



JEE Mains (11th)

Sample Paper - II

DURATION : 180 Minutes

M. MARKS : 300

General Instructions:

1. Immediately fill in the particulars on this page of the test booklet.
2. The test is of **3 hours** duration.
3. The test booklet consists of **90** questions (**75 to attempt**). The maximum marks are **300**.
4. There are three subjects in the question paper, Subject I, II and III consisting of Section-I (**Physics**), Section-II (**Chemistry**), Section-III (**Mathematics**), and having **30 questions** in each part.
5. There will be a total of **20 MCQs** and **10 Numerical** Value Based Questions (**attempt any 5**).
6. Each correct answer will give 4 marks while 1 Marks will be deducted for a wrong response.
7. No student is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.
8. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the candidates are allowed to take away this Test Booklet with them.
9. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

Name of the Student (In CAPITALS): _____

Roll Number: _____

Candidate's Signature: _____

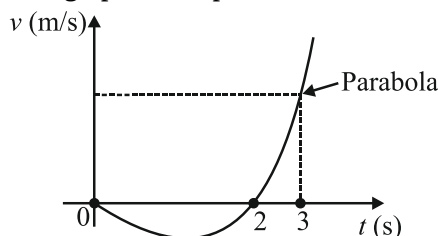
Section-I (PHYSICS)

Single Correct Type Question (1 to 20)

1. Linear momentum of a particle moving along a straight line as a function of time is given as $p = p_0 e^{-\alpha t^3}$; where p_0 and α are constants. Time is measured with a stop watch of least count 10^{-2} s and value of α is 1 s^{-3} . The percentage error in the measurement of p at $t = 1 \text{ s}$ is

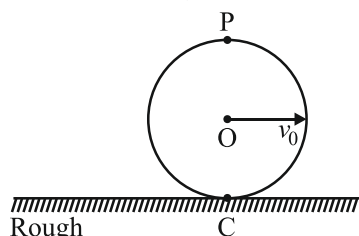
- (1) 2.5%
- (2) 3.0%
- (3) 1.5%
- (4) 1%

2. The graph of velocity (v) versus time (t) for a particle of mass 1 kg moving along a straight line is as shown. The slope of kinetic energy versus position graph of the particle at $t = 3 \text{ s}$ in SI units is

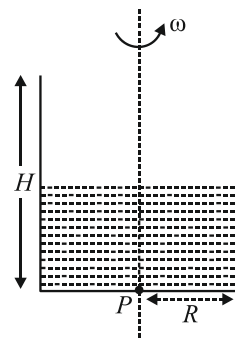


- (1) 12
- (2) 6
- (3) 3
- (4) 4

3. A uniform disc is given a linear velocity v_0 on a rough surface as shown. Regarding angular momentum of the disc, mark the correct option



- (1) Angular momentum of disc remains conserved about point C
 - (2) Angular momentum of disc is conserved about point O
 - (3) Angular momentum of disc is conserved about any point lying on a vertical line passing through point O
 - (4) Angular momentum is not conserved about any point
4. A cylindrical vessel of radius R and height H is half filled with liquid. It is rotated with angular speed ω about the central axis as shown. The free surface of the liquid takes paraboloidal shape. The value of ω for which vertex of the parabola is at a distance $\frac{H}{2}$ below P is

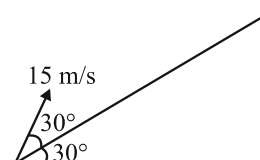


- (1) $\frac{\sqrt{2gH}}{R}$
- (2) $\frac{\sqrt{3gH}}{R}$
- (3) $\frac{\sqrt{gH}}{R}$
- (4) $\frac{\sqrt{gH}}{3R}$

5. A particle starts moving in straight line with constant acceleration. After 10 seconds, acceleration changes its sign (Opposite to the initial direction) remaining the same in magnitude. The time (in seconds) from the beginning of motion in which the particle returns to the initial positions is _____. ($\sqrt{2} = 1.414$).

