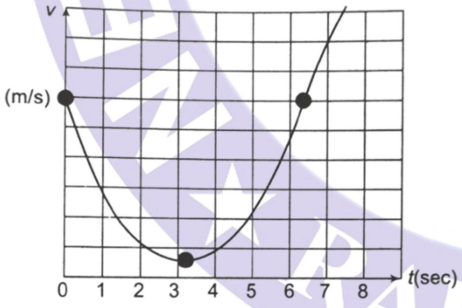
NEW STANDARD ACADEMY

Marks:300

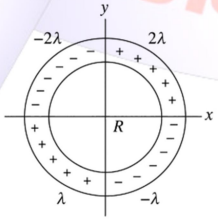
Date : 20-07-2026 **CLASS : 12TH JEE** **Time: 3 hours**

PHYSICS

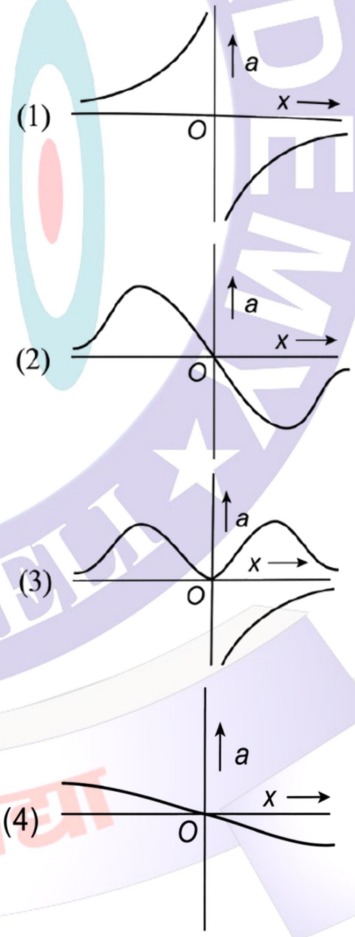
1. Two bodies of different masses m_a and m_b are dropped from two different heights a and b. The ratio of the time taken by the two to cover these distances are
   (1) a:b (2) b:a
   (3) √a : √b (4) a²: b²
2. The displacement of the particle varies with time according to the relation $x = \frac{k}{b}\left[[1 - e^{-bt}]\right]$.Then the velocity of the particle is
   (1) k(e^{-bt}) (2) $\frac{k}{b^2 e^{-bt}}$
   (3) k be^{-bt} (4) None of these
3. A bird flies for 4 s with a velocity of |t - 2| m / s in a straight line, where t is time in seconds. It covers a distance of
   (1) 2 m (2) 4 m
   (3) 6 m (4)8 m
4. Velocity-time graph for a particle is shown in figure. Starting from t = 0, at what instant t, average acceleration is zero between 0 and t?



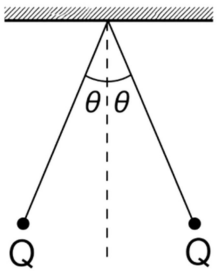
   (1) 1s (2) 3.5 s
   (3) 6.3 s (4) 7.3 s
5. The charge per unit length of the four quadrant of the ring is 2λ, -2 λ, λ and – λ respectively. The electric field at the centre is



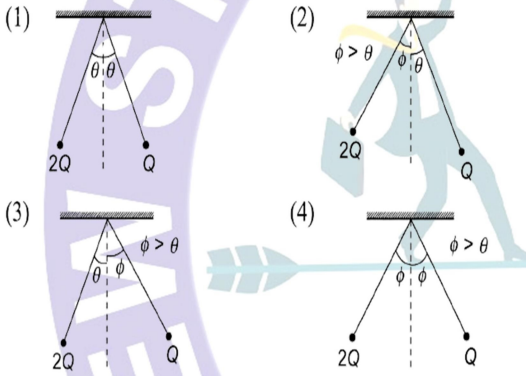
   (1) $-\frac{\lambda}{2\pi\epsilon_0 R}\,\hat{\imath}$ (2) $\frac{\lambda}{2\pi\epsilon_0 R}\,\hat{\jmath}$
   (3) $\frac{\sqrt{2}\lambda}{2\pi\epsilon_0 R}\,\hat{\imath}$ (4) None
6. Two identical positive charges are fixed on the y-axis. At equal distance from the origin O. A negatively charged particle starts on the x-axis at a large distance from O, moves along the x-axis, passes through O and moves far away from O. Its acceleration a is taken as positive along its direction of motion. The particle's acceleration a is plotted against its x-coordinate. Which of the following best represents the plot?



