MELUHA INTERNATIONAL SCHOOL
HYDERABAD

SR OUTGOING | **JEE MAINS MODEL UT-VI** | **Date: 20-06-2020**

Time: 3 Hours | **Max. Marks: 300 M**

JEE MAIN MODEL

MATHS

Section	Question type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 01 – 20)	Questions with Single Answer Type	4	-1	20	80
Sec – II(Q.N : 21 – 25)	Questions with Numerical Answer Type (+/ - Decimal Numbers)	4	0	5	20
Total				25	100

PHYSICS

Section	Question type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 26 – 45)	Questions with Single Answer Type	4	-1	20	80
Sec – II(Q.N : 46 – 50)	Questions with Numerical Answer Type (+/ - Decimal Numbers)	4	0	5	20
Total				25	100

CHEMISTRY

Section	Question type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 51 – 70)	Questions with Single Answer Type	4	-1	20	80
Sec – II(Q.N : 71 – 75)	Questions with Numerical Answer Type (+/ - Decimal Numbers)	4	0	5	20
Total				25	100

SECTION – I
(SINGLE CORRECT ANSWER TYPE)

This section contains 20 multiple choice questions. Each question has 4 options (1), (2), (3) and (4) for its answer, out of which **ONLY ONE** option can be correct.

Marking scheme: +4 for correct answer, 0 if not attempted and -1 if not correct.

MATHEMATICS

***SYLLABUS:* System of Circles, Ellipse, Parabola & Hyperbola**

1. **There are two circles whose equations are** $x^2+y^2-8x-6y+n^2=0$, $n \notin Z$ **. If the two circles have exactly two common tangents then the number of possible values of 'n' is**

1) 2 2) 5 3) 8 4) 9

2. **A circle 'S' cuts three circles** $x^2+y^2-4x-2y+4=0$, $x^2+y^2-2x-4y+1=0$ **and** $x^2+y^2+4x+2y+1=0$ **orthogonally. Then the radius of 'S' is**

1) $\sqrt{\frac{29}{8}}$ 2) $\sqrt{\frac{28}{11}}$ 3) $\sqrt{\frac{29}{7}}$ 4) $\sqrt{\frac{29}{5}}$

3. $x^2+y^2+6x+8y-7=0$ **and a circle passing through (0,0) and touching** $y=x$ **have a common chord. Then that chord always passes through the point**

1) (1, 1) 2) $\left(\frac{-1}{2},\frac{1}{2}\right)$ 3) $\left(\frac{-1}{2},\frac{-1}{2}\right)$ 4) None

4. **If the angle of intersection at a point where the two circles with radii 5 cm and 12 cm intersect is** 90^0**, then the length (in cm) of their common chord is**

1) $\frac{13}{2}$ 2) $\frac{13}{5}$ 3) $\frac{60}{13}$ 4) $\frac{120}{13}$

5. **If one end of a focal chord AB of the parabola** $y^2=8x$ **is at** $A\left(\frac{1}{2},-2\right)$**, then the equation of the tangent to it at 'B' is**

1) $x-2y+8=0$ 2) $x+2y+8=0$
3) $2x-y-24=0$ 4) $2x+y-24=0$

6. **The equation of a common tangent to the curves** $y^2=16x$ **and** $xy=-4$ **is**

1) $2x-y+2=0$ 2) $x-2y+16=0$
3) $x-y+4=0$ 4) $x+y+4=0$

7. **The slopes of the normal to the parabola** $y^2=4ax$ **intersecting at a point on the axis of the parabola at a distance *4a* from its vertex are in**

1) A.P 2) G.P 3) H. P 4) A.G.P

8. **If** $(9a,6a)$ **is a point bounded in region formed by parabola** $y^2=16x$ **and** $x=9$ **then**

1) $0<a<1$ 2) $a<\frac{1}{4}$ 3) $a<1$ 4) $0<a<4$

9. **The length of the normal chord of the parabola which subtends a right angle at the focus is**

1) $6\sqrt{3}a$ 2) $5a$ 3) $5\sqrt{5}a$ 4) $\sqrt{5}a$

10. **Let** L_1 **be the length of the common chord of the curves** $x^2+y^2=9$ **and** $y^2=8x$**, and** L_2 **be the lengths of the latusrectum of** $y^2=8x$ **then**

1) $L_1>L_2$ 2) $L_1=L_2$ 3) $L_1<L_2$ 4) $\frac{L_1}{L_2}=\sqrt{2}$

11. If $'e'$ is the eccentricity of the ellipse $4x^2+9y^2=36$ and $'c'$ is the centre and $'S'$ is the focus and A is the vertex then $CS:SA=$

1) $3-\sqrt{5}:\sqrt{5}$ 2) $3\sqrt{5}:\sqrt{5}$ 3) $\sqrt{5}:3-\sqrt{5}$ 4) $\sqrt{5}:3\sqrt{5}$

12. An ellipse, with foci at (0,2) and (0,-2) and minor axis of length 4, passes through which of the following points?

1) $\left(1,2\sqrt{2}\right)$ 2) $\left(2,\sqrt{2}\right)$ 3) $\left(2,2\sqrt{2}\right)$ 4) $\left(\sqrt{2},2\right)$

13. The locus of the foot of the perpendicular drawn from the centre of the ellipse $x^2+3y^2=6$ on any tangent to it is

1) $\left(x^2+y^2\right)^2=6x^2+2y^2$ 2) $\left(x^2+y^2\right)^2=6x^2-2y^2$

3) $\left(x^2-y^2\right)^2=6x^2+2y^2$ 4) $\left(x^2-y^2\right)^2=6x^2-2y^2$

14. If tangent at a point of the ellipse $\frac{x^2}{27}+\frac{y^2}{3}=1$ meets the coordinate axes at A and B and 'O' is the origin, then the maximum area (in sq. units) of the triangle OAB is

1) $3\sqrt{3}$ 2) $\frac{9}{2}$ 3) 9 4) $2\sqrt{3}$

15. Let the line $y=mx$ and the ellipse $2x^2+y^2=1$ intersect at a point $'P'$ in the first quadrant. If the normal to this ellipse at $'P'$ meets the coordinate axes at $\left(\frac{-1}{3\sqrt{2}},0\right)$ and $(0,\beta)$, then $'\beta'$

1) $\frac{2}{\sqrt{3}}$ 2) $\frac{\sqrt{2}}{3}$ 3) $\frac{2}{3}$ 4) $\frac{2\sqrt{2}}{3}$

16. A rectangular hyperbola whose centre is $'C'$ is cut by any circle of radius $'r'$ in four points P,Q,R and S. Then $CP^2+CQ^2+CR^2+CS^2=$