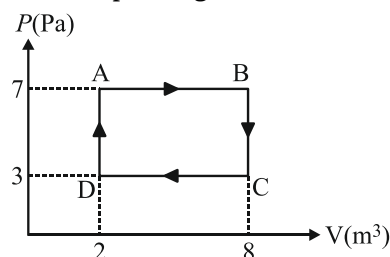
- (1) $t = 10(1 + \sqrt{2})$
- (2) $t = 10(1 - \sqrt{2})$
- (3) $t = 10$
- (4) None of these

6. A particle is projected along an inclined plane as shown in figure. After what time the particle will hit the inclined plane again? ($g = 10 \text{ m/s}^2$)



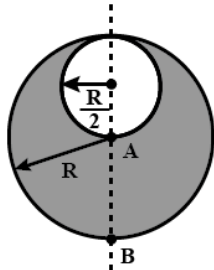
- (1) 1 s
- (2) 2 s
- (3) $\sqrt{3} \text{ s}$
- (4) $\frac{1}{\sqrt{3}} \text{ s}$

7. A gas undergoes the cyclic process as shown in figure. The cycle is repeated 25 times per second. Determine the power generated



- (1) 600 W
- (2) 300 W
- (3) 450 W
- (4) 750 W

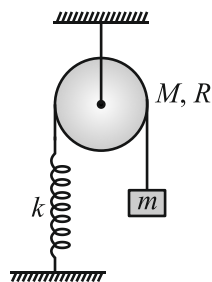
8. Consider a sphere of radius R which carries a uniform charge density ρ . If a sphere of radius $\frac{R}{2}$ is curved out of it, as shown, the ratio $\frac{|E_A|}{|E_B|}$ of magnitude of electric field $\vec{E}_A$ and $\vec{E}_B$ respectively, at points A and B due to the remaining portion is :



- (1) $\frac{18}{34}$ (2) $\frac{18}{54}$
 (3) $\frac{21}{34}$ (4) $\frac{17}{54}$
9. An open organ pipe of length l is sounded together with another organ pipe of length $l + x$ in their respective fundamental tones (given $x \ll l$). The beat frequency heard will be (Speed of sound is v)

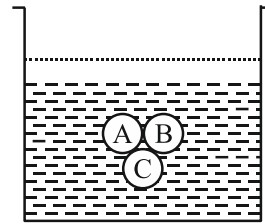
- (1) $\frac{vx}{4l^2}$
 (2) $\frac{vx}{2l^2}$
 (3) $\frac{vl^2}{2x}$
 (4) $\frac{vx^2}{2l}$

10. In the given arrangement, consider pulley as a disc, and string does not slip over the pulley. The time period of vertical oscillations of the block is given by



- (1) $2\pi\sqrt{\frac{m}{k}}$
 (2) $2\pi\sqrt{\frac{M+m}{k}}$
 (3) $2\pi\sqrt{\frac{M+2m}{k}}$
 (4) $2\pi\sqrt{\frac{M+2m}{2k}}$

11. The spherical balls A , B and C of equal size are joined and placed inside a liquid as shown in figure. Density of ball A and B are equal to ρ and that of liquid is 2ρ . If the balls stay at equilibrium, then density of ball C is $n\rho$. The value of $\frac{50}{n}$ is _____.



- (1) 14.50 (2) 12.50
 (3) 16.50 (4) 12.25

12. In a resonance tube with tuning fork of frequency 512 Hz, the first resonance occurs at water level equal to 30.3 cm and second resonance occurs at 63.7 cm. The maximum possible error in the measurement of speed of sound is

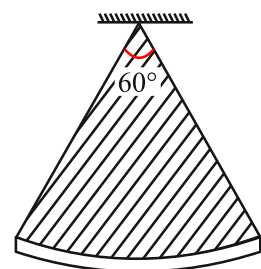
- (1) 51.2 cm/s
 (2) 102.4 cm/s
 (3) 204.8 cm/s
 (4) 153.6 cm/s

13. The maximum speed and maximum acceleration of a particle executing SHM are 10 cm/s and 50 cm/s². The speed of the particle at distance of 1 cm from the mean position is

