Test Date: 05/08/2020

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CODE

Aakash
Medical|IIT-JEE|Foundations
(Divisions of Aakash Educational Services Limited)
Regd. Office: Aakash Tower, 8, Pusa Road, New Delhi-110005, Ph.011-47623456

Time : 3 hrs **MM : 180**

Mock Test_CoE_XII
for JEE (Advanced) - 2020

Test – 4A (Paper – I)_Actual Pattern-2018

Topics covered:

PHYSICS	:	MOCK TEST on Complete Syllabus
CHEMISTRY	:	MOCK TEST on Complete Syllabus
MATHEMATICS	:	MOCK TEST on Complete Syllabus

General Instructions:

1. Read each question carefully.
2. It is mandatory to use blue/black ballpoint pen to darken the appropriate circle in the answer sheet.
3. Mark should be dark and should completely fill the circle.
4. Rough work must not be done on the answer sheet.
5. Do not use white-fluid or any other rubbing material on answer sheet.
6. Student cannot use log table and calculator or any other material in the examination hall.
7. Before attempting the question paper, student should ensure that the test paper contains all pages and no page is missing.
8. Before handing over the answer sheet to the invigilator, candidate should check that Roll No., Centre Code and Date of Birth have been filled and marked correctly.
9. Immediately after the prescribed examination time is over, the answer sheet is to be returned to the invigilator.
10. **Pattern of the questions are as under :**
    (i) The question paper consists of 3 parts (Physics, Chemistry and Mathematics). Each part has 3 sections.
    (ii) **Section-1:** This section contains **6** multiple choice questions which have one or more correct answer(s). Each question carries **+4 marks** for correct answer and **–2 marks** for wrong answer. Partial **+1 mark** is given for darkening a bubble corresponding to each correct option, provided NO incorrect option is darkened
    (iii) **Section-2:** This section contains **8** questions. The answer to each of the question is a **double-digit integer**, ranging from 00 to 99 (both inclusive) without being given any option. Each question carries **+3 marks** for correct answer and there is **no negative mark** for wrong answer.
    (iv) **Section-3:**This section contains **2** paragraphs. Based upon each paragraph, **2** multiple choice questions have to be answered. Each question has **only one** correct answer and carries **+3 marks** for correct answer and **–1 mark** for wrong answer.

PART – I: PHYSICS

SECTION - 1

One or More than One Option Correct Type

This section contains **6** questions. Each question has **FOUR** options for correct answer(s). **ONE OR MORE THAN ONE** of these four option(s), is(are) correct option(s).

1. A monoatomic ideal gas is given Q amount of heat and it does $\frac{Q}{2}$ amount of work on its surrounding. Then select the correct statement(s).

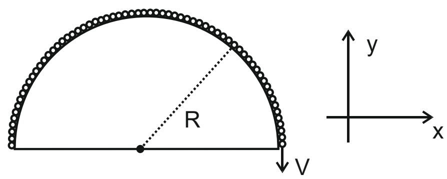
   (A) $TV^{-\frac{1}{2}} = \text{constant}$

   (B) $P\sqrt{T} = \text{const}$

   (C) Molar heat capacity is 3 R

   (D) Molar heat capacity is $\frac{7R}{2}$

2. A semi-circular chain of mass m slides over a smooth semi-cylinder with constant speed V as shown. Then at this instant



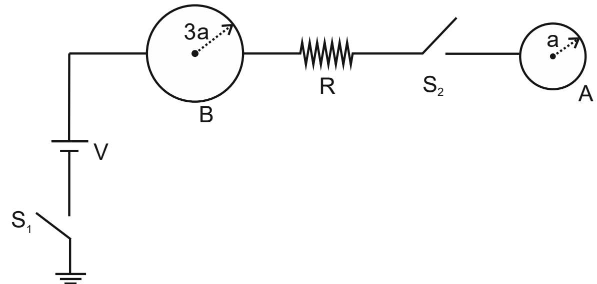
   (A) Velocity of centre of mass of chain is zero

   (B) Velocity of centre of mass of chain is $\frac{V}{2}\hat{i}$

   (C) Linear momentum of chain is $\frac{2mV}{\pi}\hat{i}$

   (D) Acceleration of chain is $\frac{-2V^2}{\pi R}\hat{j}$

3. Two conducting spheres A and B of radii a and 3a are connected as shown in figure (at large separation). Initially S_1 is closed and S_2 is open. At $t = 0$, S_1 is opened and S_2 is closed. Then



