SHIKSHA CLASSES, BHANDARA

TEST-1

CHEMISTRY , PHYSICS, MATHEMATICS

Time : - 3 Hours **Max. Marks:- 300** **Date : .....**

INSTRUCTIONS :

1. The test is of 3 hours duration.
2. The Test Booklet consists of 90 questions. The maximum marks are **300.**
3. There are three parts in the question paper A, B, C consisting of Chemistry, Physics and Mathematics having **30questions** in each part of equal weightage. **20 questions** will be **MCQs** and **10 questions** (**ATTEMPT ANY FIVE QUESTIONS OUT OF 10**)will have answer to be filled as **numerical value**.
   Marking Scheme for MCQs
   Correct Answer Four mark (+4), Incorrect Answer Minus one mark (–1), Unanswered No mark (0)
   Marking Scheme for questions for which answer is a **Numerical value**
   Correct Answer Four mark (+4), Incorrect Answer No mark (0), Unanswered No mark (0)
4. There is only one correct response for each question. Filling up more than one response in each question will be treated as wrong response and marks for wrong response will be deducted accordingly.

SYLLABUS

CHEMISTRY : SOME BASIC CONCEPTS IN CHEMISTRY, STATES OF MATTER - GASEOUS STATE, LIQUID STATE, ATOMIC STRUCTURE, CHEMICAL BONDING AND MOLECULAR STRUCTURE.

PHYSICS : PHYSICS AND MEASUREMENT, KINEMATICS, LAWS OF MOTION

MATHEMATICS : SETS, RELATIONS AND FUNCTIONS, COMPLEX NUMBERS AND QUADRATIC EQUATIONS, INEQUALITIES, SEQUENCES AND SERIES.

Accept the challenges so that you may feel the exhilaration of victory.

Before anything else, preparation is the key to success.

Name : .....

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PART A – CHEMISTRY

SECTION - 1 (Q.1 - Q.20)

Each question has FOUR options (1), (2), (3) and (4). ONLY ONE of these four options is correct.

Q.1 The molality of 1 M solution of NaCl (specific gravity 1.0585 g/ml) is :-

(1) 1.0585 (2) 1.0

(3) 0.10 (4) 0.0585

Q.2 The mass of Mg_3N_2 produced if 48 gm of Mg metal is reacted with 34 gm NH_3 gas is

$$Mg + NH_3 \rightarrow Mg_3N_2 + H_2$$

(1) (200/3) gm (2) (100/3) gm

(3) (400/3) gm (4) (150/3) gm

Q.3 Which of the following energy change is less than third balmer transition in He^+ ion :

(1) First excitation energy of He^+ ion

(2) Third separation energy of Li^{+2} ion

(3) Fourth excitation energy of H-atom

(4) Ionisation energy of Be^{+3} ion

Q.4 Which of the following relation is **incorrect** :-

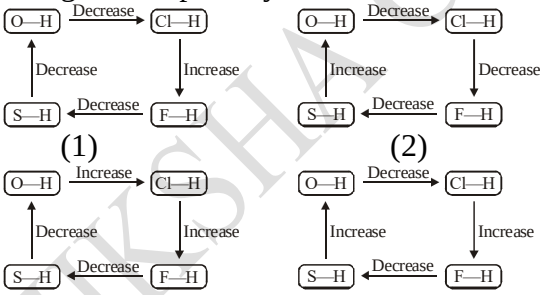
(1) 1 mol N^{-3} ions have 10 mol electrons

(2) 1 mol O^{-2} ions have 6.023×10^{22} electrons

(3) 1 mole CH_4 has 10 mol protons

(4) 1 mole water has 10 mol protons

Q.5 Which of the following diagrams shows correct change in the polarity of bond ?