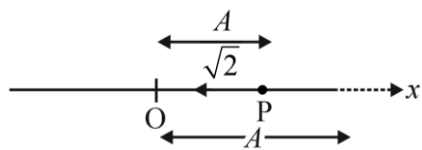
- (1) 5 cm/s
 (2) $5\sqrt{3}$ cm/s
 (3) $5\sqrt{2}$ cm/s
 (4) Zero

14. A uniform sector of mass m and radius R is suspended as shown in the figure. It executes small oscillations about an axis passing through point of suspension and perpendicular to the plane of the sector. Its time period of oscillation is

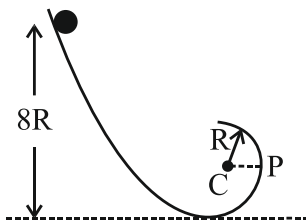
- (1) $2\pi\sqrt{\frac{R}{g}}$
 (2) $\pi\sqrt{\frac{\pi R}{g}}$
 (3) $2\pi\sqrt{\frac{R}{2g}}$
 (4) $\pi\sqrt{\frac{2\pi R}{g}}$



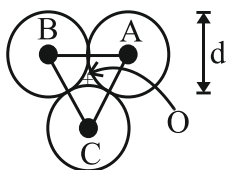
15. A particle starts from a point P at a distance $\frac{A}{\sqrt{2}}$ from the mean position O and travels towards left as shown in figure. If the time period of SHM, executed about O is T and amplitude A then the equation of motion of particle may be written as



- (1) $x = A \cos\left(\frac{2\pi t}{T} + \frac{3\pi}{4}\right)$
 (2) $x = A \sin\left(\frac{2\pi t}{T} + \frac{\pi}{4}\right)$
 (3) $x = A \sin\left(\frac{2\pi t}{T} + \frac{3\pi}{4}\right)$
 (4) $x = A \cos \frac{2\pi t}{T}$
16. A small ball of mass $m = 100 \text{ gm}$ and radius $r = \frac{R}{5}$ rolls without slipping along the track shown in figure. Radius of circular part of the track is R . If the ball starts from rest at a height of $8R$ above the bottom, the normal force on the ball at point P is _____ N. ($g = 9.80 \text{ m/s}^2$)



- (1) $\frac{4}{50} mg$ (2) $\frac{2}{30} mg$
 (3) $\frac{5}{40} mg$ (4) $\frac{50}{4} mg$
17. Three solid spheres each of mass m and diameter d are stuck together such that the lines connecting the centres form an equilateral triangle of side of length d . The ratio I_0/I_A of moment of inertia I_0 of the system about an axis passing the centroid and about center of any of the spheres I_A and Perpendicular to the plane of the triangle is:



- (1) $\frac{13}{23}$ (2) $\frac{23}{13}$
 (3) $\frac{15}{13}$ (4) $\frac{13}{15}$

18. A particle of mass m is fixed to one end of a light spring having force constant k and unstretched length ℓ . The other end is fixed. The system is given an angular speed ω about the fixed end of the spring such that it rotates in a circle in gravity free space. Then the stretch in the spring is:

- (1) $\frac{m\ell\omega^2}{k - m\omega^2}$ (2) $\frac{m\ell\omega^2}{k - m\omega}$
 (3) $\frac{m\ell\omega^2}{k + m\omega^2}$ (4) $\frac{m\ell\omega^2}{k + m\omega}$

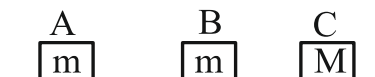
19. A load of mass $M \text{ kg}$ is suspended from a steel wire of length $2m$ and radius 1.0 mm in Searle's apparatus experiment. The increase in length produced in the wire is 4.0 mm . Now the load is fully immersed in a liquid of relative density 2. The relative density of the material of load is 8.