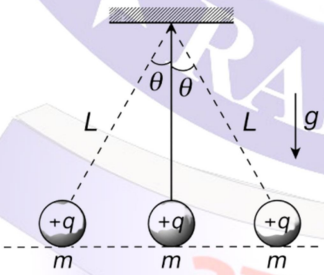
7. Two pith balls each with mass m are suspended from insulating threads.



When the pith balls are given equal positive charge Q, they hang in equilibrium as shown. We now increase the charge on the left pith ball from Q to 2Q while leaving its mass essentially unchanged. Which of the following diagrams best represents the new equilibrium configuration?

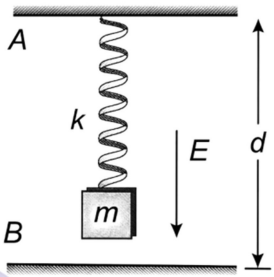


8. Three identical point charges, each of mass m and charge q, hang from three strings as shown in figure. The value of q in terms of m, L and q.



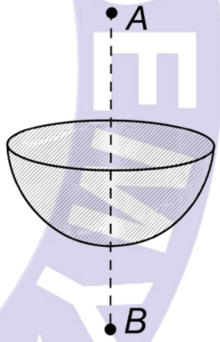
(1) $q = \sqrt{(16/5)\,\pi\varepsilon_0 mg\,L^2\,sin^2\theta tan\theta}$
(2) $q = \sqrt{(16/15)\,\pi\varepsilon_0 mg\,L^2\,sin^2\theta tan\theta}$
(3) $q = \sqrt{(15/16)\,\pi\varepsilon_0 mg\,L^2\,sin^2\theta tan\theta}$
(4) none of these

9. A block of mass m is suspended in vertical orientation with a spring of spring constant k. The block is made to oscillate in gravitation field. Its time period is found to be T. Now the space between the plates is made gravity free and an electric field E is produced in vertical downward direction. Now the block is given charge q. The new time period of oscillation is



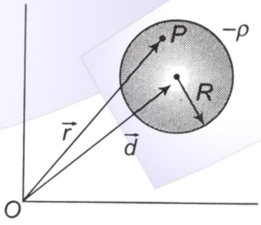
(1) T (2) $T+2\pi\sqrt{\frac{qE}{md}}$
(3) $2\pi\sqrt{\frac{qE}{md}}$ (4) none of these

10. The diagram shows a uniformly charged hemisphere of radius R. It has volume charge density p. If the electric field at a point 2R distance above its centre is E then what is the electric field at the point which is 2R below its centre?



(1) $(\rho R / 6\varepsilon_0) + E$ (2) $(\rho R / 12\,\varepsilon_0) - E$
(3) $(-\rho R / 6\,\varepsilon_0) + E$ (4) $(\rho R / 12\,\varepsilon_0) + E$

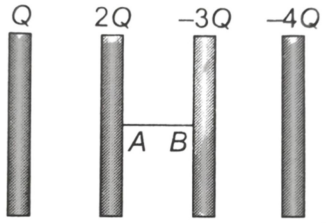
11. A non-conducting sphere of radius R is filled with uniform volume charge density $-\rho$. The centre of this sphere is displaced from the origin by $\vec{d}$ The electric field $\vec{E}$ at any point P having position vector, inside the sphere is



(1) $\frac{\rho}{3\varepsilon_0}\vec{d}$ (2) $\frac{\rho}{3\varepsilon_0}(\vec{r}-\vec{d})$
(2) $\frac{\rho}{3\varepsilon_0}(\vec{d}-\vec{r})$ (4) $\frac{\rho}{3\varepsilon_0}\vec{r}$

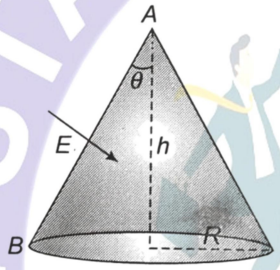
12. Four very large metal plates are given the charges as shown in figure. The middle two

are then connected through a wire. Find the charge that will flow through the wire.



