SET-A

QUANTUM POTENTIAL TEST

[Quality Nurturer & Mind Utilizer Test for Potential Enhancement]

(IPEC Scholarship-Cum-Admission Test)

For

CLASS-XI

(For XI to XII Moving Students)

Time : 3 Hrs.] **[Maximum Marks : 285**

[PAPER-2]

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

INSTRUCTIONS

1. The booklet is your Question Paper. Do not break the seal of this booklet before being instructed to do so by the invigilator.

2. Blank spaces and blank pages are provided in the question paper for your rough work. No additional sheets will be provided for rough work.

3. Blank papers, clipboards, log tables, slide rules, calculators, cameras, cellular phones, pagers and electronic gadgets are **NOT** allowed inside the examination hall.

4. The answer sheet, a machine-readable Optical Response Sheet **(ORS),** is provided separately.

5. On breaking the seal of the booklet check that it contains **1** pages and all the **75** questions.

6. A candidate has to write his / her answers in the ORS sheet by darkening the appropriate bubble with the help of **Black ball point pen** as the correct answer of the question attempted.

7. **Question Paper Format :**

This question paper consists of **Three Parts:**

Part-I: (Physics) - 25 Questions.

Part-II: (Chemistry) - 25 Questions.

Part-III: (Mathematics) - 25 Questions.

8. **Marking Scheme :**

Please see the marking scheme as mentioned in all sections.

PART -I [Physics]

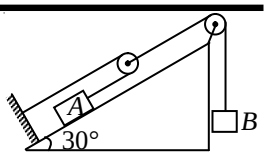
[SECTION - I]

[SINGLE CORRECT TYPE]

This section contains 5 Multiple Choice Questions. Each question has four choices (A), (B), (C) and (D) out of which ONLY ONE is correct.

[Marking Scheme: +3 marks for correct answer and **–1** for wrong answer**]**

1. In the system shown in figure m_B = 4 kg and m_A = 2 kg. The pulleys are massless and friction is absent everywhere. The acceleration of block A is (g = 10 m/s²)



(A) $\frac{10}{3}$ m/s² (B) $\frac{20}{3}$ m/s² (C) $\frac{5}{2}$ m/s² (D) $\frac{5}{3}$ m/s²

2. A string of length L and mass M are lying on a horizontal table. A force F is applied at one of its ends. Tension in the string at a distance x from the ends at which force is applied is

(A) Zero (B) F (C) $F(L-x)/L$ (D) $F(L-x)/M$

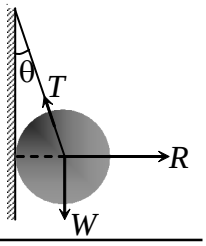
3. A particle is projected with a velocity u, at an angle α, with the horizontal. Time at which its vertical component of velocity becomes half of its net speed at the highest point will be

(A) $\frac{u}{2g}$ (B) $\frac{u}{2g}(\sin\alpha-\cos\alpha)$ (C) $\frac{u}{2g}(2\cos\alpha-\sin\alpha)$ (D) $\frac{u}{2g}(2\sin\alpha-\cos\alpha)$

4. A body of mass 1.5 kg is thrown vertically upwards with an initial velocity of 40 m/s reaches its highest point after 3 s. The air resistance acting on the body during the ascent is (assuming air resistance to be uniform, g = 10 m/s²)

(A) 35 N (B) 25 N (C) 15 N (D) 5 N

5. A metal sphere is hung by a string fixed to a wall. The force acting on the sphere is shown in figure. Which of the following statement is incorrect?



(A) $\vec{R}+\vec{T}+\vec{W}=0$ (B) $T^2=R^2+W^2$

(C) $T=R+W$ (D) $R = W\tan\theta$

(Space for rough work)

[SECTION - II]

[COMPREHENSION TYPE]

This section contains 6 comprehension (15 Multiple Choice Questions). Each question has four choices (A), (B), (C) and (D) out of which ONLY ONE is correct.

