrt{2}, \sqrt{7}]$

73. If the domain of the function $\sin^{-1}\left(\frac{3x-22}{2x-19}\right) + \log_e\left(\frac{3x^2-8x+5}{x^2-3x-10}\right)$ is $(\alpha, \beta]$ then $3\alpha + 10\beta$ is equal to
(a) 98 (b) 100
(c) 95 (d) 97
74. Let $f: R \rightarrow R$ be a function such that $f(x) = \frac{x^2 + 2x + 1}{x^2 + 1}$. then
(a) $f(x)$ is many-one in $(-\infty, -1)$
(b) $f(x)$ is one-one in $(-\infty, \infty)$
(c) $f(x)$ is many-one in $(1, \infty)$
(d) $f(x)$ is one-one in $[1, \infty)$ but not in $(-\infty, \infty)$
75. The function $f(x) = \frac{x^2 + 2x - 1}{x^2 - 4x + 9}$, $x \in R$ is
(a) neither one-one nor onto
(b) neither one-one nor onto
Onto but not one-one
One-one but not onto.