(1) 5Q from A to B (2) 5ρ / 2 from A to B
(3) 5Q from B to A (4) no charge will flow

13. A conic surface is placed in a uniform electric field E as shown such that field is perpendicular to the surface on the side AB. The base of the cone is of radius R and height of the cone is h.



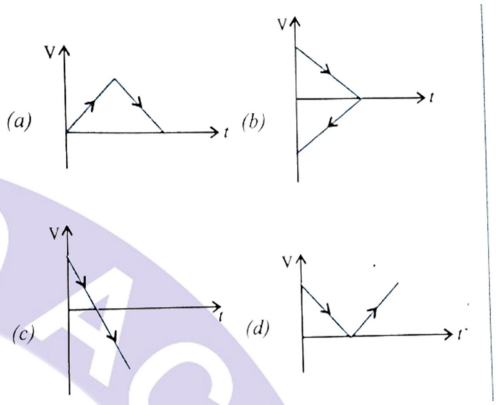
The angle of cone is θ as shown. Find the magnitude of that flux which enters the cone curved surface from left side. Don't count the outgoing flux. (theta < 45°)
(1) ER[h cos θ + π(R/2) sin θ]
(2) ER[h sinθ + π(R/2) cos θ]
(3) ER[h cos θ +πR sin θ]
(4) none of these

14. Eight dipoles of charges of magnitude e are placed inside a cube. The total electric flux coming out of the cube will be
(1) $8e/\varepsilon_0$ (2) $16e/\varepsilon_0$
(3) e/ε_0 (4) Zero

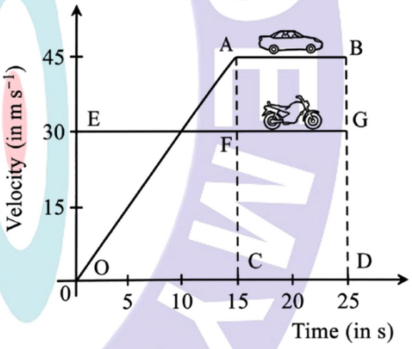
15. An object, moving with a speed of **6.25m / s** is decelerated at a rate given by $\frac{dv}{dt} = -2.5\sqrt{v}$where v is the instantaneous speed. The time taken by the object, to come to rest, would be
(1) 1s (2) 2 s
(3) 4s (4) 8s.

16. A car moving with a speed of 50km h^{-1} can be stopped by applying brakes over a distance of 6 m. If the same car is moving at a speed of 100km h^{-1} the stopping distance is
(1) 12m (2) 18m
(3) 6m (4) 24 m.

17. A body is thrown vertically upwards. Which one of the following graphs correctly represent the velocity versus time?



18. The velocity-time graphs of a car and a scooter are shown in the fig. (i) The difference between the distance travelled by the car and the scooter in 15 s and (ii) the time at which the car will catch up with the scooter are, respectively



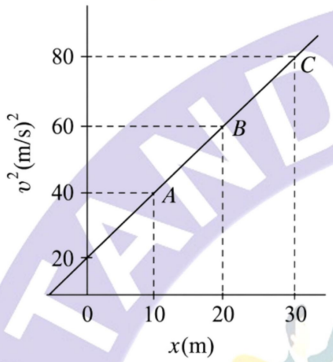
(a) 112.5 m and 15 s
(b) 337.5 m and 25 s
(c) 225.5 m and 10 s
(d) 112.5 m and 22.5 s.

