TECHNO INDIA GROUP PUBLIC SCHOOLS

Dt. 11-10-2025

JEE (Main)-XI

Monthly Mock Test - 4 (October-2025)

Time Allowed: **3 hours** Maximum Marks: **300**

General Instructions:

1. There are three subjects in the question paper consisting of Physics (Q. no. 1 to 25), Chemistry (Q, no. 26 to 50), and Mathematics (Q. no. 51 to 75).
2. Each subject is divided into two sections. Section A consists of 20 multiple-choice questions & Section B consists of 5 numerical value-type questions.
3. There will be only one correct choice in the given four choices in Section A. For each question for Section A, 4 marks will be awarded for correct choice, 1 mark will be deducted for incorrect choice questions and zero marks will be awarded for not attempted questions.
4. For Section B questions, 4 marks will be awarded for correct choice, 1 mark will be deducted for incorrect choice questions and zero marks will be awarded for not attempted questions.
5. Any textual, printed, or written material, mobile phones, calculator etc. is not allowed for the students appearing for the test.
6. All calculations/written work should be done in the rough sheet, provided with the Question Paper.

Space For Rough Works

PHYSICS

Section—A
(Single Option Correct Type)

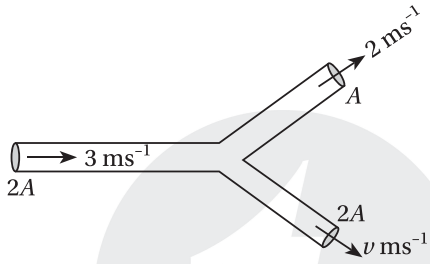
1. Two equal drops are falling through air each with a steady velocity of 5 cm/s. If the drops coalesce, the new terminal velocity will be

① 10 cm/s ② $5\times\sqrt{2}$ cm/s ③ $5\times4^{1/3}$ cm/s ④ $5\times2^{1/3}$ cm/s

2. There is a hole in the bottom of tank having water, if total pressure at bottom is 3 atm (1 atm = 10^5 Nm^{-2}) then the velocity of water flowing from hole is

① $\sqrt{400}$ ms^{-1} ② $\sqrt{600}$ ms^{-1} ③ $\sqrt{60}$ ms^{-1} ④ none of these

3. In the following figure, find the velocity of v



① 1 ms^{-1} ② 2 ms^{-1} ③ 3 ms^{-1} ④ 4 ms^{-1}

4. A copper wire ($Y = 10^{11}$ Nm^{-2}) of length 8 m and a steel wire ($Y = 2\times10^{11}$ Nm^{-2}) of length 4 m each of 0.5 m^2 cross section are fastened end to end and stretched with a tension of 500 N

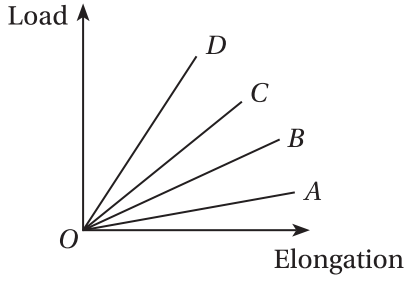
① Elongation in copper wire is 0.8 mm

② Elongation in steel is $\frac{1}{4}$ th of elongation in copper wire

③ Total elongation is 1.0 mm

④ All of the above

5. The load versus elongation graph for four wires of the same material is shown in the figure, the thinnest wire is represented by the line—



① *OA* ② *OB* ③ *OC* ④ *OD*

6. The pressure applied from all directions on a cube is *P*. How much its temperature should be raised to maintain the original volume? (bulk modulus is β and coefficient of volume expansion is γ)

① $\frac{P}{\beta\gamma}$ ② $\frac{P\beta}{\gamma}$ ③ $\frac{P\gamma}{\beta}$ ④ $\frac{\gamma\beta}{P}$

7. Bulk modulus for rubber is 9.8×10^7 N-m^{-2}. To what depth should a rubber ball be taken in a lake so that its volume is decreased by 0.1%.