[Marking Scheme: +4 marks for correct answer and **–1** for wrong answer**]**

Comprehension#1

If a man in a boat rows perpendicular to the banks he is drifted to a distance of 120 m in 10 minutes. If he heads at an angle of α from upstream he crosses the river by shortest path in 12.5 minutes.

6. The speed of the water current is

(A) 20 m/min (B) 15 m/min (C) 12 m/min (D) 9.6 m/min

7. The velocity of the boat relative to water

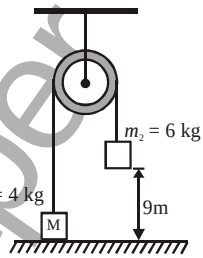
(A) 20 m/min (B) 15 m/min (C) 12 m/min (D) 9.6 m/min

8. The width of river is

(A) 250 m (B) 200 m (C) 150 m (D) 120 m

Comprehension#2

Consider the arrangement shown in figure. An object of mass m_1 = 4 kg is connected to another object of mass m_2 = 6 kg by a massless string that passes over a massless and frictionless pulley. Initially, the 4 kg object is in contact with the floor and the 6 kg object is held at rest at a height 9 m above the floor. At t = 0, the 6 kg object is released. (Take g = 10 m/s^2)



9. Speed of the 4 kg object just when the 6 kg object hits the floor is

(A) 6 m/s (B) 8 m/s (C) 4.5 m/s (D) 7.2 m/s

10. Tension in the string at t = 2.5 s is

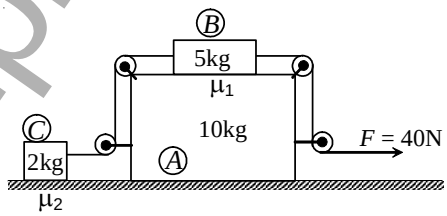
(A) 100 N (B) 18 N (C) 48 N (D) zero

11. Height of the 4 kg object from the floor when the 6 kg object is moving at 4 m/s is

(A) 5.2 m (B) 1.6 m (C) 2 m (D) 4 m

Comprehension#3

Three blocks A, B and C of masses 10 kg, 5 kg and 2 kg are arranged as shown. The coefficient of friction between A and B is μ_1, C and ground is $\mu_2 = 0.3$ and A and ground is zero. A force 40 N is applied at the string in horizontal direction. Assuming all pulleys are massless and frictionless. Strings are also massless. If all the blocks moves with same acceleration, then (g = 10 m/s^2)



12. Find the value of acceleration.

(A) 1 m/s^2 (B) 1.5 m/s^2 (C) 1.7 m/s^2 (D) 2 m/s^2

(Space for rough work)

13. Find the minimum value of μ_1

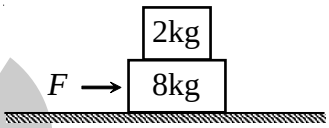
(A) 0.4 (B) 0.3 (C) 0.5 (D) 0.2

14. Find the value of net force on 10 kg block

(A) 10 N (B) 40 N (C) 20 N (D) 50 N

Comprehension#4

A plank of mass m_1 = 8 kg with a block (mass m_2 = 2 kg) on it is placed on a horizontal rough floor. A horizontal force F is applied on the plank. The co-efficient of friction for all the contact surfaces is 1/5.



15. If F = 20 N, then acceleration of the blocks w.r.t floor will be

(A) 2 m/s^2 (B) 3 m/s^2 (C) 4 m/s^2 (D) 0 m/s^2

16. If F = 60 N, then acceleration of the block 2 kg w.r.t. floor will be

(A) 2 m/s^2 (B) 3 m/s^2 (C) 1 m/s^2 (D) 0 m/s^2

Comprehension#5

Two particle is moving on a circle of radius a with uniform speed u, one is moving on a peripheral of the circle while other is on its diameter. Let us suppose that T is time period of one rotation for first particle and assume both will starts from same point on circle then

