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IIT-JEE | NEET | Foundation

JEE

Time: 3 Hours **M.M. 300**

ALL INDIA SKY TEST SERIES

XI – IIT JEE (SAMARATH BATCH)

Date: 26/11/2023

SYLLABUS

PHYSICS	CHEMISTRY	MATHEMATICS
Kinematics + Laws of motion + W.P.E. + C.O.M.	**Equilibrium + Thermodynamics**	**Previous + Bionomial**

Please read the instructions carefully. You are allotted **5** minutes specifically for this purpose.

INSTRUCTIONS:

1. This Question paper is divided in to three parts Physics, Chemistry and Mathematics each part is further divided into two sections.
   Section –A Contains 20 Questions Section B contains 10 questions. Please ensure that the Questions paper you have received contains **ALL THE QUESTIONS** in each Part.
2. **In Section A all the 20 Questions are compulsory and Section B Contain 10 Question, out of these 10 Questions**, candidates can choose to attempt any 5 Questions.
   Each Question has four choices (A), (B), (C), (D) out of which **only one is correct & Carry 4 marks each 1 mark** will be deducted for each wrong answer.

GENERAL INSTRUCTION

1. Use only **blue/black pen (avoid gel pen)** for darkening the bubble.
2. Indicate the correct answer for each question by filling appropriate bubble in your **OMR** answer sheet.
3. The answer sheet will be checked through computer hence, the answer of the question must be marked by –shading the circles against the question by dark **blue/black pen**
4. Blank papers, Clipboards, Log tables, Slide Rule, Calculator, Cellular Phones Papers and Electronic Gadgets in any form are **not** allowed to be carried inside the examination hall.

Name of the candidate:_____

Signature of the candidate: _____**Signature of the invigilator:** _____

PHYSICS

Section - A

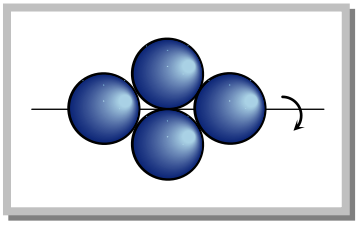
Single Choice Question

1. Where will be the centre of mass on combining two masses m and M ($M>m$)
(a) Towards m (b) Towards M
(c) Between m and M (d) Anywhere

2. A circular disc of radius R and thickness $\frac{R}{6}$ has moment of inertia I about an axis passing through its centre and perpendicular to its plane. It is melted and recasted into a solid sphere. The moment of inertia of the sphere about its diameter as axis of rotation is
(a) I (b) $\frac{2I}{8}$
(c) $\frac{I}{5}$ (d) $\frac{I}{10}$

3. Two discs of the same material and thickness have radii 0.2 m and 0.6 m. Their moments of inertia about their axes will be in the ratio
(a) 1 : 81 (b) 1 : 27
(c) 1 : 9 (d) 1 : 3

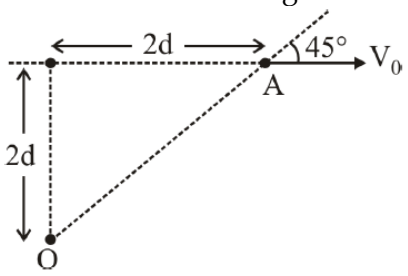
4. The moment of inertia of a sphere (mass M and radius R) about it's diameter is I. Four such spheres are arranged as shown in the figure. The moment of inertia of the system about axis XX' will be
(a) 3I
(b) 5 I
(c) 7 I
(d) 9 I



5. A bicycle wheel attained a velocity of 20 rad/sec in 5 sec starting from rest, find the number of revolutions made by the wheel.
(a) $\frac{\pi}{25}$ revolutions (b) $\frac{1}{\pi}$ revolutions
(c) $\frac{25}{\pi}$ revolutions (d) None