① 10 m ② 100 m ③ 50 m ④ 25 m

8. The Poisson's ratio of material which does not suffer any change in volume when a force is applied on it is

① 0.5 ② 1 ③ 2 ④ –0.5

9. If the tension on a wire is removed at once, then :

① It will break ② It's temperature increases

③ It's temperature decreases ④ Temperature will remain same

10. An elastic material of Young's modulus Y is subjected to a stress S. The elastic energy stored per unit volume of the material is

① $\frac{2Y}{S^2}$ ② $\frac{S^2}{2Y}$ ③ $\frac{S}{2Y}$ ④ $\frac{S^2}{Y}$

11. When the tension in a metal wire is T_1 its length is l_1, when the tension is T_2 its length is l_2, the natural length of the wire is

① $\frac{T_2}{T_1}(l_1 + l_2)$ ② $T_1 l_1 + T_2 l_2$

③ $\frac{l_1 T_2 - l_2 T_1}{T_2 - T_1}$ ④ $\frac{l_1 T_2 - l_2 T_1}{T_2 + T_1}$

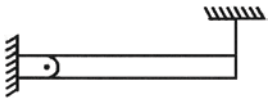
12. The escape velocity from the earth's surface is 11 km/s. The escape velocity from a planet having twice the radius and same mean density as that of earth is

① 5.5 km/s ② 11 km/s ③ 22 km/s ④ 44 km/s

13. A square formed with four thin rods, each of mass 4 g and length 3 cm, is rotating about one of it's diagonals with angular speed 2 rad/s. The kinetic energy of the square is

① 48 erg ② 24 erg ③ 36 erg ④ 6 erg

14. A uniform rod of mass m, hinged at one end, is kept horizontal with the help of a string at another end. If now the string is cut, the force supplied by the hinge on the rod is



① $\frac{mg}{2}$ ② mg ③ $\frac{mg}{3}$ ④ $\frac{mg}{4}$

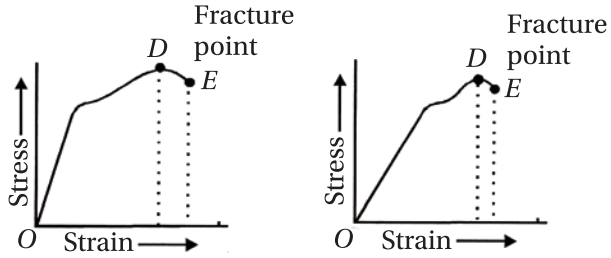
15. A cyclist is moving with a speed of 6 ms^{-1}. As he approaches a circular turn on the road of radius 120 m, he applies brakes and reduces his speed at a constant rate of 0.4 ms^{-2}. The magnitude of the net acceleration of the cyclist on the circular turn is

① 0.5 ms^{-2} ② 1.0 ms^{-2} ③ 2.0 ms^{-2} ④ 4.0 ms^{-2}

16. Two bodies are moving in concentric orbits of radii 2 cm and 4 cm such that their time periods are the same. The ratio of their centripetal accelerations is

① $\frac{1}{2}$ ② $\frac{1}{8}$ ③ $\frac{3}{2}$ ④ $\frac{4}{9}$

17. The stress-strain graphs for two materials are shown in figure (assume same scale). Choose the correct statement(s)



① *A* is more elastic and more brittle ② *B* is more elastic and more brittle

③ *A* is more elastic and less brittle ④ *B* is less elastic and less brittle

18. A thin metal disc of radius *r* floats on water surface and bends the surface downwards along the perimeter making an angle θ with vertical edge of the disc. If the disc displaces a weight of water *W* and surface tension of water is *T*, then the weight of metal disc is

① $(2\pi rt + W)$ ② $(2\pi rT\cos\theta - W)$ ③ $(2\pi rT\cos\theta + W)$ ④ $(W - 2\pi rT\cos\theta)$