19. The instantaneous velocity of a particle moving in a straight line is given by $v = \alpha t + \beta t^2$, where α and β constants. The distance travelled by the particle between **1s** and **2 s** is
(1) $3\alpha + 7\beta$ (2) $3/2\ \alpha + 7/2\ \beta$
(3) $\alpha/2 + \beta/2$ (d) $3/2\ \alpha + 7/3\ \beta$

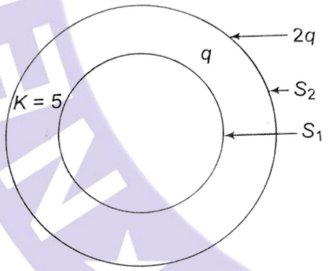
20. Water drops are falling from a nozzle of a shower onto the floor from a height of 9.8 m. The drops fall at a regular interval of time. When the first drop strikes the floor, at that instant, the third drop begins to fall. Locate the position of second drop from the floor when the first drop strikes the floor.
(1) 2.94 m (2) 4.18 m
(3) 2.45 m (4) 7.35 m

21. If the velocity of a body related to displacement x is given by $v = \sqrt{5000 + 24x}$ m/s then the acceleration of the body is ……..m/s^2.

22. A particle is moving with constant acceleration **a**. Following graph shows u versus x (displacement) plot. The acceleration of the particle is ……m / s^2



23. S_1, and S_2 are two hollow concentric spheres with charge q and 2q. Space between S_1 and S_2 is filled with a dielectric of dielectric constants.
The ratio of flux through S_2 and flux through S_1, is K. Then, find the value of 9K/11



24. In Bohr's theory of the hydrogen atom, an electron moves in a circular orbit about a proton of radius 0.53 Å. Speed of electron in Bohr's orbit is about $\frac{1}{N\times 69}$ ×speed of light. Find the value of N

25. A charged dust particle of radius 5×10^{-7} m is moving in a horizontal electric field of intensity 6.28×10^{5} V / m The surrounding medium is air with coefficient of viscosity $\eta = 1.6 \times 10^{-5}$ N- s/ m^2 .If this particle is moving with a uniform horizontal speed of 0.02 m/s, the number of excess electrons on the drop are 6*k*. Find the value of *k*.

CHEMISTRY

26. Which of the following sets of quantum numbers is not allowed?
(1) n = 3 l = 2 m_l = 0 s = + $\frac{1}{2}$
(2) n = 3 l = 2 m_l = - 2 s = + $\frac{1}{2}$
(3) n = 3 l = 3 m_l = - 3 s = - $\frac{1}{2}$
(4) n = 3 l = 0 m_l = 0 s = - $\frac{1}{2}$

27. Which of the following statements are correct?
(A) The electronic configuration of Cr is [Ar] $3d^5$ $4s^1$.
(B) The magnetic quantum number may have a negative value.
(C) In the ground state of an atom, the orbitals are filled in order of their increasing energies.
(D) The total number of nodes are given by n - 2
Choose the most appropriate answer from the options given below:
(1) (A), (C) and (D) only
(2) (A) and (B) only
(3) (A) and (C) only
(4) (A), (B) and (C) only

28. The correct decreasing order of energy, for the orbitals having, following set of quantum numbers:
(A) n = 3,*l* = 0 m = 0
(B) n = 4 ,*l* =*0,* m = 0
(C) n = 3, *l* =*0,* m = 0
(D) n = 3 , *l*=2, m = 1
(1) (D) > (B) > (C) > (A)
(2) (B) > (D) > (C) > (A)
(3) (C) > (B) > (D) > (A)
(4) (B) > (C) > (D) > (A)

29. Arrange the following orbitals in decreasing order of energy.
(A) n = 3,*l*=*0*, m = 0
(B) n = 4 *l* = 0 m = 0
(C) n = 3 , ,*l*=*0*, m = 0
(D) n = 3,*l* = 2, m = 1
The correct option for the order i is:
(1) D > B > C > A
(2) B > D > C > A
(3) A > C > B > D
(4) D > B > A > C

30. The correct set of four quantum numbers for the valence electron of rubidium atom (Z = 37) is:
(1) 5, 1, 0, + $\frac{1}{2}$
(2) 5, 1, 1, + $\frac{1}{2}$
(3) 5, 0, 1, + $\frac{1}{2}$