   (A) Initial charge on B is $12\pi\epsilon_0 aV$

   (B) After long time charge on A is $3\pi\epsilon_0 aV$

   (C) Heat dissipation through R is $\frac{3\pi\epsilon_0 aV^2}{2}$

   (D) After long time, surface charge density on B is $\frac{\epsilon_0 V}{4a}$

4. Two sound waves $y_1 = 7\sin(440t - kx)$ and $y_2 = 9\sin(484t - kx)$ interfere in a region. Displacement x and y are in mm and time t is in seconds. Then

   (A) Maximum intensity is 16 times of minimum intensity

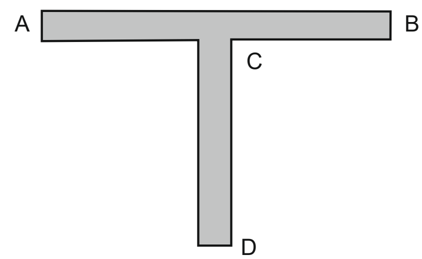
   (B) Maximum intensity is 64 times of minimum intensity

   (C) Beats would be 7 per second

   (D) Beats cannot be heard

5. An X-ray tube is operated at 10 kV and the current through the tube is 0.5 mA. Then
   (A) Number of electrons hitting the target per second is 3.1×10^{15}
   (B) Energy per second falling on target is 5 J/s
   (C) Cut off wavelength of X-rays is 1.24 Å
   (D) Maximum wavelength of X-rays is 124.2 Å

6. Two identical rods, each of thermal resistance of 5 K/W are joined to form a T-shape as shown. Point C is mid-point of AB. If free ends A, B and D are maintained at constant temperature of 100°C, 0°C and 25°C respectively. Then

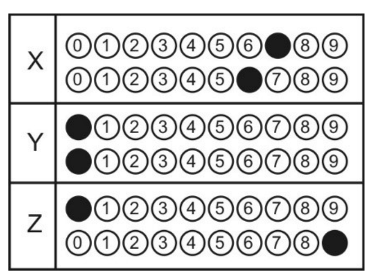


   (A) Temperature at C is 65°C
   (B) Temperature at C is 45°C
   (C) Heat current in CB is 9W
   (D) Heat current in CD is 4W

SECTION - 2

Integer Value Type

This section contains **8** questions. The answer to each of the question is a **Double-digit integer,** ranging from 00 to 99. The answer will have to be appropriately bubbled in the OMR as per the instructions as follows. **Examples-** If the correct answer to question numbers X, Y and Z (say) are 76, 0 and 9 respectively, then mark 76, 00 and 09 in OMR respectively



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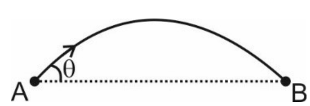
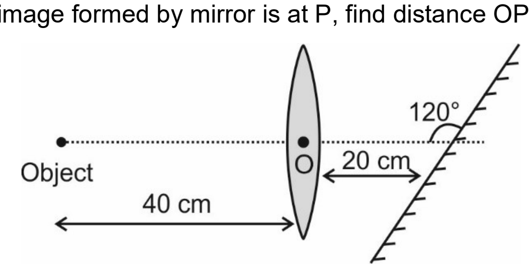
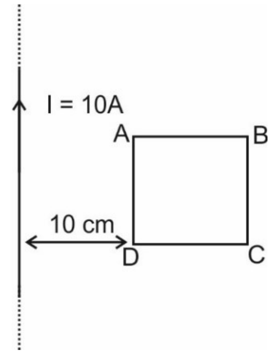
7. Two charge particles A and B having charges +4Q and –Q are arranged as shown in figure. Some of electric field lines originated from A terminate at B. Find maximum value of θ is degrees, so that field line terminates at B



8. An object is placed in front of lens of focal length 20 cm and a plane mirror is arranged as shown in figure. If image formed by mirror is at P, find distance OP in cm

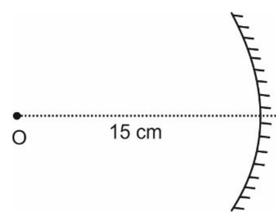


9. A square loop of side length 10 cm and resistance $10^{-2}\ \Omega$ is rotated by 180° about side BC. Find amount of charge flown through the loop in μC. (ln2 = 0.7, ln3 = 1.1, ln5 = 1.6)