17. What is the magnitude of the relative velocity at t = 0

(A) v (B) $\sqrt{2}v$ (C) 2v (D) $\sqrt{3}v$

18. What will be the magnitude of the relative velocity at t = T/6

(A) $v\sqrt{2-\sqrt{3}}$ (B) $v\sqrt{2+\sqrt{3}}$ (C) $v\sqrt{4-\sqrt{3}}$ (D) $v\sqrt{2-\sqrt{2}}$

Comprehension#6

Two cars A and B, travel in a straight line. The distance of A from the starting point is given as a function of time by $x_A(t) = at + bt^2$, with a = 4 m/s and $b = 2m/s^2$. The distance of B from the starting point is $x_B(t) = ct^2 + dt^3$, with $c = 2m/s^2$ and $d = 1m/s^3$.

19. Which car is ahead just after they leave the starting point?

(A) Car A moves ahead (B) Car B moves ahead

(C) Cars A and B move simultaneously (D) Data is insufficient

20. At what time the cars are at the same point?

(A) 2 s (B) $\frac{2}{\sqrt{3}}$ s (C) 3 s (D) $\frac{2}{3}$ s

(Space for rough work)

[SECTION - III]

[INTEGER TYPE]

This section contains 5 Subjective Questions. The answer to each of the questions is a single digits integer, ranging from 0 to 9 (both inclusive)

[Marking Scheme: +3 marks for correct answer and **–1** for wrong answer**]**

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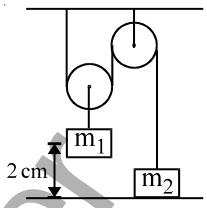
21. If the resultant of three forces $F_1 = p\hat{i} + 3\hat{j} - k$, $F_2 = -5\hat{i} + \hat{j} + 2\hat{k}$ and $F_3 = 6\hat{i} - \hat{k}$ acting on a particle has magnitude equal to 5 units, then the value (s) of p is (are)

22. Momentum of a body moving in a straight line is $p = (t^2 + 2t + 1)$ kg m/s. Force acting on a body at t = 2sec

23. On an inclined plane inclined at an angle of 30° to the horizontal, a ball is thrown upwards with a velocity of 10 m/s, at an angle of 60° to the inclined plane. Its range on the inclined plane is :

24. In the fig. $m_1 = 4m_2$. Pulleys are smooth and thread is light. At t = 0 system is released from rest. Find maximum height reached by m_2.



25. A load attached to the end of a spring and in equilibrium produces 9 cm extension of spring. If the spring is cut into three equal parts and one end of each is fixed at 'O' and other ends are attached to the same load, the extension in cm of the combination in equilibrium now is:

PART -II [Chemistry]

[SECTION - I]

[SINGLE CORRECT TYPE]

This section contains 5 Multiple Choice Questions. Each question has four choices (A), (B), (C) and (D) out of which ONLY ONE is correct.

[Marking Scheme: +3 marks for correct answer and **–1** for wrong answer**]**

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26. A, B and C are hydroxy-compounds of the elements X, Y and Z respectively. X, Y and Z are in the same period of the periodic table. A gives an aqueous solution of pH less than seven. B reacts with both strong acids and strong alkalis. C gives an aqueous solution which is strongly alkaline

Which of the following statements is/are true:

I : The three elements are metals

II : The electronegativities decrease from X to Y to Z.

III : The atomic radius decreases in the order X, Y and Z.