19. When a force is applied on a wire of uniform cross-sectional area 3×10^{-6} m^2 and length 4 m, the increase in length is 1 mm. Energy stored in it will be (Young's modulus = 2×10^{11} N/m^2)

① 6250 J ② 0.177 J ③ 0.075 J ④ 0.150 J

20. A bar of length 30 cm and uniform area of cross section 5 cm^2 consists of two equal halves *AB* of copper and *BC* of iron welded together at *B*. The end *A* is maintained at 200°C and the end *C* at 0°C. The sides of bar are conductivity of copper is 0.9 and thermal conductivity of iron is 0.2 cgs units.

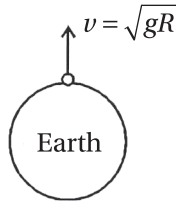
① 5.07 calories/s ② 7.05 calories/s ③ 2.03 calories/s ④ 10.0 calories/s

Section—B
(Numerical Answer Type)

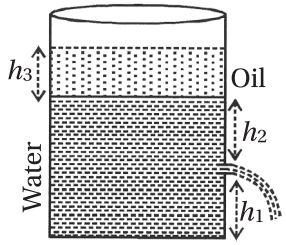
21. A body of mass m is tied to one end of a spring and whirled round in a horizontal plane with a constant angular velocity. The elongation in the spring is one centimeter. If the angular velocity is doubled, the elongation in the spring is 5 cm. The original length (in cm) of the spring is _____.

22. If the equation for the angular displacement of a particle moving on a circle is given by : $\theta = 2t^3 + 0.5$ where θ is in radian and *t* is in second, then the angular velocity (in rad/sec) of the particle at $t = 2$ s is _____.

23. A body on the earth surface is given an upward velocity $\sqrt{gR}$ and it attains a maximum height *H* from the earth's surface before coming back to earth. If $h = xR$, find the value of *x*.



24. Height of oil column = h_3 = 20 cm; Height of water column = $h_1 + h_2$ = 50 cm; Height of orifice from bottom = h_1 = 20 cm; Density of water = 1 g/cm^3; Density of oil = 0.75 g/cm^3.

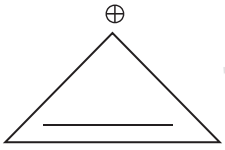
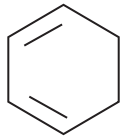


25. A soap bubble is being blown on a tube of radius 1 cm. The surface tension of the soap solution is 0.05 Nm^{-1} and the bubble makes 60° with the tube as shown in the figure. Find the excess of pressure over the atmospheric pressure in the tube (in Pa).

CHEMISTRY

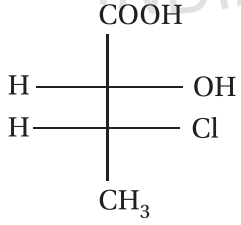
Section—A
(Single Option Correct Type)

26. Which of the following is most stable ?

① 
② 
③ 
④ 

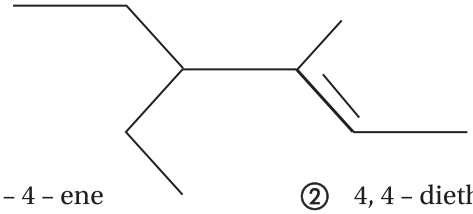
27. How many cyclic structures are possible for C_4H_6 ?

① 3 ② 5 ③ 6 ④ 4

28. The absolute configuration of  is :

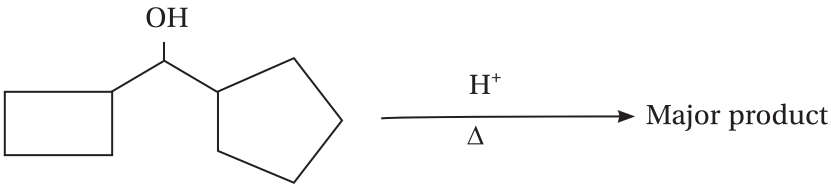
① (2S, 3S) ② (2R, 3R) ③ (2R, 3S) ④ (2S, 3R)