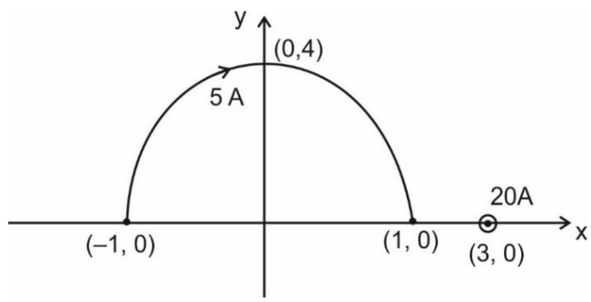
10. A YDSE is done in air. Then set-up is immersed in water (μ = 4/3) and a transparent thin sheet (μ = 1.5) is introduced in front of one of the slits. It is observed that third minima (from central maxima) coincides with previous central maxima position. If the thickness of sheet is given as $t = n\lambda_0$, where λ_0, is wavelength (in air) of light used. Find the value of *n.*

11. A point object O is moving with velocity $\overrightarrow{V_0} = 8\hat{i} + 11\hat{j}$ m/s in front of a concave mirror of focal length 10 cm. Mirror is also moving with velocity $\overrightarrow{V_m} = 4\hat{i} + 2\hat{j}$ m/s as shown in figure. At the given instant speed of image in m/s is ___



12. A hypothetical particle of mass m and charge –3q is revolving around a heavy particle of charge q. Assume Bohr's model is applicable. The orbital velocity of particle in ground state is $\dfrac{nq^2}{10 \in_0 h}$. Find value of *n*.

13. A current carrying parabolic wire is in x-y plane and a long current carrying wire parallel to z-axis is arranged as shown. The magnetic force an parabolic wire is closest to $n \times 10^{-6}$ N. Find value of *n*. (Take ln2 = 0.7)



14. 2 moles of an ideal monoatomic gas is initially at pressure $32P_0$ and volume V_0. Its volume is doubled by an isobaric process. After that the gas is adiabatically expanded to volume $16V_0$. Now the gas is isobarically expanded to $32V_0$. Finally the gas is made to return its initially state by an isothermal process. The net heat absorbed by the gas in this cyclic process is $n\ P_0V_0$. Find value of *n*. (ln2 = 0.7)

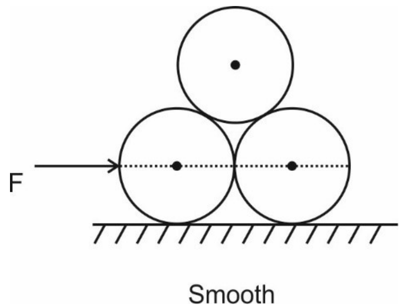
SECTION - 3

Paragraph Based Questions

This section contains **2** paragraphs. Based on each paragraph, there are Two (02) questions. Each question has Four options. **ONLY ONE** of these four options corresponds to the correct answer. For each question, choose the option corresponding to the correct answer.

Paragraph For Question Nos. 15 and 16

Three identical hollow cylinders mass M and radius R are arranged as shown in figure on a smooth horizontal surface and a horizontal force F is applied . All cylinders are smooth. All the cylinders remain in contact as shown



15. The maximum value of F is

(A) 3 Mg

(B) $\sqrt{3}$ Mg

(C) $\frac{2Mg}{\sqrt{3}}$

(D) $\frac{Mg}{\sqrt{3}}$

16. Suppose a pendulum of small bob mass is attached inside top cylinder at its top. The minimum time period of oscillation of this pendulum will be

(A) $T = 2\pi\sqrt{\frac{l}{g}}$

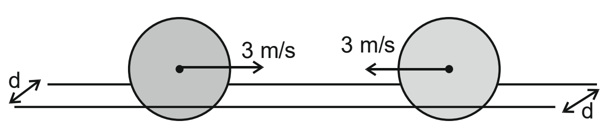
(B) $T = 2\pi\sqrt{\frac{\sqrt{3}\,l}{g}}$

(C) $T = 2\pi\sqrt{\frac{\sqrt{2}\,l}{g}}$

(D) $T = 2\pi\sqrt{\frac{\sqrt{3}\,l}{2g}}$

Paragraph For Question Nos. 17 and 18

Two identical spherical balls each of radius 2.5 cm rolling without slipping over two rails at separation d as shown in figure. Base of balls are clear off. They are moving towards each other at speed 3 m/s and collide elastically



17. If d = 3 cm, then number of collisions between balls is

(A) One

(B) Two

(C) Three

(D) Infinite

18. If d = 4 cm, then the speed of approach of two balls just before the second collision is

(A) 0.16 m/s (B) 0.32 m/s

(C) 0.64 m/s (D) 2.56 m/s

PART – II: CHEMISTRY

SECTION - 1

One or More than One Option Correct Type

This section contains **6** questions. Each question has **FOUR** options for correct answer(s). **ONE OR MORE THAN ONE** of these four option(s), is(are) correct option(s).