(4) 5, 0, 0, $+\frac{1}{2}$

31. Compare the energies of following sets of quantum numbers for multielectron system.
(A) n = 4 l = 1 *(B) n = 4 l = 2*
(C) n = 3 l = 1 *(D) n = 3 l = 2*
(E) n = 4 l = 0
Choose the correct answer from the options given below:
(1) (C) < (E) < (D) < (A) < (B)
(2) (E) < (C) < (D) < (A) < (B)
(3) (B) > (A) > (C) > (E) > (D)
(4) (E) > (C) > (A) > (D) > (B)

32. Consider the ground state of chromium atom (Z = 24) How many electrons are with Azimuthal quantum number l = 1 and l = 2 respectively?
(1) 12 and 4 (2) 16 and 4
(3) 12 and 5 (4) 16 and 5

33. Outermost electronic configuration of a group 13 element, E is $4s^2 4p^1$. The electronic configuration of an element of p-block period-five placed diagonally to element, E is:
(1) [Xe] $5d^{10}$ $6s^2$ $6p^2$ (2) [Ar] $3d^{10}4s^2$ $4p^2$
(3) [Kr] $3d^{10}$ $4s^2$ $4p^2$ (4) [Kr] $4d^{10}5s^2 5p^2$

34. The correct order of the ionic radii of O^{2-} N^{3-} F^- ,Mg^{2+} Na^+ and Al^{3+} is:
(1) $N^{3-} < F^- < O^{2-} < Mg^{2+} < Na^+ < Al^{3+}$
(2) $Al^{3+} < Mg^{2+} < Na^+ < F^- < O^{2-} < N^{3-}$
(3) $Al^{3+} < Na^+ < Mg^{2+} < O^{2-} < F^- < N^{3-}$
(4) $N^{3-} < O^{2-} < F^- < Na^+ < Mg^{2+} < Al^{3+}$

35. Consider the elements Mg, Al, S, P and Si, the correct increasing order of their first ionization enthalpy is
(1) Mg < Al < Si < S < P
(2) Al < Mg < Si < S < P
(3) Mg < Al < Si < P < S
(4) Al < Mg < S < Si < P

36. For elements B, C, N, Li, Be, O and F, the correct order of first ionization enthalpy is
(1) Li < Be < B < C < O < N < F
(2) Li < Be < B < C < N < O < F
(3) Li < B < Be < C < O < N < F
(4) B > Li > Be > C > N > O > F

37. The correct order of electron gain enthalpy is:
(1) S > Se > Te > 0
(2) Te > Se > S > 0
(3) O > S > Se > Te
(4) S > O > Se > Te

38. Match List-I with List-II.

List-I (Oxide)		List-II (Nature)	
(A)	Cl_2O_7	(I)	Amphoteric
(B)	Na_2O	(II)	Basic
(C)	Al_2O_3	(III)	Neutral
(D)	N_2O	(IV)	Acidic

Choose the correct answer from the options given below:
(1) (A)-(IV), (B)-(III), (C)-(I), (D)-(II)
(2) (A)-(IV), (B)-(II), (C)-(I), (D)-(III)
(3) (A)-(II), (B)-(IV), (C)-(III), (D)-(I)
(4) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

39. The correct decreasing order for metallic character is
(1) Na > Mg > Be > Si > P
(2) P > Si > Be > Mg > Na
(3) Si > P > Be > Na > Mg
(4) Be > Na > Mg > Si > P

40. The correct order of basicity of oxides of vanadium is
(1) $V_2O_3 > V_2O_5 > V_2O_4$
(2) $V_2O_4 > V_2O_3 > V_2O_5$
(3) $V_2O_3 > V_2O_4 > V_2O_5$
(4) $V_2O_5 > V_2O_4 > V_2O_3$

41. Arrange the bonds in order of increasing ionic character in the molecules. LiF, K_2O, N_2 ,SO_2 and CIF3.
(1) CIF, $< N_2 < SO_2 < K_2O <$ LiF
(2) LiF < $K_2O < ClF_3 < SO_2 < N_2$
(3) $N_2 < SO_2 < ClF_3 < K_2O <$ LiF
(4) $N_2 < ClF_3 < SO_2 < K_2O <$ LiF