1) r^2 2) $2r^2$ 3) $3r^2$ 4) $4r^2$

17. If a hyperbola has length of its conjugate axis equal to '5' and the distance between its foci is 13 then the eccentricity of hyperbola is

1) 2 2) $\frac{13}{8}$ 3) $\frac{13}{6}$ 4) $\frac{13}{12}$

18. The locus of the point of intersection of the lines, $\sqrt{2}x-y+4\sqrt{2}K=0$ and $\sqrt{2}Kx+Ky-4\sqrt{2}=0$ (K is any non-zero real parameter) is

1) an ellipse whose eccentricity is $\frac{1}{\sqrt{13}}$

2) a hyperbola whose eccentricity is $\sqrt{3}$

3) a hyperbola with lengths of its transverse axis $8\sqrt{12}$

4) an ellipse with length of its major axis $8\sqrt{2}$

19. If the chord of hyperbola $x^2-y^2=a^2$ touches the parabola $y^2=4ax$, then the locus of the middle point of this chord is

1) $x^3=(x-a)y^2$ 2) $x^2=(x-a)y^2$

3) $y^3=(x-a)x^2$ 4) $y^3=(x-a)y$

20. If a hyperbola passes through the point $P(10,16)$ and it has vertices at $(\pm6,0)$, then the equation of the normal to it at *P* is

1) $x+3y=58$ 2) $x+2y=42$ 3) $3x+4y=94$ 4) $2x+5y=100$

SECTION-II
(Numerical Value Answer Type)

This section contains 5 questions. The answer to each question is a Numerical values comprising of positive or negative decimal numbers. Each question has 4 options (1), (2), (3) and (4) for its answer, out of which **ONLY ONE** option can be correct.
Marking scheme: +4 for correct answer, 0 in all other cases.

21. **If the circle** $x^2+y^2+8x-4y+c=0$ **touches the circle** $x^2+y^2+2x+4y-11=0$ **externally and cuts the circle** $x^2+y^2-6x+8y+K=0$ **orthogonally, then** $K=$ ___

22. **The equation of the directrix of the parabola** $y^2+4y+4x+2=0$ **is** $\frac{K}{2}$ **then** $K=$ ____

23. **If the area of the triangle whose one vertex is at the vertex of the parabola** $y^2+4\left(x-a^2\right)=0$ **and the other two vertices are the points of intersection of the parabola and** $y-axis$ **is 250 sq. units the** $a=$ ___

24. **If** e_1 **and** e_2 **are the eccentricities of the ellipse** $\frac{x^2}{18}+\frac{y^2}{4}=1$ **and the hyperbola** $\frac{x^2}{9}-\frac{y^2}{4}=1$ **respectively and** $\left(e_1,e_2\right)$ **is a point on the ellipse** $15x^2+3y^2=K$ **then** K^2 **is equal to**

25. **For the hyperbola** $\frac{x^2}{Cos^2\alpha}-\frac{y^2}{Sin^2\alpha}=1$, **the value of ae (e is eccentricity) is equal to**

SECTION – I
(SINGLE CORRECT ANSWER TYPE)

This section contains 20 multiple choice questions. Each question has 4 options (1), (2), (3) and (4) for its answer, out of which **ONLY ONE** option can be correct.
Marking scheme: +4 for correct answer, 0 if not attempted and -1 if not correct.

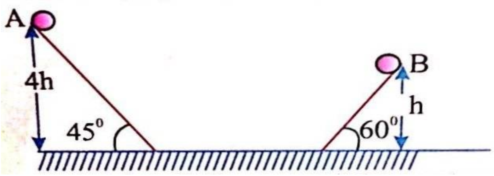
PHYSICS

SYLLABUS: Elasticity, Viscosity and fluid dynamics, Centre of Mass and Collisions

26. **Two bodies of masses** m_1 **and** m_2 **are moving with velocities 1 m/s and 3 m/s respectively in opposite direction. If the bodies undergo one dimensional elastic collision, the body of mass** m_1 **comes to rest. Find the ratio of** m_1 **and** m_2

1) $\frac{7}{1}$ 2) $\frac{6}{1}$ 3) $\frac{8}{1}$ 4) $\frac{1}{7}$

27. **Two identical balls A and B are released from the positions as shown in the figure. They collide elastically on the horizontal portion. The ratio of heights attend by A and B after collision (neglect friction)**



1) $\frac{13}{4}$ 2) $\frac{4}{13}$ 3) $\frac{7}{13}$ 4) $\frac{13}{7}$

28. **A body 'A' with momentum 'P' collides with another identical stationary body 'B' one dimensionally. During the collision 'B' gives an impulse 'J' to the body A. Then the coefficient of restitution is**

1) $1-\frac{2J}{P}$ 2) $1-\frac{P}{2J}$ 3) $\frac{2J}{P}-1$ 4) $1-\frac{J}{P}$

29. Two equal spheres A and B lies on a smooth horizontal circular grooves at opposite ends of a diameter. At time $t=0$, A is projected along the groove and it first impinges on B at time $t=T_1$, and again at time $t=T_2$. If $'e'$ is the coefficient of restitution, find the ratio of $\frac{T_1}{T_2}$

1) $\frac{e}{2+e}$ 2) $\frac{e}{3+e}$ 3) $\frac{3+e}{e}$ 4) $\frac{2+e}{e}$

30. A block of mass 0.5kg is moving with a speed of $2.00ms^{-1}$ on a smooth surface. It strikes another mass of 1 kg and then they moves as a single body. Find the loss of energy

1) 0.47 J 2) 0.57 J 3) 0.67 J 4) 0.77 J

31. A projectile is fixed on a horizontal ground coefficient of restitution between the projectile and ground is 'e'. If a, b and c be the ratio of time of flight $\left(\frac{T_1}{T_2}\right)$, maximum height $\left(\frac{H_1}{H_2}\right)$ and horizontal range $\left(\frac{R_1}{R_2}\right)$ in first two collisions with ground, then

1) $a=\frac{1}{e}$ 2) $b=\frac{1}{e^2}$ 3) $c=\frac{1}{e}$ 4) 1, 2 and 3

32. A particle strikes a horizontal frictionless floor with a speed $'\upsilon'$ at an angle θ with the vertical and rebounds with a speed $'V'$ at an angle α with the vertical. Find the value of $'V'$ if $'e'$ is coefficient of restitution

1) $V=\upsilon\sqrt{e^2Sin^2\theta+Cos^2\theta}$ 2) $V=\upsilon\sqrt{e^2Cos^2\theta+Sin^2\theta}$

3) $V=\upsilon\sqrt{e^2Cos^2+\tan^2\theta}$ 4) $V=\upsilon\sqrt{Cot^2\theta+e^2Cos^2\theta}$