The new value of increase in length of the steel wire is :

- (1) 5.0 mm (2) zero
 (3) 3.0 mm (4) 4.0 mm
20. A metallic sphere cools from 50°C to 40°C in 300 s . If atmospheric temperature around is 20°C , then the sphere's temperature after the next 5 minutes will be close to:
- (1) 35°C (2) 31°C
 (3) 33°C (4) 28°C

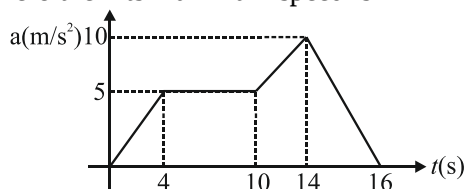
Integer Type Question (21 to 30)

21. Three blocks A, B and C are lying on a smooth horizontal surface, as shown in the figure. A and B have equal masses, m while C has mass M . Block A is given an initial speed v towards B due to which it collides with B perfectly inelastically. The combined mass collides with C, also perfectly inelastically $\frac{5}{6}$ th of the initial kinetic energy is lost in whole process. What is value of M/m ?

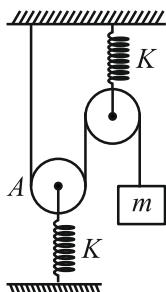


22. A tuning fork produces 5 beats/s with another tuning fork of frequency 80 Hz . The first fork is now loaded with a little wax and the beat frequency is again found to be 5 beats/s . The frequency of first tuning fork before waxing was _____ Hz.
23. A tuning fork of frequency of 330 Hz , sounds above an initially empty cylindrical vessel of height 60 cm . Water is slowly poured into the vessel. At what length of water column the sound gets appreciably intensified? (Speed of sound in air is 330 m/s)

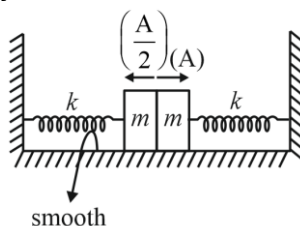
24. Acceleration-time graph of a train moving in straight line is as shown in graph. If its initial speed is zero then its maximum speed is



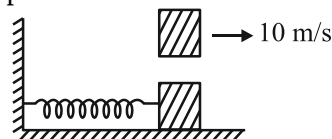
25. In the arrangement of a spring-block system, the pulleys and the springs are massless. An inextensible string passes over the pulleys and a mass m hangs from it. The period of small vertical oscillations of the mass under gravity is $T = 2\pi\sqrt{\frac{xm}{K}}$. Find the value of x .



26. Two identical blocks of mass m each are initially at equilibrium with spring in its natural length. They are given displacement $\frac{A}{2}$ and A in the direction shown in figure. If collision between them is perfectly inelastic, then the amplitude of combined mass is $\frac{A}{n}$. Find the value of n .



27. A block of mass 20 kg resting on a smooth horizontal ground is attached to one end of a spring of force constant $10\pi^2$ N/m in natural length. If another block of same mass moving with a velocity of 10 m/s sticks to it due to friction. Find the time (in second) taken by the combined mass to reach extreme position for the first time.



28. The diameter of a spherical bob is measured using a vernier callipers. 9 divisions of the main scale, in the vernier callipers, are equal to 10 divisions of vernier scale. One main scale division is 1 mm. The main scale reading is 10 mm and 8th division of vernier scale was found to coincide exactly with one of the main scale division. If the given vernier callipers has positive zero error of 0.04 cm, then the radius of the bob is _____ $\times 10^{-2}$ cm.
29. The radius of a sphere is measured to be (7.50 ± 0.85) cm. Suppose the percentage error in its volume is x . The value of x , to the nearest x , is _____.
30. A signal of 0.1 KW is transmitted in a cable. The attenuation of cable is -5 dB per km and cable length is 20 km. The power received at receiver is 10^{-x} W. The value of x is _____.

$$[\text{Gain in dB} = 10 \log_{10} \left(\frac{P_0}{P_i} \right)]$$

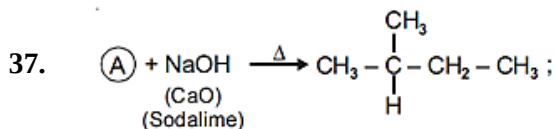
Section-II (CHEMISTRY)

Single Correct Type Question (31 to 50)