(1) (2)

(3) (4)

Q.6 Calculate the minimum and maximum number of electrons which have magnetic quantum number m = +1 and spin quantum number. s = –½ in chromium (Cr) :-

(1) 4, 6 (2) 2, 3

(3) 0, 1 (4) 1, 2

Q.7 The correct order in which the C–O bond length in CO, CO_3^{-2} and CO_2 is :-

(1) $CO_3^{-2} < CO_2 < CO$

(2) $CO_2 < CO_3^{-2} < CO$

(3) $CO < CO_3^{-2} < CO_2$

(4) $CO < CO_2 < CO_3^{-2}$

Q.8 In the crystalline solid MSO_4. nH_2O of molar mass 250 g mol^{-1}, the percentage of anhydrous salt is 64 by weight. The value of n is

(1) 2 (2) 3

(3) 5 (4) 7

Q.9 The H–N–H angle in ammonia is 107.6º, while the H–P–H angle in phosphine is 93.5º. Relative to phosphine, the p-character of the lone pair on ammonia is expected to be

(1) Less (2) More

(3) Same (4) Cannot be predicted

Q.10 Consider the van der Waals constants, a and b, for the following gases.

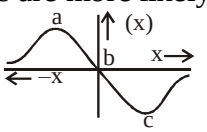
Gas	Ar	Ne	Kr	Xe
a / (atm dm^6 mol^{-2})	1.3	0.2	5.1	4.1
b / (10^{-2} dm^3 mol^{-1})	3.2	1.7	1.0	5.0

Which gas is expected to have the highest critical temperature?

(1) Kr (2) Ne

(3) Ar (4) Xe

Q.11 The electrons are more likely to be found :



(1) in the region a and b

(2) in the region a and c

(3) only in the region c

(4) only in the region a

Q.12 Which of the following statement is wrong:-

(1) B. P. of O-nitrophenol is greater than p-nitrophenol.

(2) In SO_3 $p\pi - d\pi$ bond is present

(3) In S_3O_9 no. of bridge oxygen is 3.

(4) All of these

SPACE FOR ROUGH WORK

Q.13 At identical temperature and pressure, the rate of diffusion of hydrogen gas is $3\sqrt{3}$ times that of a gaseous hydrocarbon having molecular formula C_nH_{2n-2}. What is the value of n?

(1) 1 (2) 4 (3) 3 (4) 8

Q.14 For which of the following species, Bohr's theory is not applicable

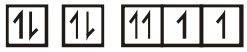
(1) Be^{+3} (2) Li^{+2}

(3) He^{+2} (4) H

Q.15 When 2 L of CO_2 is heated with graphite, volume of gases collected is 3 L, calculate number of moles of CO produced at STP?

(1) 1 / 22.4 (2) 2 / 22.4

(3) 3 / 22.4 (4) 4 / 22.4

Q.16 For the configuration  which rule is violated ?

(1) Aufbau principle (2) (n + ℓ) Rule

(3) Pauli 's Rule (4) Hund's Rule

Q.17 Correct order of bond angle is :-

(1) $OF_2 < H_2O < NH_3 < Cl_2O$

(2) $OF_2 < NH_3 < Cl_2O < H_2O$

(3) $OF_2 < Cl_2O < H_2O < NH_3$

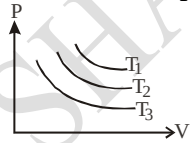
(4) $Cl_2O < OF_2 < H_2O < NH_3$

Q.18 Which bond angle θ gives maximum dipole moment for triatomic molecule XY_2 :

(1) θ = 90° (2) θ = 120°

(3) θ = 180° (4) Both 2 and 3

Q.19 Following P vs V curve is plotted :



What is the relation between T_1, T_2 and T_3 ?