33. When n number of particles of masses $m_1, 2m; 3m....nm$ are at distances $X_1=1\ X_2=4$, $X_3=9\ X_n=n^2$ units from origin on X-axis then find the distance if their center of mass from origin

1) $\frac{n(n+1)(2n+1)}{6}$ 2) $\frac{n+1}{2}$ 3) $\left[\frac{n(n+1)}{2}\right]^2$ 4) $\frac{n(n+1)}{2}$

34. A circular disc of radius R is removed from a bigger disc of radius 2R such that the circumferences of the disc touch. The C.M of disc is at a distance αR from centre of big disc. The α is

1) -1 2) $-\frac{1}{2}$ 3) $-\frac{1}{3}$ 4) $-\frac{1}{4}$

35. If linear density of a rod of length L varies as $\lambda=A+BX$ find the position of its centre of mass

1) $\frac{L(3A+2BL)}{3(2A+BL)}$ 2) $\frac{3(2A+BL)}{L(3A+2BL)}$

3) $\frac{L(3L^2A+2B)}{3(2AL+B)}$ 4) $\frac{3(2AL+B)}{L(3L^2A+2B)}$

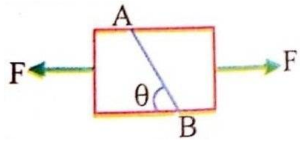
36. A rope of length 30cm is on a table with maximum length hanging from edge A of the table. The coefficient of friction between rope and table is 0.5. The distance of centre of mass of rope from A

1) $\frac{5\sqrt{15}}{3}$ 2) $\frac{5\sqrt{17}}{3}$ 3) $\frac{5\sqrt{19}}{3}$ 4) $\frac{7\sqrt{17}}{3}$

37. Distance of centre of mass of a semicircular disc of radius 'R' from its centre is

1) $\frac{4R}{3\pi}$ 2) $\frac{3R}{4\pi}$ 3) $\frac{2R}{3\pi}$ 4) $\frac{3R}{2\pi}$

38. Two equal and opposite forces F and –F act on a rod of uniform cross-sectional area A, as shown in fig. Find shearing stress on the section AB.



1) $\frac{FSin\theta Cos\theta}{A}$ 2) $\frac{FSin^2\theta}{A}$ 3) $\frac{FCos^2\theta}{A}$ 4) $\frac{FSin\theta}{A}$

39. A body of mass m is connected to an inextensible thread of length L is whirled in horizontal circle. Find the maximum angular velocity with which it can be whirled without breaking the thread (Breaking stress = S)

1) $\sqrt{\frac{mL}{SA}}$ 2) $\sqrt{\frac{SA}{mL2}}$ 3) $\sqrt{\frac{SA}{mL}}$ 4) $\sqrt{\frac{mL}{2AS}}$

40. A Long wire hangs vertically with its upper end clamped. A torque of 8Nm applied to the free end twists it through 45^0. The potential energy of the twisted wire is

1) πJ 2) $\frac{\pi}{2}J$ 3) $\frac{\pi}{4}J$ 4) $\frac{\pi}{8}J$

41. The density of water at the surface of the ocean is ρ. If bulk modulus of water is B then, what is the density of ocean water at a depth where the pressure is $n\rho o$ (ρ_o is the atmospheric pressure)

1) $\frac{\rho B}{B-(n-1)\rho_o}$ 2) $\frac{\rho B}{B+(n-1)\rho_o}$ 3) $\frac{\rho B}{B-n\rho_o}$ 4) $\frac{\rho B}{B+n\rho_o}$

42. One end of long metallic wire of length L, area of cross section A and Young's modulus Y is tied to the ceiling. The other end is tied to a mass less spring of force constant K. A mass m hangs freely from the free end of the spring. It is slightly pulled down and released. Its time period is given by

1) $2\pi\sqrt{\frac{m}{K}}$ 2) $2\pi\sqrt{\frac{mYA}{KL}}$ 3) $2\pi\sqrt{\frac{mK}{KL}}$ 4) $2\pi\sqrt{\frac{m(LK+YA)}{KYA}}$

43. A rubber ball of mass m and density $'P'$ is immersed in a liquid of density $'3P'$ to a depth 'h' and released. To what height will the ball jump up above the surface due to buoyancy force of liquid on the ball? (Neglect the resistance of water and air

1) 2h 2) h 3) 3h 4) $\frac{h}{2}$

44. A cylindrical vessel contains a liquid of density ρ upto a height h. The cylinder is closed by a piston of mass m and area of cross section A. There is a small hole at the bottom of the vessel. Find the speed υ with which the liquid comes out of the hole

1) $\sqrt{2gh}$ 2) $\sqrt{\frac{ng}{PA}}$ 3) $\sqrt{2\left(gh+\frac{mg}{PA}\right)}$ 4) $\sqrt{2\left(gh-\frac{mg}{PA}\right)}$

45. A bowl of soap water is at rest on a table in the dining compartment of a train, if the acceleration of the train is g/4 in forward direction, the angle made by its surface with horizontal is

1) $Tan^{-1}\left(\frac{1}{2}\right)$ 2) $Tan^{-1}\left(\frac{1}{4}\right)$ 3) $Tan^{-1}\left(\frac{1}{5}\right)$ 4) $Tan^{-1}\left(\frac{1}{3}\right)$

SECTION- II

(Numerical Value Answer Type)

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46. A bird of mass 1.23 kg is able to hover by importing a downward velocity of 10 m/s uniform to air of density $'\rho'\ kg/m^3$ **over an effective area** $0.1ms^2$**. Then the acceleration due to gravity is** $10ms^{-2}$**. Then the magnitude of** $'\rho'$ **in ________** kg/m^3**.**

47. If the shearing stress between the horizontal layers of water in a river is 1. 5 milli newton $/m^2$ **and** $Y_{water} = 1\times10^{-3}\ \rho a.S$**, the velocity gradient is _________** s^{-1}**.**

48. At the mouth of the tap, the area of cross section is $2.0cm^2$ **and the speed of water is 3 m/s. The area of cross section of the water column 80 cm below the tap is ________** cm^2 **(use** $g = 10m/s^2$**)**

49. The rubber cord of a catapult has a cross sectional area $1mm^2$ **and total unstretched length 10cm. It is stretched to 12cm and then released to project a missile of mass 5gm. Taking Y for rubber** $5\times10^8\ N/m^2$**, the velocity of projection is ___________ m/s**

50. A hydraulic press contains 250 litre of oil. Find the decrease in volume of the oil when its pressure increases to $10^7\ \rho a$**. The bulk modulus of the oil is** $\left(K = 5\times10^9\ \rho a\right)$ **______ litres.**

SECTION – I

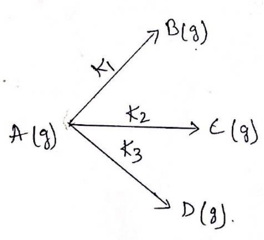
(SINGLE CORRECT ANSWER TYPE)

This section contains 20 multiple choice questions. Each question has 4 options (1), (2), (3) and (4) for its answer, out of which **ONLY ONE** option can be correct.
Marking scheme: +4 for correct answer, 0 if not attempted and -1 if not correct.