31. The weight of KOH in its 50 milliequivalent is
 (1) 1.6 g (2) 2.2 g
 (3) 2.8 g (4) 4.8 g
32. N_2 and O_2 are converted into monoanions N_2^- and O_2^- respectively, which of the following statements is wrong?
 (1) In O_2^- , bond length increases
 (2) N_2^- , becomes diamagnetic
 (3) In N_2^- , the N-N bond weakens
 (4) In O_2^- , the O-O bond order decreases
33. Which of the following is correct for XeO_2F_2 and PCl_5 ?
 (1) Both have same hybridisation and shape
 (2) Both have same hybridisation but different geometry
 (3) Both have different hybridisation but same shape
 (4) Both have same hybridisation but different shape

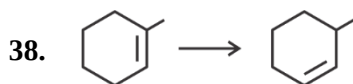
34. The first ionisation potentials of Na, Mg, Al and Si are in the order
 (1) $\text{Na} < \text{Mg} > \text{Al} < \text{Si}$
 (2) $\text{Na} < \text{Mg} < \text{Al} > \text{Si}$
 (3) $\text{Na} > \text{Mg} > \text{Al} > \text{Si}$
 (4) $\text{Na} > \text{Mg} > \text{Al} < \text{Si}$
35. Which of the following statement(s) is incorrect?
 (1) The electronic configuration of Cr is $[\text{Ar}] 3d^5 4s^1$ (Atomic No. of Cr = 24)
 (2) The magnetic quantum number may have a negative value
 (3) In silver atom, 23 electrons have spin of one type and 24 of the opposite type (Atomic number of Ag = 47)
 (4) van der Waal radius of chlorine molecule is less than its covalent radius

36. Fluorosis, a bone disease is caused by the presence of
- (1) Pesticides in water
 - (2) Fluorides in water
 - (3) Carbon monoxide in air
 - (4) Photochemical



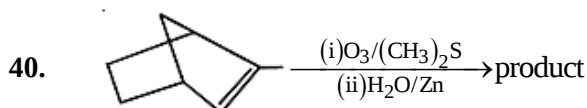
The possible compound [A] is

- (1) $CH_3 - \underset{\substack{| \\ H}}{\overset{\substack{CH_3 \\ |}}{C}} - CH_2COONa$
- (2) $CH_3 - \underset{\substack{| \\ H}}{\overset{\substack{CH_3 \\ |}}{C}} - CH_2 - CH_2 - COONa$
- (3) $CH_3 - CH_2 - \underset{\substack{| \\ CH_3}}{CH} - CH_2 - COONa$
- (4) Both (2) & (3)



The most suitable sequence of reagents to perform this conversion is

- (1) HBr then $(CH_3)_3COK/(CH_3)_3COH$
 - (2) NBS then alcoholic KOH
 - (3) HBr-peroxide then CH_3CH_2OK/CH_3CH_2OH
 - (4) HBr-peroxide then $(CH_3)_3COK/(CH_3)_3COH$
39. The K_{sp} of Ag_2CrO_4 is 1.1×10^{-12} at 298 K. The solubility (in mol/L) of Ag_2CrO_4 in a 0.1 M $AgNO_3$ solution is
- (1) 1.1×10^{-11}
 - (2) 1.1×10^{-10}
 - (3) 1.1×10^{-12}
 - (4) 1.1×10^{-9}

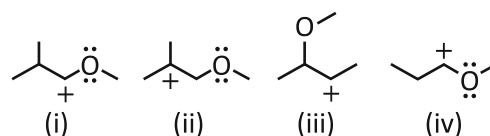


The ozonolysis product is

- (1)
- (2)
- (3)
- (4)

41. The group of elements responsible for hydride gap
- (1) Mn, Ca, Ni
 - (2) Mn, Fe, Li
 - (3) Mn, Fe, Co
 - (4) Mn, Cu, Cl