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19. Trisodium hydrogen bicarbonate [$Na_3H(CO_3)_2.2H_2O$] is a double salt of sodium carbonate and sodium bicarbonate which is used in bath salt's, Swimming Pools as an alkalinity source for water treatment. If 40 ml 0.05 M solution of this Salt required x ml of 0.05 M HCl solution to reach end point in presence of phenolphthalein indicator, while 'y' ml of same acid were required in presence of methyl orange indicator to reach end point in a separate titration. Select the correct statement(s) from the following

    (A) y – x = 80 ml

    (B) x + y = 80 ml

    (C) If the titration is started with phenolphthalein indicator and methyl orange is added at the end point, 2x ml of HCl would be required further to reach the end point

    (D) If the same volume of same solution is titrated against 0.10 M NaOH, $\frac{x}{2}$ ml of base would be required

20. Select the correct statement(s) from the following

    (A) Bromine is more selective and less reactive than chlorine towards alkanes

    (B) Monochlorination of isobutane gives 1-chloro-2-methyl propane as major product

    (C) Benzyl free Radical is more stable than 2° alkyl free radical

    (D) Vinyl free radical is more stable than alkyl free radical

21. Valence bond theory (VBT) was given by Pauling in 1931. Which of the following statement(s) is/are correct according to VBT?

    (A) $[Ni(CN)_4]^{+2}$ is a square planar complex with dsp^2 hybridisation

    (B) All Cr^{+3} octahedral complexes are paramagnetic compounds

    (C) All four co-ordinated complexes of Zn^{2+} ion are diamagnetic tetrahedral compounds

    (D) Mn^{+3} complexes formed by d^2sp^3 hybridisation are paramagnetic in nature with 2 unpaired electrons

22. Select the correct statement(s) from the following:

    (A) Decreasing order of the pK_b value:

    $C_6H_5NH_2 > C_6H_5NHCH_3 > C_2H_5NH_2 > (C_2H_5)_2NH$

    (B) Decreasing order of basic strength in gas phase:

    $(C_2H_5)_3N > (C_2H_5)_2NH > C_2H_5NH_2 > NH_3$

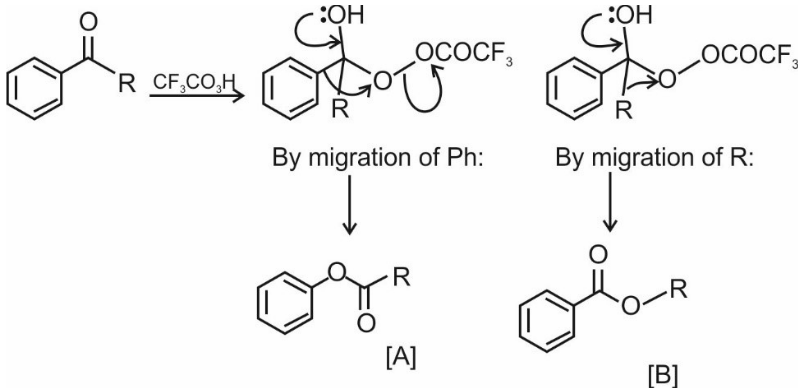
    (C) Increasing order of Boling point:

    $(CH_3)_2NH < C_2H_5NH_2 < C_2H_5OH$

    (D) Increasing order of solubility in water:

    $C_2H_5NH_2 < (C_2H_5)_2NH < C_6H_5NH_2$

23. Baeyer Villager reactions are among the most useful of all rearrangement reaction. Observe the following reaction mechanism and select the correct statement(s).