CHEMISTRY

SYLLABUS:* *Electrochemistry, Surface chemistry, Chemical kinetics, Nuclear chemistry, Solid state

51. A gaseous compound A reacts by three independent first order processes (as shown in figure) with rate constant $2\times10^{-3}, 3\times10^{-3}$ **and** $1.93\times10^{-3}\ \text{sec}^{-1}$ **for products B, C and D respectively. If initially pure A was taken in a closed container with** $P = 8atm$**, then the partial pressure of B (in atm) after 100 sec from start of experimental**

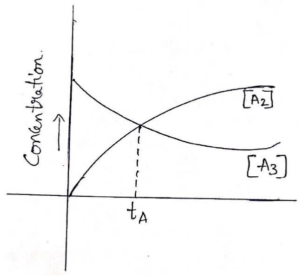


1) 0.288 2) 0.577 3) 1.154 4) None of these

52. Consider a first order decomposition process

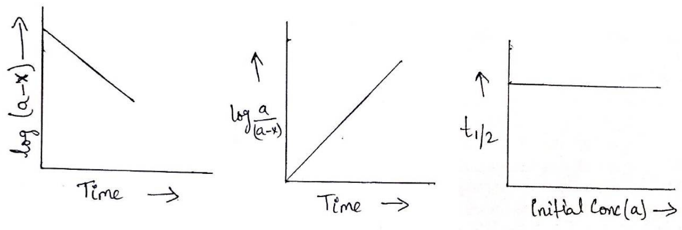
$$A_3 \rightarrow \frac{3}{2}A_2$$

A plot of concentration of A_3 **and** A_2 **versus time is shown below. At time** t_A **percentage of reactant decomposed is**



1) 75% 2) 50% 3) 40% 4) 30%

53. Which of the following plot (s) is/are correct for the first order reaction?



(i) (ii) (iii)

1) I, II 2) II, III 3) I, II, III 4) I, III

54. Which of the following pair contain ferromagnetic and ferrimagnetic solids respectively?

1) Fe_2O_3, Fe_3O_4 2) Fe_3O_4, CrO_2 3) Cr_2O_3, Fe_3O_4 4) Cr_2O_3, CrO_2

55. In a face centred lattice of X and Y, X atoms are present at the corners while Y atoms are at face centers. Then the formula at the compound would be if two atoms of X are missing from the corners

1) XY_4 2) X_3Y_4 3) XY_4 4) X_2Y_4

56. Which of the following statement is not true about the hexagonal close packing?

1) The coordination number is 12
2) It has 74% packing efficiency
3) Tetrahedral voids of the second layer are covered by the spheres of the third layer
4) In this arrangement, spheres of the fourth layer are exactly aligned with those of the first layer

57. A sol has positively charged colloidal particles which of the following solutions is required in lowest concentration for coagulation

1) $NaCl$ 2) $K_4\left[Fe(CN)_6\right]$
3) $ZnCl_2$ 4) Na_2SO_4

58. Select the correct observation in the following isotherm (where $\frac{X}{m}$ = amount of the adsorbate adsorbed per gram of the adsorbent)

1) $\left[\frac{X}{m}\right] \alpha\, P^0$ when point (X) is reached
2) Desorption may start along XY
3) $\left[\frac{X}{m}\right] \alpha\, (P)^{1/n}$ along OX
4) All of the above

59. Gold number of some lyophilic sols are
I: Casein : 0.01
II: Haemoglobin : 0.03
III: Gum Arabic: 0.15
IV: Sodium acetate: 0.40
Which has maximum protective power?

1) I 2) II 3) III 4) IV

60. **Chemical adsorption**
1) Increases with increase in temperature
2) Decreases with increase in temperature
3) First increases then decreases with increase in temperature
4) First decreases then increases with increase in temperature

61. **In acidic medium MnO_4^- is converted to Mn^{+2} when acts as an oxidizing agent, the quantity of electricity required reducing 0.05 mol of MnO_4^- would be**
1) 0.25 F   2) 0.01 F   3) 0.05   4) 0.15 F

62. **The standard emf of a cell having one electron change is found to be 0.591 Vat $25^0 C$, the equilibrium constant of the reaction is**
1) 1.0×10^{30} 2) 1.0×10^{10} 3) 1.0×10^{5} 4) 1.0×10^{4}

63. **Given standard electrode potentials**
$Fe^{3+}+3e^- \rightarrow Fe;\ E^0=-0.036 Volt$
$Fe^{2+} 2e^- \rightarrow Fe;\ E^0=-0.440\, Volt$
The standard electrode potential E^0 for
$Fe^{3+} e^- \rightarrow Fe^{2+}$
1) -0.476 Volt   2) -0.404 Volt   3) 0.440 Volt   4) 0.772 Volt

64. **When a lead storage battery is discharged then**
1) SO_2 is evolved   2) lead is formed
3) lead sulphate is consumed   4) Sulphuric acid is consumed

65. **A radioactive element has half-life period of 30 days. How much of it will be left after 90 days.**
1) $\frac{1}{8}N_0$ 2) $\frac{1}{16}N_0$ 3) $\frac{1}{4}NO_2$ 4) N_O

66. **The number of α and β-particles emitted in the nuclear reaction $^{238}_{90}Th \rightarrow ^{212}_{83}Bi$ are**
1) $8\alpha, 1\beta$ 2) $4\alpha, 7\beta$ 3) $3\alpha, 7\beta$ 4) $4\alpha, 1\beta$

67. **The reaction $^{235}_{92}U + n^1 \rightarrow ^{140}_{56}B + ^{93}_{36}Kr + 3_0 n^1$ represents**
1) artificial radioactivity   2) nuclear fission
3) nuclear fusion   4) None of the above

68. **Calculate the mass of C^{14} (half-life = 5720 years) atoms which gives 3.7×10^7 disintegration per second.**
1) $1.24\times10^{-4} g$ 2) $2.24\times10^{-4} g$ 3) $224\times10^{-4} g$ 4) $4.25\times10^{-4} g$

69. **Copper crystallizes in a structure of face centred cubic unit cell. The atomic radius of copper is $1.28A^0$. What is the axial length on an edge of copper?**
1) $2.16A^0$ 2) $3.62A^0$ 3) $3.94A^0$ 4) $4.15A^0$

70. **Which of the following is wrongly matched?**
1) Saponification of $CH_3COOC_2H_5$ – second order reaction
2) Hydrolysis of CH_3COOCH_3 – pseudo unimolecular reaction
3) Decomposition of H_2O_2 – First order reaction
4) Combination of H_2 and Br_2 to give HBr – Zero order reaction numerical value type

SECTION-II
(Numerical Value Answer Type)

This section contains 5 questions. The answer to each question is a Numerical values comprising of positive or negative decimal numbers. Each question has 4 options (1), (2), (3) and (4) for its answer, out of which **ONLY ONE** option can be correct.
Marking scheme: +4 for correct answer, 0 in all other cases.