IV : X, Y and Z could be phosphorus, aluminium and sodium respectively :

(A) I, II, III only correct (B) I, III only correct (C) II, IV only correct (D) II, III, IV only correct

(Space for rough work)

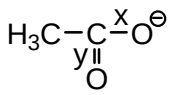
27. Choose the correct option:

List-I (Species)	List-II (Relation)
(P) CN^-, N_2	(1) Isodiaphers
(Q) F^{19}, K^{39}	(2) Isobars
(R) N^{15}, O^{15}	(3) Isotones
(S) C^{14}, N^{15}	(4) Isoesters

(A) (P)-(3); (Q)-(4); (R)-(1); (S)-(2) (B) (P)-(2); (Q)-(1); (R)-(3); (S)-(4)

(C) (P)-(3); (Q)-(1); (R)-(4); (S)-(2) (D) (P)-(4); (Q)-(1); (R)-(2); (S)-(3)

28. Compare bond length x and y for the following given compound



(A) x = y (B) x > y (C) x < y (D) data insufficient

29. The sum of angular node and angular momentum for ψ_{432} is

(A) $\frac{\sqrt{6}h + 3\pi}{2\pi}$ (B) $\frac{\sqrt{3}h + \pi}{\pi}$ (C) $\frac{\sqrt{3}h + 3\pi}{\pi}$ (D) $\frac{\sqrt{3}h + 3\pi}{3\pi}$

30. In O_2F_2, which of the following statement is incorrect.

(A) O–F bond length in O_2F_2 is longer than O–F bond length in OF_2.

(B) The oxidation number of oxygen in O_2F_2 is +1.

(C) The O–O bond length in O_2F_2 is longer than O–O bond length in H_2O_2.

(D) None of these

[SECTION - II]

[COMPREHENSION TYPE]

This section contains 6 comprehension (15 Multiple Choice Questions). Each question has four choices (A), (B), (C) and (D) out of which ONLY ONE is correct.

[Marking Scheme: +4 marks for correct answer and **–1** for wrong answer**]**

Comprehension#1

The minimum amount of energy required to remove the most loosely bound electron from an isolated atom in the gaseous state is known as ionisation energy or first ionisation energy or ionisation enthalpy (IE_1) of the element. The energy required to remove the second electron from the monvalent cation is called second ionisation enthalpy (IE_2). Similarly, we have third, fourth ..... ionistion enthalpies. The values of ionisation energy depends on a number of factors such as (i) size of the atom (ii) screening effect (iii) nuclear charge (iv) half filled and fully filled orbitals.

In a group, the ionisation energy decreases from top to bottom. In a period, the value of ionisation energy increases from left to right with breaks where atoms have some what stable configurations.

31. Compared to the second ionisation energy (IE_2) of an atom, the third ionisation energy (IE_3) is

(A) The same (B) Greater (C) Smaller (D) Half

(Space for rough work)

32. In a period, the ionisation energy is lowest for the -

(A) Noble gases (B) Halogens

(C) Alkaline earth metals (D) Alkali metals

33. The electronic configurations of some neutral elements are given below. In which of these electronic confugarations would be expected to have highest second ionisation energy (IE_2)

(A) $1s^2, 2s^2$ (B) $1s^2, 2s^22p^1$ (C) $1s^2, 2s^1$ (D) $1s^2, 2s^22p^3$

Comprehension#2

Hybridization is a theoretical concept, as state of hybridization cannot be detected even by spectroscopically; unlike intermediates or transition state in various reactions. But it corrects the predictions which are based simple on overlapping of pure atomic orbitals. VSEPR theory predicts precisely shape and bond angle in a given molecule.

34. In which pair of molecules bond angles are not same:

(A) CCl_4 & $SiCl_4$ (B) NH_4^+ & NH_3 (C) ClF_6^+ & SF_6 (D) None

35. The molecules/ions which are planar as well as polar.

(A) BF_3 , H_2O, H F , NH_2^- (B) $SnCl_2$, I_3^+ , NH_2^-, IF_3

(C) CO_3^{2-} , I_3^-, SF_2, XeF_2 (D) NO_2^-, XeF_4, ICl_4^-, NH_2^+

36. The correct order of energy levels of hybrid orbitals.

(A) $sp > sp^2 > sp^3$ (B) $sp < sp^2 < sp^3$ (C) $sp^2 > sp^3 > sp$ (D) $sp^3 > sp > sp^2$

Comprehension#3

A 10 ml mixture of N_2, a alkane & O_2 undergo combustion in Eudiometry tube. There was contraction of 2 ml, when residual gases are passed through KOH. To the remaining mixture comprising of only one gas excess H_2 was added & after combustion the gas produced is absorbed by water, causing a reduction in volume of 8 ml.