(1) $T_1 = T_2 = T_3$ (2) $T_1 > T_2 > T_3$

(3) $T_1 < T_2 < T_3$ (4) None of the above

Q.20 6.02×10^{20} molecules of urea are present in 200mL of its solution. The concentration of urea solution is

(1) 0.001 M (2) 0.01 M

(3) 0.005 M (4) 0.10 M

SECTION - 2 (Q.21 - Q.30)

This section contains TEN (10) questions. ATTEMPT ANY FIVE (05) QUESTIONS. The answer to each question is NUMERICAL VALUE. If the numerical value has more than two decimal places truncate/round-off the value upto TWO decimal places.

Q.21 If Aufbau rule is not obeyed and instead electronic filling occurs orbit by orbit till saturation is reached. The percentage change in sum of all (n + ℓ) values for unpaired electrons in an atom of iron is 10x.What is the value of x.

Q.22 6.2 g of a sample containing Na_2CO_3, $NaHCO_3$ and non-valatile inert impurity on heating loses 5%of its weight due to formation of H_2O and CO_2 as in reaction

$2NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$.

Residue is dissolved in water and formed 100 ml solution and its 10 ml portion requires 4.5 ml of 0.2 M aqueous solution of $BaCl_2$ for complete precipitation of carbonates. If number of moles of Na_2CO_3 in the original sample were 'q' then the value of '100 q' is :

Q.23 How many of the following has more than 10σ bonds.

(a) P_4O_6 (b) $K_2Cr_2O_7$ (c) $KMnO_4$

(d) I_2Cl_6 (e) K_2MnO_4 (f) K_2CrO_4

(g) C_5H_8

Q.24 How many molecules are having zero dipole moment. PCl_3F_2, $P(CH_3)_3(CF_3)_2$, BF_3, $CHCl_3$, $P(CH_3)_2(CF_3)_3$, PF_3Cl_2, CH_4, CCl_4.

Q.25 A photon is emitted in β-line of Balmer series of He^+ ion. This photon is absorbed by an electron present in ground state of hydrogen atom. Calculate the value of z, where $z = \frac{\lambda}{0.529\pi}$, λ = De Broglie wavelength associated with electron in final orbit of hydrogen atom. (in Å).

SPACE FOR ROUGH WORK

Q.26 An electron is continuously accelerated in vacuum tube by applying potential difference. If its de-broglie wavelength is decreased by 4%. Determine the approx % change in kinetic energy of the electron. Report your answer by adding '1' if kinetic energy increases and subtracting '1' if kinetic energy decreases.

Q.27 20ml of O_2 contracts to 17ml when subjected to silent electric discharge in an ozoniser. What further contraction would be observed if the partially ozonised oxygen is treated with oil of cinnamon (which absorbs ozone). All volumes are reported at the same temperature and pressure.

Q.28 The binding energy of electrons in a metal is 250 kJ/mol. The threshold frequency of metal will be ..... $\times 10^{14}$ sec^{-1}.

Q.29 The ratio of bond orders in CO_3^{2-} ion NO_3^- ion is.

Q.30 Atomic number of an element is 24. The number of unpaired electrons present in its dipositive ion is

PART B – PHYSICS

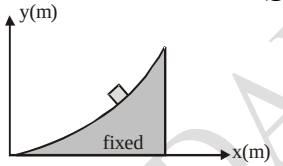
SECTION - 1 (Q.31 - Q.50)

Each question has FOUR options (1), (2), (3) and (4). ONLY ONE of these four options is correct.

Q.31 The velocity of a particle depends upon the time t according to the equation: $v = \sqrt{ab} + bt + \frac{c}{d+t}$

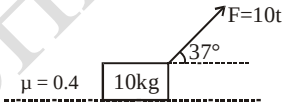
The physical quantities which are represented by a, b, c and d, are in the following order:
(1) distance, distance, acceleration, time
(2) distance, acceleration, distance, time
(3) acceleration, distance, distance, time
(4) none of above

Q.32 A block is kept on a fixed smooth wedge whose vertical section is a curve $y = \frac{x^2}{\sqrt{3}}$ as shown in figure where x represents horizontal direction and y represents vertical direction. When released from a point where $y = \frac{1}{4\sqrt{3}}$, what will be its acceleration? ($g = 10\ m/s^2$)



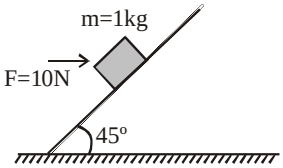
(1) 2.5 m/s^2 (2) $5\sqrt{3}\ m/s^2$
(3) 5 m/s^2 (4) Can't be determined

Q.33 A force acts on a block as shown in figure. Find time when block loses contact with surface.