42. Match List-I with List-II.

List-I		List-II	
A.	$Al^{3+} < Mg^{2+} < Na^+ < F$	I.	Ionisation Enthalpy
B.	B < C < O < N	II.	Metallic character
C.	B < Al < Mg < K	III.	Electronegativity
D.	Si < P < S < Cl	IV.	Ionic radii

Choose the correct answer from the options given below:
(1) A-IV, B-I, C-III, D-II
(2) A-III, B-IV, C-II, D-I
(3) A-II, B-III, C-IV, D-I
(4) A-IV, B-I, C-II, D-III

43. For the reaction, 2A + B → products, when the concentrations of A and B both were doubled, the rate of the reaction increased from 0.3 mol L^{-1} s^{-1} to 2.4 mol L^{-1} s^{-1}

When the concentration of A alone is doubled, the rate increased from 0.3 mol L^{-1} s^{-1} to 0.6 mol L^{-1} s^{-1}

Which one of the following statements is correct?

(1) Order of the reaction with respect to B is 2

(2) Order of the reaction with respect to A is 2

(3) Total order of the reaction is 4

(4) Order of the reaction with respect to B is 1

44. For a chemical reaction A + B → Product, the order is 1 with respect to A and B.

Rate mol L^{-1} S^{-1}	[A] mol L^{-1}	[B] mol L^{-1}
0.10	20	0.5
0.40	x	0.5
0.80	40	y

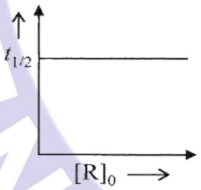
What is the value of x and y?

(1) 160 and 4 (2) 80 and 4

(3) 40 and 4 (4) 80 and 2

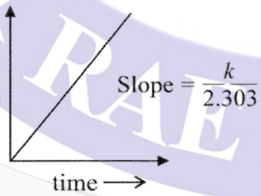
45. Given below are two statements:

Statement I:



is valid for first order reaction

Statement II: $\log \frac{[R]}{[R]_0}$



is valid for first order reaction.

In the light of the above statements, choose the correct answer from the options given below:

(1) Statement I is false but Statement II is true.

(2) Both Statement I and Statement II are false.

(3) Statement I is true but Statement II is false.

(4) Both Statement I and Statement II are true.

46. At 30°C, the half life for the decomposition of AB_2 is 200 s and is independent of the initial concentration of AB_2 The time required for 80% of the AB_2 to decompose is (Given: log2 = 0.3 log 3 = 0.48)

(1) 200 s (2) 323 s

(3) 467 s (4) 532 s

47.

$[A]_0$ / mol L^{-1}	$t_{1/2}$ / min.
0.100	200
0.025	100

For a given reaction R → P $t_{1/2}$ is related to $[A]_0$ as given in table.

Given: log 2 = 0.3

Which of the following is true?

(A) The order of the reaction is 1/2.

(B) If $[A]_0$ is 1 M, then $t_{1/2}$ is $200\sqrt{10}$ min

(C) The order of the reaction changes to 1 if the concentration of reactant changes from 0.100 M to 0.500 M.

(D) $t_{1/2}$ is 800 min for $[A]_0$ = 1.6M

Choose the correct answer from the options given below:

(1) (C) and (D) Only

(2) (A) and (B) Only

(3) (A), (B) and (D) Only

(4) (A) and (C) Only

48. In a first order decomposition reaction, the time taken for the decomposition of reactant to one fourth and one eighth of its initial concentration are t_1 and t_2(s) respectively. The ratio t_1 / t_2 will:

(1) 4/3 (2) 3/2

(3) 3/4 (4) 2/3

49. The rate of a reaction doubles when its temperature changes from 300 K to 310 K. Activation energy of such a reaction will be (R = 8.314 JK^{-1} mol^{-1} and log 2 = 0.301)