29. The I.U.P.A.C name of the following compound is :



① 3 – ethyl – 4 – methylehex – 4 – ene
② 4, 4 – diethyl – 3 – methyl but – 2 – ene
③ 4 – methyl – 3 – ethylehex – 4 – ene
④ 4 – ethyl – 3 – methylehex – 2 – ene

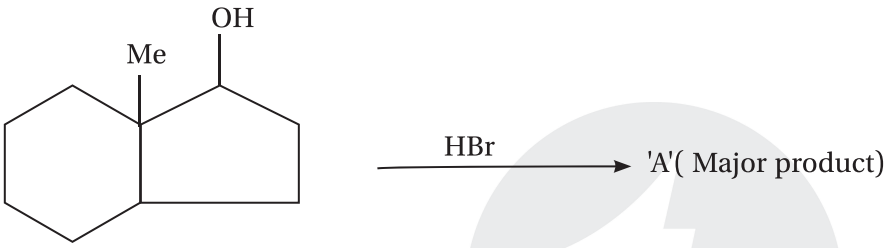
30.



In the above reaction, left hand side and right hand side rings are named as 'A' and 'B' respectively. The undergo ring expansion. The correct statement for this process is :

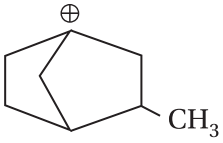
① Finally both rings well become six membered each
② Finally both rings will become five membered ring
③ Only 'A' will become 6 membered
④ Ring expansion can go upto seven members ring .

31. The number of hypercajugation structures involved to stabilize carbocation formed in the above reaction is :

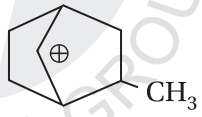


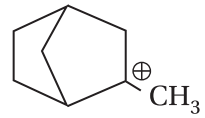
① 3 ② 6 ③ 7 ④ 10

32. Which of the following cations is most stable ?

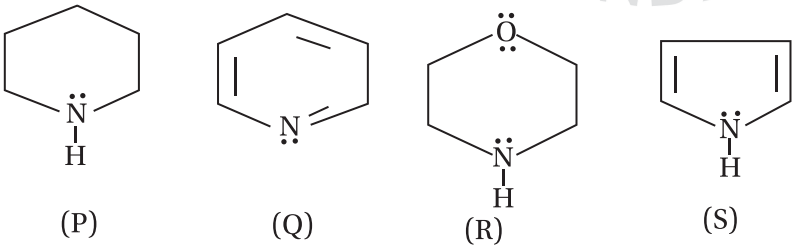
① 

② 

③ 

④ 

33. Write the order of basic strength :

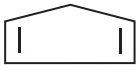


(P) (Q) (R) (S)

① Q > R > S > P ② P > R > Q > S ③ R > P > S > Q ④ P > Q > R > S

34. Which of the following compounds contain most acidic H ?

① $H_2C = CH_2$ ② $HC \equiv CH$

③  ④ $H_2C = CH - CH_2 - CH = CH_2$

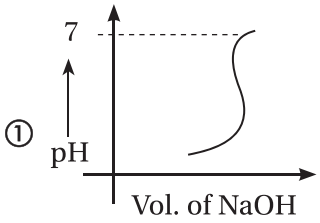
35. What is the pH of a 10^{-4} M OH^- solution at 330k, if k_w at 330 k is $10^{-13.67}$

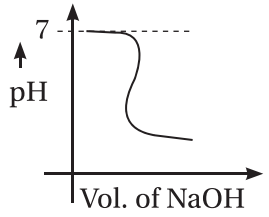
① 4 ② 9.0 ③ 10 ④ 9.6

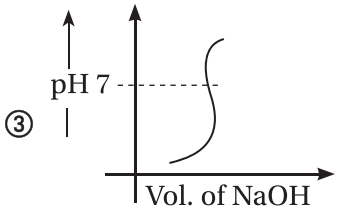
36. How many litres of water must be added to 1 litre an aqueous solution of HCl with a pH of 1 to create an aqueous solution with pH 2 ?