(A) If R = Me, yield (%) for [A] is maximum & major product [A] is formed

(B) If R = t – Bu, yield (%) for [A] is maximum & major product [A] is formed

(C) If R = Me, yield (%) for [B] is maximum & major product [B] is formed

(D) If R = t- Bu, yield (%) for [B] is maximum & major product [B] is formed

24. A solution of $K_2C_2O_4$ containing 0.1520 moles in 500 ml water is shaken at 298 K with excess of Ag_2CO_3 till the equilibrium is established as:

$Ag_2CO_3 + K_2C_2O_4 \rightleftharpoons Ag_2C_2O_4 + K_2CO_3$ (K_{SP} $(Ag_2C_2O_4) = 1.29 \times 10^{-11}$ $mol^3.L^{-3}$)

At equilibrium, 0.0358 moles of K_2CO_3 is present in the solution. Assuming the degree of dissociation of $K_2C_2O_4$ and K_2CO_3 to be equal, Then:

(A) K_{SP} $(Ag_2CO_3) = 3.97 \times 10^{-12}$ $mol^3.L^{-3}$

(B) $\left[CO_3^{-2}\right] = 0.0716$ M

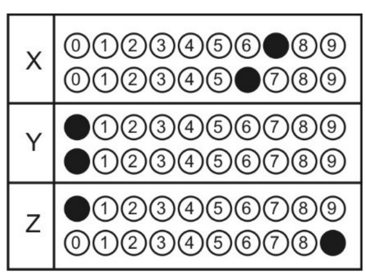
(C) $[Ag^+] = 7.45 \times 10^{-6}$ M

(D) $\left[C_2O_4^{-2}\right] = 0.2324$ M

SECTION - 2

Integer Value Type

This section contains **10** questions. The answer to each of the question is a **Double-digit integer,** ranging from 00 to 99. The answer will have to be appropriately bubbled in the OMR as per the instructions as follows. **Examples-** If the correct answer to question numbers X, Y and Z (say) are 76, 0 and 9 respectively, then mark 76, 00 and 09 in OMR respectively

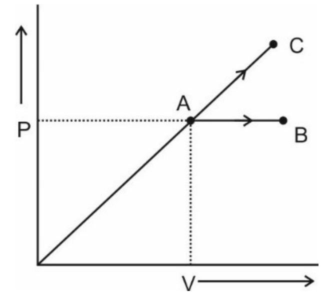


25. Total number of basic radicals among the following cations, which can form soluble complex compound on adding excess of NH_3 solution.

Mg^{+2}(aq), Fe^{+3}(aq), Ni^{+2}(aq), Cd^{+2}(aq), Mn^{+2}(aq), Zn^{+2}(aq), Ag^{+}(aq), Hg^{+2}(aq), Pb^{+2}(aq)

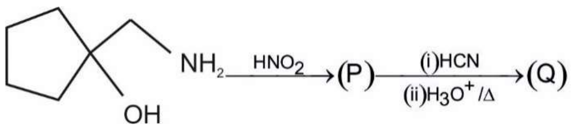
26. A photon of energy 4.9 eV strikes on a metal surface of work function 3.4 eV. If uncertainty in position is $\frac{25}{4\pi}$ Å. What is the uncertainty in measurement of de-Broglie wavelength in Å?

27. One mole of Neon gas is heated according to the path AB and AC as shown in the figure:



If temperature at state B and C are same, then calculate $\left(\frac{q_{(AC)}}{q_{(AB)}}\right)^2 \times 100$

28. In the given reaction sequence



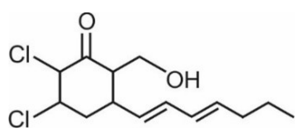
The percentage of carbon in Q is $\frac{700}{R}$, the value of R is:

29. In the structure of Pyro phosphoric acid ($H_4P_2O_7$)

Number of P – O – P linkage = A, Number of P – OH bonds = B and Number of P = O bonds = C, the value of $B^2 - (A + C)$ is

30. An industrial waste water contain 8.2% Na_3PO_4 & 12% $MgSO_4$ by mass in solution. If percentage ionisation of Na_3PO_4 & $MgSO_4$ are 50 & 60 respectively, then the increase in boiling point is ΔTb. Find the value of $14 \times \Delta Tb$ if $Kb(H_2O) = 0.5$ K kg mol^{-1}.