(1) 53.6 JK^{-1} mol^{-1}

(2) 48.6 JK^{-1} mol^{-1}

(3) 58.5 JK^{-1} mol^{-1}

(4) 60.5 JK^{-1} mol^{-1}

50. The energy of an electron in a hydrogen atom in its ground state is 13.6 eV. The energy of the level corresponding to the quantum number equal to 5 is:

(1) – 0.54 eV (2) – 0.85 eV

(3) – 0.64 eV (4)– 0.40 eV

MATHS

51. If $3^{2\sin 2\alpha - 1}$, 14 and $3^{4 - 2\sin 2\alpha}$ are the first three terms of an A.P. for some α, then the sixth term of this A.P. is
(1) 66 (2) 65
(3) 81 (4) 78

52. Let a_1, a_2, a_3 be an A.P. If $a_7 = 3$ the product $a_1 a_4$ is minimum and the sum of its first n terms is zero, then $n!-4a_{n(n+2)}$ is equal to
(1) $\frac{381}{4}$ (2) 9
(3) $\frac{33}{4}$ (4) 24

53. Let a_1, a_2, a_{30} be an A .P.,S , $\sum_{i=1}^{30} a_i$ and T = $\sum_{i=1}^{15} a_{(2i-1)}$.
If $a_5 = 27$ and S-2T=75, then a_{10} is equal to
(1) 57 (2) 47
(3) 42 (4) 52

54. If a_1, a_2, a_3, ... are in A.P. such that $a_1 + a_7 + a_{16} = 40$, then the sum of the first 15 terms of this A.P. is
(1) 280 (2) 120
(3) 200 (4) 150

55. Let a_1, a_2 ,...,a_{21} be an A.P. such that
$$\sum_{n=1}^{20} \frac{1}{a_n a_{n+1}} = \frac{4}{9}$$
If the sum of this AP is 189, then $a_6 a_{16}$ is equal to.
(1) 57 (2) 48
(3) 36 (4) 72

56. The sum to 10 terms of the series $\frac{1}{1+1^2+1^4} + \frac{1}{1+2^2+2^4} + \frac{3}{1+3^2+3^4} + \cdots$.is
(1) $\frac{56}{111}$ (2) $\frac{58}{111}$
(3) $\frac{55}{111}$ (3) $\frac{59}{111}$

57. In an increasing geometric progression of positive terms, the sum of the second and sixth terms is $\frac{70}{3}$ and the product of the third and fifth terms is 49. Then the sum of the 4th, 6th and 8th terms is
(1) 91 (2) 84
(3) 96 (4) 78

58. The set of all values of a for which $\lim_{x \to x}([x - 5] - [2x + 2]) = 0$ where $[\alpha]$ denotes the greatest integer less than or equal to a is equal to
(1) [-7.5, -6.5) (2) (-7.5, -6.5)
(3) (-7.5, -6.5] (4) [-7.5, -6.5]

59. If $\lim_{x \to 1} \frac{sin(3x^2-4x+1)-x^2+1}{2x^3-7x^2+ax+b} = -2$,then the value of (a-b) is equal to
(1) 11 (2) 22
(3) 12 (4) 14

60. If
$$\alpha = \lim_{x \to \frac{\pi}{4}} \frac{tan^3 x - \tan x}{cos\left(x + \frac{\pi}{4}\right)}$$
and
$\beta = \lim_{x \to 0}(\cos x)^{\cot x}$ are the root of the equation $ax^2+bx-4=0$, then the ordered pair (a,b) is
(1) (-1,3) (2) (1,-3)
(3) (1,3) (4) (-1,-3)

61. If the function f defined on $\left(\frac{\pi}{6}, \frac{\pi}{3}\right)$ by $f(x) = \begin{cases} \frac{\sqrt{2}\cos x - 1}{\cot x - 1}, x \neq \frac{\pi}{4} \\ k, \quad x = \frac{\pi}{4} \end{cases}$ is continuous then k is equal to
(1) $\frac{1}{2}$ (2) $\frac{1}{\sqrt{2}}$
(3) 1 (4) 2