71. The volume (in L) of 0.1 N $FeSO_4$ can be oxidized by a current of 2 ampere hours is

72. For a reaction $A \rightarrow B$, half-life time for a reaction at $(A) = 0.1M$ is 200 S and at $[A] = 0.4M$ it is 50 S. The order of the reaction is

73. A second order Bragg's diffraction of X-rays from a set of parallel planes separated by $1.155A^0$ occurs at an angle 60^0 using wavelength of XA. What is the value of X

74. In CS_2 sulphur atoms are associated to form colloidal Sol. 2.56 g of sulphur colloidal sol in 100g CS_2 shows osmotic pressure of 2.463 atm at 300K. How many sulphur atoms are associated in colloidal sol?
(Solution constant = 0.821 L atm $mol^{-1}\ K^{-1}$)

75. The molar conductivity of acetic acid at infinite dilution is 390.7 and for 0.01 M acetic acid is $3.907\ cm^2 mol^{-1}$ what is the pH of solution?

MELUHA INTERNATIONAL SCHOOL
HYDERABAD

OUTGOING SR | **JEE MAINS MODEL UT-VI** | **Date: 20-06-2020**
Time: 3 Hours | | **Max. Marks: 300 M**

KEY SHEET
MATHEMATICS

1) **4**	2) **1**	3) **2**	4) **4**	5) **1**	6) **3**	7) **1**	8) **1**	9) **3**	10) **3**
11) **3**	12) **4**	13) **1**	14) **3**	15) **2**	16) **4**	17) **4**	18) **3**	19) **1**	20) **4**
21) **-59**	22) **3**	23) **5**	24) **256**	25) **1**					

PHYSICS

26) **1**	27) **2**	28) **3**	29) **4**	30) **3**	31) **4**	32) **2**	33) **4**	34) **3**	35) **1**
36) **2**	37) **1**	38) **1**	39) **3**	40) **1**	41) **1**	42) **4**	43) **1**	44) **3**	45) **2**
46) **1.23**	47) **1.5**	48) **1.2**	49) **20**	50) **-0.5**					

CHEMISTRY

51) **3**	52) **2**	53) **3**	54) **2**	55) **1**	56) **4**	57) **2**	58) **4**	59) **1**	60) **3**
61) **1**	62) **2**	63) **4**	64) **4**	65) **1**	66) **4**	67) **2**	68) **2**	69) **2**	70) **4**
71) **0.746**	72) **2**	73) **2.24**	74) **8**	75) **4**					

HINTS & SOLUTIONS
MATHEMATICS

1. $C_1(0,0)$, $r=3$ $C_2=(4,3)$ $r_2=\sqrt{25-n^2}$

$C_1C_2 < r_1+r_2 \Rightarrow 5<3+\sqrt{25-n^2} \Rightarrow 2<\sqrt{25-n^2} \Rightarrow n^2<21$

$\Rightarrow n=0,\pm1,\pm2,\pm3,\pm4 \Rightarrow$ Number of values of n is 9

2. Radical axes $2x-2y-3=0$, $x+y=0 \Rightarrow (x,y)=\left(\frac{3}{4},\frac{-3}{4}\right)$

R = length of the tangent from $\left(\frac{3}{4},\frac{-3}{4}\right)$ to any circle

$=\sqrt{\frac{9}{16}+\frac{9}{16}-\frac{12}{4}+\frac{6}{4}+4}=\sqrt{\frac{29}{8}}$

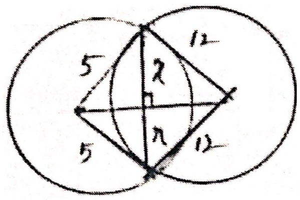
3. The circle touches the line $x-y=0$ at $(0,0)$ is $x^2+y^2+\lambda(x-y)=0$

Equation of the common chord is $(6-\lambda)x+(8+gl)y-7=0$

$\Rightarrow 6x+8y-7+\lambda(y-x)=0$

$\Rightarrow P.O.I=\left(\frac{1}{2},\frac{1}{2}\right)$

4. Length of the common chord = $2x$



$\Rightarrow \sqrt{25-x^2}+\sqrt{144-x^2}=13$

Solving $x=\frac{60}{3} \Rightarrow 2x=\frac{120}{3}$

(or) From Fig $\frac{1}{x^2}=\frac{1}{25}+\frac{1}{144} \Rightarrow \frac{1}{x^2}=\frac{169}{25\times144}$

$\Rightarrow x=\frac{5\times12}{13} \Rightarrow 2x=\frac{120}{13}$

5. $y^2=8x$, $a=2$, $A\left(\frac{1}{2,}-2\right)$

$(at^2,2at)=\left(\frac{1}{2},-2\right)$, $2at=-2 \Rightarrow t_1=\frac{-1}{2}$

For focal chord other end $B=\left(\frac{a}{t_1^2},\frac{-2a}{t_1}\right)=(8,8)$

Tangent at $B(8,8)$ is $y(8)=4(x+8)$

$\Rightarrow 2y=x+8 \Rightarrow x-2y+18=0$

6. $y^2=16x, a=4$

Tangent is $y=mx+\frac{4}{m}$ and $y=\frac{-4}{x}$

Solving $mx^2+\frac{4}{m}x+4=0$

Condition for common tangent is $D=0$

$\Rightarrow m^3=1$

$m=1$

$\therefore$ Common tangent is $y=x+4$

7. Normal is $y=mx-2am-am^3$

   If it passes through $(4a,0)$ the point on the axis $y=0$, at a distance 4a from the vertex $(0,0)$ then $m=0,\pm\sqrt{2}$