31. Total number of stereoisomers in the given structure are:



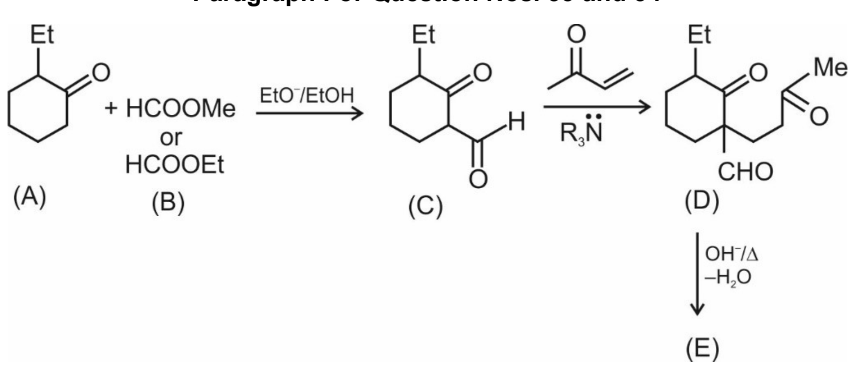
32. The optical rotation of a compound (A) changes slowly due to slow first order hydrolysis of (A) into (B) and (C), both of which are also optically active specific rotations of (A), (B) and (C) are +40°, –60° and +50° respectively. Starting with pure A the time for rotation to change from +40° to 0° is 46.06 min. The rate constant of the reaction is $Y \times 10^{-3}$ min^{-1}. What is the value of Y?

SECTION - 3

Paragraph Based Questions

This section contains **2** paragraphs. Based on each paragraph, there are Two (02) questions. Each question has Four options. **ONLY ONE** of these four options corresponds to the correct answer. For each question, choose the option corresponding to the correct answer.

Paragraph For Question Nos. 33 and 34



33. In the formation of A to D, which statement is incorrect?

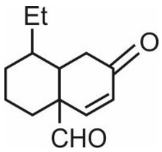
(A) A acts as a source of carbanion & B as an acceptor and it is claisen ester type condensation

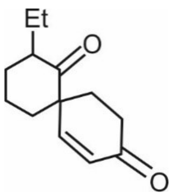
(B) The –CHO group is introduced in (C) to increase the acidity of α – H atom and it is Michael addition reaction

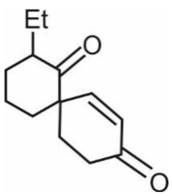
(C) It undergoes intramolecular aldol condensation to give an alcohol followed by the elimination of H_2O in the formation of (E) from (D)

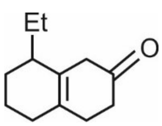
(D) It undergoes intramolecular claisen ester condensation in the formation of (E) from (D)

34. Product E is:

(A) 

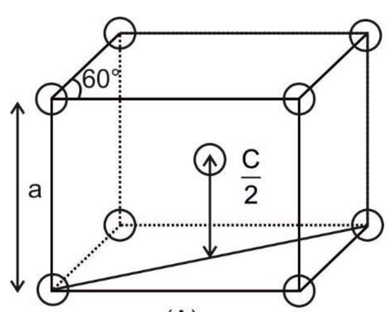
(B) 

(C) 

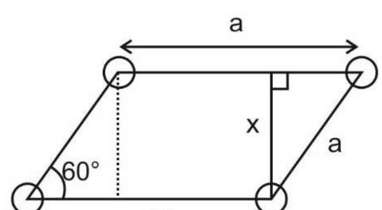
(D) 

Paragraph For Question Nos. 35 and 36

A hexagonal closed packed lattice can be represented by figures (A) and (B) below. If $C = \sqrt{\frac{8}{3}}\,a = 1.633\,a$, there is an atom at each corner of the unit cell and another atom which can be located by moving one-third the distance along the diagonal of the rhombus base, starting at the lower left hand corner and moving perpendicular upward by $\frac{C}{2}$. Mg(At. Wt. 24.3 g) Crystallise in this lattice and has d = 1.74 g/c.c



(A)



(B)

35. Edge length (a) and volume of unit cell are:

(A) a = 3.2 Å, V = 46.4 $Å^3$

(B) a = 2.2 Å, V = 29.5 cm^3

(C) a = 1.2 Å, V = 63.4 cm^3

(D) a = 4.2 Å, V = 88.5 $Å^3$

36. Distance between nearest neighbour's and no. of nearest neighbour's does each atom have?

(A) 0.866 Å & 12 nearest neighbour's

(B) 3.2 Å & 12 nearest neighbour's

(C) 0.866 Å & 6 nearest neighbour's

(D) 3.2 Å & 8 nearest neighbour's

PART – III: MATHEMATICS

SECTION - 1

One or More than One Option Correct Type

This section contains **6** questions. Each question has **FOUR** options for correct answer(s). **ONE OR MORE THAN ONE** of these four option(s), is(are) correct option(s).