6. A particle is moving along a circular path with uniform speed. Through what angle does its angular velocity change when it completes half of the circular path?
(a) 0^0 (b) 45^0 (c) 180^0 (d) 90^0

7. Find angular velocity of A with respect to O, at the instant shown in figure.

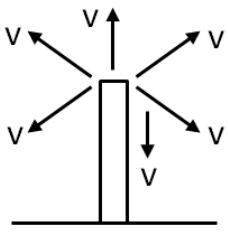


(a) $\frac{V_0}{d}$ (b) $\frac{V_0}{2d}$ (c) $\frac{V_0}{4d}$ (d) $\frac{V_0}{3d}$

8. A particle travels in a circle of radius 20 cm at a speed that uniformly increases. If the speed changes from 5 m/s to 6 m/s in 2 sec. Find the angular acceleration –
(a) 2 Rad/s^2 (b) 2.5 Rad/s^2
(c) 3 rad/s^2 (d) 3.5 Rad/s^2

9. The linear momentum of a body is increased by 50%. Then increase in the kinetic energy will be :-
(a) 25% (b) 50% (c) 100% (d) 125%

10. Particles are projected from the top of a tower with same speed at different angles as shown. Which of the following are true?

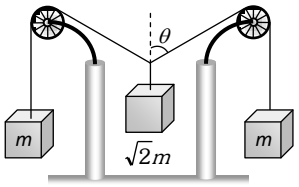


(a) All the particles would strike the ground with same speed
(b) All particle strike the ground at the same time
(c) All particle strike the ground with different speed
(d) All particle strike the ground with different kinetic energy

11. A body falls freely from rest under gravity. It covers as much distance in the last second of its motion as covered in the first three seconds. The body has fallen for a time of
(a) 3 sec. (b) 5 sec.
(c) 7 sec. (d) 9 sec.

12. A rope of length L is pulled by a constant force F. What is the tension in the rope at a distance x from the end where the force is applied
(a) $\frac{FL}{x}$ (b) $\frac{F(L-x)}{L}$ (c) $\frac{FL}{L-x}$ (d) $\frac{Fx}{L-x}$

13. The pulleys and strings shown in the figure are smooth and of negligible mass. For the system to remain in equilibrium, the angle θ should be



(a) 0^o (b) 30^o (c) 45^o (d) 60^o

14. On the Celsius scale the absolute zero of temperature is at
(a) $0°C$ (b) $-32°C$
(c) $100°C$ (d) $-273.15°C$

15. A uniform metal rod is used as a bar pendulum. If the room temperature rises by 10^oC, and the coefficient of linear expansion of the metal of the rod is 2×10^{-6} per ^oC, the period of the pendulum will have percentage increase of
(a) 3×10^{-3} (b) 4×10^{-3}
(c) 2×10^{-3} (d) 1×10^{-3}

16. The coefficient of linear expansion of crystal in one direction is α_1 and that in every direction perpendicular to it is α_2. The coefficient of cubical expansion is
(a) $\alpha_1+\alpha_2$ (b) $2\alpha_1+\alpha_2$
(c) $\alpha_1+2\alpha_2$ (d) None of these

17. On an X temperature scale, water freezes at -125.0^oX and boils at 375.0^oX. On a Y temperature scale, water freezes at -70.0^oY and boils at -30.0^oY. The value of temperature on X – scale equal to the temperature of 50.0^oY on Y-scale is
(a) 455.0^oX (b) -125.0^oX
(c) 1375.0^oX (d) 1500.0^oX

18. In figure which strip brass or steel have higher coefficient of linear expansion.

(A) (B)

(a) Brass strip
(b) Steel strip
(c) Both strip has same coefficient of linear expansion
(d) Cannot be decided from given data

19. The length of two metallic rods at temperature θ are L_A and L_B and their linear coefficient of expansion are α_A and α_B respectively.If the difference in their length is to remain constant at any temperature then
(a) $L_A/L_B=\alpha_A/\alpha_B$ (b) $L_A/L_B=\alpha_B/\alpha_A$
(c) $\alpha_A=\alpha_B$ (d) $\alpha_A\alpha_B=1$