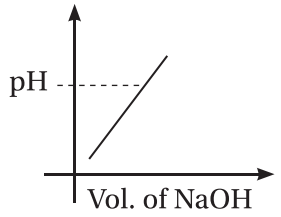
① 0.1 L ② 0.9 L ③ 2.0 L ④ 9.0 L

37. 100 ml of 0.1 (M) HCl is taken in a beaker and to it 100 ml of 0.1 (M) NaOH is added in steps of 2 ml and the pH is continuously measured. Which of the following graphs correctly depicts the change in pH ?

① 

② 

③ 

④ 

38. Equal volumes of two solutions, one having pH = 6 and other having pH = 4 are mixed. The pH of the resulting solution would be : [$\log_{10}2 = 0.3$]

① 5.7 ② 4.33 ③ 5.0 ④ 5.5

39. Calculate the pH of each of the following solutions when 100 ml of 0.1 (M) CH_3COOH mixed with 100 ml of 0.1 M NaOH (Given pka = 4.75)

① 2.78 ② 7.28 ③ 8.72 ④ 7.23

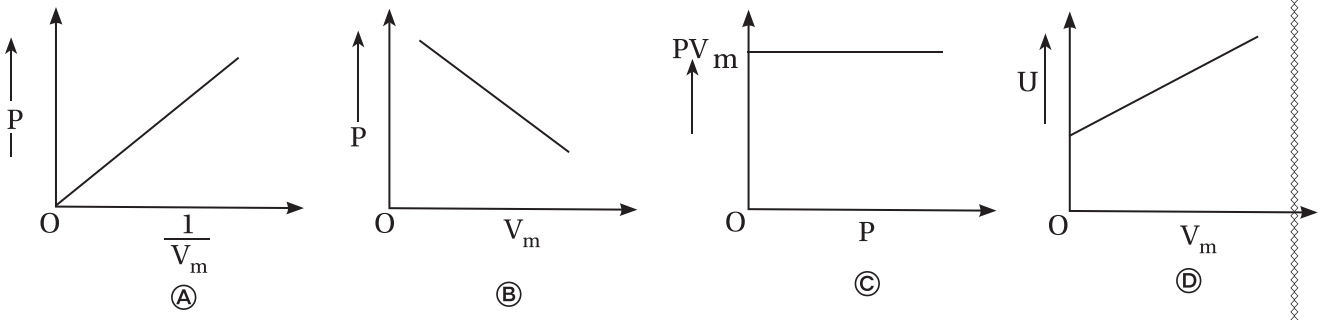
40. $(K_{Sp})_{AgCl}$ is 2.8×10^{-10} at 25°C. Calculate the solubility of AgCl is 0.1 M $AgNO_3$ (miles/L) :

① 2.8×10^{-10} ② 2.8×10^{-11} ③ 2.8×10^{-9} ④ 5.6×10^{-9}

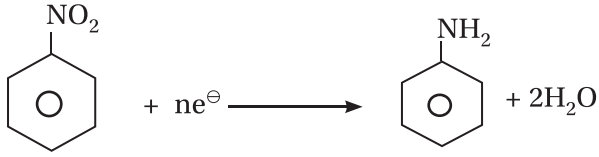
41. The internal energy change when a system goes from state A to B is 40 kj/mole. if the system goes from A to B by reversible path and returns to state A by an irreversible path. What would be the net change in internal energy ?

① > 40 K j ② < 40 K j ③ Zero ④ 40 K j

42. The combination of plots which does not represent isothermal expansion of an ideal gas is :



① B & D ② A & C ③ B & C ④ A & D

43. 

For converting one mole of nitrobenzene to aniline, how many moles of electrons are transferred ?