42. The correct order of stability of given carbocations is

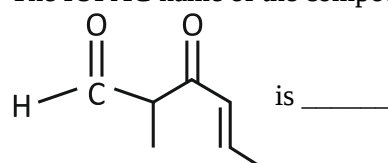


- (1) I > IV > III > II
- (2) I > IV > II > III
- (3) IV > I > III > II
- (4) IV > I > II > III

43. If an aqueous solution at 25°C, has twice as many OH^- as pure water, its pOH will be

- (1) 6.7
- (2) 7.3
- (3) 7
- (4) 6.98

44. The IUPAC name of the compound



- (1) 3-keto-2-methylhex-4-enal
- (2) 5-formylhex-2-en-3-one
- (3) 5-methyl-4-oxohex-2-en-5-al
- (4) 3-keto-2-methylhex-5-enal

45. In the chemical reaction, $K_2Cr_2O_7 + aH_2SO_4 + bSO_2 \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + cH_2O$. a, b and c are

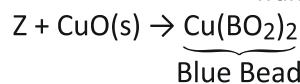
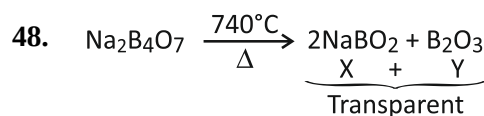
- (1) 1, 3, 1
- (2) 4, 1, 4
- (3) 3, 2, 3
- (4) 2, 1, 2

46. 100 mL of O_2 gas diffuses in 10 s. 100 mL of gas 'X' diffuses in 't' second. Gas 'X' and time 't' can be

- (1) H_2 , 2.5 s
- (2) SO_2 , 16 s
- (3) CO, 10 s
- (4) He, 4 s

47. Which of the following statement concerning the four quantum number is incorrect?

- (1) n gives the size of an orbital
- (2) l gives the shape of an orbital
- (3) m gives the energy of the electron in orbital
- (4) s gives the direction of spin of electron in the orbital



The 'Z' will be

- (1) X
- (2) Y
- (3) Mixture of X & Y in 2 : 1 ratio
- (4) Mixture of X & Y in 1 : 2 ratio

49. Which of the following statement is correct?
- (1) Boron and aluminium halides behave as Lewis acids
 - (2) Al forms $[\text{AlF}_6]^{3-}$ ion but B does not form $[\text{BF}_6]^{3-}$ ion
 - (3) The $p\pi - p\pi$ back bonding occurs in the halides of boron and not in those of aluminium
 - (4) All of these

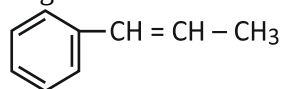
50. The volume strength of 3.57 M solution of hydrogen peroxide is
- (1) 30
 - (2) 20
 - (3) 10
 - (4) 40

Integer Type Question (51 to 60)

51. In the structure
- $$\begin{array}{c}
 \text{NH}_2 \\
 | \\
 \text{C} = \text{O} \\
 | \\
 \text{CH}_3 - \text{CH} - \text{CH} - \text{CH} - \text{CH}_2, \\
 | \quad \quad | \\
 \text{OH} \quad \quad \text{CN}
 \end{array}$$
- Number of functional groups present is
52. When a gas filled in a closed vessel is heated through 1°C , its pressure is increased by 0.4%. The initial temperature of the gas was (Report your answer by dividing 10 in K)
53. $E_n = -313.6/n^2 \text{ kcal/mole}$. If the value of $E = -34.84 \text{ kcal/mole}$, to which value does 'n' correspond?
54. The volume of 0.1 M $\text{Ca}(\text{OH})_2$ needed for the neutralization of 40 ml of 0.05 M oxalic acid is

55. When ethyl alcohol and acetic acid mixed together in equimolecular proportions, equilibrium is attained when two-third of the acid and alcohol are consumed. The equilibrium constant of the reaction will be