37. Gas produced after introduction of H_2 in the mixture?

(A) H_2O (B) CH_4 (C) CO_2 (D) NH_3

38. Volume of N_2 present in the mixture?

(A) 2 ml (B) 4 ml (C) 6 ml (D) 8 ml

39. Volume of O_2 remained after the first combustion?

(A) 4 ml (B) 2 ml (C) 0 (D) 8 ml

Comprehension#4

Orbital is the region in an atom where the probability of finding the electron is maximum. It represents three-dimensonal motion of an electron around the nucleus. Orbitals do not specify a definite path according to the uncertainty principle. An orbital is described with the help of wave function ψ . Whenever an electron is described by a wave function, we say that an electron occupies that orbital. Since many wave functions are possible for an electron, there are many atomic orbitals in an atom. Orbitals have different shapes; except s-orbitals, all other orbitals have directional character. Number of spherical nodes in an orbital is equal to $(n-\ell-1)$. Orbital angular momentum of an electron is $\sqrt{\ell(\ell+1)}\,\hbar$.

40. The nodes present in 5p orbital are -

(A) one planar, five spherical (B) one planar, four spherical

(C) one planar, three spherical (D) four spherical

(Space for rough work)

41. When an atom is placed in a magnetic field, the possible number of orientations for an orbital of azimuthal quantum number 3 is -

(A) three (B) one (C) five (D) seven

Comprehension#5

Pyrolusite, MnO_2, is the main ore from which manganese is produced. The manganese content of the ore may be determined by reducing the MnO_2 under acidic conditions to Mn^{2+} with the oxalate ion, $C_2O_4^{2-}$, the oxalate ion being oxidised to carbon dioxide during the reaction. The analytical determination is carried out by adding excess volume of oxalate solution to a suspension of the pyrolusite and digesting the mixture on a hot water bath until all the MnO_2 has been reduced. The excess, unreacted oxalate solution is then titrated with standardised potassium permanganate, $KMnO_4$ solution after which the manganese content of the ore can be calculated.

A student prepared a standard solution of sodium oxalate by weighing 13.4 g of the dry anhydrous salt, dissolving it in distilled water and making the solution up to 500 mL. 25 mL of the oxalate solution required 10 mL of $KMnO_4$ solution.

42. What is the equivalent mass of MnO_2 in the present titration ?

(A) $\frac{M.w.}{1}$ (B) $\frac{M.w.}{2}$ (C) $\frac{M.w.}{3}$ (D) $\frac{2M.w.}{3}$

43 How many moles of $C_2O_4^{2-}$ ions will be oxidised by 1 mole MnO_4^-?

(A) 1/2 (B) 3/2 (C) 5/2 (D) 7/2

Comprehension#6

On a planet, an atom consisted of electrons and protons only. Each electron has mass 1η and each proton has mass 2η. [η is a unit of mass and it is equal to $\frac{1}{4}u$]

44. An atom containing 10 electrons will weigh (atom is neutral)

(A) 10 u (B) 7.5 u (C) 12.5 u (D) 5 u

45. On this planet, which of the following cannot exist?

(A) Isotopes (B) Isobars (C) Both (A) and (B) (D) None of these

(Space for rough work)

[SECTION - III]

[INTEGER TYPE]

This section contains 5 Subjective Questions. The answer to each of the questions is a single digits integer, ranging from 0 to 9 (both inclusive)

[Marking Scheme: +3 marks for correct answer and **–1** for wrong answer**]**

46. What is the maximum number of species among the following which are isoelectronic with N_2?
CN^-, Si, NO^-, CO, O_2^{2+}, C_2^{2-}, C_2H_4, CH_3^+, MgH_2

47. What is the ratio of weights of O_2 and He, the mixture of which contains equal number of molecules of each gas?

48. Common salt obtained from sea-water contains 58.5% NaCl by mass. The approximate number of molecules (formula-units) of NaCl present in 5 g of common salt is 10^{22} x. Find value of x

49. An alpha particle has charge 'a' times the charge of a proton and has mass about 'b' times the mass of a neutron. Report your answer as (b–a).