20. 1 g of a steam at 100^oC melt how much ice at 0^oC? (Latent heat of ice = 80 cal/gm and latent heat of steam = 540 cal/gm)
(a) 1 gm (b) 2 gm (c) 4 gm (d) 8 gm

Section - B

Integer Type Questions

21. A stone of mass 500g is dropped from the top of a tower of 100m height and simultaneously other stone of mass 1kg is thrown horizontally with a speed of 10 m/s from same point. The height of the centre of mass of the above two stone system after 3s is 5x meter. The value of x is_____

22. Two homogeneous spheres A and B of masses m and 2m having radii 2a and a respectively are placed in touch. The distance of the centre of mass from the first sphere is xa. The value of x is____

23. A man of mass M stands at one end of a plank of length L which lies at rest on a frictionless surface. The man walks to the other end of the plank. If the mass of the plank is 3M, the distance that the man moves relative to the ground is $\frac{xL}{4}$. The value of x is_____

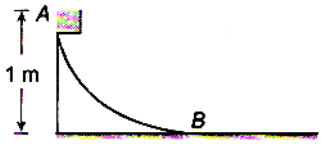
24. The distance of the centre of mass of a hemispherical shell of radius R from its centre is $\frac{R}{x}$. The value of x is_____

25. A position –dependent force $F = 7 - 2x + 3x^2$ newton acts on a small body of mass 2 kg and displaces it from x = 0 to x = 5 m. The work done in joule is $9x$. The value x is_____

26. A pump can take out 7200 kg of water per hour from a well 100 m deep. The power of pump(in kW), assuming its efficiency as 50%, will be___

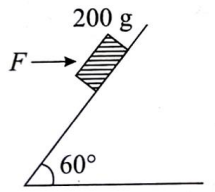
27. A spring of force constant 800N/m has an extension of 5 cm. The work done (in Joule) in extending it from 5 cm to 15 cm is_____

28. A block weighing 10 kg travels down a smooth curved track AB joined to a rough horizontal surface (see the figure). The rough surface has a friction coefficient of 0.20 with the block. If the block starts slipping on the track from a point 1 m above the horizontal surface, how far will it move(in meter) on the rough surface?



29. A body crosses the topmost point of a vertical circle with a critical speed. Its centripetal acceleration, when the string is horizontal will be xg. The value of x is_____

30. A block of mass 200 g is kept stationary on a smooth inclined plane by applying a minimum horizontal force $F = \sqrt{x}N$ as shown in figure. The value of x = _____.



CHEMISTRY

SECTION - A

Single Choice Question

31. Match the atomic numbers given in column I with the block in which the element is placed in column II and mark the appropriate choice.

	Column – I (Atomic number)		Column – II (Block)
(A)	62	(i)	d – block
(B)	47	(ii)	p-block
(C)	56	(iii)	f-block
(D)	53	(iv)	s-block

(a) (A) → (iii), (B) → (i), (C) → (iv), (D) → (ii)
(b) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)
(c) (A) → (ii), (B) →(iv), (C) → (i), (D) → (iii)
(d) (A) → (iv), (B) →(i), (C) → (ii), (D) → (iii)

32. Arrange the following in increases order of covalent character - $NaCl, MgCl_2, AlCl_3$
(a) $NaCl < MgCl_2 < AlCl_3$
(b) $MgCl_2 < NaCl < AlCl_3$
(c) $AlCl_3 < MgCl_2 < NaCl$
(d) $NaCl < AlCl_3 < MgCl_2$

33. What is common between the following molecules:
SO_3, CO_3^{2-}, NO_3^- ?
(a) All have linear shape
(b) Al have trigonal planar shape
(c) All have tetrahedral shape
(d) All have trigonal pyramidal shape