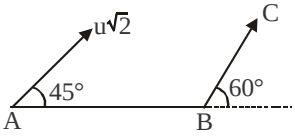
(1) t = 25/3 sec (2) t = 50/3 sec
(3) t = 100/3 sec (4) t = 50 sec

Q.34 A body of mass 1 kg lies on smooth inclined plane. The body is given force F = 10N horizontally as shown. The magnitude of net normal reaction on the body is :-



(1) $10\sqrt{2}$ N (2) $10/\sqrt{2}$ N
(3) 10 N (4) None of these

Q.35 A particle is projected from a point A with velocity $u\sqrt{2}$ at an angle of 45° with horizontal as shown in fig. It strikes the plane BC at right angles. The velocity of the particle at the time of collision is-



(1) $\sqrt{3}u/2$ (2) u/2
(3) $2u/\sqrt{3}$ (4) u

SPACE FOR ROUGH WORK

Q.36 A particle located at x = 0, at time t = 0, starts moving along the positive X-direction with a velocity v that varies as $v = \alpha\sqrt{x}$. The displacement of the particle with time is proportional to :-

(1) t^3 (2) t^2

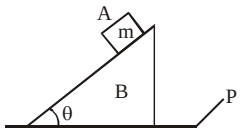
(3) t (4) $t^{1/2}$

Q.37 From the top of a tower of height 40 m, a ball is projected upwards with a speed of 20 m/s at an angle 30° to the horizontal. The ball will hit the ground in time : (Take g = 10 m/s^2) :-

(1) 1 (2) 2 s

(3) 3 s (4) 4 s

Q.38 In the figure shown 'P' is a plate on which a wedge B is placed and on B a block A of mass m is placed. The plate is suddenly removed and system of B and A is allowed to fall under gravity. Neglecting any force due to air on A and B, the normal force on A due to B is :-



(1) $\frac{mg}{\cos\theta}$ (2) mg cos θ

(3) zero (4) $\frac{2mg}{\cos\theta}$

Q.39 If the speed of light (c), acceleration due to gravity (g) and pressure (p) are taken as fundamental units, the dimensions of gravitational constant (G) are:-

(1) c^0gp^{-3} (2) $c^2g^3p^{-2}$

(3) $c^0g^2p^{-1}$ (4) $c^2g^2p^{-2}$

Q.40 A particle of mass m is moving in a straight line with momentum p. Starting at time t = 0, a force F = kt acts in the same direction on the moving particle during time interval T so that its momentum changes from p to 3p. Here k is a constant. The value of T is :

(1) $2\sqrt{\frac{p}{k}}$ (2) $\sqrt{\frac{2p}{k}}$

(3) $\sqrt{\frac{2k}{p}}$ (4) $2\sqrt{\frac{k}{p}}$

Q.41 The diameter and height of a cylinder are measured by a meter scale to be 12.6 ± 0.1 cm and 34.2 ± 0.1 cm, respectively. What will be the value of its volume in appropriate significant figures ?

(1) 4262 ± 80 cm^3 (2) 4300 ± 80 cm^3

(3) 4264.4 ± 81.0 cm^3 (4) 4264 ± 81 cm^3

Q.42 A particle is moving with speed n = b x along positive x-axis. Calculate the speed of the particle at time t = τ (Assume that the particle is at origin at t = 0).