62. If f(x) $\begin{cases} \frac{\sin(a+2)x + \sin x}{x}; x < 0 \\ b \quad ; x = 0 \\ \frac{(x+3x^2)^{1/3} - x^{1/3}}{x^{4/3}}; x > 0 \end{cases}$ is continuous at x=0 then a+2b is equal to
(1) 0 (2) -2
(3) 1 (4) -1

63. Let a, b ∈ R b ≠0, Define a function
$f(x) \begin{cases} a \sin\frac{\pi}{2}(x-1), \ for\ x \leq 0 \\ \frac{\tan 2x - \sin 2x}{bx^3}, \ for\ x > 0 \end{cases}$
If is continuous at x = 0, then 10 - ab is equal to
(1) 15 (2) 14
(3) 20 (4) 24

64. For x ∈ R f(x) = $|\log_e 2 - \sin x|$ and g(x) = f(f(x)),then
(1) g '(0) = $\cos(\log_e 2)$
(2) g '(0) = - $\cos(\log_e 2)$.
(3) g is differentiable at x = 0 and g' (0) = - $\sin(\log_e 2)$
(4) g is not differentiable at x = 0

65. If the function
$f(x)=\begin{cases}k_1(x-\pi)^2-1, & x\le\pi\\ k_2\cos x, & x>\pi\end{cases}$ is twice differentiable then the ordered pair (k_1k_2) is equal to
(1) $\left(\frac{1}{2},1\right)$ (2) (1,1)
(3) $\left(\frac{1}{2},-1\right)$ (4) (1, 0)

66. Let f(x) $\begin{cases}x^2\sin\left(\frac{1}{x}\right), x\neq 0\\ 0, x=0\end{cases}$ then at x = 0
(1) f is continuous but not differentiable
(2) f is continuous but f' is not continuous
(3) f'is continuous but not differentiable
(4) f and f' both are continuous

67. Let $f(x)=\begin{cases}1+\frac{2x}{a}, 0\le x<1\\ ax, 1\le x\le 2\end{cases}$ if
$\lim_{x\to 1} f(x)$
exists then a is
(a) 1 (2) -1
(c) 2 (4) -2

68. The function defined by f(x) = $(-1)^{[x^3]}$ ([.] denotes the greatest integer function) satisfies
(1) discontinuous for x = $n^{1/3}$ where n is any integer
(2) f(3/2) = 1
(3) f'(x) = 1 for - 1 < x < 1
(4) none of these

69. If $f(x)=\frac{a\cos x-\cos bx}{x^2}$ x ≠ 0 and f(0) = 4 is continuous at x = 0 then the ordered pair (a, b) is
(1) (±1 ,3) (2) (1,±3)
(3) (-1,-3) (4) (1,3)

70. Let f(x) = [$\sin^4$x]. Then (where [.] represents the greatest integer function)
(1) $f(x)$ is continuous at x = 0
(2) $f(x)$ is differentiable at x = 0
(3) $f(x)$ is non-differentiable at x = 0
(4) $f'(0) = 1$

71. The value of $(0.16)^{log_{2.5}\left(\frac{1}{3}+\frac{1}{3^2}+\frac{1}{3^3}+\cdots to\ \infty\right)}$ is equal to_____

72. Let a,b,c be three distinct positive real number such that $(2a)^{log_e a}=(bc)^{log_e b}$ and $b^{log_e 2}=a^{log_e c}$. Then 6a+5bc is equal to _____

73. Let a= $3\sqrt{2}$ and $\frac{1}{5^{1/6}\sqrt{6}}$. If x,y ∈ R are such that 3x+2y =$log_a(18)^{5/4}$ and 2x-y=$log_b\left(\sqrt{1080}\right)$,then 4x+5y is equal to _____

74. Let k and m be positive real numbers such that the function
$f(x)=\begin{cases}3x^2+k\sqrt{x+1}, 0<x<1\\ mx^2+k^2, x\ge 1\end{cases}$ is differentiable for all x> 0. Then $\frac{8f'(8)}{f'\left(\frac{1}{8}\right)}$ is equal to _____

75. If the value of
$\lim_{x\to 0}\left(2-cosx\sqrt{cos2x}\right)^{\left(\frac{x+2}{x^2}\right)}$ is equal to e^a, then a is equal to_____