34. Which type of overlapping is shown by p(p_x, p_y and p_z) – orbitals?
(a) Two end to end and one sidewise overlap
(b) Two sidewise and one end to end overlap
(c) Three sidewise overlaps
(d) Three end to end overlaps

35. 2s and 2p – atomic orbital combine to give how many molecular orbitals?
(a) 2 (b) 4 (c) 8 (d) 6

36. Which of the following pairs will have same order?
(a) F_2 and O_2^{2-} (b) N_2 and CO_2
(c) O_2 and O_2^- (d) N_2 and N_2^+

37. Which of the following observation can be explained on the basis of hydrogen bonding?
(i) H – F has higher boiling point than other halogen acids.
(ii) H_2O has highest boiling point among hydrides of group 16 elements
(iii) NH_3 has lower boiling point than PH_3
(a) (i), (ii) and (iii) (b) (i) and (iii)
(c) (ii) and (iii) (d) (i) and (ii)

38. A compound contains atoms X, Y and Z. The oxidation number of X is +2, Y is +5 and Z is – 2. The possible formula of the compound is
(a) XYZ_2 (b) $Y_2(XZ_3)_2$
(c) $X_3(YZ_4)_2$ (d) $X_3(Y_4Z)_2$

39. PCl_5, PCl_3 and Cl_2 are at equilibrium at 500 K with concentration 2.1 M PCl_3 2.1 M Cl_2 and 1.9 M PCl_5. The equilibrium constant for the given reaction is
$PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$
(a) 2.32 (b) 1.79 (c) 4.2 (d) 3.8

40. At 473 K, K_c for the reaction $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$ is 8.3×10^{-3}. What will be the value of K_c for the formation of PCl_5 at the same temperature ?
(a) 8.3×10^{3} (b) 120.48
(c) 8.3×10^{-3} (d) 240.8

41. 5 moles of PCl_5 are heated in a closed vessel of 5 litre capacity. At equilibrium 40% of PCl_5 is found to be dissociated. What is the value of K_c ?
(a) 0.266 M (b) 0.133 M
(c) 2.5 M (d) 0.20 M

42. For the reaction $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$, the forward reaction at constant temperature is favoured by
(a) introducing an inert gas at constant volume
(b) introducing Cl_2 at constant volume
(c) introducing PCl_5 at constant volume
(d) reducing the volume of the container.

43. Fill in the blanks in the given table with the appropriate choice.

Species	Conjugate acid	Conjugate base
HCO_3^-	___p___	CO_3^{2-}
HSO_4^-	H_2SO_4	___q___
NH_3	___r___	___s___
H_2O	___t___	OH^-

	p	q	r	s	t
(a)	H_2CO_3	SO_4^{2-}	NH_4^+	NH_2^-	H_3O^+
(b)	HCO_3^-	H_2SO_3	NH_2^-	NH_4^+	H_3O^+
(c)	NH_3	HSO_4^-	NH_4^+	NH_2^-	H_2O
(d)	H_2O	H_2SO_4	NH_2^+	NH_2^-	OH^-

44. What is the percentage dissociation of 0.1 M solution of acetic acid ? ($K_a = 10^{-5}$)
(a) 10% (b) 100% (c) 1% (d) 0.01%

45. Solution of a monobasic acid has a pH = 5. If one mL of it is diluted to 1 litre, what will be the pH of the resulting solution?
(a) 3.45 (b) 6.96 (c) 8.58 (c) 10.25

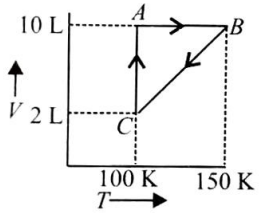
46. Dissociation constants of CH_3COOH and NH_4OH in aqueous solution are 10^{-5}. If pH of a CH_3COOH solution is 3, What will be the pH of NH_4OH?
(a) 3.0 (b) 4.0 (c) 10.0 (d) 11.0