56. Number of carbon atoms present in sp^2 hybrid state of given molecule?



57. For the melting of NaCl heat required is $7.26 \text{ kcal mol}^{-1}$ and ΔS increases by $6.73 \text{ cal mol}^{-1} \text{ K}^{-1}$. The melting point of the salt is. (Report your answer by dividing 10 in $^\circ\text{C}$)
58. The dissociation energy of $\text{CH}_4(\text{g})$ is $360 \text{ kcal mol}^{-1}$ and that of $\text{C}_2\text{H}_6(\text{g})$ is $620 \text{ kcal mol}^{-1}$. The C - C bond energy
59. How many of the following are correctly matched?
- | Element | Colour in flame test |
|---------|----------------------|
| K | Violet/Lilac |
| Na | Yellow |
| Be | Crimson red |
| Ca | Brick red |
| Sr | Apple green |
| Mg | No colour |
| Rb | Red violet |
| Cs | Blue |
| Li | Crimson red |
60. Consider a prototypical fullerene, C_{60} .
 Let, a = Number of 5-membered rings;
 b = Number of 6-membered rings;
 c = Number of π -bonds in C_{60}
 Find the value of $(3a - 2b + c)$

Section-III (MATHEMATICS)

Single Correct Type Question (61 to 80)

61. The number of ways of arranging 18 boys such that 3 particular boys are always separated, is equal to
- (1) $18! - 16! \cdot 3!$
 - (2) $16! \cdot {}^{17}P_3$
 - (3) $15! \cdot {}^{16}P_3$
 - (4) $17! \cdot {}^{17}P_3$
62. If z is a complex number satisfying the equation $|z - (1 + i)|^2 = 2$ and $\omega = \frac{2}{z}$, where $(z \neq 0)$ then the locus of ω is
- (1) $x - y - 1 = 0$
 - (2) $x + y - 1 = 0$
 - (3) $x - y + 1 = 0$
 - (4) $x + 2y + 1 = 0$
63. If $p \Rightarrow (\sim p \vee q)$ is false, then the truth values of p and q are respectively
- (1) F, T
 - (2) F, F
 - (3) T, T
 - (4) T, F

64. If the focus of a hyperbola is $(\pm 3, 0)$ and the equation of a tangent is $2x + y - 4 = 0$, then the equation of the hyperbola is
- (1) $4x^2 - 5y^2 = 20$
 - (2) $5x^2 - 4y^2 = 20$
 - (3) $4x^2 - 5y^2 = 1$
 - (4) $5x^2 - 4y^2 = 1$
65. If p and q are two statements, then $p \vee \sim (p \rightarrow \sim q)$ is equivalent to
- (1) $p \wedge q$
 - (2) p
 - (3) $p \wedge \sim q$
 - (4) $\sim p \wedge q$
66. The average of five consecutive odd numbers is 61. Then the difference between the highest and lowest numbers is
- (1) 2
 - (2) 5
 - (3) 8
 - (4) cannot be determined