(1) $\frac{b^2\tau}{4}$ (2) $\frac{b^2\tau}{2}$

(3) $b^2\tau$ (4) $\frac{b^2\tau}{\sqrt{2}}$

Q.43 Ship A is sailing towards north-east with velocity $\vec{v} = 30\hat{i} + 50\hat{j}$ km/hr where $\hat{i}$ points east and $\hat{j}$, north. Ship B is at a distance of 80 km east and 150 km north of Ship A and is sailing towards west at 10 km/hr. A will be at minimum distance from B in :

(1) 4.2 hrs. (2) 2.2 hrs.

(3) 3.2 hrs. (4) 2.6 hrs.

Q.44 A body is projected at t = 0 with a velocity 10m/s at an angle of 60° with the horizontal. The radius of curvature of its trajectory at t = 1s is R. Neglecting air resistance and taking acceleration due to gravity g = 10 ms^{-2}, the value of R is :

(1) 2.5 m (2) 10.3 m

(3) 2.8 m (4) 5.1 m

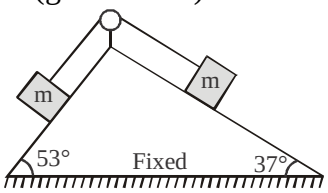
Q.45 The correct dimensional formula for impulse is given by –

(1) ML^2T^{-2} (2) MLT^{-1}

(3) ML^2T^{-1} (4) MLT^{-2}

SPACE FOR ROUGH WORK

Q.46 Two blocks which are connected to each other by means of a massless string are placed on two inclined planes as shown in fig. After releasing from rest, the magnitude of acceleration of the centre of mass of both the blocks is- ($g = 10\ m/s^2$)



(1) 1 m/s^2 (2) m/s^2
(3) 2 m/s^2 (4) zero

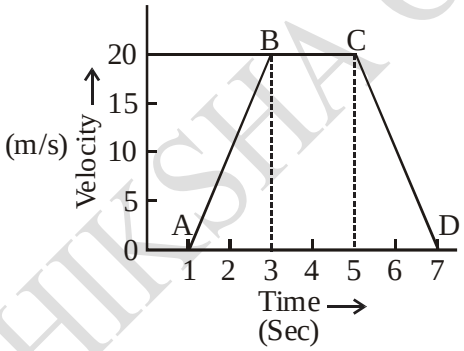
Q.47 A particle of mass 1 kg is moving along x-axis, where its velocity depends on x-coordinate as $v = 2\sqrt{x}$ (m/s). Find the net force acting on the particle 2 second after the start of motion.

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

Q.48 If $v = x^2 - 5x + 4$, find the acceleration of particle when velocity of the particle is zero :

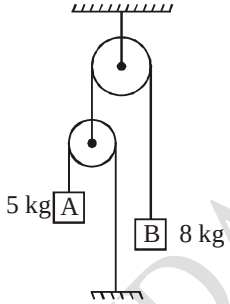
(1) 4 (2) 1
(3) 3 (4) 0

Q.49 For the velocity-time graph shown in figure, the total distance covered by the particle in the last two seconds of its motion is what fraction of the total distance covered by it in all seven seconds:



(1) 1/2 (2) 1/4
(3) 1/8 (4) 1/16

Q.50 Find the acceleration of block B :

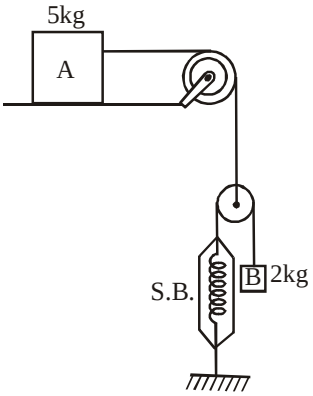


(1) 0 (2) (5/2) m/s^2
(3) (5/7) m/s^2 (4) (5/14) m/s^2

SECTION - 2 (Q.51 - Q.60)

This section contains TEN (10) questions. ATTEMPT ANY FIVE (05) QUESTIONS. The answer to each question is NUMERICAL VALUE. If the numerical value has more than two decimal places truncate/round-off the value upto TWO decimal places.