47. What is the pH at which $Mg(OH)_2$ begins to precipitate from a solution containing 0.1 M Mg^{2+} ions ?
[K_{sp} for $Mg(OH)_2 = 1.0\times10^{-11}$]
(a) 4 (b) 6 (c) 9 (d) 7

48. The solubility product of $BaCl_2$ is 3.2×10^{-9}. What will be its solubility in mol L^{-1} ?
(a) 4×10^{-3} (b) 3.2×10^{-9}
(c) 1×10^{-3} (d) 1×10^{-9}

49. What will be the solubility of AgCl in 0.05 M NaCl aqueous solution if solubility product of AgCl is 1.5×10^{-10} ?
(a) $3\times10^{-9} mol\ L^{-1}$ (b) 0.05 mol L^{-1}
(c) $1.5\times10^{-5} mol\ L^{-1}$ (d) $3\times10^{9}\ mol\ L^{-1}$

50. Consider the given diagram for 1 mole of a gas X and answer the following question.



The process $A \rightarrow B$ represents
(a) isobaric change (b) isothermal change
(c) adiabatic change (d) isochoric change

SECTION - B

Integer Type Questions

51. Among the following species.
$N_2, N_2^+, N_2^-, N_2^{2-}, O_2, O_2^+, O_2^-, O_2^{2-}$
The number of species showing diamagnetism is

52. According to molecular orbital theory, the number of unpaired electron(s) in O_2^{2-} is

53. (i) $X_{(g)} \rightleftharpoons Y_{(g)} + Z_{(g)}; K_{p_1} = 3$
(ii) $A_{(g)} \rightleftharpoons 2B_{(g)}; K_{p_2} = 1$
If the degree of dissociation an initial concentration of both the reactants $X_{(g)}$ and $A_{(g)}$ are equal, then the ratio of the total pressure at equilibrium $\left(\frac{p_1}{p_2}\right)$ is equal to $x:1$.
The value of x is

54. Consider the following reaction approaching equilibrium at 27°C and 1 atm pressure
$A + B \underset{k_b=10^2}{\overset{k_f=10^3}{\rightleftharpoons}} C + D$
The standard Gibb's energy change $\left(\Delta_f G^o\right)$ at 27^oC is $(-)$_____kJ mol^{-1} (Nearest Integer).
(Given : $R = 8.3$ JK^{-1} mol^{-1} and In 10 = 2.3)

55. Consider the following equation :
$2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}, \Delta H = -190$ kJ. The number of factors which will increase the yield of SO_3 at equilibrium from the following is
(A) Increasing temperature
(B) Increasing pressure
(C) Adding more SO_2
(D) Addition of catalyst

56. For reaction $SO_{2(g)} + \frac{1}{2}O_{2(g)} \rightleftharpoons SO_{3(g)}$
$K_p = 2 \times 10^{12}$ at 27^oC and 1 atm pressure. The K_C for the same reaction is _____$\times 10^{13}$.
(Given : R = 0.082 L atm K^{-1} mol^{-1})

57. At 298 K, the solubility of silver chloride in water is $1.434 \times 10^{-3} gL^{-1}$. The value of – log K_{sp} for silver chloride is
(Given mass of Ag is 107.9 g mol^{-1} and mass of Cl is 35.5 g mol^{-1})

58. The molar solubility of $Zn(OH)_2$ in 0.1 M NaOH solution is $x \times 10^{-18} M$. The value of x is
(Given : The solubility product of $Zn(OH)_2$ is 2×10^{-20})

59. Two salts A_2X and MX have the same value of solubility product of 4.0×10^{-12}. The ratio of their molar solubilities i.e., $\frac{S(A_2X)}{S(MX)} =$ _____
(Round off to the Nearest Integer)