50. Oxidation no. of Cr in K_3CrO_8 is

PART -III [Mathematics]

[SECTION - I]

[SINGLE CORRECT TYPE]

This section contains 5 Multiple Choice Questions. Each question has four choices (A), (B), (C) and (D) out of which ONLY ONE is correct.

[Marking Scheme: +3 marks for correct answer and **–1** for wrong answer**]**

51. The number of solutions of $\log_4(x-1)=\log_2(x-3)$ is

(A) 3 (B) 1 (C) 2 (D) 0

52. If $x>1, y>1, z>1$ are in GP, then $\frac{1}{1+\ln x}, \frac{1}{1+\ln y}, \frac{1}{1+\ln z}$ are in

(A) AP (B) HP (C) GP (D) None of these

53. The domain of definition of $f(x)=\frac{\log_2(x+3)}{x^2+3x+2}$ is

(A) $R/\{-1,-2\}$ (B) $(-2,\infty)$ (C) $R/\{-1,-2,-3\}$ (D) $(-3,\infty)/\{-1,-2\}$

54. The orthocentre of the triangle formed by the lines $xy=0$ and $x+y=1$, is

(A) $\left(\frac{1}{2},\frac{1}{2}\right)$ (B) $\left(\frac{1}{3},\frac{1}{3}\right)$ (C) $(0,0)$ (D) $\left(\frac{1}{4},\frac{1}{4}\right)$

(Space for rough work)

55. Which of the following numbers is rational ?

(A) $\sin 15^\circ$ (B) $\cos 15^\circ$ (C) $\sin 15^\circ \cos 15^\circ$ (D) $\sin 15^\circ \cos 75^\circ$

[SECTION - II]

[COMPREHENSION TYPE]

This section contains 6 comprehension (15 Multiple Choice Questions). Each question has four choices (A), (B), (C) and (D) out of which ONLY ONE is correct.

[Marking Scheme: +4 marks for correct answer and **–1** for wrong answer**]**

Comprehension#1

Consider a triangle with vertices $(a,b),(c,d),(e,f)$ then its area is given by $\Delta = \left|\frac{1}{2}\begin{vmatrix} a & b & 1 \\ c & d & 1 \\ e & f & 1 \end{vmatrix}\right|$.

Now answer the following questions.

56. Let k be an integer such that the triangle with vertices $(k,-3k),(5,k)$ and $(-k,2)$ has area 28 sq units. Then, the orthocentre of this triangle is at the point

(A) $\left(2,-\frac{1}{2}\right)$ (B) $\left(1,\frac{3}{4}\right)$ (C) $\left(1,-\frac{3}{4}\right)$ (D) $\left(2,\frac{1}{2}\right)$

57. If $\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} = \begin{vmatrix} a_1 & b_1 & 1 \\ a_2 & b_2 & 1 \\ a_3 & b_3 & 1 \end{vmatrix}$, then the two triangles with vertices $(x_1,y_1),(x_2,y_2),(x_3,y_3)$ and $(a_1,b_1),(a_2,b_2),(a_3,b_3)$ must be

(A) Equilateral (B) Isosceles (C) Similar (D) Congruent

58. Area of triangle formed by the lines $x+y=3$ and angle bisectors of the pair of straight lines $x^2-y^2+2y=1$ is

(A) 2 sq units (B) 4 sq units (C) 6 sq units (D) 8 sq units

Comprehension#2

In mathematics, the logarithm is the inverse function to exponentiation. That means the logarithm of a given number x is the exponent to which another fixed number, the base b, must be raised, to produce that number x. The logarithm of x to base b is denoted as $\log_b x$. More generally, exponentiation allows any positive real number to be raised to any real power, always producing a positive result, so the logarithm for any two positive real numbers b and x where b is not equal to 1, is always a unique real number y.More explicitly,the defining relation between exponentiation and logarithm is: $\log_b x = y \Rightarrow b^y = x$, Now answer the following questions.