Q.51 If all the pulleys are massless and string is ideal, the reading of spring balance is (5X/13) kg. Find the value of X.



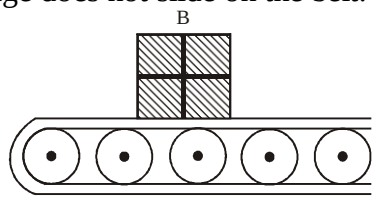
Q.52 If the mass, time and work are taken as fundamental physical quantities then dimensional formula of length is $[M^X T^Y W^Z]$. Find the value of X + Y + Z.

Q.53 A bird flies for 4 sec. from t = 0 with a velocity of | t – 2 | m/s in a straight line, where t = time in seconds. It covers a distance [in m] of –

SPACE FOR ROUGH WORK

Q.54 Two towns A and B are connected by a regular bus service with a bus leaving in either direction every T minutes. A man cycling with speed of 20 km/h in the direction A to B, notices that a bus goes past him every t_1 = 18 minutes in the direction of motion, and every t_2 = 6 minutes in the opposite direction.
What is the period T (in minutes) of the bus service? Assume that velocity of cyclist is less than velocity of bus.

Q.55 The conveyor belt is moving at 4 m/s. The coefficient of static friction between the conveyor belt and the 10 kg package B is μ_s=0.2. Determine the shortest time (in sec) in which the belt can be stopped so that the package does not slide on the belt.



Q.56 Two trains cross each other at speeds of 36 km/h and 54 km/h travelling in the opposite directions. A passenger in the first train notices that the second train passes by him in 2 min. What is the length of the second train (in km)?

Q.57 A small block is projected up from the bottom of a fixed incline, inclined at 60º from the horizontal. Coefficient of friction between the block & the incline is $\sqrt{3}/2$. If the ratio of descending time to ascending time is λ then find the value of λ^2 ?

Q.58 A mass of 60 kg is on the floor of a lift moving down. The lift moves at first with an acceleration of 3 m/sec^2, then with constant velocity and finally with a retardation of 3m/sec^2. If possible reactions exerted by the lift on the body in each part of the motion are (400 + A) N, (580 + B)N and (760 + C) N then find the value of (A + B + C)/3.

Q.59 If P represents radiation pressure, c represents speed of light and Q represents radiation energy striking a unit area per second, then non-zero integers x, y and z such that $P^xQ^yc^z$ is dimensionless, are x = 1, y = –a, z = b. Find the value of a + b.

Q.60 An airplane pilot sets a compass course due west and moves with a constant speed 12 km/hr with respect to air. After flying for 1/2 hour, he finds himself over a town that is 7.5 km west and 2 km south of his starting point. Find the magnitude of wind velocity (in km/hr).

PART C – MATHEMATICS

SECTION - 1 (Q.61 - Q.80)

Each question has FOUR options (1), (2), (3) and (4). ONLY ONE of these four options is correct.

Q.61 If three distinct numbers a,b,c are in G.P. and the equations $ax^2 + 2bx + c = 0$ and $dx^2 + 2ex + f = 0$ have a common root, then which one of the following statements is correct?

(1) d, e, f are in A.P. (2) $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ are in G.P.

(3) $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ are in A.P. (4) d, e, f are in G.P.