37. Circles are drawn on chords of the rectangular hyperbola $xy = 4$ parallel to the line $y = x$ as diameters. All such circles pass through two fixed points whose coordinates are

(A) (2, 2) (B) (2, – 2)

(C) (–2, 2) (D) (–2, –2)

38. If $\cos A + \cos C = 4\sin^2\left(\frac{B}{2}\right)$, where A, B, C are angles of triangle then

(A) $\cos A + \cos C = \frac{2r}{R}$ (B) a, b, c are in G. P

(C) $\cos B = 1 - \frac{r}{R}$ (D) $2\sin B = \sin A + \sin C$

39. In a battle, 75% of the combatant lost one eye, 80% lost one leg, 85% lost ears, 90% an arm, Which of the following is correct?

(A) The minimum percent of combatant who lost all four organs is 30%

(B) The minimum percent of combatant who lost one eye, one leg and one arm is 45%

(C) The minimum percent of combatant who lost all four organs is 25%

(D) The minimum percent of combatant who lost one leg, one arm and one ear is 45%

40. Let g(x) be the inverse of an invertible function $f(x)$ such that $f'''(x)$ exists $\forall\ x \in R$ and $f'(x) \neq 0$, then identify the correct statement(s)

(A) $g''(f(x)) = -\frac{f''(x)}{(f'(x))^5}$ (B) $g''(f(x)) = -\frac{f''(x)}{(f'(x))^3}$

(C) $g'''(f(x)) = \frac{2f''(x) - f'''(x)f'(x)}{(f'(x))^5}$ (D) $g'''(f(x)) = \frac{3(f''(x))^2 - f'''(x)f'(x)}{(f'(x))^5}$

41. If the tangent at any point P($4m^2$, $8m^3$) of $x^3 - y^2 = 0$ is also a normal to the curve $x^3 - y^2 = 0$, then the value of m is

(A) $m = \frac{\sqrt{2}}{3}$

(B) $m = \frac{-\sqrt{2}}{3}$

(C) $m = \frac{3}{\sqrt{2}}$

(D) $m = -\frac{3}{\sqrt{2}}$

42. Let $\int \frac{\sin^2 x}{(x - \sin x\cos x)^2}dx = \frac{1}{P}g(x) + C$ (where $P \in R^+$ and $\pi f(\pi) + 1 = 0$)

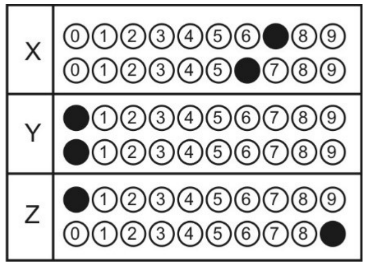
(A) $P = 2$ (B) $\lim_{x\to 0} x.g(x) = -\frac{1}{2}$

(C) $\lim_{x\to 0} x^3 g(x) = \frac{-3}{2}$ (D) g is odd function

SECTION - 2

Integer Value Type

This section contains **8** questions. The answer to each of the question is a **Double-digit integer,** ranging from 00 to 99. The answer will have to be appropriately bubbled in the OMR as per the instructions as follows. **Examples-** If the correct answer to question numbers X, Y and Z (say) are 76, 0 and 9 respectively, then mark 76, 00 and 09 in OMR respectively



43. Let $L = \lim\limits_{x \to 0} \dfrac{\sin x + \log\left(\sqrt{1+\sin^2 x} - \sin x\right)}{\sin^3 x}$, then the value of 6*L* + 5 is

44. Let $f:[1,\infty) \to [2,\infty)$ be a differentiable function such that $6\int\limits_1^x f(t)\,dt = 3x f(x) - x^3 - 5$ for all $x \ge 1$, then the value of *f*(2) is