(Space for rough work)

59. The number $\log_2 7$ is

(A) an integer (B) a rational number
(C) an irrational number (D) a prime number

60. If $\log_{0.3}(x-1) < \log_{0.09}(x-1)$, then x lies in the interval

(A) $(2,\infty)$ (B) $(1,2)$ (C) $(-2,-1)$ (D) None of these

61. The least value of the expression $2\log_{10} x - \log_x(0.01)$, for $x > 1$, is

(A) 10 (B) 2 (C) – 0.01 (D) None of these

Comprehension#3

Suppose $\sin^3 x \sin 3x = \sum_{m=0}^{n} C_m \cos nx$ is an identity in x, where $C_0, C_1, ..., C_n$ are constants and $C_n \neq 0$. Now answer the following questions.

62. The value of n is

(A) 5 (B) 6 (C) 7 (D) 8

63. The value of C_1 is

(A) $-\frac{1}{8}$ (B) $\frac{1}{8}$ (C) 0 (D) $\frac{3}{8}$

64. The value of C_4 is

(A) $-\frac{1}{8}$ (B) $\frac{1}{8}$ (C) $-\frac{3}{8}$ (D) $\frac{3}{8}$

Comprehension#4

Consider the quadratic equation $f(x) = ax^2 + bx + c = 0; a \neq 0$ with roots α, β satisfying $p < \alpha < q < \beta$, where p, q are two real numbers, then $f(p) \cdot f(q) < 0$. Now answer the following questions.

65. Both the roots of the equation $(x-b)(x-c)+(x-a)(x-c)+(x-a)(x-b)=0$ are always

(A) positive (B) negative (C) real (D) None of these

66. If $b > a$, then the equation $(x-a)(x-b)-1=0$ has

(A) both roots in (a,b) (B) both roots in $(-\infty, a)$

(C) both roots in $(b,+\infty)$ (D) one root in $(-\infty,0)$ and the other in (b,∞)

(Space for rough work)

Comprehension#5

If the sequence of numbers satisfy $a_{n+1} = a_n + d \ \forall n \geq 1$, then the sequence will be named as arithmetic progression (A.P.). If in the sequence the reciprocal of the numbers are in arithmetic progression, then the sequence will be named as harmonic progression (H.P.). If the sequence of numbers satisfy $a_{n+1} = a_n r \ \forall n \geq 1; r \neq 0$ then the sequence will be named as Geometric progression (G.P.). Now answer the following questions.

67. If $a_1, a_2, ...a_n$ are in arithmetic progression, where $a_i > 0, \forall i$, then

$$\frac{1}{\sqrt{a_1}+\sqrt{a_2}} + \frac{1}{\sqrt{a_2}+\sqrt{a_3}} + ... + \frac{1}{\sqrt{a_{n-1}}+\sqrt{a_n}} =$$

(A) $\frac{n-1}{\sqrt{a_1}+\sqrt{a_n}}$ (B) $\frac{n+1}{\sqrt{a_1}+\sqrt{a_n}}$ (C) $\frac{n-1}{\sqrt{a_1}-\sqrt{a_n}}$ (D) $\frac{n+1}{\sqrt{a_1}-\sqrt{a_n}}$

68. If the positive numbers a,b,c,d are in AP. Then, abc, abd, acd, bcd are

(A) not in AP/GP/HP (B) in AP (C) in GP (D) in HP

Comprehension#6

Consider a function $f : A \to B$ where A and B are two sets with cardinal number m, n respectively. Total number of onto functions from set A to set B is given by expression $n^m - \binom{n}{1}(n-1)^m + \binom{n}{2}(n-2)^m - \binom{n}{3}(n-3)^m + ...$ where $\binom{n}{r} = \frac{n!}{r!(n-r)!}$ .Now answer the following questions.