   $\therefore -\sqrt{2},0,\sqrt{2}$ which are in A.P

8. Since the point $(9a,6a)$ is bounded in the region formed by the parabola $y^2=16x$ and $x=9$

   $\Rightarrow y^2-16x<0, x-9<0$

   $\Rightarrow 36a^2-16(9a)<0, 9a-9<0$

   $\Rightarrow 36a(a-4)<0, a<1$

   $\Rightarrow 0<a<4; a<1 \Rightarrow 0<a<1$

9. Normal chord drawn at the point $P(t)$ to the parabola $y^2=4ax$ subtends a right angle at the focus then $t=\pm 2$

   $P(t), Q(t_1)$ are the ends of normal chord

   Then $t=2, t_1=-3\left(t_1=-t\frac{-2}{t}\right)$

   $P=\left(at^2,2at\right)=(4a,a)$

   $Q=\left(at_1^2,2at_1\right)=(9a,-6a)$

   $PQ=\sqrt{(5a)^2+(10Q)^2}=\sqrt{125a}=5\sqrt{5}a$

10. P.O.I of $x^2+y^2=9$ and $y^2=8x$ are

    $A\left(1,2\sqrt{2}\right), B\left(1,-2\sqrt{2}\right)$

    $L_1=AB=\left|2\sqrt{2}+2\sqrt{2}\right|=4\sqrt{2}$

    $L_2=4a=8$ $\qquad\qquad \therefore L_2>L_1 (or) L_1<L_2$

11. $CS:SA=ae:a-ae=\sqrt{5}:3-\sqrt{5}$

12. $be=2$ and $a=2$ $(here\, a<b)$

    $\therefore a^2=b^2\left(1-e^2\right)\Rightarrow b^2=8$

    Ellipse is $\frac{x^2}{4}+\frac{y^2}{8}=1$, it passes through $\left(\sqrt{2},2\right)$

13. $\frac{x^2}{6}+\frac{y^2}{2}=1$

    Equation of any variable tangent is $y=mx\pm\sqrt{a^2m^2+b^2}$ ----- (1)

    Perpendicular line drawn from centre to tangent is $y=\frac{-x}{m}$ ----- (2)

    Eliminating 'm' $x^2+y^4++2x^2y^2=a^2x^2b^2y^2$

    $\Rightarrow \left(x^2+y^2\right)^2=6x^2+2y^2$

14. $a=3\sqrt{3}$, $b=\sqrt{3}$

    Tangent at 'θ' is $\frac{xCos\theta}{3\sqrt{3}}+\frac{ySin\theta}{\sqrt{3}}=1$

Area formed with coordinate axes $=\frac{1}{2}.\frac{3\sqrt{3}}{Cos\theta}\frac{\sqrt{3}}{Sin\theta}=\frac{9}{Sin2\theta}$

$\therefore$ Minimum area = 9 sq. units (Area is minimum at $Sin2\theta=1$)

15. $\frac{x^2}{\left(\frac{1}{\sqrt{2}}\right)^2}+\frac{y^2}{(1)^2}=1$, Normal to the ellipse $\frac{xSec\theta}{\sqrt{2}}-yCo\sec\theta=\frac{-1}{2}$

$\Rightarrow\frac{x}{\left(\frac{-Cos\theta}{\sqrt{2}}\right)}+\frac{y}{\left(\frac{Sin\theta}{2}\right)}=1 \Rightarrow\frac{-Cos\theta}{\sqrt{2}}=-\frac{1}{3\sqrt{2}}$ and $\frac{Sin\theta}{2}=\beta$

$$\Rightarrow\beta=\frac{\sqrt{2}}{3}$$

16. Let the rectangular hyperbola $xy=c^2$

Circle is $x^2+y^2=r^2$

$CP^2+CQ^2+CR^2+CS^2=r^2+r^2+r^2+r^2=4r^2$

17. $2b=5\Rightarrow b=5/2, 2ae=13$

$b^2=a^2\left(e^2-1\right)\Rightarrow a^2=36$ and $a=6$

$2ae=13 \Rightarrow ae=\frac{13}{2} \Rightarrow e=\frac{13}{12}$

18. $\sqrt{2}x-y+4\sqrt{2}K=0$ --- (1)

$\sqrt{2}Kx-Ky-4\sqrt{2}=0$ ------ (2)

Eliminating 'K' from (1) & (2)

$\left(\sqrt{2}x+y\right)\left(\frac{\sqrt{2}x-y}{-4\sqrt{2}}\right)=4\sqrt{2}$

$\Rightarrow 2x^2-y^2=-32$

$\Rightarrow\frac{y^2}{32}-\frac{x^2}{16}=1$, hyperbola (conjugate)

$e=\sqrt{\frac{32+16}{32}}=\sqrt{\frac{3}{2}}$ and length of transverse

$axis=8\sqrt{2}$

19. Let $P\left(h,k\right)$ be the middle point of the chord

$\Rightarrow S_1=S_{11}\Rightarrow hx-ky=h^2-k^2$

It is a tangent to the parabola $y^2=4ax$

$\Rightarrow aK^2=h\left(K^2-h^2\right)$

$\Rightarrow aK^2=hK^2-h^3\Rightarrow h^3=K^2\left(h-a\right)$

$\therefore$ The locus of P is $x^3=y^2\left(x-a\right)$

20. Let $A=\left(\pm6,0\right)=\left(\pm a,0\right)\Rightarrow a=6\Rightarrow a^2=36$

$\frac{x^2}{36}-\frac{y^2}{b^2}=1$ passes through $P\left(10,16\right)$

$\Rightarrow\frac{100}{36}-\frac{256}{b^2}=1\Rightarrow b^2=144$

The normal at $P\left(10,16\right)$ is $\frac{36x}{10}+\frac{144y}{16}=36+144$

$\Rightarrow 2x+5y=100$

21. $C_1=(-4,2), C_2=(-1,-2)$

$r_1=\sqrt{20-C}, r_2=\sqrt{1+4+11}=4$

$C_1C_2=r_1+r_2$

$5=\sqrt{20-C}+4 \Rightarrow \sqrt{20-C}=1 \Rightarrow C=19$

and $2gg^1+2ff^1=C+C^1$

$\Rightarrow 2(4)(-3)+2(-2)(4)=19+K \Rightarrow K=-59$

22. $y^2+4y+4x+2=0 \Rightarrow (y+2)^2=-4\left(x-\frac{1}{2}\right)$

$h=\frac{1}{2}, K=-2, a=1$

Directrix is $x-h-a=0 \Rightarrow x-\frac{1}{2}-1=0 \Rightarrow x=\frac{3}{2}=\frac{K}{2}$

$\therefore K=3$

23. $y^2+4(x-a^2)=0$

$\Rightarrow y^2=-4x(x-a)^2$

$Area=\frac{1}{2}(4a)(a^2)=250$

$\Rightarrow 2a^3=250 \Rightarrow a^3=125$

$\Rightarrow a=5$

24. Ellipse $\frac{x^2}{18}+\frac{y^2}{4}=1$ and Hyperbola $\frac{x^2}{a}-\frac{h^2}{4}=1$

$e_1=\sqrt{\frac{18-4}{18}}=\sqrt{\frac{14}{18}}=\frac{\sqrt{7}}{3}; e_2=\sqrt{\frac{5+4}{9}}=\frac{\sqrt{13}}{3}$