45. Consider the following Matrices

$$A = \begin{bmatrix} 4 & -1 \\ 15 & -4 \end{bmatrix}, B = \begin{bmatrix} 3 & -6 \\ 1 & -2 \end{bmatrix}, C = \begin{bmatrix} 1 & 1 & 3 \\ 5 & 2 & 6 \\ -2 & -1 & -3 \end{bmatrix}; P_n = k^n \begin{bmatrix} tr\left(A^{2n}\right) & tr\left(B^{2n}\right) & tr\left(C^{2n}\right) \\ tr\left(A^{n}\right) & tr\left(B^{n}\right) & tr\left(C^{n}\right) \\ tr\left(A^{3n}\right) & tr\left(B^{3n}\right) & tr\left(C^{3n}\right) \end{bmatrix}.$$ If $\sum\limits_{n=1}^{\infty} tr(P_n) = 1$,

then $\left(\dfrac{1}{k}\right)^{\sqrt{k}}$ equals

46. If $I(x) = \int \dfrac{x^2\left(1-x^2\right)^2\left(1-3x^2\right)dx}{1+\left((x+1)^3+(x-1)^3-8x^3\right)^3}$ and *I*(0) = 0, then *I*(1) equals

47. If $\dfrac{dy}{dx} = \dfrac{y}{e^x}(1-x) - \dfrac{y}{x}$ denotes a curve passing through (1, $e^{1/e}$) and at *x* = 2, *y* = ae^b (where a $\in$ Q). If $P = \dfrac{1}{ab}$ then [*P*] equals. ([.] is greatest integer function)

48. The result of 22 hockey matches are to be predicted. Given that result can be win, lose or draw. If *p* is number of different forecast which contain exactly 18 correct results and q is number of different forecast which contains exactly 19 correct results. Then value of $\left(\dfrac{4p}{q}\right)$ is

49. If $f(x) = \begin{vmatrix} x^2+1 & 2x-1 & x^3-1 \\ 2x+1 & x^2 & x+3 \\ x^2+3 & x^2+x & x^2+2 \end{vmatrix} = a_7x^7 + a_6x^6 + a_5x^5 + \ldots\ldots a_1x + a_0$. Then value of $|a_7 + a_1 + a_0|$ =

50. If a_1, a_2 ($a_1 > a_2$) and b_1, b_2 ($b_1 > b_2$) are the real roots of the equation $x^4 - 16x - 12 = 0$ and $x^4 + 16x - 12 = 0$ respectively and the angle between the lines $L_1 = \dfrac{x-1}{a_1} = \dfrac{y-2}{b_1} = \dfrac{z-3}{a_1b_1}$, $L_2 = \dfrac{x-1}{a_2} = \dfrac{y-2}{b_2} = \dfrac{z-3}{a_2b_2}$ is 'α' then $[3\sin^2\alpha]$ equals ([.] is greatest integer function)

SECTION - 3

Paragraph Based Questions

This section contains **2** paragraphs. Based on each paragraph, there are Two (02) questions. Each question has Four options. **ONLY ONE** of these four options corresponds to the correct answer. For each question, choose the option corresponding to the correct answer.

Paragraph for Question Nos. 51 and 52

Consider the two variable complex numbers z_1 & z_2 such that $\arg\left(\dfrac{z_2-\dfrac{3z_1}{|z_1|}}{-\dfrac{3z_1}{|z_1|}}\right)=\theta$ & $\left|\dfrac{3z_1}{|z_1|}-z_2\right|=4$, then

51. The area of the region satisfied by z_2 when $\frac{\pi}{3}\le\theta\le\frac{\pi}{2}$, is

(A) 25π sq. units (B) 13π sq. units

(C) 12π sq. units (D) 9π sq. units

52. If $\theta=\cos^{-1}\left(\frac{2}{3}\right)$ then $\arg\left(\dfrac{3z_1}{|z_1|.z_2}\right)$ is equal to

(A) $\cos^{-1}\left(\frac{2}{3}\right)$ (B) $2\cos^{-1}\left(\frac{2}{3}\right)$

(C) $2\sin^{-1}\left(\frac{2}{3}\right)$ (D) $\sin^{-1}\left(\frac{2}{3}\right)$

Paragraph for Question Nos. 53 and 54

Let M be the 2 × 2matrix given by M = $[m_{ij}]$ where $m_{ij}\in\{0,1,2,3,4\}$ such that $m_{11}+m_{12}+m_{21}+m_{22}=4$

53. The number of matrices M such that M is invertible is

(A) 12 (B) 17

(C) 18 (D) 20

54. The absolute value of difference between maximum and minimum values of det(M) is equal to

(A) 4 (B) 6

(C) 8 (D) 12

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