67. Let α, β and γ be the roots of the equation $x^3 + 6x^2 - px - 42 = 0$. If α, β and γ are in arithmetic progression then $|\alpha| + |\beta| + |\gamma| =$
- (1) 10 (2) 11
(3) 12 (4) 13
68. The sum of positive terms of the series $10 + 9\frac{4}{7} + 9\frac{1}{7} + \dots$ is
- (1) $\frac{352}{7}$ (2) $\frac{437}{7}$
(3) $\frac{852}{7}$ (4) $\frac{752}{7}$
69. The sum of the first three terms of an arithmetic progression is 9 and the sum of their squares is 35. The sum of the first n terms of the series can be
- (1) $n(n+1)$ (2) $2n^2$
(3) $n(4-n)$ (4) $n(6-n)$
70. Digit at the unit place of the sum of $(1!)^2 + (2!)^2 + (3!)^2 + \dots + (2008!)^2$
- (1) 5 (2) 7
(3) 9 (4) 6
71. Let α and β be the roots of $x^2 + x + 1 = 0$, then the equation whose roots are α^{2020} and β^{2020} is
- (1) $x^2 + x + 1 = 0$
(2) $x^2 - x - 1 = 0$
(3) $x^2 + x - 1 = 0$
(4) $x^2 - x + 1 = 0$
72. The line $2x - y + 1 = 0$ touches a circle at the point $(2, 5)$ and the centre of the circle lies on $x - 2y = 4$. The diameter (in units) of the circle is
- (1) $6\sqrt{5}$ (2) $10\sqrt{3}$
(3) $4\sqrt{3}$ (4) $10\sqrt{2}$
73. Equivalent statement of the statement "If $9 > 10$ then $3^2 = 5$ " will be
- (1) If $3^2 = 5$ then $9 > 10$
(2) $9 < 10$ and $3^2 \neq 5$
(3) $9 < 10$ or $3^2 = 5$
(4) $9 \leq 10$ or $3^2 = 5$
74. For two sets A and B , if $n(A) = 7$, $n(B) = 13$ and $n(A \cap B) = 5$, then the incorrect statement is
- (1) $n(A \cup B) = 15$
(2) $n(A - B) = 6$
(3) $n(A \times B) = 91$
(4) $n\{(A \cup B) \times (A \cap B)\} = 75$
75. The mean of the data set comprising of 16 observations is 16. If one of the observation valued 16 is deleted and three new observations valued 3, 4 and 5 are added to the data, then the mean of the resultant data, is:
- (1) 15.8 (2) 14.0
(3) 16.8 (4) 16.0
76. $z \in \mathbb{C}$ satisfies the condition $|z| \geq 3$. Then the least value of $\left|z + \frac{1}{z}\right|$ is
- (1) $\frac{3}{8}$ (2) $\frac{8}{5}$
(3) $\frac{8}{3}$ (4) $\frac{5}{8}$
77. At a point on the ground the angle of elevation of a tower is such that its cotangent is $3/5$. On walking 32 metres towards the tower the cotangent of the angle of elevation is $2/5$. The height of the tower is
- (1) 160 m (2) 120 m
(3) 64 m (4) 80 m
78. The number of solutions of the equation $\cot^2(\sin x + 3) = 1$ in $[0, 3\pi]$ is equal to
- (1) 2 (2) 4
(3) 6 (4) 8
79. The x -intercept of the common tangent to the parabolas $y^2 = 32x$ and $x^2 = 108y$ is
- (1) -18 (2) -12
(3) -9 (4) -6
80. The product of real roots of equation, $x^2 + 18x + 30 = 2\sqrt{x^2 + 18x + 45}$ is
- (1) 18 (2) -18
(3) 20 (4) -20
- Integer Type Question (81 to 90)**
81. A straight line l_1 with equation $x - 2y + 10 = 0$ meets the circle with equation $x^2 + y^2 = 100$ at B in the first quadrant. A line through B , perpendicular to l_1 cuts the y -axis at $P(0, t)$. The value of 't' is
82. Given a number $N = 4200$, then the number of divisor of N which are neither divisible by 3 nor by 5 is
83. If A, B, C are in arithmetic progression and $B = \frac{\pi}{4}$, then $\tan A \tan B \tan C =$

84. The number of common tangents to the circles $x^2 + y^2 + 2x + 8y - 23 = 0$ and $x^2 + y^2 - 4x - 10y + 9 = 0$, are
85. If the values of m , for which the line $y = mx + 2\sqrt{5}$ is a tangent to the hyperbola $16x^2 - 9y^2 = 144$, are the roots of the equation $x^2 - (a + b)x - 4 = 0$, then the value of $(a + b)$ is equal to
86. For $n \in N$, in the expansion of $\left(\sqrt[4]{x^{-3}} + a\sqrt[4]{x^5}\right)^n$, the sum of all the binomial coefficients lie between 200 and 400. Also, the term independent of x is 448, then the value of a is
87. $\frac{\sin 54^\circ + \sin 196^\circ + \sin 110^\circ}{\sin 27^\circ \sin 98^\circ \sin 55^\circ}$ equals
88. If the most general solution of $2^{1+|\cos x|+\cos^2 x+|\cos x|^3+\dots\infty} = 4$ is $n\pi \pm \frac{\pi}{k}$ then find k .
89. Let P denotes the ways in which persons A, B & C will get 1, 2, 5 objects respectively out of 10 distinct objects. If $P = \lambda \left(\frac{10!}{1!2!5!}\right)$, then $4\lambda =$
90. In the expansion of $(ax + b)^{2020}$, if the coefficients of x^2 and x^3 are equal, then the value of $\frac{3b}{2018a}$ is equal to