(e_1, e_2) lies on $15x^2+3y^2=K$

$\Rightarrow 15e_1^2+3e_2^2=K$

$\Rightarrow 15\left(\frac{7}{9}\right)+3\left(\frac{13}{9}\right)=K$

$\Rightarrow \frac{144}{9}=K \Rightarrow K=16 \Rightarrow K^2=256$

25. $ae=\sqrt{a^2+b^2}=\sqrt{Cos^2\alpha+Sin^2\alpha}=1$

PHYSICS

26. $V_1=\left(\frac{m_1-m_2}{m_1+m_2}\right)\mu_1+\left(\frac{2m_2}{m_1+m_2}\right)\mu_2=0$

$\frac{m_1}{m_2}=\frac{7}{1}$

27. $\mu_A=\sqrt{2gh}\ \ \mu_\beta=\sqrt{2g(4h)}=\sqrt{8gh}$

$h_A=\frac{\mu_A^2}{2g}=h$

$h_B=h+\frac{V_B^2 Sin^2 60}{2g}=\frac{13h}{4}$

$\frac{h_A}{h_B}=\frac{4}{13}$

28. $P-P_1=P_2$ where $P_2=J$

$$e=\frac{V_2-V_1}{\mu_1-\mu_2}=\frac{P_2-P_1}{P}$$

$$e=\frac{P_2-\left(P-P_2\right)}{P}=\frac{2P_2-P}{P}=\frac{2J}{P}-1$$

29. $T_1=\frac{\pi R}{\mu_1}$ ---(1)

$$\frac{V_2-V_1}{\mu_1}=e$$

Time taken for A to collide with B again is

$$T_2-T_1=\frac{2\pi R}{V_2-V_1}=\frac{2\pi R}{e\mu_1}\text{ -----(2)}$$

Find (1) and (2) $\frac{T_2}{T_1}=\frac{2+e}{e}$

30. $m_1\mu_1+m_2\mu_2=\left(m_1+m_2\right)V$

Loss of energy $\Delta K.E=\frac{1}{2}m_1\mu_1^2-\frac{1}{2}\left(m_1+m_2\right)V^2$

31. $T_n=e^nT$, $H_n=e^{2n}H$ and $P_n=e^nR$

32. $V=\sqrt{\left(VSin\alpha\right)^2+\left(VCos\alpha\right)^2}$

$$V=\sqrt{\left(\mu Sin\theta\right)^2+\left(eCos\theta\right)^2}$$

33. $X_C=\frac{m_1X_1+m_2X_2+....+m_nX_n}{m_1+m_2+......+m_n}$

34. Shift= $\frac{\text{mass removed}\times\text{distance of CM}}{\text{Remaining mass}}$

35. $X_C=\frac{\int_0^2 Xdm}{\int_0^2 dm}$

36. Fractional length hanging $\frac{l}{L}=\frac{M}{1+M}$

$l=10cm$

If ρ is mass per unit length

The co-ordinates of 20ρ and 20ρ are

$(10,0)$ and $(0,5)$

distance of CM from $A=\sqrt{X_C^2+X_C^2}$

37. Use Rappus theorem

38. Shearing stress= $\frac{\text{Shearing F}}{\text{Area}}=\frac{\text{FSin}\theta\text{Cos}\theta}{\text{A}}$

39. $T=F=mL\omega^2$

$$S=\frac{I}{A}=\frac{mL\omega^2}{A}\qquad\Rightarrow\omega=\sqrt{\frac{SA}{mL}}$$

40. $w=\frac{1}{2}\Upsilon\phi=\frac{1}{2}\times8\times\frac{\pi}{4}=\pi J$

41. Increase in Pressure $\Delta P = nP_0 - P_0 = (n-1)P_0$

Decrease in volume $\Delta V = \frac{V\Delta P}{B}$

$V^1 = V - \Delta V = V - \frac{V\Delta P}{B} = \frac{V}{B}(B - \Delta P)$

$P_1 = \frac{M}{V^1} = \frac{PV}{V^1}$

42. $K_e = \frac{K_1K_2}{K_1 + K_2}$

$K_e = \frac{K\frac{YA}{L}}{K_1 + \frac{YA}{L}} = \frac{KYA}{KL + YA}$

$T = 2\pi\sqrt{\frac{m}{K_e}}$

43. Acceleration$= \frac{\text{F}}{\text{m}} = \frac{\text{upthrust-weight}}{\text{m}}$

$a = \frac{VP_2g - mg}{m} = \frac{\frac{m}{P}(3P)g - mg}{m} = 2g$

The ball will jump to a height

$H = \frac{\upsilon}{2g} = \frac{4gh}{2g} = 2h \qquad \left(V = \sqrt{ah^2}\right)$

44. Use Bernoulli's theorem

$\left(\rho_0 + \rho gh + \frac{mg}{A}\right) + 0 = \rho_0 + \frac{1}{2}\rho\upsilon^2$

45. $Tan\theta = \frac{a}{g}$

46. Weight of bird= Force by the bird by moving its wings

$(\rho A\mu^2 = mg)$

47. $\frac{d\upsilon}{dt} = \frac{F}{AY}$

48. $A_1\upsilon_1 = A_2\upsilon_2$

Use Bernoulli's theorem

49. $\frac{1}{2}m\upsilon^2 = \frac{1}{2}Fe \qquad Y = \frac{Fl}{Ae}$

50. $B = \frac{\Delta P}{\left(\frac{-\Delta V}{V}\right)}$

CHEMISTRY

51. Overall rate constant $K = K_1 + K_2 + K_3 = 6.93\times10^{-3}$

$t_{1/2} = \frac{0.693}{6.93\times10^{-3}} = 100\,\text{sec}$

After half-life, $P_B + P_C + P_D = 4atm$

$$\frac{P_B}{P_B+P_C+P_D}=\frac{K_1}{K_1+K_2+K_3}=\frac{200}{693}$$

$$P_B=4\times\frac{200}{639}=1.154atm$$

52. $A_3\to\frac{3}{2}A_2$

$$A-X=\frac{3}{2}X$$

$A-X=\frac{3}{2}X$ (or) $X=\frac{2}{5}A=40\%$ of A

53. All the three pots are correct

(i) $\log(a-X)$, where $(a-X)$ is remaining concentration decreases with passage of time

(ii) $K=\frac{2.303}{t}t_{\log_{10}}\left[\frac{a}{a-X}\right]$

$\log\left[\frac{a}{a-X}\right]=\frac{K}{2.303}\times t$, plot of $\log\left[\frac{a}{a-X}\right]$ against t gives straight line through origin

(iii) $t_{1/2}=\frac{0.693}{K}$, Half -life of first order reaction does not depend on initial concentration, thus, graph of $t_{1/2}$ against a gives horizontal straight line

54. Fe^{3+}, Cr^{3+} shows Para magnetism whereas CrO_2 is attracted by very strongly by magnetic field but Fe_3O_4 is weakly attracted by magnetic field and hence show ferrimagnetism

55. For X, $6\times\frac{1}{8}=\frac{3}{4}$; for 4, $6\times\frac{1}{2}=3$ So $X_{3/4}Y_3$ (or) X_3Y_{12} (or) XY_4

56. In Hexagonal close packing 1st layer and 4th layer are not exactly aligned

57. Higher the coagulating power of ion due to higher valency. So decreases the concentration for ion $Fe(CN)_6^{-4}$ has lowest concentration for coagulation.