① 2 ② 3 ③ 6 ④ 8

Assertion and Reason : (Q. 44 - 45)

Directions: Read the following questions and choose any one of the following four responses.

a. Assertion and Reason both are correct and Reason is the correct explanation of Assertion.
b. Assertion and Reason both are correct and Reason is not the correct explanation of Assertion.
c. Assertion is correct but Reason is wrong.
d. Assertion is wrong but Reason is correct.

44. **Assertion (A) :** Oxidation state of nickel in $[Ni(CO)_4]$ is zero.

Reason (R) : Nickel is (Co- ordinated to neutral carbonyl ligand.

① a ② b ③ c ④ d

45. **Assertion (A) :** Oxidation state of sulphur in H_2SO_5 is 6

Reason (R) : H_2SO_5 is commonly knOH as Caso's acid, it that one peroxy linkage.

① a ② b ③ c ④ d

Section—B
(Numerical Answer Type)

46. A certain gas obeys $P(V_m - b) = RT$. The value of $\left(\frac{\delta Z}{\delta P}\right)_T$ is $\frac{xb}{RT}$. The value of x is _____. (Z = compressibility factor.)

47. The hybridisation of 'P' exhibited in PF_5 is sp^xd^y . The value of x + y is _____ .

48. The wavelength of electrons accelerated from rest through a potential difference of 40 Kv is $x \times 10^{-12}$ m. The value of x is _____ (nearest integer).

Given : Mass of electron = 9.1×10^{-31} kg

Charge of electron = 1.6×10^{-19} c

h = 6.63×10^{-34} js.

49. In the following reactions, the total number of oxygen atoms in 'X' and 'Y' is _____ .

$Na_2O + H_2O \longrightarrow 2x$

$Cl_2O_7 + H_2O \longrightarrow 2y$

50. if the concentration of glucose ($C_6H_{12}O_6$) in blood is 0.72 $g(L)^{-1}$, the molarity of glucose in blood is +_____ $\times 10^{-3}$. (M). (nearest integer).

MATHEMATICS

Section—A
(Single Option Correct Type)

51. The set of all natural numbers x such that $4x + 9 < 30$ is equal to

① $\{2,3,4,5\}$ ② $\{1,2,3,4,5\}$ ③ $\{1,2,3,4,5,6\}$ ④ None of these

52. Suppose that the number of elements in set A is p, the number of elements in set B is q and the number of elements in $A \times B$ is 7. Then $p^2 + q^2 =$

① 42 ② 49 ③ 50 ④ 51

53. If $\frac{5z_2}{11z_1}$ is purely imaginary, then the value of $\left|\frac{2z_1+3z_2}{2z_1-3z_2}\right|$ is

① $\frac{37}{33}$ ② 2 ③ 1 ④ 3

54. If $|3-4x| \geq 9$ then $x \in$

① $(-\infty,-3)\cup(3,\infty)$ ② $\left(-\infty,\frac{-3}{2}\right]\cup(3,\infty)$ ③ $\left(-\infty,\frac{-3}{2}\right)\cup(0,\infty)$ ④ $\left(-\infty,\frac{-3}{2}\right]\cup[3,\infty)$

55. If $\left(2x^2-x-1\right)^5 = a_0 + a_1x + a_2x^2 + \cdots + a_{10}x^{10}$, then $a_2 + a_4 + a_6 + a_8 + a_{10} =$

① 15 ② 30 ③ 16 ④ 17

56. The rank of the word RAHUL is

① 70 ② 71 ③ 73 ④ 74

57. The number of positive integral divisors of $\left[\left(2+\sqrt{3}\right)^5\right]$ is, ($[\cdot]$ = GIF)

① 6 ② 4 ③ 2 ④ 8

58. If $2\alpha = -1 - i\sqrt{3}$ and $2\beta = -1 + i\sqrt{3}$, then $5\alpha^4 + 5\beta^4 + 7\alpha^{-1}\beta^{-1} = ?$