Q.62 Two newspapers A and B are published in a city. It is known that 25% of the city populations reads A and 20% reads B while 8% reads both A and B. Further, 30% of those who read A but not B look into advertisements and 40% of those who read B but not A also look into advertisements, while 50% of those who read both A and B look into advertisements. Then the percentage of the population who look into advertisement is :-

(1) 12.8 (2) 13.5
(3) 13.9 (4) 13

Q.63 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) 200 (2) 280

SPACE FOR ROUGH WORK

(3) 120 (4) 150

Q.64 $A = \{(x, y) : x^2 + y^2 \le 9\}$
$B = \{(x, y) : | x - 1 - x^2 | \le | x^2 - 3x + 4 | \}$ where x and y are integers.
Number of integral (x, y) in set $A \cap B$ are
(1) 20 (2) 18
(3) 22 (4) 23

Q.65 If the sum and product of the first three term in an A.P. are 33 and 1155, respectively, then a value of its 11th term is :-
(1) –25 (2) 25
(3) –36 (4) –35

Q.66 The sum
$$\frac{3\times1^3}{1^2}+\frac{5\times(1^3+2^3)}{1^2+2^2}+\frac{7\times(1^3+2^3+3^3)}{1^2+2^2+3^2}+...$$
(1) 660 (2) 620
(3) 680 (4) 600

Q.67 The domain of the definition of the function
$f(x) = \frac{1}{4-x^2} + \log_{10}(x^3 - x)$ is –
(1) $(1, 2) \cup (2, \infty)$
(2) $(-1, 0) \cup (1, 2) \cup (3, \infty)$
(3) $(-1, 0) \cup (1, 2) \cup (2, \infty)$
(4) $(-2, -1) \cup (-1, 0) \cup (2, \infty)$

Q.68 Let N denote the set of all natural numbers and R be the relation on N × N defined by (a, b) R (c, d) if ad (b + c) = bc(a + d), then R is-
(1) Symmetric only
(2) Reflexive only
(3) Transitive only
(4) An equivalence relation

Q.69 The sequence $S = i + 2i^2 + 3i^3 + ...$ upto 100 terms simplifies to where $i = \sqrt{-1}$
(1) 50 (1 – i) (2) 25i
(3) 25 (1 + i) (4) 100 (1 – i)

Q.70 If $f(x) = \{x\} + \{x + 1\} + \{x + 2\}.....\{x + 99\}$, then the value of $[f(\sqrt{2})]$ is, where {.} denotes fractional part function & [.] denotes the greatest integer function
(1) 5050 (2) 4950
(3) 41 (4) 14

Q.71 If z and ω are two non-zero complex numbers such that $|z\omega| = 1$, and Arg (z) – Arg (ω) = π/2, then $\bar{z}\,\omega$ is equal to -
(1) 1 (2) –1
(3) i (4) –i

Q.72 The smallest integer x for which the inequality $\frac{x-5}{x^2+5x-14} > 0$ is satisfied is given by -
(1) – 7 (2) – 5
(3) – 4 (4) – 6

Q.73 Let $f(x) = \sin\sqrt{[a]}\ x$ (where [ ] denotes the greatest integer function). If f is periodic with fundamental period π, then a belongs to -
(1) [2, 3) (2) {4, 5}
(3) [4, 5] (4) [4, 5)

Q.74 A point 'z' moves on the curve $|z - 4 - 3i| = 2$ in an argand plane. The maximum and minimum values of |z| are -
(1) 2, 1 (2) 6, 5
(3) 4, 3 (4) 7, 3

Q.75 The sum of n terms of the series
$$\frac{\frac{1}{2}\cdot\frac{2}{2}}{1^3}+\frac{\frac{2}{2}\cdot\frac{3}{2}}{1^3+2^3}+\frac{\frac{3}{2}\cdot\frac{4}{2}}{1^3+2^3+3^3}+..... \text{ is-}$$
(1) $\frac{1}{n(n+1)}$ (2) $\frac{n}{n+1}$
(3) $\frac{n+1}{n}$ (4) $\frac{n+1}{n+2}$

Q.76 If the function $f : [1, \infty) \to [1, \infty)$ is defined by $f(x) = 2^{x(x-1)}$, then $f^{-1}(x)$ is -
(1) $\left(\frac{1}{2}\right)^{x(x-1)}$ (2) $\frac{1}{2}(1+\sqrt{1+4\log_2 x})$
(3) $\frac{1}{2}(1-\sqrt{1+4\log_2 x})$ (4) Not defined