58. This represents Freundlich adsorption isotherm

59. The lower the gold number, the higher the protective power of lyophilic colloid.

60. The amount of gas adsorbed increases with rise in temperature. Further increase of temperature will increase the energy of molecules.

61. $\underset{1mol}{MnO_4^-}+8H^++5e^-\to\underset{5mol}{Mn^{+2}}+4H_2O$

MnO_4^- required= $5\,mole^-$ So 0.05 MnO_4^- required $=5\times0.5=0.25$

1 mole e^- required = 1F

So 0.25 required $-0.25\times F=0.25F$

62. $E_{cell}=E_{cell}^0-\frac{0.59}{n}\log Q$

At equilibrium, $E_{cell}=0$ and $Q=K_C$

$$E_{cell}^0=\frac{0.59}{1}\log K_C$$

$$\to 0.591=\frac{0.59}{1}\log K_C$$

$$K_C=1\times10^{10}$$

63. $Fe^{3+}+3e\to Fe$ $\quad E_1^0=-0.036Volt;\Delta 9^0$

$Fe\to Fe^2+2e$ $\quad E_2^0=0.44\,Volt;\Delta 9_2^0$

$Fe^{3+} + e^- \rightarrow \Delta C_1^0 = \Delta G^0 + \Delta G_2^0$

$-nFE^0 = -3FE_1^0 + \left(-2FE_2^0\right)$

$-FE^0 = -F\left(3E_1^0 + 2E_2^0\right)$

$E^0 = \left(3\times 0.36\right) + \left(2\times 0.44\right) = E^0 = 0.772\,Volt$

64. The reaction occurring

Anode: $Pb_{(s)} + H_2SO_4^- + H_2O \rightarrow PbSO_{4(s)} + 2e^- + H_3O^+$ $\quad E_0^0 p = +0.556V$

Cathode: $PbO_2 + H_2SO_4^- + 3H_3O^+ + 2e^- \rightarrow PbSO_{4(s)} + 5H_2O$ $\quad E_R^0 p = +1.685V$

Net change: $Pb_{(S)} + 2HSO_4^- + 2H_2O^+ + PbO_{2(s)} \rightarrow 2PbSO_{4(S)} + 4H_2O$

$C^0 = 2.041V$

65. Total time = 90 days

Half-life $\left(t_{1/2}\right)$ = 30 days

Total time $= n\times t_{1/2}$

$90 = n\times 30$

Thus, the quantity left after three half-life periods

$= \left(\frac{1}{2}\right)^3 N_0 \left[N_0 = original\ amount\right]$

$= \frac{1}{8}N_0 = \frac{1}{8}N_0$

66. $4\alpha, 1\beta$

67. Nuclear fission

68. Number of atoms in m.g of $^{14}C = \frac{m}{14}\times 6.02\times 10^{23}$

$\alpha = \frac{0.693}{half\ life} = \frac{0.693}{5720\times 365\times 24\times 60\times 60} = 3.84\times 10^{-12}\ \sec^{-1}$

$-\frac{dN}{dt} = \lambda.N$

i.e., Rate of disintegration $= \lambda \times no.of\ atoms$

$3.7\times 10^7 = \frac{0.693}{5720\times 365\times 24\times 60\times 60}\times\frac{m}{14}\times 6.02\times 10^{23}$

$3.7\times 10^7 = \frac{3.84\times 10^{-12}\times m\times 6.02\times 10^{23}}{14}$

$m = 2.24\times 10^{-4}\,g$

69. For FCC unit cell

$4r = a\sqrt{2}$

$a = \frac{4r}{\sqrt{2}} = \frac{4\times 1.28}{\sqrt{2}}\ A = 3.62A^0$

70. $H_2 + Br_2 \rightleftharpoons 2HBr$ is a 1.5 order reaction

71. If 96500 C = 1 eq. of Fe^{2+}

$2\times 3600 = \frac{2\times 3600}{96500} = 0.0746$

$V = 0.1 = 0.0746$

$V = 0.746\,L$

72. $T_{50}\,\alpha\left[\frac{1}{a}\right]^{n-1}$

$\frac{T_1}{T_2}=\left[\frac{a_2}{a_1}\right]^{n-1}$

$\left[\frac{200}{50}\right]=\left[\frac{0.4}{0.1}\right]^{n-1}$

$(4)=(4)^{n-1}$

$n-1=1$

$n=2$

73. By Bragg's equation

$2dSin\theta = n\lambda$

$\lambda=\frac{2dSin\theta}{n}$

$d=1.155A^0$

$Sin\theta = Sin60^0=\frac{\sqrt{3}}{2}$

$n=2$ (second order diffraction)

74. $X_s \rightleftharpoons S_X$ (Associated)

Osmotic pressure $\pi = MRT=\frac{n}{V}RT=\frac{W}{m}\frac{RT}{V}$

Molar mass of $S_X = m(S_X)=\frac{wRT}{\pi V}$

$=\frac{2.56\times 0.0821\times 300}{2.463\times 0.01}=256$

$32X=256$

$X=8$

75. $\alpha\frac{l^c m}{l^0 m}=\frac{3.907}{390.7}=0.0$

$\underset{C}{CH_3COOH} \rightleftharpoons \underset{O}{CH_3COO^-}+\underset{O}{H^+}$

Initial

Final $C(1-\alpha)$ $C\alpha$

Conc. $\left[H^+\right]=C\alpha=0.01\times 0.01=10^{-4}M$

$P^H=-\log 10^{-4}=4$

Paper Setters:

SNO	Subject	Name of the Paper Setter	Phone No	Branch
1	MATHS-A & B	K RAM MURTHY	9848164155	HYD MP
2	PHYSICS	SHAIK KAREEMULLAH	9000321088	HYD MP
3	CHEMISTRY	UMA RANI	9912346339	HYD MP