① –1 ② 0 ③ 1 ④ 2

59. If $\left(1+x+x^2\right)^n = \sum_{r=0}^{2n} a_r x^r = a_0 + a_1x + \cdots + a_{2n}x^{2n}$

and $P = a_0 + a_3 + a_6 + \cdots$, $Q = a_1 + a_4 + a_7 + \cdots$, $R = a_2 + a_5 + a_8 + \cdots$

Then find the value of $P + Q - R$

① 3^n ② 3^{n+1} ③ 3^{n-1} ④ 3^{n-2}

60. For all $n \in \mathbb{N}$, if $1^3 + 2^3 + 3^3 + \cdots + n^3 > x$, then a value of x among the following is

① $\frac{n^2}{4}$ ② n^2 ③ n^4 ④ $\frac{n^2(n+1)^2}{4}$

61. If $i = \sqrt{-1}$, then $\sum_{n=2}^{30} i^n + \sum_{n=30}^{65} i^{n+3} =$

① 0 ② –1 ③ i ④ $-i$

62. If z_1 and z_2 are two of the n^{th} roots of unity such that the line segment joining them subtends a right angle at the origin then for a positive integer k, n takes the form

① $4k$ ② $4k+1$ ③ $4k+2$ ④ $4k+3$

63. $\left(\sqrt{\sqrt{2}+1}+i\sqrt{\sqrt{2}-1}\right)^8 = ?$

① 64 ② $64i$ ③ -64 ④ $-64i$

64. If the harmonic mean of the roots of the equation $\sqrt{2}x^2 - bx + \left(8-2\sqrt{5}\right) = 0$, is 4, then the value of b is

① 3 ② 2 ③ $4-\sqrt{5}$ ④ $4+\sqrt{5}$

65. All the values if k such that the quadratic expression $2kx^2 - (4k+1)x + 2$ is negative for exactly three integral values of x, lie in the interval.

① $\left(\frac{1}{12},\frac{1}{10}\right)$ ② $\left(\frac{1}{6},\frac{1}{5}\right)$ ③ $[-1,2)$ ④ $[2,6)$

66. If α and β ($\alpha > \beta$) are the multiple roots of the equation $4x^4 + 4x^3 - 23x^2 - 12x + 36 = 0$, then $2\alpha - \beta =$

① -1 ② 3 ③ 5 ④ -7

67. If α, β and γ are the roots of the equation $x^3 - 13x^2 + kx + 189 = 0$ such that $\beta - \gamma = 2$, then $\beta + \gamma : k + \alpha = ?$

① 4 : 3 ② 2 : 1 ③ 6 : 5 ④ 3 : 4

68. The number of all possible positive integral solutions of the equation $xyz = 30$ is

① 24 ② 25 ③ 26 ④ 27

69. The number of all five letter words having at least one repeated letter that can be formed by using the letters of the word INCONVENIENCE is

① 2025 ② 3605 ③ 2765 ④ 3265

70. The number of ways of arranging all the letters of the word PERFECTION such that there must be exactly two consonants between any two vowels is

① $4! + 6!$ ② $3! + 6!$ ③ $2!\,3!\,6!$ ④ $\frac{6!}{4!}$

Section—B
(Numerical Answer Type)

71. Number of complex numbers z satisfying $z^3 = \overline{z}$ is _____.

72. Let, $y = \frac{x^2 - 3x + c}{x^2 + 3x + c}$, $y_{max} = 7$, $y_{min} = \frac{1}{7}$. Find c.

73. If the coefficient of x in the expansion of $\prod_{r=1}^{110}(1+rx)$ is $\lambda(1+10)\left(1+10+10^2\right)$, then value of λ is

74. Let, $A = \left\{x : x \in Z \text{ and } \left(\frac{1}{3}\right)^{\frac{|x+2|}{2-|x|}} > 9\right\}$. $n(A) = ?$

75. The ten's digit of $1!+2!+3!+\cdots+97!$ is _____.