69. Let $E = \{1,2,3,4\}$ and $F = \{1,2\}$. Then, the number of onto functions from E to F is

(A) 14 (B) 16 (C) 12 (D) 8

70. Let $E = \{1,2,3,4\}$ and $F = \{1,2\}$. Then, the number of into functions from E to F is

(A) 4 (B) 8 (C) 2 (D) 0

(Space for rough work)

[SECTION - III]

[INTEGER TYPE]

This section contains 5 Subjective Questions. The answer to each of the questions is a single digits integer, ranging from 0 to 9 (both inclusive)

[Marking Scheme: +3 marks for correct answer and **–1** for wrong answer**]**

71. If the products of the roots of the equation $x^2 - 3kx + 2e^{2\log k} - 1 = 0$ is 7, then the roots are real for $k =$

72. The sides of a right angled triangle are in arithmetic progression. If the triangle has area 24, then what is the length of its smallest side ?

73. Let $g(x) = 1 + x - [x]$ and $f(x) = \begin{cases} -1, & x < 0 \\ 0, & x = 0 \\ 1, & x > 0 \end{cases}$, then for all x, $f(g(x))$ is equal to

74. If $P(1,2), Q(4,6), R(5,7)$ and $S(a,b)$ are the vertices of a parallelogram $PQRS$, then $a + b =$

75. If $\sin A \sin B \sin C + \cos A \cos B = 1$, then the value of $\sin C$ is

(Space for rough work)

SET-A

QUANTUM POTENTIAL TEST

[Quality Nurturer & Mind Utilizer Test for Potential Enhancement]

(IPEC Scholarship-Cum-Admission Test)

For

CLASS-XI

(For XI to XII Moving Students)

Time : 3 Hrs.] **[Maximum Marks : 285**

(SAMPLE PAPER) ANSWER KEY

1.	**(A)**	**2.**	**(C)**	**3.**	**(D)**	**4.**	**(D)**	**5.**	**(B)**
6.	**(C)**	**7.**	**(A)**	**8.**	**(B)**	**9.**	**(A)**	**10.**	**(C)**
11.	**(D)**	**12.**	**(D)**	**13.**	**(A)**	**14.**	**(C)**	**15.**	**(D)**
16.	**(A)**	**17.**	**(B)**	**18.**	**(A)**	**19.**	**(A)**	**20.**	**(A)**
21.	**2**	**22.**	**6**	**23.**	**0**	**24.**	**6**	**25.**	**1**
26.	**(C)**	**27.**	**(D)**	**28.**	**(A)**	**29.**	**(C)**	**30.**	**(C)**
31.	**(B)**	**32.**	**(D)**	**33.**	**(C)**	**34.**	**(D)**	**35.**	**(B)**
36.	**(B)**	**37.**	**(D)**	**38.**	**(B)**	**39.**	**(C)**	**40.**	**(C)**
41.	**(D)**	**42.**	**(B)**	**43**	**(C)**	**44.**	**(B)**	**45.**	**(C)**
46.	**6**	**47.**	**8**	**48.**	**3**	**49.**	**2**	**50.**	**5**
51.	**(B)**	**52.**	**(B)**	**53.**	**(D)**	**54.**	**(C)**	**55.**	**(C)**
56.	**(D)**	**57.**	**(C)**	**58.**	**(A)**	**59.**	**(C)**	**60.**	**(A)**
61.	**(D)**	**62.**	**(B)**	**63.**	**(C)**	**64.**	**(C)**	**65.**	**(C)**
66.	**(D)**	**67.**	**(A)**	**68.**	**(D)**	**69.**	**(A)**	**70.**	**(C)**
71.	**2**	**72.**	**6**	**73.**	**1**	**74.**	**5**	**75.**	**1**