60. If the solubility product of AB_2 is $3.20 \times 10^{-11} M^3$, then the solubility of AB_2 in pure water is _____ $\times 10^{-4}$ mol L^{-1}.
[Assuming that neither kind of ion reacts with water]

MATHEMATICS

Section - A

Single Choice Question

61. *If* $\log_{0.04}(x-1) \geq \log_{0.2}(x-1)$, then x belongs to the interval
(a) (1, 2] (b) $(-\infty, 2]$
(c) $[2, \infty)$ (d) None of these

62. The equation $\sqrt{x+1} - \sqrt{x-1} = \sqrt{4x-1}$ has
(a) no solution
(b) one solution
(c) two solutions
(d) more than two solutions

63. In a certain town 25% families own a phone and 15% own a car, 65% families own neither a phone nor a car. 2000 families own both a car and a phone.
Consider the following statements in this regard.
1. 10% families own both a car and a phone
2. 35% families own either a car or a phone
3. 40,000 families live in the town
Which of the following statements are correct ?
(a) 1 and 2 (b) 1 and 3
(c) 2 and 3 (d) 1, 2 and 3

64. For any two complex numbers z_1, z_2 we have $|z_1+z_2|^2=|z_1|^2+|z_2|^2$. Then,
(a) $\text{Re}\left(\frac{z_1}{z_2}\right)=0$ (b) $\text{Im}\left(\frac{z_1}{z_2}\right)=0$
(c) Re $(z_1 z_2) = 0$ (d) Im $(z_1 z_2) = 0$

65. *If* z_1 and z_2 are two complex numbers such that $|z_1|=|z_2|+|z_1-z_2|$, then arg (z_1)-arg(z_2)
(a) 0 (b) $\pi/2$
(c) $-\pi/2$ (d) none of these

66. *If* $\left(\frac{3}{2}+\frac{i\sqrt{3}}{2}\right)^{50}=3^{25}(x+iy)$, where x and y are reals, then the ordered pair (x, y) is given by
(a) (0,3) (b) $(1/2, \sqrt{3}/2)$
(c) (-3,0) (d) $(0, -3)$

67. If $z^2+z+1=0$, where z is a complex number, then the value of
$$\left(z+\frac{1}{z}\right)^2+\left(z^2+\frac{1}{z^2}\right)^2+\left(z^3+\frac{1}{z^3}\right)^2+...+\left(z^6+\frac{1}{z^6}\right)^2$$
is
(a) 54 (b) 6 (c) 12 (d) 18

68. Let z, ω be complex numbers such that $\bar{z}+i\bar{w}=0$ and arg $(z\omega) = \pi$. Then, arg z equals
(a) $\frac{5\pi}{4}$ (b) $\frac{\pi}{2}$
(c) $\frac{3\pi}{4}$ (d) $\frac{\pi}{4}$

69. Let $a_1, a_2, a_3, ...$ be terms of an A.P. If $\frac{a_1+a_2+...+a_p}{a_1+a_2+...+a_q}=\frac{p^2}{q^2}, p\neq q$, then $\frac{a_6}{a_{21}}$ equals
(a) $\frac{41}{11}$ (b) $\frac{7}{2}$ (c) $\frac{2}{7}$ (d) $\frac{11}{41}$

70. Three numbers form an increasing G.P. If the middle number is doubled, then the new numbers are in A.P. The common ratio of the G.P. is
(a) $2-\sqrt{3}$ (b) $2+\sqrt{3}$
(c) $\sqrt{3}-2$ (d) $3+\sqrt{2}$

71. Consider an infinite geometric series with first term a and common ratio r. If its sum is 4 and the second term is 3/4, then
(a) $a=\frac{4}{7}, r=\frac{3}{7}$ (b) $a=2, r=\frac{3}{8}$
(c) $a=\frac{3}{2}, r=\frac{1}{2}$ (d) $a=3, r=\frac{1}{4}$

72. The number of real solutions of the equation $\left(\frac{9}{10}\right)^x=-3+x-x^2$ is
(a) 0 (b) 1
(c) 2 (d) none of these