Q.77 If $i = \sqrt{-1}$, then
$$4+5\left(-\frac{1}{2}+\frac{i\sqrt{3}}{2}\right)^{334}+3\left(-\frac{1}{2}+\frac{i\sqrt{3}}{2}\right)^{365}$$
is equal to :

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(1) $1-i\sqrt{3}$ (2) $-1+i\sqrt{3}$

(3) $i\sqrt{3}$ (4) $-i\sqrt{3}$

Q.78 The values of λ such that sum of the squares of the roots of the quadratic equation, $x^2 + (3 - \lambda)x + 2 = \lambda$ has the least value is :

(1) 2 (2) 4/9

(3) 15/8 (4) 1

Q.79 Let $a_1, a_2, ..., a_{10}$ be a G.P. If $\frac{a_3}{a_1} = 25$, then $\frac{a_9}{a_5}$ equals –

(1) 2 (5^2) (2) 4 (5^2)

(3) 5^4 (4) 5^3

Q.80 Let $\left(-2-\frac{1}{3}i\right)^3 = \frac{x+iy}{27}(i=\sqrt{-1})$, where x and y are real numbers, then y – x equals :

(1) –85 (2) 85

(3) –91 (4) 91

SECTION - 2 (Q.81 - Q.90)

This section contains TEN (10) questions. ATTEMPT ANY FIVE (05) QUESTIONS. The answer to each question is NUMERICAL VALUE. If the numerical value has more than two decimal places truncate/round-off the value upto TWO decimal places.

Q.81 Let p, q $\in \{1, 2, 3, 4\}$. Then number of equation of the form $px^2 + qx + 1 = 0$, having real roots, is

Q.82 If $|z_1| = 1$, $|z_2| = 2$, $|z_3| = 3$ and $|9z_1z_2 + 4z_1z_3 + z_2z_3| = 12$ then the value of $|z_1 + z_2 + z_3|$ is equal to-

Q.83 If $\sum_{s=1}^{n}\left\{\sum_{r=1}^{s} r\right\} = an^3 + bn^2 + cn$, then find the value of a + b + c.

Q.84 Let $f_k(x) = \frac{1}{k}(\sin^k x + \cos^k x)$ for k = 1, 2, 3, ... Then for all $x \in R$, the value of $f_4(x) - f_6(x) = \frac{1}{2 \times A}$. Find the value of A.

Q.85 If one real root of the quadratic equation $81x^2 + kx + 256 = 0$ is cube of the other root, value of k is $(-100 \times A)$. Find the value of A.

Q.86 If the equations $2x^2 + \alpha x + \alpha = 0$ and $x^2 + 2x + 2\alpha = 0$ have a common root, then find the no. of integral values of α.

Q.87 If e^{λ} and $e^{-\lambda}$ are roots of the equation $3x^2 - (a + b)x + 2a = 0$, a, b, $\lambda \in R$, $\neq 0$, then least integral value of b is

Q.88 If $\alpha, \beta, \gamma, \delta$ be the roots of $16x^4 + 4x^2 + 1 = 0$, then the value of $-64(\alpha^4 + \beta^4 + \gamma^4 + \delta^4)$ is

Q.89 If $z_n = a_n + i\,b_n$ (n = 1, 2, 3,....., 11) are the roots of the equation $z^{11} + 2z^{10} + 3z^9 + 4z^8 + 5z^7 + 6z^6 + 5z^5 + 4z^4 + 3z^3 + 2z^2 + z = 0$ then find the value of $\sum_{n=1}^{11} |a_n|$.

Q.90 If the 10^{th} and 15^{th} terms of an H.P. are respectively 15 and 10, then 6^{th} term is (20+X). Find the value of X.

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