73. In a quadratic equation with leading coefficient 1, a student reads the coefficient 16 of x wrongly as 19 and obtain the roots as -15 and -4. The correct roots are.
(a) 6, 10 (b) -6, -10
(c) -7, -9 (d) none of these

74. *If* x is real, the maximum value of $\frac{3x^2+9x+17}{3x^2+9x+7}$, is
(a) $\frac{1}{4}$ (b) 41 (c) 1 (d) $\frac{17}{7}$

75. The coefficient of x^4 in the expansion of $\left(\frac{x}{2}-\frac{3}{x^2}\right)^{10}$, is
(a) $\frac{405}{256}$ (b) $\frac{504}{259}$
(c) $\frac{450}{263}$ (d) none of these

76. The coefficient of the term independent of x in the expansion of $(1+x+2x^3)\left(\frac{3}{2}x^2-\frac{1}{3x}\right)^9$, is
(a) 1/3 (b) 19/54 (c) 17/54 (d) 1/4

77. The number of integral terms in the expansion of $(5^{1/2}+7^{1/8})^{1024}$ is
(a) 128 (b) 129 (c) 130 (d) 131

78. The coefficient of the term independent of x in the expansion of
$$\left(\frac{x+1}{x^{2/3}-x^{1/3}+1}-\frac{x-1}{x-x^{1/2}}\right)^{10}$$ is
(a) 210 (b) 105 (c) 70 (d) 112

79. The coefficient of x^5 in the expansion of $(1+x)^{21}+(1+x)^{22}+...+(1+x)^{30}$ is
(a) ${}^{51}C_5$ (b) ${}^{9}C_5$
(c) ${}^{31}C_6-{}^{21}C_6$ (d) ${}^{30}C_5+{}^{20}C_5$

80. The sum of the last 30 coefficients of powers of x in the binomial expansion of $(1+x)^{59}$ is
(a) 2^{58} (b) 2^{29} (c) 2^{28} (d) 2^{59}-2^{29}

Section - B

Integer Type Questions

81. Number of solutions of equation $\log_2(9-2^x)=10^{\log_{10}(3-x)}$, is

82. Find the number of solution of the equation $\frac{|x^2-4x|+3}{x^2+|x-5|}=1$.

83. The smallest value of k for which both the roots of the equation $x^2-8kx+16(k^2-k+1)=0$ are real, distinct and have values at least 4, is

84. The quadratic equations $x^2-6x+a=0$ and $x^2-cx+6=0$ have one root in common. The other roots of the first and second equations are integers in the ratio 4 : 3. Then, the common root is

85. Let α and β be the roots of $x^2-6x-2=0$, with $\alpha>\beta$. If $a_n=\alpha^n-\beta^n$ for $n\geq 1$, then the value of $\frac{a_{10}-2a_8}{2a^9}$ is

86. If $\frac{1}{n+1}{}^nC_n+\frac{1}{n}{}^nC_{n-1}+.....+\frac{1}{2}{}^nC_1+{}^nC_0=\frac{1023}{10}$. the n n is equal to

87. If $({}^{30}C_1)^2+2({}^{30}C_2)^2+3({}^{30}C_3)^2+\ldots+30({}^{30}C_{30})^2=\frac{\alpha 60!}{(30!)^2}$, then α is equal to

88. The lowest integer which is greater than $\left(1+\frac{1}{10^{100}}\right)^{10^{100}}$

89. If the coefficient of x^7 in $\left(ax-\frac{1}{bx^2}\right)^{13}$ and the coefficient of x^{-5} in $\left(ax+\frac{1}{bx^2}\right)^{13}$ are equal, then a^4b^4 is equal to

90. The sum of the coefficient of three consecutive terms in the binomial expansion of $(1+x)^{n+2}$, which are in the ratio 1 : 3 : 5, is equal to